



2019

ABSTRACT PROGRAM

June 9 - 13, 2019
JW Marriott Parq Vancouver
NAACCR / IACR
Combined Annual Conference

THE NORTH AMERICAN ASSOCIATION OF CENTRAL
CANCER REGISTRIES (NAACCR) AND THE INTERNATIONAL
ASSOCIATION OF CANCER REGISTRIES (IACR) ARE PLEASED
TO WELCOME YOU TO THE COMBINED 2019 CONFERENCE

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Electronic versions of many of the posters and oral presentations will be made available online at NAACCR-IACR2019.org after the conference.

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NAACCR

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✘ These posters will not be presented

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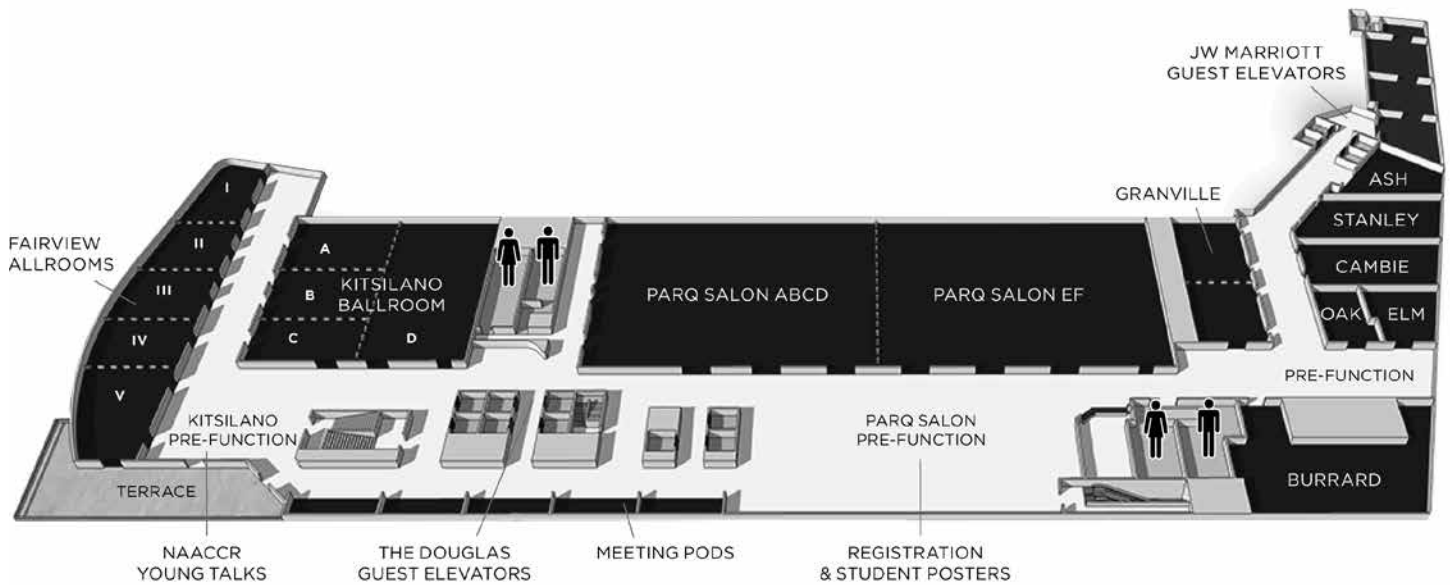
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✘ These posters will not be presented

VENUE FLOOR PLAN



Fairview Ballrooms:

Concurrent Sessions, Pre-Conference

Parq Salon EF:

Plenaries, Opening Ceremony, Reception

Parq Salon ABCD:

Exhibits, IACR Posters, Breakfast, Breaks

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Fairview Ballrooms, Kitsilano ABC, Granville & Burrard:

Concurrent Sessions / Meetings



PLENARY SESSION 1

TUESDAY, JUNE 11

8:45 AM – 10:00 AM

ACR

1PL1

ESTIMATES OF CANCER INCIDENCE IN SPAIN, 2019

Jaume Galceran^{1,2,3}; Alberto Ameijide^{1,2,4,3}; Ana Isabel Marcos^{5,6},
³; Rafael Marcos-Gragera^{7,3,8}; Maria-José Sánchez^{9,10,3,8}; Josefina
Perucha^{11,3}; María-Dolores Chirlaque; Eva Ardanaz^{12,3,8}; Marià
Carulla^{1,3}; Antonio Mateos^{13,3}; José Ramón Quirós^{14,3}; Arantza López
de Munain^{15,3}; Maria Dolores Rojas^{16,3}; Paula Franch^{17,3}; Fernando
Almela^{18,3}; Matilde Chico^{19,3}

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²Foundation Society for Cancer Research and Prevention (FUNCA),
Reus, Spain

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Spain

⁶Cuenca Cancer Registry, Cuenca, Spain

⁷Girona Cancer Registry, Girona, Spain

⁸CIBERESP, Girona, Spain

⁹Granada Cancer Registry, Granada, Spain

¹⁰Andalusian School of Public Health

¹¹La Rioja Cancer Registry, Logroño, Spain

¹²Navarra Cancer Registry, Pamplona, Spain

¹³Albacete Cancer Registry, Albacete, Spain

¹⁴Asturias Cancer Registry, Oviedo, Spain

¹⁵Euskadi Cancer Registry, Vitoria-Gasteiz, Spain

¹⁶Canarias Cancer Registry, Santa Cruz de Tenerife, Spain

¹⁷Mallorca Cancer Registry, Palma, Spain

¹⁸Castellon Cancer Registry, Castellón, Spain

¹⁹Ciudad Real Cancer Registry, Ciudad Real, Spain

Background: Population based cancer registries of Spain covers 26.7% of the Spanish population. To know the cancer incidence of Spain as a whole in the current year is a need and it is of great interest for the health authorities.

Objectives: To calculate the estimates of cancer incidence in Spain for the year 2019 by sex and type of tumour.

Methods: All invasive tumours and those with 1 or 2 urinary bladder behaviour have been included. 1998-2012 incidence data derive from Spanish cancer registries. Cancer mortality data (1997-2016) were provided by Statistical National Institute. Mortality national rates were projected to 2017-2021 and applied to population of 2019 using NORDPRED model. National cancer incidence was estimated applying the estimated incidence/mortality ratios (RIM) over the mortality estimate for 2019. For each combination tumour type and sex, estimates of RIM were obtained from Bayesian generalized linear mixed models assuming Poisson distribution for incident cases. Age, year of diagnosis and registry were predictive variables. For some rare cancers, models based on local incidence rates have been used.

Results: It is estimated that in 2019, 277,234 new cases of cancer will be diagnosed in Spain (161,064 in males (ASIRW 336.3 (95%CI= 319.6-354.6)) and 116,170 in females (ASIRW 233.9 (95%CI=220.7-248.6))). In men, the most frequent cancers will be: prostate (N=34,394, ASIRW = 67.7), colon-rectum (N=26,746, ASIRW = 52.6), lung (N=22,083, ASIRW = 45.4) and urinary bladder (N=19,467, ASIRW = 37.7). In women, the most frequent cancers will be: breast (N=32,536, ASIRW = 72.9), colon-rectum (N=18,191, ASIRW = 30.2), lung (N=7,420, ASIRW = 15.0) and corpus uteri (N=6,682, ASIRW = 13.6).

In relation to 2015, the ASIRW decreased 6.6 points (1.93%) in men and increased 4.4 points (1.92%) in women. A large part of this increase in women is due to tobacco-related tumours (3.5 points, 11.4%) and especially in lung (15.4%), urinary bladder (9.0%) and oral cavity and pharynx (9.7%).

Conclusions/Implications: A total of 277,234 new cancers are expected to be diagnosed in 2019 in Spain. Colorectal, prostate and breast cancers are the most frequent cancers globally, in men and in women respectively. In Spain, a special effort in the prevention of tobacco-related cancers is necessary, especially focused on women.

IACR
1PL2**CANCER INCIDENCE RATES AND TRENDS AMONG CHINESE-, FILIPINO-, JAPANESE-, AND KOREAN-AMERICANS**

Lihua Liu¹; Andrea Sipin-Baliwas¹; Juanjuan Zhang¹; Amie Hwang¹; Dennis Deapen¹

¹Los Angeles Cancer Surveillance Program –USC, Los Angeles, CA, United States

Background: Study of cancer incidence rates and trends among immigrants in comparison with those of their countries of origin provides valuable information for identifying modifiable environmental and behavioral factors that contribute to cancer development. As population mobility increases globally with time, this area of research becomes even more important and needed. The standardized and detailed data assembled in the Cancer in Five Continents (CI5) series around the world have enabled numerous international comparison studies.

Purpose: The Los Angeles Cancer Surveillance Program is the only U.S. cancer registry that has consistently reported cancer incidence for the ethnic Asian Americans (i.e., Chinese, Filipinos, Japanese, and Koreans) in its catchment area (Los Angeles County, California, USA), which allows the comparisons of these largely immigrant populations against those of their countries of origin and the US whites. In this study, we will expand our earlier analysis of such comparisons for the Chinese-Americans to include the Filipino-, Japanese-, and Korean-Americans.

Methods: We will use the CI5 online analysis tool, CI5plus, that contains updated annual incidence rates for 124 selected populations from 108 cancer registries published in CI5 for the longest period up to 2012 for all cancers and 28 major types and age-specific curves for the most recent time period of 2008-2012. We will extract age-adjusted and age-specific incidence rates by sex and cancer site from USA, California, Los Angeles registry for Chinese, Filipinos, Japanese, and Koreans to compare with rates from China, Philippines, Japan, and South Korea, as well as the whites from USA, SEER registries.

Results: We expect to see similar patterns as in our earlier study of Chinese Americans - the cancer incidence rates among the Asian Americans are generally in between those of the Asian countries and those of the US whites, indicating the roles of non-genetic, modifiable ecologic factors in the development of cancer. We also expect to see heterogeneous risk patterns across the Asian-American subgroups, resulting from different immigration history and distinct cultural practices among the ethnic Asian-American groups.

Conclusions: The findings will stimulate interest and awareness of the unique opportunities in immigrant cancer research.

IACR
1PL3**SURVCAN: PRINCIPLES, EVOLUTION AND THE CURRENT STATUS OF SURVCAN-3**

Rajaraman Swaminathan¹

¹Cancer Institute (W.I.A), Chennai, India

Cancer survival is a key measure of overall effectiveness of the health system. Population-based survival studies are readily available in Europe, North America and other more-developed regions, however there are generally few data available on cancer survival in developing countries. Previously, IARC published two landmark publications (SURVCAN-1 in 1999 and SURVCAN-2 in 2011) that assessed and benchmarked cancer survival as an indicator of population health impact in developing countries. SURVCAN-3 enlarges this to over 80 cancer registries in Asia, Central and Latin America and Africa. Results from SURVCAN-3 will provide valuable data to national policy makers in lower-resource settings, forming the baseline for assessing progress in cancer survival through adequate investments in health services infrastructure, in order to improve awareness, early detection and access to effective cancer treatment. The talk will describe the principles of SURVCAN and the evolution in registry participation worldwide, with a focus on the steps taken to improve data quality in individual registries within SURVCAN-3, a partnership project with the International Association of Cancer Registries (IACR) and the IARC Regional Hubs, including the Tata Memorial Centre (TMC) in Mumbai and the Cancer Institute (WIA) in Chennai.

PLENARY SESSION 2

TUESDAY, JUNE 11

1:30 PM – 3:00 PM

IACR
2PL1

USING ARTIFICIAL INTELLIGENCE TO IMPROVE CASE ASCERTAINMENT IN A POPULATION CANCER REGISTRY

Catherine Shang; Vicky Thursfield¹; Fiona Kennett¹; Helen Farrugia¹
¹Cancer Council Victoria, Melbourne, Victoria, Australia

Background: Historically, the process of pathology labs identifying relevant pathology report for notification to the Victorian Cancer Registry was inconsistent and known to be incomplete. Existing systems both missed reportable cases as well as submitting large numbers of ineligible notifications. Both resulted in significant coding resources being required to obtain missing reports and delete unwanted reports.

Purpose: The aims of the project were to improve consistency across all labs, and automate reporting of pathology for all notifiable neoplasms whilst reducing the need for time-consuming manual processes and sensitivity and specificity of reporting using natural language processing (NLP) technology.

Method/Approach: Following a successful pilot project, Artificial Intelligence in Medicine's (AIM) E-Path technology was implemented in 15 Victorian pathology laboratories. These labs previously notified in a mixture of paper and electronic formats, with case ascertainment being based on manual flagging or electronic word trap programs. The 14 labs are responsible for > 94% of all pathology notifications to the registry, with the remainder being small and specialist private labs.

The NLP case finding routines were developed iteratively to incorporate lab-specific differences and obtain optimal specificity and sensitivity.

Results: Evaluation showed a 49% increase in the numbers of path reports submitted for tumours diagnosed between 2010 and 2016, and a significant reduction in those that required manual chasing of specific test results. Improved reporting increased the actual number of tumours registered by 22% which is higher than the 19% increase we would expect due to population growth and aging. The greatest increases in ascertainment were in the haematological and reportable in situ tumours.

The proportion of Death Certificate Only notifications (DCO) reduced across all tumour types during this period. Whilst it is impossible to directly attribute this to E-Path, this is likely to be a contributing factor. As DCO is one of IARC's measures of data quality, this is a pleasing result.

Conclusion: The implementation of E-Path in the VCR has significantly improved the accuracy of case ascertainment and will assist in managing the growth of pathology volume. E-Path provides opportunities for expansion of the VCR dataset using auto-abstraction using AIM's Abrevio – this may include staging, genetic sub-types and information on treatment and recurrence.

NAACCR
2PL2

THE FUTURE OF DIGITAL PATHOLOGY AND CANCER SURVEILLANCE

Alison Van Dyke¹

¹National Cancer Institute, Bethesda, MD, United States

Background: Many innovations in surgical pathology have implications for the future of cancer surveillance infrastructure and practice. With the development of College of American Pathologist guidelines for validating whole slide imaging for diagnostic purposes and the Food and Drug Administration approval of a whole slide imaging system for digital pathology, such technologies will play an integral part in future clinical practice.

Concepts: Rapid whole slide imaging has opened the door for intraoperative diagnoses and for pathologists in remote locations to gain access to subspecialty pathologist evaluation, making pathology a global rather than a local, siloed practice. Digital image analysis algorithm development is a burgeoning field that will automate and make more efficient routine examination of microscopic images such as quantification of tumor infiltrating lymphocytes (TILs), which is a more important prognostic factor than clinical stage among colorectal cancer patients. Other clinical applications include more objective and faster counting of mitoses, scoring of immunohistochemical stains, determining tumor cellularity, and assessing necrosis than if a pathologist tried to score stains or count mitoses by eye. Another newer technology is in vivo microendoscopy through which, for example, a gastroenterologist can see during a colonoscopy what colon tissue looks like on a cellular level for targeted sampling more likely to render a diagnosis than tissue obtained via traditional colonoscopy. These impending advances raise many questions about how cancer surveillance will need to evolve to keep pace with and integrate new types of information on a population level.

Conclusions: Supporting personnel, training, and information technology infrastructure will need to develop as digital slide images and pathologist's slide annotations become part of the medical record. Standards will need to be developed for training and acquiring, inventorying, storing, retrieving, and transmitting digital slide images, associated metadata, and automated digital image analysis data. The concept of pathology data sources for cancer surveillance will need to be broadened as pathology diagnoses and/or supporting information evolve. Just as digital pathology will not replace the surgical pathologist, these data resources will serve to augment and to be integrated with traditional forms of cancer surveillance data rather than replacing the tumor registrar

NAACCR
3PL1

A CHANGING PARADIGM FOR CANCER SURVEILLANCE

Lynne Penberthy¹

¹National Cancer Institute, MD, United States

Background: The perceptions of cancer surveillance and population-based cancer registry data vary widely by the external research community. A full understanding of how cancer registry data can be used is critical to the changing world of oncology care and survival estimates. Rapidly changing patient care is having an impact on the collection and utility of the data we collect. Significant changes in surveillance methods are critical to preserving the foundation of high quality curated cancer data that has been built over the last 40+ years. The proliferation of cancer treatment providers, the complexity and duration of cancer care, the increasing use of oral agents and targeted therapies, all serve to complicate the collection of useful surveillance data. Genomic and tissue data are going to be increasingly important to cancer management. Cancer recurrence data, currently lacking in our data collection system, is another key element we must consider as cancer patient survival increases. Yet in opportunities to support cancer research in novel ways through improved data linkages, nationwide cohort matching, rapid case ascertainment, and eligibility screening, to name a few.

Purpose: The purpose of this talk is to put in perspective some of the challenges in cancer surveillance and offer solutions to ensure population-based cancer registries are prepared to build on the foundation of quality data that has been established.

Methods: Various methods are being tested at the National Cancer Institute and with our cancer surveillance partners in government and the private sector to improve data collection and research applications. These methods will be discussed to demonstrate advances that can be used to improve surveillance.

Conclusions: Technological advances, machine learning, advances in data sharing that protect patient privacy, and improved understanding of the applications of population-based cancer data are all critical as cancer surveillance moves into the next phase.

IACR
3PL2

AUSTRALIAN CANCER ATLAS – DEVELOPMENT AND INTERPRETATION

Peter Baade; Kerrie Mengersen¹; **Joanne Aitken**²; Susanna Cramb²; Earl Duncan¹; Upeksha Chandrasiri²; Thom Saunders¹

¹Queensland University of Technology, Australia

²Cancer Council Queensland

Background: Achieving health equity for all Australians, regardless of race, income and where they live, has been identified as the greatest health challenge faced by Australia, as in most countries of the world. For cancer, quantifying the extent and patterns of geographical inequalities in cancer is a first essential step to addressing this challenge.

Purpose: The purpose of the Australian Cancer Atlas was, for the first time, to quantify the small area spatial patterns in cancer incidence and survival using the latest spatial modelling techniques and novel visualisation methods. The Atlas was designed to provide an interactive digital product, making it freely accessible to a wide audience.

Methods: The Australian Cancer Atlas reported geographical variations in cancer incidence and survival across 2,148 small areas across Australia. There were five key components to the development of the atlas: obtaining the data from population-based cancer registries, spatial smoothing using Bayesian spatial models to generate robust spatial estimates and preserving confidentiality, developing innovative methods of visualising of results with a specific emphasis on communicating uncertainty, developing the bespoke digital architecture for an interactive web-based system and translating the information into the community.

Results: The Australian Cancer Atlas was launched in September 2018, with 30,000 individual users accessing the Atlas in the first week. The extent and patterns of the geographical inequalities in cancer incidence and survival varied for each cancer type. Through examining the patterns for prostate cancer, lung cancer, liver cancer and melanoma, along with what is known about diagnostic methods, population distribution and risk factors for these cancers, we will show how the geographical patterns provide insights into key drivers of the variation, and the information gaps that need to be addressed.

Conclusions: The Atlas forms the basis for an ongoing program of development and research, including assessing how geographical patterns change over time, incorporating additional indicators of cancer burden, and to examine reasons why the geographical burden exists, thus informing evidence-based interventions designed to reduce inequalities in cancer burden across the country.

PLENARY SESSION 4

THURSDAY, JUNE 13

8:00 AM - 10:00 AM

IACR
4PL1

2ND REVISION OF THE INTERNATIONAL CLASSIFICATION OF DISEASES FOR ONCOLOGY (ICD-O-3.2) – IMPLICATIONS FOR CANCER REGISTRIES AND FUTURE DIRECTIONS

Ariana Znaor¹; Jacques Ferlay¹; Reiko Watanabe²; Ian Cree¹; Valerie White¹; Brian Rous³

¹International Agency for Research on Cancer, Lyon, France

²National Cancer Center, Tokyo, Japan

³National Cancer Registration and Analysis Service, Public Health England, Cambridge, United Kingdom

The International Classification of Diseases for Oncology, now in its 3rd Edition (ICD-O-3) is specifically developed for coding cancer according to its site of origin (topography - modified from ICD), appearance under the microscope (morphology), and behaviour (malignant, benign, in situ or uncertain). As it enables recording the most detailed level of information about the tumour, it is optimal for use in cancer registries and also integrated into the CanReg5 open source cancer registration software developed by the International Agency for Research on Cancer (IARC). IARC has also been responsible for the WHO Classification of Tumours, known as the WHO Blue Books, which describe the characteristics of each cancer type to provide the international standards for diagnosis and cancer research. The first revision of the ICD-O-3 (from 2011) has now been updated to include the new diagnostic terms and other changes reflecting the 4th Edition Blue Books cycle. We will present the work of the IARC/WHO Committee and the International Association of Cancer Registries Working Group for ICD-O updates on updating the classification and compiling the listing of changes, as well as implications for use in cancer registries and future directions.

IACR
4PL2

DO CLASSIFICATION RULES FOR CODING CANCER SITE IMPACT ESTIMATES OF RATES AND TRENDS?

Goncalo Forjaz de Lacerda¹; Steve Scoppa²; Angela Mariotto¹; Dave Campbell²

¹National Cancer Institute, Bethesda, MD, United States

²Information Management Services Inc. Calverton, MD, United States

Background: Two sets of rules are used for reporting incidence rates by cancer site: those developed jointly by the International Agency for Research on Cancer (IARC) and the International Association of Cancer Registries (IACR) for the Cancer Incidence in Five Continents (CI5) series, and those developed by the U.S. National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) Program. This study investigates the impact and interpretation of these different rules on incidence rates and trends.

Methods: IARC/IACR conversion rules were used to create a new site recode in SEER*Prep and SEER*Stat software. This "CI5 Recode" matches the ICD-10 grouping codes adopted in CI5-Vol. XI. SEER Site Recodes and the CI5 Recodes for SEER 18 malignant registry cases diagnosed in 2015 were used to assess the level of concordance and the 2000-2015 cases were used to compare trends between the two recoded nomenclatures.

Results: For all 61 site groupings in the CI5 Recode compared with SEER Site Recodes, 14 (23.0%) presented a perfect match; 9 (14.8%) presented almost 100% concordance; 25 (41.0%) had minor non-concordance, 7 (11.5%) presented major mismatches, and 6 (9.8%) site groupings had no concordant site group. Some sites had to be grouped to become comparable. Trends for sites with minor non-correspondence showed similar patterns in the trends, with the CI5 Recode presenting slightly lower annual age-standardized rates. 'Non-Hodgkin Lymphoma' (NHL) and 'Lymphoid Leukemia' (LL) were the main sites showing major non-correspondence.

Discussion: Even after adjusting for differences in multiple primary coding rules – which should be accounted for whenever the aim is to compare SEER data with data that follows IARC/IACR rules for multiple primaries –, registries would still need to deal with discrepancies related to different rules for grouping cancer sites. Our study shows that caution is needed when interpreting results for some cancer sites presenting minor non-correspondence and particularly for NHL and LL. Specifically, discrepancies in these two cancer sites might be due to changes in coding rules specified in the "WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues" (2008) and that were implemented differently in 2010 by the SEER Program and the CI5 series.

IACR
4PL3**CANCER SURVEILLANCE IN DINDIGUL DISTRICT IN TAMIL NADU, INDIA**Rajaraman Swaminathan¹; Rengaswamy Sankaranarayanan²; Sampath Pitchaimuthu¹¹Cancer Institute (W.I.A), Chennai, India²International Agency for Research on Cancer, Lyon, France

Background: Dindigul Ambilikai Cancer Registry (DACR) is one of the few rural registries in India with acceptable international standards covering 2.1 million population. This study illustrates the cancer incidence, mortality, trend, survival and coverage as part of surveillance.

Method: A total of 17,419 incident cancers registered in DACR during 2003-2015 formed the material. Case-finding from potential sources and completeness of details were done by active methods. A majority of cancers (63%) were registered from sources located outside the registry area. Data quality was determined with 76% having histologically verified diagnosis, 9% registered based on a death certificate only and 88% had an address with caregiver names for efficient duplicate checking.

Results: The age-standardized rate (ASR/10⁵) of all cancers together in DACR during 2013-2015 was 74.2 among women and 56.8 among men. The top ranking cancers were stomach (ASR:6.0), lung (5.1) and mouth (4.7) among men and cervix (20.8), breast (19.8) and ovary (4.7) among women. Education-specific incidence revealed an inverse trend for cervix and mouth cancers with 68-87% reduced risk for highest education level and 6-fold higher risk for breast cancer compared to no formal education. Mortality to incidence ratio was 56.9%. An independent ascertainment of cancer cases by random survey of 97,632 subjects revealed that 30% were missed in DACR during 2003-2010, mainly from yet-to-be-covered new sources.

The average annual percent increase of all cancers together in 2013-2015 compared to 2003-2007 ranged between 0.9 and 1.4 for men and women respectively. Cervix (-2%) and stomach (-0.5%) cancers showed a decreasing trend while breast (5%), large bowel (5%), lung (3.7%) and ovary (2.9%) cancers showed an increasing trend. Five-year survival (%) experience of 12,541 single primary cancers in DACR registered during 2003-2012 revealed the following: All cancers together 30%, cervix 37%, breast 45%, stomach 10%, mouth 23%, oesophagus 9%, lung 6%, ovary 39%, tongue 28%, larynx 30%, rectum 16%.

Implications: Systematic surveillance is continuing and expanded as well covering 78 million population of Tamil Nadu, the largest in the world. Cancer is now declared as notifiable disease resulting in increased coverage and cost benefit. Registry framework is utilized for evaluating state-funded cancer screening program.

IACR
4PL4**THE ECONOMIC IMPACT OF CANCER: EPICOST, A POPULATION-BASED STUDY IN ITALY**Anna Gigli; **Silvia Francisci**¹; Stefano Guzzinati²¹Istituto Superiore di Sanità, Roma, Italy²Istituto Tumori del Veneto, Italy

Background: Costs of cancer care are increasing due to growing cancer survivor population and rising costs of novel treatments. As a consequence, the sustainability of cancer burden is a challenge for health care systems.

Purpose: To estimate the public healthcare expenditure associated to diagnosis, care and monitoring of cancer patients, in areas covered by cancer registries in Italy.

Methods: EPICOST is based on 80,000 prevalent cases diagnosed with colon, rectum and female breast cancer in eight areas covered by cancer registries (1/6 of Italian population). Cases are individually linked to hospital admissions, outpatient services and drug prescriptions occurring in a year (information retrieved from administrative databases). The study is prevalence-based, i.e. on prevalence date each patient belongs to one phase of care (initial, continuing, last year of life). Interventions, procedures and drugs correlated to the chosen cancer are identified and monthly cost profiles are estimated.

Results: The patient average annual cost is Euros 22,606, 25,847 and 16,647 for a colon, rectum, breast cancer patient, respectively. Costs are higher during the first months of initial phase, decline until reaching a plateau in continuing phase and increase again in the final phase. Costs are mainly due to hospitalization (90%), followed by outpatient services (9%) and drug prescribed in pharmacies (1%). Costs are higher for patients with more advanced stage at diagnosis. Younger patients cost more in every phase of the disease.

Conclusions: The phase of care approach takes into account healthcare needs that vary according to the phase: initial (diagnostic procedures and treatments in the first 12 months following diagnosis), continuing (follow up treatments and monitoring), end-of-life (palliative care in the last year of life). This study highlights the role of stage at diagnosis, that has an influence on the therapeutic strategy and related costs. In a public health framework, the results confirm that primary prevention and early diagnosis play an important role in the improvement of patient survival, as well as in containing costs. Study funded by the Italian Ministry of Health.

PLENARY SESSION 5

THURSDAY, JUNE 13

3:30 PM - 5:00 PM

IACR
5PL1

LONG-TERM SURVIVAL OF PATIENTS WITH PROSTATE CANCER IN MARTINIQUE: RESULTS OF A POPULATION-BASED STUDY

Clarisse Joachim²; Stephen Ulric-Gervaise¹; Moustapha Drame²; Jonathan Macni¹; Patrick Escarmant²; Jacqueline Veronique-Baudin¹; Vincent Vinh-Hung²

¹Martinique Cancer Registry, Martinique

²Chu de Martinique, Martinique

Background: Martinique has one of the highest incidences of prostate cancer (PCa) worldwide. We analysed overall survival (OS) among patients with PCa in Martinique, using data from a population-based cancer registry between 2005 and 2014.

Methods: The log-rank test was used to assess the statistical differences between survival curves according to age at diagnosis, risk of disease progression including Gleason score, stage at diagnosis and Prostate Specific Antigen (PSA). A multivariable Cox model was constructed to identify independent prognostic factors for OS.

Results: A total of 5045 patients were included with a mean age at diagnosis of 68.1±9.0 years [36.0 – 98.0 years]. Clinical stage was analysed in 4999 (99.1% of overall), 19.5% were at low risk, 34.7% intermediate and 36.9% at high risk. In our study, 8.9% of patients with available stage at diagnosis, were regional/metastatic cancers. Median PSA level at diagnosis was 10.4 ng/mL. High-risk PCa was more frequent in patients aged 65-74 and ≥75 years as compared to those aged <65 years (36.6% and 48.8% versus 28.7% respectively; $p < 0.0001$). One-year OS was 96.3%, 5-year OS was 83.4% and 10-year OS was 65.0%. Median survival was not reached in the whole cohort. High-risk PCa (HR=2.32; $p < 0.0001$), regional/metastatic stage (HR=9.51; $p < 0.0001$) and older age (65-74 and ≥75 years - respectively HR=1.70; and HR=3.38), were independent prognostic factors for OS ($p < 0.0001$).

Conclusion: This study provides long term data that may be useful in making cancer management decisions for patients with PCa in Martinique.

IACR
5PL2

ADHERENCE TO THE THYROID CANCER GUIDELINE 2.0 IN THE NETHERLANDS, A GUIDELINE EVALUATION USING CANCER REGISTRY DATA

Annemiek Kwast²; Jan Maarten van der Zwan¹

¹Department of Research, Netherlands Comprehensive Cancer Organisation (IKNL), Utrecht, The Netherlands

²Comprehensive Cancer Organisation the Netherlands, Utrecht, The Netherlands

Background and Aim: In 2015 the national Thyroid Cancer Guideline was updated in the Netherlands. This multidisciplinary evidence-based guideline contains recommendations for the diagnosis and treatment of thyroid cancer. We aimed to examine the adherence towards this newly updated guideline.

This to:

1. Promote the use of the updated thyroid cancer guideline
2. Understand the possible bottlenecks in the daily clinical practice of the updated guideline
3. Identify items for follow-up to further improve the thyroid cancer guideline

Methods: A national multidisciplinary expert group identified six indicators related to the newly developed recommendations. Information on the numerator and denominator was collected by the Dutch Cancer Registry (NCR). This included adult patients with a histological confirmed primary thyroid malignancy in the year 2016 (n=680). Results and a benchmark were presented on national level and discussed with the national multidisciplinary expert group. Also at regional and hospital level the outcome and benchmark of the indicators were presented and discussed on request, this within the boundaries of the GDPR.

Results: The multidisciplinary expert group identified the following topics to examine the adherence towards the new guideline.

- the use of the Bethesda classification in the pathology report
- the use of ultrasound-guided fine-needle aspiration (FNA)
- the completeness of the operative report
- node picking
- Iodine dose
- risk stratification

Out of the 748 FNAs performed in 2016, 97% reported the Bethesda classification. This was lowest for poorly-differentiated thyroid cancers (81%). For the use of FNA we found 96% to be ultrasound-guided, for patients aged ≥75 this was worst (90,8%). The university hospitals had the highest percentage of complete operative reports (29%) this was worst for the local hospitals (13%). The use of node picking should be low, this was 9%. On the contrary a high percentage of low risk patient received high dose Iodine (37%). Risk stratification was only described in 75% of the patients included.

Conclusions and Implications: The new thyroid cancer guideline needs further implementation. This includes standardization of the pathology report and promotion of multidisciplinary team meetings to discuss and improve risk stratification and dose of iodine treatment.

NAACCR

5PL3

RACIAL DISPARITIES IN THE RECEIPT OF GUIDELINE CARE AND CANCER DEATHS FOR WOMEN WITH OVARIAN CANCER

Kathy Cronin¹; Nadia Howlader¹; Joan Warren¹; Jennifer Stevens²

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²Information Management Services, Inc. Calverton, MD, United States

Background: Black women with ovarian cancer experience worse survival than white women. Receipt of guideline care improves survival yet care may vary by race. We assessed rates of guideline care and role of receipt of guideline treatment on survival disparities.

Methods: This retrospective cohort analysis used the National Cancer Institute's Patterns of Care data for women diagnosed with ovarian cancer, 2002 and 2011 (weighted n=3999), with follow-up through 12/31/14. Logistic regression included patient characteristics, insurance, and gynecologic oncologist (GO) consultation to produce adjusted standardized percentages of women receiving guideline treatment by race. Cox proportional hazards analysis assessed risk of ovarian cancer death.

Results: Guideline care was significantly lower for black vs. white women (adjusted 27.5% vs 34.1%). Increase receipt of guideline care was associated with GO consultation, younger ages, stage and insurance. Rates of GO consultation were comparable for black and white women, ~60%. Black women were more likely to receive no surgery, particularly without GO consultation or with later stage disease. The unadjusted death risk was significantly higher in black women (HR=1.43). After controlling for receipt of guideline care and other factors, black and white women had similar risk of death (HR=1.05).

Conclusion: Race was not associated risk of death when guideline care was included in multivariate survival models. However, black patients received less guideline care. GO consultation significantly increased receipt of guideline care.

IACR

1A1

GALL BLADDER CANCERS IN INDIA – A REPORT FROM POPULATION BASED CANCER REGISTRIES (1982-2010)

Meesha Chaturvedi¹; Shakuntala TS^{2,1}; Priyanka Das¹; Sathishkumar K¹; Prashant Mathur¹

¹Indian Council of Medical Research, Bangalore, KS, India

²NCDIR, Bangalore, KS, India

Background: As per Globocan Chile has the highest rate of gall bladder cancer, followed by Bolivia and Bangladesh. About 66% of gall bladder cancer cases occur in developing countries. Cancers of Gall Bladder are important due to its etiological factors and approaches to diagnosis. The present study aims to analyze various epidemiological aspects of Gall Bladder Cancers among Indian Population.

Methods: This descriptive study has been conducted mainly based on analysis of Population Based Cancer Registry (PBCR) data of different parts of the country from 1982- 2010. Epidemiological variables studied include age, sex, basis of diagnosis etc. A comparison of study variables with possible morphological types has been done. Hospital Based Cancer Registry (HBCR) data of same regions were also analyzed.

Results: A total of 22404 cases were documented. Out of which 8245 cases occurred among males and 14159 among females which accounted for 1.7% and 3% of total cases respectively. The crude Rates ranged from 0.3 to 2.5 in various Indian registries. Linear trend analysis indicated that incidence increased significantly during the period 1982 through 2010. The incidence rates significantly increased annually in the PBCRs of Bangalore, Bhopal, Mumbai, Chennai, and Dibrugarh District among older registries. The newer registries of Kamrup Urban District and Sikkim state show a significantly rising trend. During 1982-2010 time period, incidence for Gall bladder cancer in broad age groups for females significantly increased annually in age groups in Bhopal and Chennai PBCRs increase in 25-34, 35-44 and for Bangalore in 65 and above age group respectively.

Conclusion: The descriptive study indicates female predisposition of the cancer with females to male ratio of 1.7:1 from the PBCRs. A rising trend in relatively younger age group is observed in registries with more number of years of data. A geographic specificity in distribution of Gall Bladder cancer was found.

NAACCR

1A2

EARLY AGE OF ONSET IN 200 LYMPHOID CANCER FAMILIES

Samantha Jones; Jackson Voong¹; Jinko Graham¹; Angela Brooks-Wilson²

¹Simon Fraser University, Vancouver, BC, Canada

²Simon Fraser University, Department of Biomedical Physiology and Kinesiology, Vancouver, BC, Canada

Introduction: Lymphoid cancers are the fourth most common cancer type in the US. They are a clinically and biologically heterogenous group of neoplasms, with more than 60 different subtypes, each varying with respect to sex, ethnicity, and age of onset. Familial lymphoid cancer is rare and underrepresented in the literature. We examined more than 200 multigenerational families with a history of lymphoid cancers, including non-Hodgkin lymphoma (NHL), Hodgkin lymphoma (HL), chronic lymphocytic leukemia (CLL) and multiple myeloma (MM), for deviation from the expected population age of onset and sex.

Methods: To examine the effect of lymphoid cancer type on age of onset, an analysis of variance was performed. Surveillance, Epidemiology, and End Results (SEER) data was used to generate cumulative incidence distributions that were specific to all combination of reported sex, ethnicity, lymphoid cancer subtype and age of onset. These distributions were converted to percentiles which allowed for the uniform comparison of individuals with lymphoid cancers, while controlling for cofactors known to affect risk

Results: Median familial NHL ($p < 0.0001$), HL ($p = 0.0019$), CLL ($p < 0.0001$) and MM ($p = 0.0096$) ages of onset are substantially earlier than comparable population data. NHL ($p < 0.0001$), HL ($p = 0.0011$) and CLL ($p = 0.0135$) (but not MM) also show earlier age of onset in later generations, known as anticipation. The sex distribution for familial HL ($p = 0.0126$) and MM ($p = 0.0454$) cases were significantly different from, and less male than that of population cases.

Discussion & Conclusion: The familial median age of onset was substantially younger than sporadic population cases when controlling for known cofactors that affect risk. Earlier age of onset and different sex distribution suggests the existence of shared genetic factors that increase the risk of developing a lymphoid cancer.

These observations support the application of genomic methods to identify genes and genetic variants that underlie familial lymphoid cancers. Awareness of familial lymphoid cancer patterns and the identification of susceptibility genes have the potential to enhance screening methods for affected families in the future.

IACR
1A3**TIME TREND AND INCIDENCE PATTERN OF BREAST CANCER AT THE IBADAN CANCER REGISTRY, NIGERIA OVER A TWENTY-YEAR PERIOD: 1998-2017****Gabriel Ogun**³; Akinade Ladipo¹; Oluwatoyin Bodunwa²; Oluwatoyin Fabowale¹; Olufemi Ogunbiyi¹¹Ibadan Cancer Registry, Ibadan, OY, Nigeria²Ibadan Cancer Registry, Department of Pathology, Ibadan, OY, Nigeria, ³University of Ibadan, Ibadan, Nigeria**Background:** Breast Cancer is the commonest cancer worldwide and also at the IBCR.**Aim:** This study was done to assess trend, pattern and incidence of breast cancer over a 20 year period for the area of coverage of our registry**Method:** All cases of breast cancer in our CANREG software over the study period were extracted and analyzed with the specific aim of assessing only cases that fall within the coverage of our registry. All cases in which patient were not resident in our coverage area were excluded. The data was cleaned up to improve quality. The period was divided into 5 year grouping- 1998-2002, 2003-2007, 2008-2012 and 2013-2017.**Result:** A total of 6593 cases were recorded in the registry during the period with an average of 330 cases per year. There was a gradual rise in incidence over the study period. The peak incidence period was in years 2008 to 2012 with the peak incidence in year 2010 with 514 cases. Overall, about 60% of cases occurred in women aged less than 49 years with the peak age group of incidence being in the 40-49 years with 2052(31%) of cases. Overall, the incidence rose consistently from the year 2003 to peak in 2010. Subsequent the incidence was fairly stable.**Conclusions:** Breast cancer incidence at IBCR has risen but currently now stable with majority occurring in pre- menopausal women.NAACCR
1A4**INTERNATIONAL TRENDS IN FEMALE BREAST CANCER INCIDENCE AND MORTALITY RATES, 1985-2013**MaryBeth Freeman¹; Ahmedin Jemal¹; **Lindsey Torre**¹¹American Cancer Society, Atlanta, GA, United States**Background:** Previous research has reported global breast cancer age-specific incidence and mortality rates (2012) and trends (through 2008).**Purpose:** To provide short- and long-term trends in breast cancer incidence and mortality across five continents using the most recent cancer incidence data from the International Agency for Research on Cancer and mortality data from the World Health Organization (WHO).**Methods:** We include 2018 estimates for breast cancer incidence and mortality as obtained from GLOBOCAN. Also, we present short-term (most recent 5 years) and long-term (1985-2013) trends in female breast cancer among countries with available incidence and mortality data. Trends were expressed as annual percent change using JoinPoint modeling.**Results:** In 2018, the Netherlands, Luxembourg and Belgium have the highest estimated breast cancer incidence rates while Zimbabwe, Malawi and Kenya have the highest estimated mortality rates. During the most recent five years of breast cancer incidence data examined, 7 countries had increasing trends, 1 country was decreasing, and 34 countries had stabilizing trends. Breast cancer mortality trends in the most recent 5 years of data showed 3 countries with increasing trends, 13 countries with decreasing trends, and 58 countries with stabilizing trends.**Conclusions:** In 2018, breast cancer was the most commonly diagnosed cancer among women in 156 countries and the leading cause of death in 104 countries. In the most recent 5 years of data examined, breast cancer incidence and mortality rates were stabilizing in most countries of the world though incidence rates increased in several countries in Asia, including China and India.

IACR
1B1

COMPARATIVE NET SURVIVAL OF ELDERLY PATIENTS WITH CANCER: DATA FROM THE CANCER REGISTRY OF GUADELOUPE F.W.I.

Jacqueline Deloumeaux¹; Bernard Bhakkan-Mambir¹; Maturin Tabue-Teguo²

¹Cancer Registry of Guadeloupe, University Hospital of Guadeloupe, Pointe-à-Pitre, GA, France

²Geriatrics Department, University Hospital of Guadeloupe, Pointe-à-Pitre, GA, France

Background: Guadeloupe is an archipelago of about 400,000 inhabitants, mainly of African descent. This French territory benefits from the national health insurance system, which guarantees universal access to care. With an aging population (people over 65 years are expected to represent 28% of the population by 2030), cancer burden in the elderly is a growing concern for health planning. The lower overall incidence of cancer reported by the Registry compared to metropolitan France could change dramatically in the next decades. The adequacy of cancer care in the elderly needs therefore to be monitored.

Purpose: To estimate net survival, the survival which would be observed if cancer was the only cause of death, in patients over 65 compared to those under 65.

Methods: We analysed the registry's data for the period 2008–2015 for 4 major sites. Net-survival was estimated with the unbiased Pohar-Perme estimator method, with an endpoint set at September 30th 2018.

Results: Over the period, 13220 cases were recorded with 53.5% of patients over 65. The main cancer sites were prostate (58.5%), colon (6.6%) and stomach (6.2) in elderly men and breast (22.4%), colon (11.9%) and stomach (8.7%) in elderly women. In men, net survivals in the elderly compared to lower ages were respectively 88% vs. 96.4% for prostate, 49.7 vs. 52.6% for colon and 22.2 vs. 25.6% for stomach cancers. In women, they were respectively 74.5 vs. 96.4% for breast, 55 vs. 61.1% for colon and 25.8 vs. 42.5% for stomach cancers.

Conclusion: We observed little differences in net survival in the elderly for prostate cancer in men and breast cancer in women compared to metropolitan France, indicating similar cancer care. Colon and stomach cancers had lower survivals in both men and women. In Guadeloupe, women had higher survivals than men whatever their age group. Special attention is needed for these cancers with increasing incidence due to environmental and lifestyle factors.

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NAACCR
1B2

PANCREATIC CANCER SURVIVAL TRENDS IN THE US FROM 2001 TO 2014 BY RACE AND STAGE AT DIAGNOSIS (CONCORD-3)

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Background: The CONCORD-3 study included data on 1,349,628 adults diagnosed with pancreatic cancer in 62 countries during 2000-2014, highlighting poor survival worldwide. Age-standardised 5-year net survival in the US improved only slightly, from 7.2% for patients diagnosed during 2000-2004, to 8.9% for 2005-2009, and 11.5% for 2010-2014.

Aim: To examine the distributions by race and stage for adults diagnosed with pancreatic cancer during 2001-2014 in 48 US cancer registries, covering 86% of the US population. To examine trends in survival by stage and race.

Methods: Data on stage were requested from 2001. One- and 5-year net survival was estimated by race, stage and calendar period (2001-2003, 2004-2009, 2010-2014), using the non-parametric Pohar-Perme estimator, correcting for background mortality by single year of age, sex, race, county-level SES and calendar year. Survival estimates were age-standardised using the International Cancer Survival Standard weights.

Results: During 2001-2014, 48% of all patients were diagnosed at distant stage, and only 9% with localised disease, although this proportion increased slightly, from 7% in 2001-2003 to 9% in 2004-2009 and 11% in 2010-2014.

Age-standardised 5-year net survival for all stages combined was poor in both whites and blacks. Survival for patients with advanced disease was only 2.8% in 2001-2003, 3.3% in 2004-2009, and 4.3% in 2010-2014. Survival for localised cancer increased from 24% in 2001-2003 to 31.1% in 2004-2009 and 37.8% in 2010-14.

At localised stage, the racial differences in survival were large and persistent: 24.1% vs. 20.1% for whites and blacks, respectively, in 2001-2003; 31.5% vs. 25.5% in 2004-2009, and 38.5% vs. 30.9% 2010-2014. At distant stage, survival was similarly low in both whites and blacks (2.7% vs. 2.6% in 2000-2003, 3.2% vs. 3.1% in 2004-2009, 4.1% vs. 4.2% in 2010-2014, respectively).

Conclusions: We present the most complete available picture on the distribution of stage at diagnosis, and stage-specific survival from pancreatic cancer by different racial groups in the US. The results highlight the need to achieve a further shift towards early stage at diagnosis, especially among blacks, and to improve survival for patients who were diagnosed at distant stage.

NAACCR
1B3**COLORECTAL CANCER SURVIVAL DISPARITIES IN CALIFORNIA 1997-2014**

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Background: Colorectal cancer (CRC) is the third most common cancer in men and women and is the second leading cause of cancer death in the United States. Both incidence and mortality rates have declined in recent decades with increased screening and scientific advances in treatment. However, improvement in cancer outcomes have not been equal for all groups and cancer health disparities have evolved over time.

Purpose: To examine to what extent improvements in colorectal cancer survival are experienced across sociodemographic groups.

Methods: Data from the CCR were used to estimate trends in colorectal cancer-specific survival. Analyses included all patients in California diagnosed between January 1997 and December 2014 with colorectal cancer as a first, primary malignancy.

Results: Using a population-based sample of 196,792, we identified trends in colorectal cancer disparities over a period of 18 years. Overall, the CRC-specific mortality decreased from 1997-2002 to 2003-2008 (HR 0.85; 95% CI 0.83-0.87) and to 2009-2014 (HR 0.78; 95% CI 0.76-0.80). Sequential analysis identified that AJCC stage, lymph nodes status, tumor size, and tumor grade at diagnosis accounted for the majority of the improvement in mortality. Racial survival disparities decreased over time between non-Hispanic blacks, Hispanics, and non-Hispanic whites. There were no changes in disparities in neighborhood SES. There were increasing disparities by health insurance status.

Conclusions: California's racial/ethnic as well as socioeconomic diversity offer unique insight into the effect of recent advances in science and policy on colorectal cancer disparities over time. Disparities by health insurance status increased over time. CRC-specific mortality for patients with no insurance, Medicare only or Medicare plus private insurance, and patients with any public, Medicaid, or military insurance all increased from 1997-2002.

NAACCR
1B4**THE BURDEN OF CANCER IN NOVA SCOTIA – AN EVALUATION OF LOSS IN EXPECTATION OF LIFE**

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Background: Cancer survival measures are important for national and international comparisons, to highlight progress against cancer, or to identify cancers for which survival variation may represent opportunities for improvement across the continuum of cancer care.

It is also important to provide measures at the individual level – the world of the cancer patient. Such measures must take account of individual patient characteristics beyond age and sex. One such measure is the Loss in Expectation of Life (LEL)(Andersson, 2013).

LEL contrasts future life years predicted from survival analysis, to the future life years that are expected, based on published mortality data. LEL can be reported at the individual level, or for a population, becoming a measure of total disease burden. LEL can also be presented as a percentage of expected future life. Comparisons between observed LEL and that corresponding to a hypothetical change in some characteristic can be examined.

Methods: Flexible parametric relative survival modelling was applied to a range of cancers using data from the Nova Scotia Cancer Registry and resulting LEL estimated. All analyses were carried out using SAS®.

Results: Preliminary results show that male lung cancer patients diagnosed at age 65 in 1981, lost 85% of their future life expectancy (95% CI: 83-87%). This percentage dropped to 80% (77%-82%) for those diagnosed in 2016. Over the same time period, the proportion for 65 year-old male colon cancer patients dropped from 50% (46-55%) to 32% (28-37%).

Total provincial future years of life lost due to cancer diagnosed in 2014-2016 varied among the cancers examined, with lung cancer having the greatest impact on total LEL (21,300 years, 31% due to observed stage distribution) and skin melanoma the least (2,300 years, 87% due to stage distribution).

Interpretation: LEL can augment the presentation of survival estimates in patient education and cancer control, providing a different perspective on the impact of a cancer diagnosis, one that is not limited to a few fixed time points.

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NAACCR**1B5****TRENDS IN SURVIVAL FROM METASTATIC LUNG CANCER IN CALIFORNIA, 1990-2014****Rosemary Cress**¹; Amy Klapheke¹; Tianhong Li²; Kevin Pan³¹Cancer Registry of Greater California, Sacramento, CA, United States²Division of Hematology & Oncology, Department of Internal Medicine, University of California Davis Comprehensive Cancer Center, University of California Davis, School of Medicine, Davis, CA, United States³Davis High School, Davis, CA, United States

Background: Despite steady declines in incidence attributable to reductions in smoking, lung cancer remains the leading cause of cancer mortality in California. However, developments in treatment for metastatic lung cancer, including histology- and biomarker-driven therapies, have improved survival.

Purpose: The purpose of this study was to evaluate trends in survival by gender, race/ethnicity, and histologic type for patients diagnosed with metastatic lung cancer in California.

Methods: Through the California Cancer Registry, we identified patients diagnosed with a first primary lung cancer diagnosed at remote/distant (metastatic) stage between 1990 and 2014 with follow up through December 2015. Race/ethnicity was categorized into non-Hispanic white (NHW), non-Hispanic black (NHB), Hispanic, and Asian/Pacific Islander (API). Histologic subtype was categorized into small cell lung cancer (SCLC), squamous cell carcinoma (SCC), adenocarcinoma, large-cell carcinoma (LCC), non-small cell lung cancer, not otherwise specified (NSCLC, NOS), and other/unknown. One-year relative survival was calculated overall and by age at diagnosis, sex, race/ethnicity, and histology for each year in the study period. Joinpoint Regression was used to evaluate trends and to calculate the estimated annual percentage rate change (APC).

Results: A total of 103,013 adults with metastatic lung cancer were identified for analysis. Between 1990 and 2014, one-year relative survival increased significantly from 18.4% to 29.4%, with most improvement observed between 1993-2012 (APC=2.60%, 95% CI: 2.41-2.79, $p < 0.01$). Relative survival rose more quickly for females than for males, and was more pronounced among APIs, with an APC of 3.28% over the study period (95% CI: 2.84-3.72%, $p < 0.01$). By histology the greatest increases in relative survival were observed for adenocarcinoma, particularly for the period 1990-2009 when the APC was 3.9% (95% CI: 3.59-4.21, $p < 0.01$). All age groups experienced an improvement in survival.

Conclusions: Survival for patients with metastatic lung cancer improved during this 25-year period. Progress was most pronounced for Asian and female patients, and for those with adenocarcinoma. This increase in survival likely reflects advances in treatment for these patients, in particular specific chemotherapy and molecularly targeted therapies which have significantly improved clinical outcomes compared with unselected chemotherapy in patients with metastatic adenocarcinoma.

NAACCR

1C1

Bioinformatics I: Software Tools

AUTOMATIC CODING TO THE 2018 NAACCR REQUIREMENTS

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The introduction of the 2018 NAACCR Requirements has created significant changes in the coding requirements for cancer registries. This has required a significant campaign by NAACCR and NCRA to train and up skill thousands of registrars across the USA and Canada in the revisions.

The great advantage of automatic methods of coding is that once they have mastered the coding for a particular tumor stream it doesn't forget that processing method. The disadvantage is that it can be susceptible to errors as the variety of human language usage strays significantly away from the language it used to build its model of language for the coding task.

Most site-specific rules require identification of modifier terms (e.g. "features", "differentiation", and "architecture") to code the correct histology. Depending on the modifiers and rules involved, the coded histology could be either a specialised code or the NOS form. A new tag was required to identify references to these modifiers and the Stanford grammar tagger was used alongside the new tag to analyse these phrases for correct histology identification.

Many new histology codes require supplementary information e.g. Biomarker and Molecular results not held in the one report and so require a new strategy to analyse multiple documents to achieve the coding. Where Biomarker and Genetic results are in one report there is some coding functions performed when this information is separately demarcated, but when it is placed in the general text it is not always easy to correctly identify the content in an unambiguous manner.

The coding of the correct grade code was achieved by using the computed Site, Histology and Behaviour code to determine a Schema ID, which then maps to a Grade Table and then selecting the grade value indicated by source text. This was extended to identify the appropriate grade time frame by determining whether the grade is a Clinical, Pathological and/or Post-Therapy grade, so that all three are reported in the context of a given report.

A review of 17,000 new documents enabled identification and validation of 45% (187 codes) more Site codes and 85% (237 codes) new Histology codes conforming to the 2018 NAACCR Requirements.

NAACCR

1C2

ENHANCING THE USER EXPERIENCE FOR SEER*DMS

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Background: The Surveillance, Epidemiology, and End Results (SEER) Program managed by the Surveillance Research Program (SRP) at the National Cancer Institute (NCI) is an authoritative source of cancer incidence and survival representing about 34 percent of the US population. Central cancer registries use the SEER Data Management System (SEER*DMS) to process and submit cancer data to NCI. A survey of Health Information Technology usability research reveals few studies on population-based applications and indicates that complex systems are difficult to assess.^{1,2} SRP created a user experience evaluation and implementation framework (uxF) to improve SEER*DMS usability, to enable the system to accommodate future processes and technologies, and to integrate user-centered design methods into ongoing software development. SRP engaged Nielsen Norman Group (NN/g) to support the evaluation and planning activities and to provide targeted suggestions to improve SEER*DMS.

Purpose: NN/g conducted research to (1) Assess SEER*DMS usability, (2) Understand the role SEER*DMS plays in the user's workflow, and (3) Identify helpful parts of the design and places where inefficiency, confusion, or difficulty in completing tasks occur.

Methods: The study took place during two registry site visits. Each 3-day site visit consisted of a field study with editors and managers, and interviews with key stakeholders. Participants were observed using the contextual inquiry protocol for 60-120 minutes. Twenty-six participants were interviewed over more than 36 session hours.

Results: Results from the study include recommended changes that do not require prototyping (e.g., improve readability, preserve the user's preferences); low effort prototypes (e.g., modify form field layout and controls, enhance global navigation); and high effort prototypes (e.g., streamline task flows, refine local navigation).

Conclusions: NCI leadership and stakeholders vetted the results of the study. NCI is prioritizing the recommendations and planning for implementation with Information Management Services (IMS). NN/g will test prototypes with users remotely prior to NCI releasing SEER*DMS updates to all registries.

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IACR
1D1**PERTINENCE OF THE WHO 2010 GUIDELINE ON NEC DIAGNOSIS**

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Background and Aim: Neuroendocrine carcinomas (NEC) are diagnosed through a combination of immunohistochemistry (IHC) and morphology according to the 2010 guideline for the classification of tumours and the new Standard of Care for pathology by ENETS. A reliable diagnosis is critical for treatment selection and interpretation of trials. Aim of this study is to assess the effect of the WHO 2010 guideline on the completeness of pathology reporting for NEC and how this relates to the prognostic significance.

Methods: Patients registered with a NEC (gastrointestinal or with an unknown origin) in the Netherlands Cancer Registry (NCR) between 2008 and 2012 were included. Local pathology reports were reviewed for reporting of the morphology and IHC comparing 2008-2010 (baseline) with 2011-2012. The diagnosis of NEC was confirmed according to WHO 2010, if synaptophysin or chromogranin were positive in a majority of cells and Ki67 or mitotic count confirmed a grade 3 tumour.

Results: Within the NCR 591 patients were registered with a NEC in the gastrointestinal tract or with an unknown origin. In total 436 pathology reports were suitable for review. Morphology, IHC and grading in accordance with WHO 2010 guideline was described in 63.2% of the reports. Reporting of these parameters increased from 50.0% in 2008 to 70.6% in 2012. Large cell NEC could be confirmed in 45.0% of patients, increasing from 31.7% in 2008 to 56.7% in 2012 ($p=0.02$). Other diagnoses included NET G1/2 13.3%, small cell carcinoma 2.8%, no NEN 17.7%, NEN grade unknown 21.3%. Mean survival was 1.1 years in large cell NEC versus 2.2 years in NET G1/2 ($p=0.005$).

Conclusions and Implications: Implementation of the WHO 2010 guideline resulted in a significant increase of reporting parameters needed for classification of NEC. This study demonstrates that implementation of new guidelines for reporting is already an effective measure. Reporting of neuroendocrine markers is essential in this group of patients as ki-67 staining are again shown to predict survival. Synoptic reporting might give an important boost to meet requirements more quickly.

IACR
1D2**DUAL PRIMARY MALIGNANCIES: A CAUSE OF CONCERN**

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Background: The presence of dual malignancy in patients has been identified with increasing frequency, in part due to the increase in life expectancy of cancer survivors, a boon of advancements in cancer therapeutics and to the more comprehensive screening protocols used in cancer patients. Patients with a confirmed diagnosis of cancer have a lifetime risk of developing a second primary synchronous or metachronous malignancy.

Purpose: The incidence of dual malignancy is not uncommon and the purpose of the study was to assess the clinical and survival profile of such patients.

Methods: This is a retrospective analysis of patients with dual malignancies over a period of five years (2012-2016) at a tertiary cancer center. During this period, a total of 57,759 patients were registered in the Institute with a confirmed diagnosis of malignancy, of which 216 patients had dual primary malignancies. The demographic, clinical and survival details of the patients were extracted from the hospital medical records of the Institute.

Results: Among the 216 enrolled patients (54.2% males), the most common first and second primary malignancy was head & neck cancers (31.5%) and genitourinary cancers (33.3%), respectively. First/second primary malignancy occurred most commonly in the age group of 41-60 years. The mean age at the time of diagnosis of first and second primary malignancies was 54.6+11.6 years and 58.8+11.3 years, respectively. First/second primary malignancy occurred together in 26.4% patients whereas 60.2% patients had metachronous cancer. The correlations between site of first/second primary malignancy & gender (p -value < 0.001) and duration between the diagnosis of first/second primary malignancy & age group (p -value < 0.006) were statistically significant. Around 36.1% patients were dead whereas 49.1% patients were lost to follow up. The mean follow up of the patients was 75 months whereas the mean duration between the diagnosis of first/second primary malignancies was 52 months.

Conclusion: Early detection and treatment is the key to better management of patients with double primary malignancies. In a developing country like India, regular screening and follow up visits may help in the early detection of both synchronous and metachronous double primary malignancies.

NAACCR 1D3

DEVELOPING A REDCAP INQUIRY SYSTEM TO FACILITATE CASE SPECIFIC COMMUNICATION BETWEEN HOSPITAL REGISTRARS AND CENTRAL REGISTRY OPERATIONS EDITING STAFF

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Background: Central cancer registry operations editing staff (CTRs) spend time responding to questions from hospital registrars specific to cases they are abstracting. Anecdotally, it appeared that the majority of questions were being directed to only a few CTRs, creating an undue burden on those staff.

Purpose: Utah Cancer Registry (UCR) operations and informatics staff developed a systematic tracking method using a standard system for hospital registrars to submit questions electronically. The goal was to evenly distribute the workload of responding to inquiries and collect data to identify training needs for hospital registrars.

Methods: REDCap is a widely used web-based, user-friendly, and secure clinical research tool. We created a REDCap survey with simple questions to gather the information a CTR would need to answer coding or patient-specific inquiries. The central registry CTR categorizes the questions into one of eight categories: demographics, diagnostic information, treatment, staging, multiple primaries, reportability, comorbidities, and other. Time spent on each individual question is also tracked by central registry CTRs. Before deployment, UCR staff and a group of hospital registrars did a pilot test of the tool to assess usability and usefulness.

Results: From April 24, 2018 to December 31, 2018, we received 684 inquiries through the REDCap survey. Most questions (658) were regarding individuals, while only 26 were general coding questions. The three most common questions by category were Treatment (44.2%), Diagnostic Information (27.9%), and Staging (17.7%). Most questions (83.8%) required < 15 minutes of CTR time; 13.6% of inquiries required 16-30 minutes of CTR time. The average time for CTR response was 1.4 days with 72% of inquiries answered within one day.

Conclusions: Using this method for tracking case specific inquiries from hospital registries allows for better CTR time management when responding. Rather than immediately answering phone calls or emails, the CTR can schedule times during their work week to reply to inquiries. In addition, it allows for a more even distribution of workload among CTR staff. We are currently assessing the inquiries submitted to identify areas where hospital registries would benefit from training or additional information to clarify coding rules and instructions.

NAACCR 1D4

LOUISIANA'S HOSPITAL FOLLOW-UP EXCHANGE: A DECADE OF PARTNERSHIP

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Background: Survival data is an essential aspect of cancer surveillance and assessing survival is dependent on complete and timely follow-up data collection. Since becoming a SEER registry in 2001, the Louisiana Tumor Registry (LTR) has sought innovative ways to enhance follow-up data collection. The LTR established a program to facilitate the electronic exchange of follow-up data with hospital registries.

Purpose: To layout, the process implemented to establish an exchange of follow-up data, to describe procedural changes and improvements, and to highlight the 10-year partnership between LTR and hospital registries through improvement of follow-up reporting.

Approach: In 2007, LTR established a program to exchange follow-up data with CoC accredited hospitals, benefitting both LTR and participating hospitals. The process followed a series of steps that included downloading follow-up patient data from the facilities database and securely transmitting to LTR through WebPlus. The LTR linked the file in SEER*DMS through a specially designed follow-up file format and generated a return document containing the submitted cases where LTR had better follow-up and/or demographic information. The return document, which began as a manual update, has moved towards auto updates through adherence to software vendor specific formatting.

Results: Since 2009, LTR has consistently met or exceeded the follow-up percentage benchmarks set forth by SEER. Through yearly linkages, participating hospitals are able to maintain follow-up that adheres to CoC accreditation standards. The hospitals also benefit from LTR's national linkages with SSA, NDI, and CMS as well as the yearly death certificate linkage. In 2018, there were 13 CoC and 6 non-CoC accredited facilities that routinely exchanged data with LTR. The LTR was able to provide good follow-up on 17%-43% of cases linked from these hospitals. In turn, follow-up from hospitals makes up 7% of LTR's follow-up for invasive cancers diagnosed between the ages of 20 and 65.

Implications: The LTR Follow-up Exchange has allowed for a symbiotic relationship between the state and hospital registry. As the state registry requires abstracts from hospital registries to achieve surveillance goals, we have identified a place within routine operations where the state registry can give back.

**NAACCR
1E1**

ASSESSMENT OF BREAST AND COLORECTAL CANCER SURGERY IN MANITOBA

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Surgery is the key modality of curative treatment for patients with breast and colorectal cancer. Measuring treatment patterns and quality of care are essential to evaluating health system performance. Understanding types of surgery at a population-level, where the surgery is provided (i.e., in a rural or urban location), and the quality of surgery remains a significant gap. This study explored surgical treatment patterns, assessed quality of care, and evaluated post-operative outcomes for individuals diagnosed with breast, colon, or rectal cancer between 2010 to 2014 in the province of Manitoba, Canada. Individuals diagnosed with cancer and treated with surgery were identified from the Manitoba Cancer Registry. The cohort was linked to administrative health data including Hospital Discharge Abstracts and Medical Claims. Indicators from existing literature related to access (timeliness, care close to home), quality (resection margins, lymph node removal, re-excisions), and post-operative outcomes (complications, re-admissions, length of post-operative hospital stay) were assessed at a population-level. Invasive breast (165 per 100,000), in situ breast (24 per 100,000), colon (60 per 100,000 colon), and rectal cancer (24 per 100,000) rates were similar to national rates. Among breast cancer patients, 93% underwent surgery while 87% of colon and 67% of rectal cancer patients were treated with a resection. Most patients (66% breast, 73% colon, 70% rectal) received surgery in the same region in which they lived. For breast cancer, rates of immediate reconstruction ranged from 4% to 15% and rates of axillary dissection for node negative disease ranged from 13% to 42%. Rates of laparoscopic surgery for colon (24%) and rectal (13%) cancers were lower than national comparisons, 90% of stage II and III cases had ≥ 12 lymph nodes removed, and 4% had a positive circumferential resection margin. The findings from this study can be compared to national benchmarks and used to inform cancer services planning, quality improvement efforts, and policy development. Influencing data-driven change at the health system level is paramount to ensuring Manitobans receive the highest quality of care.

**NAACCR
1E2**

METHODOLOGY OF CONDUCTING THE PATTERN OF OVARIAN CANCER CARE AND SURVIVAL IN THE MIDWESTERN REGION OF THE UNITED STATES

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Background: Various studies have shown that involvement of a gynecologic oncologist (GO) in the care of ovarian cancer patients leads to improved outcomes, perhaps related to greater adherence by GOs to guidelines-based procedures. CDC has led patterns of care projects to identify treatment patterns and survival of ovarian cancer patients since 2003. This project pursued investigation of ovarian cancer treatment and survival in the Midwest region where the availability of GOs may be low when compared to other regions of the US.

Purpose: The purpose of the study was to 1) assess patterns of ovarian cancer care, treatment and survival; and 2) identify factors associated with receipt of non-guidelines-based treatment. Our purpose is to describe and analyze the methodology used throughout the study regarding study design and execution.

Methods: The current study collaborated with three central cancer registries (CCRs) in the Midwest: Iowa, Kansas, and Missouri. Software was customized to collect diagnosis, treatment and demographic data on a random sample of patients diagnosed with ovarian cancer between 2010 (Kansas only) and 2012, resident in the state where diagnosed and reported to the state's CCR. Data collected included existing information from each registry's database as well as additional study-specific data items obtained from reporting facility medical records. CCR staff followed a protocol developed by CDC.

Results: We collected 1,003 incidence and 432 recurrence ovarian cancer cases. Of the cases collected, close to 20% were from rural or non-metropolitan areas. Detailed chemotherapy information was not readily available in the medical record and was, at times, either difficult or impossible to obtain. For example, chemotherapy dose was unknown for up to 27 percent of cases whereas chemotherapy agent and route were more likely to be known.

Conclusions: The study was time consuming and challenging but yielded useful information. We will discuss the many intricate details and ideas used to design; recruit; select the sample; collect data; and assure data quality among the cancer cases included in the study. We will also explore the study's successes, challenges/barriers to be overcome and lessons learned.

NAACCR
1E3

TREATMENT OF STAGE IV COLON CANCER IN THE U.S.: A PATTERNS OF CARE ANALYSIS

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Background: Stage IV colorectal cancer has an overall 5-year survival of 14%. National guidelines promote chemotherapy as the mainstay of treatment for stage IV colon cancer with primary tumor resection (PTR) reserved for patients with symptomatic or resectable metastatic disease.

Purpose: To analyze patient, tumor and hospital level factors associated with different treatment modalities and survival in stage IV colon cancer.

Methods: Patients diagnosed with stage IV colon cancer between Jan. and Dec. 2014 were extracted from the Surveillance, Epidemiology, and End Results (SEER) Patterns of Care dataset, for which in-depth treatment and comorbidity variables are collected on a sample of SEER cases. Treatments were categorized into chemotherapy only, PTR only, PTR and chemotherapy, and none/unknown. Chi square tests were used to compare categorical variables among treatment groups. Multinomial regression was used to assess factors independently associated with treatment groups. Cox regression was used to calculate overall survival (OS).

Results: The total weighted number of cases was 3336. Sixteen percent of patients received PTR only, 23% received chemotherapy only, 41% received both PTR and chemotherapy, and 17% received no/unknown treatment. On multivariable analyses, non-White patients had higher odds of undergoing chemotherapy only while those treated at smaller, non-academic hospitals had lower odds. Patients with any Medicaid coverage had higher odds of undergoing PTR with or without chemotherapy and older patients had higher odds of receiving PTR only or no/unknown treatment. Compared to patients who underwent chemotherapy only, those who had no/unknown treatment did not have more comorbidities or more severe disease burden but had higher odds of having unknown disease factors. PTR only (HR= 1.99, CI: 1.7-2.4) and no/unknown treatment (HR=3.25, CI: 2.8-3.8) were associated with worse OS when compared to chemotherapy only, while PTR plus chemotherapy (HR=0.45, CI: 0.4-0.5) had improved OS.

Conclusions: Among patients with stage IV colon cancer, the majority received PTR as a part of their treatment. The association between Medicaid coverage, hospital type, and non-chemotherapy-only treatment suggests that there may be system-level variations in management and warrants further investigation.

NAACCR
1E4

URBAN-RURAL VARIATIONS IN QUALITY OF CARE AND SURVIVAL AMONG CANCER PATIENTS IN CALIFORNIA

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Background: The impact of rural place of residence on cancer treatment and outcomes is uncertain. Access to care, socioeconomic status (SES), race/ethnicity and other factors may obscure the relationship between rurality and cancer treatment and outcomes. This study sought to determine the independent effect of rural place of residence on the quality and outcomes of cancer care in California.

Methods: Persons diagnosed with breast, ovarian, endometrial, cervix, colon, lung, or gastric cancer between 2004 and 2015, inclusive, were identified in the California Cancer Registry. Multivariate logistic regression and Cox proportional hazards models were generated to assess the effect of area of residence on quality of care and survival, adjusting for health insurance, age, sex, race/ethnicity, comorbidities, and SES. The quality of cancer treatment was evaluated using established Commission on Cancer quality measures. For comparison, models were built using two measures of rurality; Rural Urban Commuting Areas (RUCA) and Medical Service Study Areas (MSSA).

Results: A total of 838,104 cancer patients were evaluated, with 4% (RUCA) and 13% (MSSA) classified as living in a rural area. Regardless of the rural classification scheme used, results were largely consistent. Rural cancer patients were significantly older, non-Hispanic white, and of lower SES compared to urban residents. Rural area patients were significantly less likely to undergo radiation after breast conserving surgery (O.R: 0.82, 95% C.I: 0.76, 0.89) and 21% more likely to have radiation after mastectomy compared to urban area residents. Colon and gastric cancer patients had 37% and 15% lower odds, respectively, of having the recommended number of lymph nodes surgically removed and examined. For all cancers, survival was similar in urban and rural groups.

Conclusions: Rurality is an independent predictor of receiving recommended radiation treatment and surgery for some cancer types. Despite differences in quality of care, controlling for demographic factors and health insurance attenuated this relationship, and eliminated survival differences between urban and rural cancer patient populations in California. Further research into the individual and structural factors underlying the association between rurality and receipt of recommended treatment is warranted.

NAACCR
1F1**ELEVATING THE SCIENCE OF CANCER RESEARCH BY USING THE CENTRAL CANCER REGISTRY AS A VIRTUAL TISSUE REPOSITORY (VTR)**Rachel Maynard¹; **Thomas Tucker**¹¹Kentucky Cancer Registry, Lexington, KY, United States

Background: The ability to perform genomic sequencing on formalin-fixed paraffin embedded (FFPE) tissue and improvements in the ability to identify activity levels of many different signaling molecules in FFPE make it possible for central cancer registries to elevate the science of cancer research by serving as a population-based Virtual Tissue Repository (VTR).

Purpose: To develop the infrastructure that will allow the Kentucky Cancer Registry (KCR) to serve as a VTR.

Methods: KCR has developed strong relationships with all of the clinical pathology labs that will see histologic material for Kentucky Cancer patients. This allows KCR to go through the procedures at each lab to obtain access to the tissue blocks, have the tissue blocks processed in a central research lab, and provide investigators with both de-identified high quality data as well as population-based tissue samples.

Results: KCR has served as a VTR for a number of research projects. As just one example, four basic science investigators at the University of Kentucky, are each studying five different signaling molecules believed to be associated with the recurrence of breast cancer. A number of researchers now believe that multiple signaling molecules in different pathways are likely involved in the recurrence of breast cancer. Using KCR, a retrospective cohort of 479 female breast cancer patients treated surgically and determined to be disease free were identified. Tissue blocks from the initial surgery were obtained for these patients, TMAs were constructed and stained to determine activity levels for each of the five proteins. This cohort was then traced forward in time to determine which patients recurred and which did not. The study identified two proteins that were abnormally expressed in the women who subsequently had a recurrence. This may represent an early biomarker for women who are likely to have a breast cancer recurrence. The study would not have been possible without using the central cancer registry as a VTR.

Conclusions: Using the central cancer registry as a VTR can elevate the science of cancer research by providing investigators with both high quality deidentified data and population-based tissue samples that lead to studies with strong external validity.

IACR
1F2**USING CANCER REGISTRY INFRASTRUCTURE AND LINKAGE TO BIOBANK FACILITIES TO INVESTIGATE THE ROLE OF INFECTIOUS AGENTS IN THE PROGRESSION FROM OESOPHAGEAL PREMALIGNANCY TO CANCER**Andrew Kunzmann²; Massimo Tomassino³; Tarik Gheit³; Robbie Wilson⁴; Jackie Jamison⁴; Christopher Cardwell²; Jacqueline James²; Brian Johnston⁵; Damian McManus⁵; Helen Coleman²; **Lesley Anderson**¹¹Northern Ireland Cancer Registry, Belfast, United Kingdom²Queen's University Belfast³International Agency for Research on Cancer, Lyon, France⁴Northern Health and Social Care Trust⁵Belfast Health and Social Care Trust

Background: The Northern Ireland Cancer Registry (NICR) prepares Official Cancer Statistics for Northern Ireland (NI). A selection of pre-malignant registers have been trialled in NI with the NI Barrett's Register (NIBR) having data on all patients with this premalignant condition. Oesophageal adenocarcinoma incidence is increasing and a causal role of infectious agents has been postulated. No studies have assessed the role of viral agents in neoplastic progression from Barrett's oesophagus. This study used the NIBR and linkage to the NI Biobank to investigate the presence of infectious agents in Barrett's oesophagus biopsy tissue from patients with and without neoplastic progression.

Methods: Barrett's oesophagus patients who progressed to oesophageal adenocarcinoma (cases) and Barrett's oesophagus patients who did not progress (controls) were identified through linkage of the NICR to the NIBR. Formalin-fixed paraffin-embedded tissue from cases and controls were retrospectively collected from across NI. Sections were cut utilising strict guidelines to ensure non-contamination. Viral DNA was assessed using a Luminex-based platform in the International Agency for Research on Cancer.

Results: In a systematic review of 7,144 articles, our research group investigated the role of viral infections in oesophageal adenocarcinoma suggesting a possible association with HPV. Preliminary analysis of 49 cases (Barrett's oesophagus patients who progressed to oesophageal adenocarcinoma) and 98 controls (Barrett's oesophagus patients who did not progress) matched on age and gender suggests that HPV is not associated with progression from Barrett's oesophagus to oesophageal adenocarcinoma with only 8.8% of having a HPV genotype (alpha, beta or gamma) identified. HPV16 and HPV18 were observed solely in cases but < 5 were affected. While polyoma and herpes viruses were identified in the Barrett's oesophagus biopsies neither were found in cases who progressed to oesophageal adenocarcinoma. None of the samples tested positive for other viral agents investigated. More samples are being processed with final results available shortly.

Discussion: Cancer registry infrastructure can be utilised to investigate premalignant conditions and their progression to cancer. Viral infections do not appear to be a major contributor to the progression from Barrett's oesophagus to oesophageal adenocarcinoma.



NAACCR

1F3

SEER-LINKED VIRTUAL TISSUE REPOSITORY (VTR) AND PRELIMINARY PILOT PROGRAM FINDINGS: LESSONS LEARNED ABOUT TISSUE AND FUTURE VISION**Alison Van Dyke**¹; Valentina Petkov¹; Serban Negoita¹; Lynne Penberthy¹¹Surveillance Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute, National Institutes of Health, Rockville, MD, United States**Presentation Objectives:** Attendees will understand:

1. The concept of and purpose of the VTR and advantages of the SEER infrastructure in development of a tissue and data resource,
2. How the VTR Pancreatic Ductal Adenocarcinoma Technical Pilot (Pilot) has been informative regarding feasibility of using archival formalin-fixed, paraffin-embedded diagnostic tissue for molecular studies, and
3. Lessons regarding tissue-based best practices and future infrastructure needs.

As clinical trials are not representative of the United States population, tissue-based studies conducted within these trials may not reflect the diverse biology of the US population. A potential solution is to build a tissue repository utilizing the existing, population-based SEER cancer registry infrastructure. The goal of the future SEER-Linked Virtual Tissue Repository (VTR) is to provide an infrastructure through which researchers can access deidentified, but linked, archival, diagnostic formalin-fixed, paraffin-embedded (FFPE) tissue and clinical data (e.g., medical history, treatment information, and digital slide images) with the registries acting as honest brokers. To establish feasibility of and best practices for a VTR, the Surveillance Research Program is conducting two genomics studies (in pancreatic and breast cancers) comparing cancer cases with extreme outcomes to similar, pair-matched cancer cases with usual outcomes. Six SEER registries (GrCA, CT, HI, IA, KY, and LA) are participating in these pilot genomics studies. This pilot is providing valuable information that will inform the scaling of a larger SEER wide VTR in the future. Key lessons to date include: demonstration that good quality and quantity of tumor and nontumor, normal DNA can be extracted from FFPE tissue as old as ten years; good quality of DNA sequencing data can be obtain using this DNA, but not RNA. Logistical considerations and challenges included: requesting and tracking tissue for cancer cases that were matched across registries, fees assessed by the laboratories for determining tissue availability, and variability in laboratory policies for sharing tissue; interval from diagnosis as tissue in some cases was destroyed (after the CAP required interval of 10 years) or depleted. This illustrated the need to have a residual component for the scaled VTR such as the discard registries in HI, IA, and Los Angeles, that collect tissue being discarded by laboratories, to prevent tissue destruction. Other

considerations included necessity of expert pathologist review as tissue originally selected based on local pathologist's diagnosis was in some cases was not PDAC. These lessons illustrated the need to oversample to achieve the desired sample size for researchers, as the attrition rate for a combination of these and other reasons was approximately 30%.

In summary, the VTR PDAC Pilot has demonstrated that SEER is well-suited for the development of a VTR, archival FFPE tissue can be obtained and utilized for molecular studies, and best practices for custom clinical annotation and requesting and tracking biospecimens. Expansion of the existing RTRs in parallel with future VTR infrastructure will be critical for the success of the future VTR.

CONCURRENT SESSION 1

TUESDAY, JUNE 11

10:30 AM - 12:00 PM

EMERGING REGISTRIES I

G

IACR
1G1

IMPLEMENTING A SUB-REGIONAL VIRTUAL CANCER REGISTRY TO SUPPORT CANCER REGISTRATION IN 10 CARIBBEAN COUNTRIES

Sarah Quesnel-Crooks²; Carlene Radix¹; Glennis Andall-Brereton²; Nkosi Husbands²; Brenda Edwards; Damali Martin³; Leslie Mery⁴

¹Organization of Eastern Caribbean States (OECS) Health Unit

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⁴International Agency for Research on Cancer, Lyon, France

The Organization of Eastern Caribbean States (OECS) is a ten-member state grouping with established political and economic ties. In the 2017 Fort de France Declaration the OECS Health Ministers committed to joint approaches in health. These small island states are geographically close and include Anguilla, Antigua and Barbuda, the British Virgin Islands, Dominica, Grenada, Martinique, Montserrat, St Kitts and Nevis, St Lucia, and St Vincent and the Grenadines [1] [2]. Martinique, an overseas region of France, is the largest member with a population of 385,000 and the only member with a high-quality population-based cancer registry which captures roughly 1,650 incident cancer cases annually [3].

Several OECS countries have attempted to or have a desire to establish independent cancer registries. Progress has been limited due to insufficient resources for implementing and sustaining such registries. The IARC Caribbean Cancer Registry Hub, together with the OECS Health Unit, is proposing a sub-regional virtual cancer registry as an innovative and cost-effective solution. Shared infrastructure would be used to host the registry, with on-site data abstraction in participating countries and secure, virtual reporting of data to country-specific databases hosted within the shared registry. The IARC Caribbean Cancer Registry Hub would provide technical support.

The proposed approach received endorsement from the OECS Council of Ministers and partial funding has been committed by the French Technical Cooperation to support this initiative. Based on the history of partnership and shared approaches to challenges faced in the OECS, successful implementation of the sub-regional virtual cancer registry to support cancer surveillance in the OECS is anticipated.

References:

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[2] Organization of Eastern Caribbean States. 2016. Available from: <https://www.oecs.org/homepage/member-states>. Accessed: January 16 2019.

[3] Joachim C, Veronique-Baudin J, Almont T, Ulric-Gervaise S, Macni J, Pierre-Louis O, Godaert, L; Drame, M; Novella, J; Farid, K; Vinh-Hung, V; Escarmant, P. Cohort profile: the Martinique Cancer Registry and the quality of life prostate cancer cohort (QoL Prostate-MQ): challenges and prospects for reducing disparities in the Caribbean. *BMJ Open*. 2018 (8)

IACR
1G2

IARC REGIONAL HUB FOR CANCER REGISTRATION, MUMBAI, INDIA

Les Mery²; Atul Budukh; Suchita Yadav¹; Sonali Bagal; Shraddha Shinde¹; Rajesh Dikshit¹; Leslie Mery²; Morten Ervik²; Freddie Bray

¹Centre for Cancer Epidemiology, India

²International Agency for Research on Cancer, Lyon, France

Background: One of the main objectives of the Global Initiative for Cancer Registry Development (GICR) is to establish regional hub for cancer registration and to provide technical support to the cancer registries from low and middle income countries. As a GICR initiative, the International Agency for Research on Cancer (IARC/WHO) in Lyon, France has established an IARC regional hub for cancer registration at the Tata Memorial Centre, in Mumbai, India to provide technical support to the cancer registries of South, South East and Eastern Asian countries. The Mumbai hub started functioning from 2nd October, 2012.

Objective: To assess the activities of the IARC Regional Hub for Cancer Registration, Mumbai, India

Method: As of 2012, Mumbai hub has organised cancer registration courses in Mumbai as well as at Thailand, Sri Lanka, Indonesia, Myanmar and Bhutan. More than 400 candidates participated in the training programme. The candidates were trained in cancer registration methods, ICD-O Coding including classification, data quality, statistical analysis and presentation. Participants from Kathmandu valley registry (Nepal), Kabul cancer Registry (Afghanistan) and Yangon cancer registry (Myanmar) attended both basic and advanced course in the cancer registration, including mentorship stays at the Hub. The principles of cancer registration and data analysis were covered in depth in the advanced course. The Sri Lanka cancer registry was provided technical support in CanReg5 operation from the Mumbai hub. More recently, a series of IARC GICR Collaborating Centres have been established to implement activities and increase support in the Hub region.

Results: In the coming years, we expect the first report from the Kathmandu valley cancer registry Nepal, Bhutan as well from Yangon population based cancer registry.

Conclusion: Due to technical support provided by Mumbai Hub to the cancer registries from Nepal, Myanmar and Bhutan, Afghanistan, the cancer registry operation in these countries is more effective and efficient. In the coming year these population based cancer registries will play important role in cancer control programme.

NAACCR

1H1

NAACCR GEOCODER MICRO MATCH STATUS CODES: CRITERIA FOR ASSESSING GEOGRAPHIC MICRODATA FITNESS FOR USE IN HIGH RESOLUTION SPATIAL ANALYSIS

Daniel Goldberg¹; Payton Baldrige¹; Recinda Sherman²

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The NAACCR Geocoder has recently been upgraded to output a "Penalty Code" and a "Penalty Code Summary" which are intended to provide registry personnel and related research staff with an indication of a geocoding result's fitness for use in spatial analysis at the micro (sub-county) scale. These new output fields were developed through the collaborative efforts of the NAACCR geocoding team. These outputs attempt to capture and integrate a series of the internal decisions and heuristics within the geocoding process for an input postal address. These micro match status variables provide an indication as to if the geocode associated with a registry record should or should not be utilized within fine-level geographic analysis with or without some form of manual review being attempted. These codes include both an overall summary (Penalty Code Summary) value of M=Match, R=Review, F=Fail, as well as a detailed breakdown (Penalty Code) containing a series of sub-codes describing the results for multiple components of the geocoding process across algorithmic and geographic considerations. This talk will provide a detailed definition of the output status codes, how these codes are derived, and what each of the results types is telling a user about the quality of a geocode.

NAACCR

1H2

EVALUATION OF GEOCODING QUALITY IN MONTANA: CONSIDERATIONS FOR SUB-COUNTY ANALYSIS

Heather Zimmerman¹

¹Montana Central Tumor Registry, Helena, MT, United States

The Montana Central Tumor Registry geocodes address at diagnosis. Sixteen percent of cases have only a PO box reported. Another 2.5% of cases have incomplete or incorrect physical address. These cases are geocoded to the zip code tabulation area (ZCTA) centroid and have the potential to be assigned to the wrong census tract. The aim of this evaluation was to ensure analysis decisions account for geocoding limitations and to direct physical address quality improvement efforts by answering the following questions: What areas of Montana have the highest potential of census tract misclassification? What areas have the highest proportion of cases with PO box only? To what degree would using population weighted centroids minimize misclassification?

Analysis included all cases of invasive cancer diagnosed from 2009 to 2016 among Montana residents. Proportion of cases with each level of geocoding quality were calculated by county, 2010 census tract, and year. Spatial analysis will be used to identify areas where ZCTA and census tract overlap create a high potential for misclassification. Finally, the population weighted centroid of ZCTAs will be compared to the geographic centroid.

The proportion of cancer cases geocoded to the street level increased slightly from 80% in 2009 to 82% in 2016. There was a corresponding decrease in the proportion of cases geocoded to the ZCTA centroid and cases with PO Box only remained at about 16% throughout. There was a high degree of variation in the proportion of cancer cases geocoded to the street level between counties. Higher population counties had more than 90% of cases geocoded to the street level while frontier counties had as low as 31%. Similar geographic variation was seen between census tracts with some tracts having 100% of cases geocoded to the street level while a few had 0%. Spatial analysis is not yet complete. Results will be available by June.

Frontier areas had the highest proportion of cases with PO box only and should be targeted for quality improvement efforts. Cancer incidence estimates for census tracts should be interpreted with caution and should be avoided in areas with high potential for misclassification.

**NAACCR
1H3**

COMPARISON OF TWO GEOCODING APPROACHES TO ESTIMATE THE EFFECT OF RESIDENTIAL AMBIENT PESTICIDE EXPOSURE ON PROSTATE CANCER

Laura Thompson⁴; Alexandra Smith; Julia Heck¹; Beate Ritz²; Bryan Langholz²; Daniel Goldberg³; Myles Cockburn⁴

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In this case-control study, two exposure estimation methods were applied and compared to study the association between residential ambient pesticide exposure and prostate cancer risk. The study population included 173 prostate cancer cases from the California Cancer Registry and 162 controls located in an agriculturally intensive area in the Central Valley of California. Pesticide exposure classifications were determined using a point based geocoding method as well as an area-based geocoding method. We found that the two exposure estimation approaches produced significantly different exposure classifications in cases and controls for exposure to any pesticide, and exposure classifications differed significantly by differing levels of locational accuracy. Odds ratios and 95% confidence intervals were calculated for six different pesticides or pesticide groups using exposures generated by each geocoding approach. Our results demonstrate that risk estimates are substantially biased due to the misclassification of exposure occurring only as a result of the geocoding approach used.

**NAACCR
1H4**

NAACCR GEOCODER ALIAS TABLES: IMPROVING GEOCODING QUALITY THROUGH THE INCLUSION OF PLACENAME ALIASES

Daniel Goldberg¹; Recinda Sherman²; Pamela Agovino³; Gerald Harris⁴; Payton Baldrige¹

¹Texas A&M University, College Station, TX, United States

²North American Association of Central Cancer Registries, Springfield, IL, United States

³New Jersey State Cancer Registry, Hainesport, NJ, United States

⁴Rutgers Cancer Institute of New Jersey, Hainesport, NJ, United States

The NAACCR geocoding team has recently developed and released the capability to define a include placename aliases within the geocoding process at the per-state level. In this approach, registry staff can submit commonly-encountered alternative and/or vanity placenames which are alternative names by which a location is known. These alternative names are treated as acceptable substitutes for the municipality portion of postal addresses covered by the geographic extent of the official placename. This enhancement eliminates the need for manual review of registry records which would have geocoded to an imperfect or non-match. This talk will first describe the system which is now available for registries to upload placename alias tables for use in per-state geocoding. Next, the results of employing this approach for the state of New Jersey will be detailed to motivate the use of such an approach. Finally, the talk will describe and promote a method for automating the creation of placename alias lists for each state. This approach is designed to eliminate the per-registry process of creating placename alias lists, and minimize the required manual review of aliases used in per-state geocoding.

IACR
2A1

GEOGRAPHICAL AND TEMPORAL DIFFERENCES IN GASTRIC AND OESOPHAGEAL CANCER IN EUROPE

Francesco Giusti¹; Carmen Martos¹; Emanuele Crocetti²; Giorgia Randi¹; Luciana Neamtiu¹; Tadeusz Dyba¹; Nadya Dimitrova¹; Raquel Negroa Carvalho¹; Manuela Flego¹; Manola Bettio¹

¹European Commission - DG Joint Research Centre, Brussels, Belgium

²University of Florence, Italy

Materials and Methods: 909287 gastric and oesophageal cancer cases incident in 1995-2014 from 54 European cancer registries (CR) contributing to the European Cancer Information System (ECIS) have been selected. Nine CRs are operating in Northern Europe (NE), 25 in Western Europe (WE), 3 in Eastern Europe (EE) and 17 in Southern Europe (SE). DCO (Death Certificate Only) cases have been excluded for comparison purposes. The distribution by topography subsites and morphologies has been calculated on malignant stomach and oesophagus cancer cases for periods 1995-2004 and 2005-2014.

Results: The ratio between number of stomach cancer cases (C16.1-C16.9) and oesophagus and gastro oesophageal junction (GOJ) cases (C15-C16.0) differs between European regions. In the selected CRs from EE gastric cancers are 78% of the total, while the lowest percentage is in NE (43%). Among gastric cancers, topography Stomach Not Otherwise Specified (NOS) decreased in NE from 63% (1995-2004) to 57% (2005-2014), while in EE from 30% to 21%. Cases with NOS neoplasm or carcinoma decreased from 33% to 15% in EE and from 12% to 10% in SE in the two periods. NOS adenocarcinoma proportions range from 32% in WE to 54% in NE in the whole period (1995-2014). Intestinal type gastric cancers are 19% in SE and 2% in EE. As for oesophagus, GOJ cases range from 40% in SE to 23% in NE, while NOS neoplasm or carcinoma cases range from 21% in EE to 8% in WE.

Conclusions: Geographical and temporal differences were observed in the subsite and morphology distribution of stomach and oesophagus cancers. Increasing the proportion of more detailed topography and morphology would allow more precise evaluations for the epidemiology of these tumours.

IACR
2A2

DEMOGRAPHIC AND EPIDEMIOLOGICAL TRANSITION AND CANCER IN INDIA

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²Canada Research Chair in Population Cancer Care

Background & Objectives: Cancer is increasingly recognized as a major threat to public health in low-middle income countries. Herein we describe the evolution of cancer epidemiology in India during/over the past three decades. Changes in disease patterns are placed in context with transition of demographic and epidemiologic risk factors.

Materials & Methods: India's cancer registry data (<http://www.ncdirindia.org>), (population coverage < 10%), was compared with transition in life-expectancy and prevalence of smoking, alcohol and obesity. We fitted linear regression to the natural logarithm of the estimated incidence rates of cancer registries in India.

Results: The burden of cancer in India increased from 0.6 million incident cases in 1991 to 1.4 million in 2015. Common cancers in the contemporary era among males include lung (12%), mouth (11%), prostate (7%), and tongue (7%); among females, they are breast (21%), cervix-uteri (12%), ovary (7%), and lung (5%). Rising rates of most cancers are being driven by increased life-expectancy, population growth, increased use of alcohol and greater prevalence of obesity. This transition has also seen parallel decreases in infection-related cancers such as cervix-uteri and tobacco-related cancers such as pharynx and oesophagus.

Interpretation & Conclusion: Transition in demographics and epidemiologic risk factors, have contributed to an increase in all cancers in India except for a reduction in cancers that have historically been associated with poverty. India's health system will need a coordinated plan to address the rising incidence and shift in risk factors. Disease control activities will be strengthened by increasing the population coverage of cancer registries in India.

**NAACCR
2A3**

CHANGING TRENDS IN THYROID CANCER INCIDENCE IN CANADA: A HISTOLOGIC EXAMINATION, 1992 TO 2016

Larry Ellison^{1,2}; Tracey Bushnik²

¹Canadian Cancer Registry, Ottawa, ON, Canada

²Health Statistics Division, Statistics Canada, Ottawa, ON, Canada

Background: Age-standardized incidence rates (ASIRs) of thyroid cancer (TC) have increased in many developed countries primarily due to increased detection of papillary thyroid cancer. While rapid increases in TC incidence have also been reported in Canada, an analysis of incidence and survival by histologic subtype has been lacking. Moreover, recent data points in Canada suggest that the era of rapid annual increases may have ended.

Purpose: This study examines sex-specific TC incidence rates from 1992 to 2016 focusing on recent changes in trends and examining the role of histology. These findings are supplemented with corresponding results for mortality and survival.

Methods: Data are from the Canadian Cancer Registry (1992-2016), the Canadian Vital Statistics – Death Database (1992-2016), and an analytic file linking the two (1992-2014). Age-specific and ASIRs of TC are estimated by sex, province, and histology. Annual percent changes (APC) in incidence and mortality rates are estimated using Joinpoint regression software. Net 5-year survival is derived using the Pohar Perme estimator. Period survival is used to obtain predicted estimates for 2010-2014 while the cohort approach is used for 1992-1996.

Results: In 2012-2016, the TC ASIR was higher among females than males (25.7 versus 9.0 per 100,000). Among females, the TC ASIR decreased by 3.0% annually during this period, following years of rapid growth. When restricted to papillary cases, the annual decrease in 2012-2016 was 3.7%. A change in trend in 2012, from rapid increase to stability, was noted among males. From 1992 to 2016, TC mortality rates were stable among females and increased slightly among males (APC = 1.3). Five-year net survival for 2010-2014 was higher among females than males (99% versus 94%) and higher among papillary than non-papillary cases (99% versus 80%). Overall, net survival increased by 2.1 percentage points from 1992-1996 after adjusting for age-, sex-, and histologic case-mix.

Conclusions: The results of this study confirm the central role papillary TC cases have played in TC incidence trends in Canada. They also cast some doubt on whether projected increases in TC incidence will materialize. Continued monitoring is needed to confirm whether there has been a systemic shift in TC incidence in Canada.

**IACR
2A4**

INCIDENCE AND MORTALITY OF CHILDHOOD CANCER IN CHINA FROM 2000 TO 2015

Kexin Sun¹; Rongshou Zheng; Siwei Zhang; Hongmei Zeng²; Xiaonong Zou¹; Ru Chen¹; Wenqiang Wei; Jie He¹

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²National Cancer Center of China, Beijing, China

Background: The epidemic characteristics of childhood cancer have not been well described in recent years in China.

Purpose: To reveal the patterns and trends of childhood cancer in China from 2000 to 2015.

Methods: 368 registries submitted cancer registry data with high quality in 2015. These data were used to estimate nationwide new cancer cases and deaths for children between 0-14 years in 2015. Data from 22 registries were used for trend analysis from 2000 to 2015. The age-standardized rates were calculated using the world Segi's population.

Results: In 2015, 21,300 childhood cancer cases were diagnosed, including 12,500 boys and 8,800 girls. The age-standardized incidence rate by world standard population (ASIRW) was 103.2/1,000,000. ASIRW was highest in age group below 1 year old, followed by 1-4, 10-14 and 5-9 age groups. ASIRW was higher for boys than for girls (112.5/1,000,000 vs 92.5/1,000,000). The 5 most common cancer types were leukemia, brain tumor, lymphoma, bone tumor and kidney cancer. Lymphoma and bone tumor became more common as age increased, while leukemia, brain tumor and kidney cancer followed the inverse pattern. 8,800 childhood cancer deaths were reported in 2015, including 5,000 boys and 3,800 girls. The age-standardized mortality rate by world standard population (ASMRW) was 42.3/1,000,000. ASMRW decreased as age increased. ASMRW was higher for boys than for girls (44.7/1,000,000 vs 39.6/1,000,000). The 5 most common causes of cancer deaths were leukemia, brain tumor, lymphoma, liver cancer and bone tumor. ASMRW for bone tumor increased with age, while ASMRWs for leukemia, brain tumor and liver cancers followed the inverse pattern. ASMRW for lymphoma remained stable across age groups. From 2000 to 2015, incidences for leukemia (APC=3.4%, 95%CI: 2.4%~4.3%) and brain tumor (APC=1.9%, 95%CI: 0.5%~3.4%) in boys increased significantly, while incidence for leukemia (APC=2.0%, 95%CI: 0.2%~3.9%) in girls increased significantly. Mortality for lymphoma (APC=-7.2%, 95%CI: -11.9%~-2.4%) in boys decreased significantly.

Conclusion: Leukemia is the major life threatening cancer for children between 0-14 years old in China. The uptrends of leukemia and brain tumor incidences suggested urgent needs for further studies and childhood cancer prevention and control plans.

IACR
2B1

WORLDWIDE VARIATION IN MORPHOLOGY AND SURVIVAL FROM MELANOMA OF THE SKIN (CONCORD-3)

Veronica Di Carlo¹; Michel Coleman¹; Claudia Allemani¹;

¹London School of Hygiene and Tropical Medicine, London, England, United Kingdom on behalf of the CONCORD Working Group

Background: CONCORD-3 included data on 1,553,109 adults diagnosed with melanoma of the skin in 59 countries between 2000 and 2014. Five-year net survival for patients diagnosed during 2010-2014 ranged from 60% to 90%. Survival was generally low in Asian and Latin American countries.

Melanoma is rare in Asia and in Central and South America, with estimated world-standardised annual incidence rates in 2018 in the range 0.4-2.0 per 100,000, much lower than in Oceania, Europe or North America (28, 11 and 13 per 100,000, respectively). Clinical evidence suggests marked international differences in frequency of the more lethal acral and nodular subtypes.

Aim: To quantify international variation in histological subtypes of melanoma of the skin; to estimate age-standardised 5-year net survival by morphology for patients diagnosed during 2000-2004, 2005-2009 and 2010-2014; and to highlight international differences.

Methods: We defined 7 morphology groups based on ICD-O-3: superficial spreading; lentigo maligna; nodular; acral lentiginous; desmoplastic; not otherwise specified, and other morphologies. We estimated net survival with the non-parametric Pohar-Perme estimator, correcting for background mortality by single year of age, sex and calendar year in each country. All-ages survival estimates are standardised with the International Cancer Survival Standard weights.

Results: Overall, 42% of tumours are coded as "melanoma, not otherwise specified" (ICD-O-3 M8720). Superficial spreading melanoma is the most common specific subtype (36%). 9% of patients diagnosed during 2010-2014 present with nodular melanoma, ranging from 5% (Austria) to 29% (Cyprus). Acral lentiginous melanoma is rare (1% of all registrations), but much more common in East Asia (Taiwan 25%, Singapore 19%, Korea 16%).

In 2010-2014, age-standardised 5-year net survival for superficial spreading melanoma reached 95% or more in Oceania, North America and most European countries, but ranged from 71% (Taiwan) to 88% (Japan) in Asia. Survival for acral lentiginous melanoma ranged from 66% (Taiwan) to 95% (Belgium). Nodular melanoma had the poorest prognosis, particularly in Asia (54%, 42% and 37% in Turkey, Korea and Taiwan, respectively).

Conclusion: Global variation in both incidence and survival of the histologic sub-types of skin melanoma is extremely wide. Population-based registries with high-quality data are crucial to understand these differences.

NAACCR
2B2

INTERNATIONAL COMPARISONS OF OVARIAN CANCER SURVIVAL: SHOULD WE STANDARDISE BY HISTOLOGICAL SUBTYPE?

Melissa Matz¹; Michel Coleman¹; Claudia Allemani¹ on behalf of the CONCORD Working Group

¹London School of Hygiene and Tropical Medicine, London, England, United Kingdom

Background: Ovarian cancer comprises several histologically distinct tumour types with differing levels of survival. The distribution of ovarian cancer histology varies worldwide and by age: the proportion of tumours with a favourable prognosis is higher in East Asia, while younger women have a different distribution of histology from that of older women. While standardising survival estimates by age is normal practice for international comparisons of cancer survival, standardisation by histology may be needed for comparisons of survival for all ovarian cancers combined.

Purpose: The CONCORD programme is the largest population-based study of global trends in cancer survival. CONCORD-3 includes data on 874,321 women (aged 15-99 years) from 61 countries diagnosed with ovarian cancer during 2000-2014. We examined these data to determine if survival estimates for all ovarian cancers combined should be standardised by histological subtype.

Methods: We defined five histological groups (type I epithelial, type II epithelial, germ cell, sex cord-stromal and other specific non-epithelial tumours) and five age groups (15-44, 45-54, 55-64, 65-74 and 75-99 years). Only microscopically verified tumours were included. Tumours with a borderline, non-specific or unknown morphology were excluded. The proportions of women in each group defined by age and histology were used as weights for standardisation. For each country, we first estimated unstandardised five-year net survival, then age-specific, histology-specific and age-histology-specific survival, and finally age-standardised, histology-standardised and age-histology-standardised survival.

Results: Five-year unstandardised survival for women diagnosed during 2000-2014 was 46.2% in the US, and 54.4% in Japan. After standardising for age, survival was lower in the US (46.9%), but higher in Japan (50.8%). Histology-standardised survival was 46.8% and 49.1% in the US and Japan, respectively. After joint standardisation for age and histology, five-year survival was 47.4% in the US and 47.0% in Japan.

Conclusions: International comparisons of ovarian cancer survival should be standardised for both age and histological subtype to avoid erroneous conclusions about the differences in survival. Unstandardised five-year survival was higher in Japan than in the US, but when survival was standardised by both age and histology, the difference was minimal.

IACR
2B3**GEOGRAPHIC VARIATION IN PANCREATIC CANCER MORPHOLOGY AND SURVIVAL (CONCORD-3)**

Maja Niksic¹; Claudia Allemani¹; Michel Coleman¹; on behalf of the US CONCORD Working Group

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Background: CONCORD-3 included data on 1,341,567 adults diagnosed with pancreatic cancer in 59 countries during 2000-2014, highlighting very poor survival worldwide. Age-standardised 5-year net survival was generally in the range 5-15% throughout 2000-14. Although survival does not vary much between different countries, there seem to be striking differences in survival by morphology.

Aim: To examine the morphology distribution for adults diagnosed with pancreatic cancer during 2000-2014 in 59 countries, including 294 cancer registries. To examine international trends in age-standardised 5-year net survival by morphology group in the periods 2000-2004, 2005-2009 and 2010-2014.

Methods: Five-year net survival from pancreatic cancer was estimated by morphology group (carcinomas, neuroendocrine tumours, other specified morphologies, and unspecified morphologies) and calendar period (2000-2004, 2005-2009, 2010-2014), using the non-parametric Pohar-Perme estimator, correcting for background mortality by single year of age, sex and calendar year. Survival estimates were age-standardised using the International Cancer Survival Standard weights.

Results: The vast majority of patients were diagnosed with a carcinoma (89%), while neuroendocrine tumours (4%) were much less common, without much variation over time or geographical area. Survival was very poor for patients with a carcinoma (range 2-8%), but much higher for those with a neuroendocrine tumour (range 20-50%). Trends in 5-year survival between 2000-04, 2005-09 and 2010-14 were generally flat, but increases of approximately 1-3% were seen for carcinomas, and of 4-10% for neuroendocrine tumours. Survival estimates were slightly higher in Asia than in Western countries. During 2010-2014, age-standardised 5-year net survival for carcinomas was 21% in Kuwait, 10% in China (22 registries) and 9% in Turkey (10 registries), as opposed to 7% in Canada (9 cancer registries), US (48 registries), Spain (6 registries) and Australia (4 registries), and only 4% in the UK, Slovenia and the Netherlands.

Conclusion: These results highlight the need to improve survival from pancreatic cancer world-wide, especially for patients with a carcinoma. International differences in survival from pancreatic cancer by morphology group may be useful in guiding cancer policy changes.

NAACCR
2B4**OVARIAN CANCER SURVIVAL BY RACE IN THE UNITED STATES (CONCORD-3)**

Melissa Matz¹; Michel Coleman¹; Claudia Allemani¹; on behalf of the US CONCORD Working Group

¹London School of Hygiene and Tropical Medicine, London, England, United Kingdom

Background: Ovarian cancer survival in the US has increased¹, but differences in survival between black and white women are persistent².

Purpose: The CONCORD programme is the largest population-based study of global trends in cancer survival. CONCORD-3 included data on 281,559 US women diagnosed with ovarian cancer during 2000-2014. We assessed whether improvements in ovarian cancer survival were seen for both white and black women in most recent years.

Methods: We estimated trends in age-standardised five-year net survival for black and white women diagnosed during 2000-2004, 2005-2009 and 2010-2014. To control for differences and trends in background mortality, we used life tables of all-cause mortality by single year of age, sex, county and race for each calendar year. Stage-specific survival was estimated for white and black women.

Results: For women diagnosed during 2010-2014, five-year net survival was 44.9% for white women, but only 35.2% for black women. Survival increased between 2000-2004 and 2010-2014 for both black women (30.8% to 35.2%) and white women (41.4% to 44.9%), but the gap in survival narrowed only very slightly. Stage at diagnosis does not explain the difference in survival between white and black women. In 2010-2014, 5-year survival for white women with advanced-stage ovarian cancer was 31.3% but only 23.0% for black women.

Conclusions: Survival for ovarian cancer is persistently higher for white women than for black women in the US. While survival for advanced-stage ovarian cancer was poor for both white and black women, there was still a large gap in survival. The distribution of histological sub-type does not appear to explain the lower survival for black women. Further research is needed to determine how socio-demographic factors and differences in accessing care may explain the gap in ovarian cancer survival.

References:

[1] Allemani, C., et al. Global surveillance of trends in cancer survival 2000-14 (CONCORD-3). *Lancet* 2018; 391: 1023-75.

[2] Stewart, S., et al. Disparities in ovarian cancer survival in the United States (2001-2009). *Cancer* 2017; 123: 5138-59.

CONCURRENT SESSION 2

TUESDAY, JUNE 11

3:30 PM - 5:00 PM

**IACR
2B5**

SURVIVAL TRENDS FROM MELANOMA OF THE SKIN IN THE USA, BY SEX AND STAGE AT DIAGNOSIS: RESULTS FOR 578,430 ADULT PATIENTS DIAGNOSED DURING 2001-2014 (CONCORD-3)

Veronica Di Carlo¹; Michel P Coleman¹; Claudia Allemani¹; on behalf of the US CONCORD Working Group

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Background: CONCORD-3 included data on 1,553,109 adults diagnosed with melanoma of the skin in 59 countries between 2000 and 2014, highlighting upward trends in survival worldwide. For patients diagnosed in the United States during 2010-2014, age-standardised 5-year net survival estimates reached 91%, one of the highest in the world.

Differences in survival between men and women are well documented, and lower survival is observed among older patients and those diagnosed at an advanced stage.

Purpose: To present the distributions by sex, age and stage for adults diagnosed with melanoma of the skin in 48 US cancer registries during 2001-2014. To investigate time trends in survival by SEER Summary Stage and sex.

Methods: 1- and 5-year net survival has been estimated by sex and SEER Summary stage for patients diagnosed during 2001-2003, 2004-2009 and 2010-2014, using the non-parametric Pohar-Perme estimator, correcting for background mortality by single year of age, sex, race, county-level SES and calendar year. All-ages survival estimates are standardised using the International Cancer Survival Standard weights.

Results: Men represent 57% of patients diagnosed between 2001 and 2014. Localised disease was reported for 78% of men and 82% of women. This proportion is similar at all ages among men, but falls from 85% among women aged 15-44 years to 76% in the age group 75-99 years.

Age-standardised 5-year net survival was higher for women than men throughout 2001-2014. Survival is high and rather stable over time for localised melanoma (96% in 2001-03, 98% in 2010-14). Five-year net survival for patients diagnosed at a distant stage is poor, but it has increased markedly, from 19% during 2004-2009 to 26% during 2010-2014, particularly for younger patients.

Conclusions: The results will offer the widest picture on the availability of data on stage at diagnosis and stage-specific survival from melanoma of the skin in the United States. They are of particular interest in the light of the recent introduction of targeted therapies and immunotherapies to treat advanced melanoma.

NOTES:

**NAACCR
2C1****GETTING READY FOR NAACCR XML IN 2020****Isaac Hands**¹; Joseph Rogers²; Fabian Depry³¹Kentucky Cancer Registry, Lexington, KY, United States²Centers for Disease Control and Prevention, Atlanta, GA, United States³Information Management Services, Inc. Calverton, MD, United States

Starting in 2020, after nearly 30 years of defining a fixed width format for data exchange, NAACCR XML will be the only format defined in Volume II of the NAACCR Data Standards and Data Dictionary. The NAACCR Community is finally ready for this change. For 10 years, from 2005 to 2015, NAACCR evaluated, designed, and piloted various alternatives to the nearly 30-year-old fixed width data exchange format for cancer registry abstracts. Then, in 2015, a consensus was reached on a path forward, and the NAACCR XML data exchange standard was approved by the NAACCR Board and documented through the tireless efforts of many volunteers. Since that time, NAACCR XML has been implemented at several large central registries, piloted with 3 major registry software vendors, and used as the sole transmission format during the NAACCR Call for Data for most central registries. This presentation will highlight the readiness of registry software vendors for this important new data standard, as well as explaining the rich set of software resources and technical expertise available to the NAACCR community to make sure this transition to NAACCR XML is as seamless as possible. Information presented will come from NPCR, SEER, major registry software vendors, the NAACCR organization, and others. If you are interested in the impact that NAACCR XML will have on your registry or organization, this presentation will be invaluable to your planning.

**NAACCR
2C2****HANDLING LARGE NAACCR XML DATA FILES USING THE SEER DATA VIEWER**Steven Friedman²; **Fabian Depry**¹¹Information Management Services, Inc. Calverton, MD, United States²National Cancer Institute, Bethesda, MD, United States

The new NAACCR XML standard is making its way into the software used by the NAACCR community to handle cancer-related data files. But the adoption rate is fairly slow, mainly due to the complexity of transitioning from the flat layout to a multi-level data model.

The SEER Data Viewer can help with that transition by offering solutions to visualize and recode large NAACCR XML data files that most traditional XML editors wouldn't be able to handle.

This presentation will highlight the features provided by the SEER Data Viewer to support the NAACCR XML standard. This will include

- Visualizing large data files.
- Tracking down and fixing data issues.
- Comparing data files.
- Transforming a data file into CSV for SAS processing.
- Running complex queries against a data file using the SQL language.

In addition to demonstrating these features, the presentation will also cover plans for future improvements to the software.

**NAACCR
2D1**

**IMPLEMENTATION OF EPATH REPORTING IN CALIFORNIA:
SETTING DATA QUALITY STANDARDS**

Dennis Deapen¹; **Andrea Sipin-Baliwas**¹; Cheryl Moody²; Kathleen Davidson-Allen³; Kyle Ziegler⁴; Jeremy Pine²; Mignon Dryden⁴

¹Los Angeles Cancer Surveillance Program –USC, CA, United States

²California Cancer Registry, Sacramento, CA, United States

³Greater Bay Area Cancer Registry, San Francisco, CA, United States

⁴Cancer Registry of Greater California, Sacramento, CA, United States

Background: California Assembly Bill 2325 requires pathologists who diagnose cancer to provide their cancer pathology reports to the California Cancer Registry (CCR) electronically effective January 1, 2019. A pathologist or pathology lab will be able to satisfy reporting compliance by adhering to the reporting requirements regarding the specific data items and standardized format regardless of the technical platform used to capture, store, and submit data. However, it appears that many laboratories currently lack the capacity to submit the reports in the required HL-7 2.5.1 format; it is estimated that there are several hundred such facilities in the state. While a manual copy and paste submission option is available, this may be insufficient if the volume is large and may provide incomplete data.

Purpose: Quality standards are necessary to ensure that the ePath reports transmitted to the CCR contain the required data elements.

Methods: The five organizations charged with cancer reporting in California have drafted an ePath Data Quality Plan. Data Quality Plan components:

- Completeness
 - Adherence of HL-7 message to constraints document
 - Monitoring of completeness
 - Consequences of non-compliance
- Accuracy
 - Monitoring of reportable vs non-reportable
 - Monitoring of accuracy and quality of reporting
 - Consequences of non-compliance
- Timeliness
 - Adherence to 2-week timeline from final diagnosis/sign-out to date transmitted
 - Monitoring of timeliness
 - Consequences of non-compliance
- Consideration for developing edit checks run against transmitted ePath
- Determine method of communicating data quality issues to transmitting lab
- Determine who is responsible for compliance with the three metrics described and how often assessment will take place
- Establishing annual audits and improvement processes

Results: We will present ePath quality standards developed upon implementation of the Data Quality Plan and establish best practices to be shared with other states considering passage of legislation similar to AB 2325

Conclusion: We will discuss the importance of establishing a Data Quality Plan and any increase of case completeness from ePath data capture.

CONCURRENT SESSION 2

TUESDAY, JUNE 11

3:30 PM - 5:00 PM

LEVERAGING DATA SOURCES

D

NAACCR
2D2

IMPLEMENTATION OF EPATH REPORTING IN CALIFORNIA: CHALLENGES FOR SMALL AND MEDIUM-SIZED FACILITIES

Dennis Deapen¹; Andrea Sipin-Baliwas¹

¹Los Angeles Cancer Surveillance Program -USC, CA, United States

Background: California Assembly Bill 2325 requires pathologists who diagnose cancer to provide their cancer pathology reports to the California Cancer Registry (CCR) electronically effective January 1, 2019. A pathologist or pathology lab will be able to satisfy reporting compliance by adhering to the reporting requirements regarding the specific data items and standardized format regardless of the technical platform used to capture, store, and submit data.

Purpose: It appears that many laboratories currently lack the capacity to submit the reports in the required HL-7 2.5.1 format; it is estimated that there are several hundred such facilities in the state. While a manual copy and paste submission option is available, this may be insufficient if the volume is large and may provide incomplete data. Furthermore, it is believed that these laboratories lack Certified Tumor Registrar expertise to perform accurate casefinding.

Methods: The Los Angeles Cancer Surveillance Program is partnering with two technical providers to develop and pilot test a new approach to ePath reporting. We are seeking a low-tech, low-cost process which requires no on-site visit and minimal technical expertise at the laboratory to transmit pathology reports to an external server on which an automated text screener would select cancer-related reports for upload to the central registry. It is also important to receive additional patient identifiers and demographics that are not usually included on pathology reports, to accurately identify and classify new cases.

Results: Six pilot installations are planned in the first half of 2019. The completeness of reporting will be documented as well as the level of effort and cost for installation and production.

Conclusions: Many central registries are seeking earlier identification of incident cancer cases. For nearly all cancers, a pathology report is the first definitive record of a cancer diagnosis and could represent a near real-time surveillance record. Automated methods would facilitate rapid collection of these reports and reduce cost and, if successful, may be of benefit to other NAACCR registries.

NAACCR
2D3

OUTPATIENT CLINIC REPORTING: UNDERSTANDING THE LANDSCAPE AND ESTABLISHING REPORTING PROCESSES

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²City of Hope National Medical Center, Duarte, CA, United States

Background: In 2014, City of Hope (COH) acquired several clinics under the Wilshire Oncology Group allowing COH to provide comprehensive cancer care at the community practice level. The Los Angeles Cancer Surveillance Program (CSP) worked with COH to identify clinics within the CSP catchment area and established a mechanism for reporting any missed treatment or missed cases.

Purpose: We aim to thoroughly evaluate the underreporting of cancer treatment data and incident cancer cases seen at free-standing medical oncology clinics and establish reporting processes for this evolving landscape.

Methods: The CSP Secure Hospital Web application was utilized by COH to upload outpatient clinic records to CSP for their review, reporting, and analysis of incident cancer cases and cancer treatment. We had one casefinder review the documentation for reportability of cases and an abstractor ascertain the cases when appropriate. For pathology reports with confirmed reportable malignancies, we referenced the statewide database, Eureka, to determine whether the case was in, not in, or a possible recurrence/metastasis. Additional documentation was requested from COH to ensure complete demographics and other case information was included in the abstract. When cases were already reported in Eureka but had missing treatment, treatment summaries were provided by COH to update the database. Our goal is to assess what was captured during this process and determine the degree of missingness should outpatient clinics not report. Subsequently, we aim to establish best practices for ensuring complete reporting in the outpatient setting.

Results: We will share results of this assessment including the number of cases abstracted and the breadth of treatment captured from the outpatient clinic records. We will generate graphs that quantify cancer site distribution, year of diagnosis, race/ethnicity, and age distribution of new incident cases.

Conclusion: We will discuss the extent of missed cases and treatment and we will determine best approaches to improve overall outpatient reporting.

IACR
2E1**The Impact of Novel Agents on Multiple Myeloma: Trends of Incidence and Mortality in Japan**Yoshiaki Usui³; Yuriko Koyanagi¹; Kota Katanoda²; Tomohiro Matsuda; Keitaro Matsuo³; Hidemi Ito¹Division of Cancer Information and Control, Department of Preventive Medicine, Aichi Cancer Center Research Institute, Aichi, Japan²National Cancer Center, Tokyo, Japan³Division of Cancer Epidemiology and Prevention, Department of Preventive Medicine, Aichi Cancer Center, Aichi, Japan**Backgrounds:** Treatment for multiple myeloma (MM) has dramatically changed in the past two decades because of introduction of novel agents. Although several clinical studies have showed the improvement in survival, the impact of novel agents on population-based mortality has not been adequately evaluated.**Purpose:** To evaluate the impact of novel agents on the public health, we observed trend in mortality of MM in Japan, considering the effect of trend in incidence.**Methods:** We used incidence data from 13 selected population-based cancer registries and mortality data from national statistics in Japan. The period covered in this analysis was 1995-2015, during which 74,972 patients in Japan died from MM. We used a joinpoint regression analysis to characterize trends in the age-standardized rate of incidence and mortality of MM. Stratified analysis by age was also performed.**Results:** Although the incidence was in an upward trend over the observed period, the stable trend of mortality had begun to decline in 2005 (95% confidence interval, 2003-2008) with an annual percent change (APC) of -2.5% (95% CI -2.9 to -2.1%) when novel agents were introduced for the treatment. Especially, among people aged 70-79 years, mortality was decreased with an APC of -3.1% (-3.7 to -2.6%) from 2004 to 2015, after increasing with an APC of 1.2% (0.4-2.0%). The period of change in this mortality trend seems to correlate with the period in which the novel agents appeared.**Conclusion:** We observed the improvement of mortality of MM in novel agents' era, especially for the elderly who had not benefited from conventional chemotherapy.IACR
2E2**MEASURING THE IMPLEMENTATION OF RECOMMENDATIONS ON PATIENT CENTRED MANAGEMENT OF LOCALIZED PROSTATE CANCER WITH POPULATION BASED CANCER REGISTRATION DATA**
Lien van Walle; Karin Haustermans²; Julie Verbeeck¹; Liesbet Van Eycken¹¹Belgian Cancer Registry, Brussels, Belgium²Particle Therapy Interuniversity Center Leuven, University Hospitals Leuven, Belgium**Background:** Clinical practice guidelines for localized prostate cancer (PC) were published in Europe (EAU 2011, ESMO 2013) and by the Belgian Health Care Knowledge Center (2012).**Purpose:** To evaluate whether and at which rate, recommendations are implemented after their release, using population-based data of the Belgian Cancer Registry (BCR).**Methods:** A total of 41,686 localised PC (cT1-2N0M0) diagnosed in 2004-2015 was selected in the BCR and linked with pathology reports and administrative data. Results were calculated on the national level, by year, age category (<65, 65-75, >75 years) and risk category (low (LR) n=20,705 (50%), intermediate (IR) n=15,257 (37%), high (HR) n=5724 (13%)). Analyses were conducted evaluating the proportion of no active treatment (i.e. active surveillance/watchful waiting) in LR PC, and hormonotherapy alone in localised PC (any risk category). A linear trend with incidence year was evaluated with a regression model for a proportion.**Results:** In 2015, 45.8% of <65 compared to 75.4% of >75 years old LR PC patients, received no active treatment. After 2012, an increase of 5.4% by year (95%CI 4.4;6.4%; p<0.0001) was noted in all age groups. For the period 2004-2015, 1.9% of <65 compared to 29.4% of >75 years old patients received hormonotherapy alone (all risks). In 2015 in >75 years of age, 9.6% (n=37), 19.8% (n=81) and 39.2% (n=89) of LR, IR and HR respectively received hormonotherapy alone. After 2012 in >75 years of age, an annual decline of -2.8% (95%CI -4.4;-1.3%; p=0.0003) in LR and -5.0% (95%CI -7.0;-2.9%; p<0.0001) in IR was noted, compared to no trend in the HR group. Inter-hospital variability in the implementation of these guidelines will be elaborated.**Conclusions:** Restraining active treatment in LR PC was increasingly established in Belgium after 2012, albeit rather at a slow rate. In contrast and despite the recommendations, rates of hormonotherapy alone in >75 localised PC remained high, especially in HR. This study demonstrates how cancer registry data can be relevant in the evaluation of the uptake of clinical guidelines on a population based level.

NAACCR 2E3

METHODS, RESULTS, AND LESSONS LEARNED FROM TWO POSTMARKETING DRUG SAFETY SURVEILLANCE STUDIES LINKING STATE CANCER REGISTRY DATA TO LARGE PHARMACY DATABASES

David Harris¹; Deborah Casso²; Kirk Midkiff¹; Amanda Anderson²; Alicia Gilsenan¹; Susan Oliveria²; Elizabeth Andrews¹; Nicole Kellier-Steele³

¹RTI Health Solutions, Research Triangle Park, NC, United States

²IQVIA, Plymouth Meeting, PA, United States

³Eli Lilly and Company, Indianapolis, IN, United States

Background: Postmarketing drug safety surveillance studies can be used to monitor drug safety but require large sample sizes to detect small increases in risk when assessing the combination of an infrequent drug exposure and a rare cancer outcome. Linking data from multiple state cancer registries to large pharmacy databases can potentially address these issues.

Objective: To describe the methods for two parallel but separate studies that implemented linkages between participating state cancer registries and two large United States pharmacy databases (either the Medicare Part D prescription claims database or a large commercial prescription dispensing database [IQVIA LRx]).

Methods: All state cancer registries were invited to participate in both studies. Exposure and comparator cohorts were created using either Medicare Part D data (aged 65+) or LRx data (aged 18+). Both studies utilized trusted third parties (TTPs) to perform the linkages. Linkage with Medicare required registries to send encrypted data to Medicare's TTP, while linkage with LRx required registries to either send identifiable data via secure FTP that was then deidentified and encrypted by IQVIA's TTP or install deidentification and encryption software locally and send data to the TTP.

Results: For the Medicare linkage, 26 registries participated, covering 68% of osteosarcoma cases aged 65+, while for the LRx linkage, 29 registries participated, covering 70% of osteosarcoma cases aged 20+. Reasons why registries could not participate in one or both studies included inability to send identifiable data externally, inability to install software locally, lack of resources/interest, and/or the inability of TTPs to sign registry data use and/or confidentiality agreements. Challenges among participating registries included working through local registry restrictions for sharing identifiable data, gaining permission to install external software, and/or completing contractual agreements that aligned with TTP and data holder requirements.

Conclusions: Varying requirements and the logistics of working with state entities, the federal government, and a commercial database made the study complex and resource-intensive. However, linking registry data to pharmacy databases can be an effective way to conduct safety studies investigating rare drug exposures that also require validated outcomes for a rare cancer.

IACR 2E4

DEVELOPING AN INTEGRATED CLINICAL DECISION-MAKING SCHEME (ICDS) FOR PREDICTING SPCS IN WOMEN WITH ENDOMETRIAL CANCER: A RETROSPECTIVE ANALYSIS IN TAIWAN AND THAILAND

Chi-Chang Chang; Wen-Chien Ting¹; Gin-Den Chen¹; Chalong Cheewakriangkrai²; Chi-Jie Lu³; Ssu-Han Chen⁴

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²Chiang Mai University, Thailand

³Chien Hsin University of Science and Technology Taoyuan City, Taiwan

⁴Ming Chi University of Technology, New Taipei City, Taiwan

Background: The high effectiveness of cancer screening and therapies resulted in the increased diagnosis of Second Primary Cancers (SPCs) in the world. The aim of the present study was to investigate the clinical data and to develop an Integrated Clinical Decision-making Scheme (ICDS) for predicting the risk factors of SPCs in women with endometrial cancer.

Methods: In the empirical study, the endometrial cancer dataset was provided by two hospitals in Taiwan and one in Thailand. Of the 599 Taiwanese patients and 788 Thai patients included in the current study. The proposed ICDS was based on the tree-based classifier with five comparable strategies: transformation, resampling, clustering, ensemble and balanced metric to improve the validation balanced accuracy. In addition, a Taguchi's orthogonal for L8(25) experiment (DOE) technique is fitted via an evaluate validation performance for each strategy combination and then adds a critical factor for each step. Finally, the procedure is end up with ANOVA and main effects plot.

Results: Our findings suggest that, the best prediction accuracy empirical case is the XGBoost associates with the strategies of and clustering. The proposed scheme auto-select the strategies of and clustering to associate with our based finally alleviates the class imbalance problem and shows an acceptable classification accuracy. The proposed scheme auto-select the strategies of clustering and to be our based learner in which classification accuracy is 84.76%, sensitivity is 87.58%, and specificity is 35.29%. Our findings suggest that age, chemotherapy, histology, Grade Differentiation, and BMI are relatively more important risk factors related to the endometrial.

Discussion and Conclusion: In summary, the Integrated Clinical Decision-making Scheme (ICDS) can support the important influence of personality and clinical symptom representations on all phases of guide interventions with the complexities of primary treatment trajectory. Application of this proposed diagnostic model may facilitate targeted intervention to reduce the incidence of SPCs; however, our results suggest that adaptive machine learning techniques require incorporation of significant variables for optimal prediction.

IACR
2F1**CANCER REGISTRATION IN THE ERA OF GENOMICS: INTEGRATING GERMLINE AND SOMATIC GENETIC DATA INTO THE CANCER REGISTRATION SYSTEM FOR ENGLAND****Fiona McDonald**¹; Brian Shand; Nathan Bricault²; Sophia Richardson¹; Katrina Lavelle¹; Sally Vernon¹; Caroline Brook¹; Francesco Santaniello¹; Joanna Pethick¹; Margreet Luchtenborg¹; Steven Hardy¹; Jem Rashbass^{1,3}¹Public Health England, Cambridge, UK²Health Data Insight CIC, Cambridge, UK³National Cancer Registration and Analysis Service, Cambridge, UK**Background:** Advances in genomics are transforming oncology: modern cancer registration practice needs to incorporate and link this precision data in a systematic fashion.**Purpose:** The English National Cancer Registration and Analysis Service (NCRAS) has established a Genomics Data Programme to tackle this multifaceted challenge. We are collecting and registering both germline and somatic genetic test data from laboratories across the National Health Service (NHS).**Methods:** We have established regular, high quality somatic data feeds from eleven NHS genetics and pathology laboratories, covering approximately 80% of solid tumour molecular diagnostics within England. We also have germline data submissions from ten genetics laboratories; we have developed a novel method to pseudonymise the germline demographics upon upload, to protect the identity of people without cancer undergoing predictive genetic testing. We have integrated comprehensive genetics tables into the registry central database system; accordingly, we can record diverse and granular genetic data in a structured format incorporating internationally agreed conventions for genomic nomenclature. Data arrives from laboratories in various free-text and semi-structured formats; these are mapped to the standard schema by a combination of computational methods and manual registration. We have developed teaching and training materials to support and enable registration staff to interpret molecular data.**Results:** Our pilot work covering 12 months' worth of somatic testing data has recorded and linked >50,000 genetic test results on >20,000 tumours, covering >1000 distinct combinations of gene and tumour site. In addition, we have collated data on germline tests on the BRCA1 and BRCA2 genes and released summary data on >22,000 individuals (including variant counts) back to the NHS clinical molecular genetics community. The released aggregate data are used to calculate variant frequencies and assist in national consensus reclassification of BRCA1/2 Variants of Uncertain Significance (VUS).**Conclusions:** This work will enable audit of the national scope, availability and usage of molecular diagnostics within NHS cancer pathways and services. Patient-level and tumour-level linkage of molecular data embedded within the national registration service is already changing clinical management for high risk BRCA1/2 families, and future work will allow correlation between individual DNA aberrations, treatments, and overall outcomes and survival.NAACCR
2F2**LINKED ONCOTYPEDX DCIS TEST IN SEER: QUALITY ASSESSMENT AND CLINICAL SIGNIFICANCE****Yao Yuan**¹; Valentina Petkov²; Alison Van Dyke¹; Serban Negoita¹¹National Cancer Institute, Bethesda, MD, United States²NIH/NCI**Background:** OncotypeDX DCIS is a 12-gene assay designed to predict the 10-year risk of local recurrence and to guide treatment decisions, specifically the benefit of radiation therapy in breast ductal carcinoma in situ (DCIS). The test became available in December 2011 and is not currently recommended by guidelines.

Collaborative Stage Site Specific Factors (SSF) 22 & 23 provide for collection of breast cancer (BC) multigene panel data, but previous studies of invasive BC indicate that these data are underreported. To address this issue, SEER has been conducting annual linkages with Genomic Health Clinical Laboratory, the only lab performing the test.

Purposes: This study was conducted to assess the quality of linked data from Genomic Health and registry collected OncotypeDX DCIS data, to determine demographic and clinical factors associated with receiving the test, and to investigate the clinical utility of the 12-gene assay.**Methods:** SEER cases who were diagnosed with in situ breast cancer between 2011-2015 were included in the analysis. SSF 22 & 23 data were compared to linked OncotypeDX DCIS test data reported by Genomic Health. Logistic regression was used to evaluate the relationship between receiving the test and patient characteristics, and the relationship between treatments and test generated risk categories.**Results:** Among 78,199 patients with in situ BC diagnosed between 2011 and 2015, DCIS test utilization increased from < 1% to 4.7%. Data from 2,169 in situ BC were linked to test data, and 47% of these patients were not captured in SSF 22. Receiving the test was associated with age under 75 years, married, higher SES, non-Medicaid insured, recent year diagnosis, smaller and lower grade tumor, and fewer treatments. The test generated risk categories (low, median, high) were associated with clinical treatment decisions including chemotherapy, radiation, and surgery ($p < 0.05$).**Conclusions:** A significant number of tests were not captured in the registry data supporting the importance of data linkages for registry data capture. Adoption of the OncotypeDX DCIS test in the clinical practice has been slow. Receiving the test was associated with multiple demographic factors pointing to disparities and also clinical factors. Test results appeared to guide clinical decisions.

NAACCR

2F3

MULTIGENE GENOMIC TESTING (ONCOTYPE DX) AMONG NEW YORK (NY) PROSTATE CANCER PATIENTS, 2015-2016

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Background: The ONCOTYPE DX genomic test for prostate cancer is a biopsy-based multigene assay suggested for use in localized disease. It is also a Medicare-approved test for eligible patients.

Purpose: The purpose of this study is to: 1) assess prostate cancer ONCOTYPE DX test use among NY residents diagnosed between Jan 1st, 2015 and Dec. 31, 2016; 2) identify characteristics associated with test use (patient demographics, tumor stage, diagnostic confirmation, type of facility); and 3) describe treatment reported for patients who had the genomic test compared to those who did not.

Methods: NY residents with prostate tumors diagnosed between 2015 and 2016 were selected from the NY State Cancer Registry's data base (SEER*DMS). Patient, tumor, and treatment data were then linked to the Oncotype DX test results submitted to the NY State Department of Health's Electronic Clinical Laboratory Reporting System (ECLRS). SAS 9.4 was used to analyze the data.

Results: Penetrance of Oncotype DX test use among eligible patients will be shown by year. Results stratified by tumor stage, age groups (< 55, 55 to 64, 65 and older), genomic score, and type of facility will be presented. In addition, the association between received treatment and genomic score will be explored.

Implications: The results of the study will improve our understanding of any associations between multigene genomic test utilization and patient characteristics, tumor characteristics, and treatment selection.

NAACCR

2F4

ENHANCING CANCER SURVEILLANCE: STATEWIDE COLLECTION OF BIOMARKERS AND PROGNOSTIC FACTORS, COLORADO'S MULTI-PHASE IMPLEMENTATION

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In an era of personalized medicine and targeted therapy, there is rising interest in using biomarker and prognostic factor (BPF) data to provide the best treatment for cancer. National, statewide, and local cancer registry leaders have suggested the inclusion of biomarkers and prognostic factors to the standard transmission files. Through a cooperative agreement with the Centers for Disease Control and Prevention (CDC), the Colorado Central Cancer Registry (CCCR) embarked on a multi-phase effort to examine the availability of select BPFs and establish statewide requirements for their collection.

The CCCR, in consultation with an advisory committee and local partners, examined the availability of emerging BPFs and created code sets and procedures to collect them. Code sets were finalized using CAP checklists, the AJCC staging book, NAACCR SSDI documentation, and NCCN guidelines where available. The CCCR added a list of emerging cancer BPFs to its statewide cancer data collection requirements and shared a preliminary implementation plan with reporting facilities. In the first phase of data collection, facilities are required to collect select BPFs in the text field for diagnosis year 2018 and will be expected to accommodate the new codes in their data collection software for 2019 data. The CCCR continues to collaborate with the CDC and other relevant national and statewide partners to establish data collection procedures, automated edits, quality control procedures, and data submission specifications.

A number of Colorado's reporting facilities had already begun collecting BPFs using their own codes. The CCCR aligned facility coding with CAP, SSDI, AJCC, and NCCN guidelines to create a standardized code set to abstract ALK, EFGR, PD-L1, and ROS1 translation for late stage, non-small cell lung cancer cases diagnosed in 2017. The CCCR registrars collected lung BPFs from reporting facilities text or through Colorado's electronic data exchange and abstracted the data in central registry software.

Cancer biomarker and prognostic factor data provide valuable information about tumors that are crucial to clinicians. Colorado's initial endeavors indicate the feasibility and practicality of collecting BPF data. Preliminary results towards standardizing the collection and reporting of BPFs are promising and could contribute to understanding cancer in new ways.

**NAACCR
2G1**

CHANGES IN HEALTH-RELATED QUALITY OF LIFE IN OLDER WOMEN AFTER DIAGNOSIS WITH GYNECOLOGIC CANCER

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Background: The impact of gynecologic cancer on health-related quality of life (HRQOL) in older women is not fully understood. One major limitation of previous studies is the lack of HRQOL data prior to cancer diagnosis, which makes it difficult to discern the changes associated with cancer. While several studies have evaluated the impact of cancer treatment on HRQOL, few studies, if any, have measured how HRQOL changes from before to after gynecologic cancer diagnosis.

Purpose: To measure HRQOL changes after gynecologic cancer diagnosis.

Methods: Data were obtained from the Surveillance, Epidemiology, and End Results – Medicare Health Outcomes Survey database. Women aged 65 and older who were diagnosed with cervical, ovarian, or uterine cancer between baseline and follow-up surveys (n = 248; mean time from diagnosis = 12.54 + 7.11 months) were propensity-matched to cancer-free controls (n = 1,240). Logistic regression was used to assess risk of functional impairments and depressive symptoms at follow-up. Changes in HRQOL, as measured by the Medical Outcomes Study Short Form-36 and Veterans RAND 12-Item Survey, were estimated with mixed effects linear models.

Results: Women who were within 12 months of diagnosis and women diagnosed with regional/distant disease had significantly greater odds of functional impairment than controls at follow-up. HRQOL declines were greatest in those with advanced disease, with the most notable changes from baseline to follow-up observed for role limitations due to emotional problems (-8.60 vs. -3.42 in controls), general health (-7.76 vs. 0.10), and physical functioning (-7.70 vs. -1.67). There were significant decreases in physical functioning and role limitations due to emotional problems for all cancer patients regardless of time since diagnosis.

Conclusions: Gynecologic cancer has significant impacts on physical and mental aspects of HRQOL in older women. Interventions are needed to reduce pain, provide support, and prepare patients for changes in functioning and health.

**NAACCR
2G2**

INFLUENCE OF DEPRESSION ON TREATMENT AND SURVIVAL: A POPULATION-BASED STUDY FOR BREAST CANCER PATIENTS IN KENTUCKY

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Background: Depression is a common mental health condition among breast cancer patients. Because of limited availability of depression data, few prior studies have explored the impact of depression status on receipt of guideline-recommended cancer treatment and survival among breast cancer patients. A Kentucky Registry data set linked with health administrative claims provided the needed information to examine the impact of depression in a population-based research.

Methods: The Kentucky Cancer Registry KCR data linked with Medicare, Medicaid, and private insurance claims were used in this study. Total 6054 adult Female breast cancer patients diagnosed in 2007 to 2011 with a continuous insurance coverage 12 months prior and after the cancer diagnosis were included. Depression status of patients was based on ICD-9 diagnostic codes from the administrative claims. Based on the time of depression diagnosis, patients were classified into four groups: no depression; pre-diagnostic depression only; post-diagnostic depression only; and persistent depression. The effect of depression status on receiving guideline-recommended cancer treatment and survival was examined using multivariate logistic regression and Cox regression.

Results: Compared to no depression, pre-diagnostic depression was marginally significantly associated with less likelihood of receiving guideline-recommended treatment (odds ratio, 0.73; 95% CI, 0.52-1.01). Depression status was significantly associated with survival in a cox regression model controlling for demographics and clinic factors (p < 0.001). Both pre- and post-diagnostic depression only groups had significantly higher hazard ratios (HR) than no depression (HR 1.38, 95%CI 1.09-1.74; HR 1.48, 95%CI 1.22-1.80, respectively). The persistent depression group was not significant (HR 1.16, 95% 0.90-1.49).

Discussion: Patients with pre-diagnostic depression had a higher portion of not receiving guideline-recommended treatment and being at-risk for lower survival. No significant difference in survival between patients with no depression and persistent depression may indicate that early detection and well management of depression is critical in improving the survival among breast cancer patients with this mental health condition.

NAACCR

2G3

IMPACT OF DEPRESSION AND COMORBIDITY ON SUICIDE FOR CANCER PATIENTS

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Background: Suicide is currently one of the leading causes of death in the U.S., signaling a need for a greater focus on mental health. Suicide rates among cancer patients are about two times higher than in the general U.S. population. Although characteristics of suicide among cancer patients have been examined before, the impact of comorbidity and depression has not been well studied for U.S. cancer patients in a population-based setting. Elucidating the effects of comorbidity and depression on suicide will aid physicians in providing more holistic and better care to reduce the risk of suicide among cancer patients.

Methods: Several major cancers for Kentucky residents diagnosed in 2000-2013 were identified from the SEER*Medicare data. Suicide status is defined based on the cause of death variable. Depression status was based on ICD-9 diagnostic codes from the claims. Descriptive analysis, including bivariate analysis by comorbidity/ depression and suicide were performed. Suicide specific survival analysis was conducted to examine the effect of both comorbidity and depression along with other demographics and clinical factors. To further examine the impact of comorbidity and depression on younger patients, cancer patients diagnosed in 2007-2011 from the Kentucky Cancer Registry (KCR) linked with health administrative claims were utilized and analyzed.

Results: Out of 75,197 lung, female breast, colorectal and prostate cancer patients from the Medicare data, 106 patients committed suicide. While controlling for other factors, patients with depression had significant higher risk of committing suicide (hazard ratio (HR)=2.2, p=0.01) compared to patients without depression. Comorbidity and age were not found to be significantly associated with suicide. Sixty-five patients out of 53,630 cancer patients from the KCR data committed suicide. Similar results were found. Younger age had lower HR but it was not significant.

Discussion: The results of the studies agree with previous studies and provide meaningful knowledge that can be used for suicide prevention strategy. The significant elevated risk for patients with depression suggests the importance of managing patients' psychological conditions. Due to the small number of suicide patients found in the KCR data, further studies utilizing a larger sample size is needed.

NAACCR

2G4

IMPACT OF NAVIGATION AND NEIGHBORHOODS ON BREAST CANCER SURVIVORSHIP

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Background: Given the increasing number of breast cancer survivors in the United States, it is important to understand the multilevel factors that improve breast cancer survivorship in order to reduce health disparities persistent among underserved communities. Navigation of patients along the survivorship trajectory has been an important cornerstone of this area; however, no studies have documented its impact on quality of life or mortality. The impact of neighborhood on cancer survivorship outcomes is a promising area of research on both the individual and population level; however, few studies have accounted for the social and built environments that may impact survivorship.

Purpose: To develop a multilevel data infrastructure to understand how navigation impacts survivorship by linking neighborhood, registry and community data.

Methods: We linked data from Shanti's breast cancer care navigation clients with data from the Greater Bay Area Cancer Registry to build a unique infrastructure for breast cancer survivorship research. In addition, we appended small area social and built environment data from the California Neighborhoods Data System to examine impact of neighborhood on survivorship outcomes.

Results: We linked 1173 first primary breast cancer cases diagnosed from 2002-2016 in San Francisco to data from the Greater Bay Area Cancer Registry. There were fewer non-Hispanic whites, age 70 years and older, private insurance, and high socioeconomic status among cases in the navigation program compared to all breast cancer cases in San Francisco. Preliminary analyses also show differences in tumor and treatment characteristics, as well as social and built environment factors.

Conclusions/Implications: This data will help to better understand what effect neighborhood social and built environment factors have on the lives of navigation participants and what roles they play in their experience with cancer across the survivorship trajectory. This information will be used to develop better ways of measuring and meeting client needs. Additionally, the linkage work with the registry will result in a protocol that will be disseminated to other stakeholders to facilitate use of community data in addressing health inequities.



NAACCR
2G5

DO LATINAS WITH BREAST CANCER WHO LIVE IN ETHNIC ENCLAVES HAVE BETTER OR WORSE SURVIVAL? ANALYSIS OF CANCER REGISTRY DATA FROM CALIFORNIA AND TEXAS

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Introduction: Many Latinos live in ethnic enclaves – culturally distinct neighborhoods with high concentrations of individuals of the same ethnic origin, high linguistic isolation, a large share of recent immigrants, and ethnic specific businesses and resources. Prior studies were often limited to a single state and demonstrated mixed results which may be true regional differences in enclave effects or a result of different measures and analytic methods.

Methods: We conducted parallel analyses of California and Texas cancer registry data from adult (≥18 years of age) Latinas diagnosed with invasive breast cancer from 1996 to 2005, with follow-up through 2014 using the same measures and methods. We linked 2000 U.S. Census data to measure Latino enclaves and neighborhood socioeconomic status (nSES). We defined enclaves using an established multidimensional index of seven census tract measures (percent Latino, foreign-born, recent immigrants, and linguistically isolated, with limited English proficiency) split into statewide quintiles. We fitted Cox Proportional Hazard models for all-cause and breast cancer specific mortality adjusted for year of diagnosis, patient age, birthplace (with multiple imputation), tumor stage, histology, grade, and size, and clustering by census tract. We explored interactions of enclave residence with nSES.

Results: Among 40,716 Latinas, the majority (61.3% in CA, 70.5% in TX) lived in ethnic enclaves. Enclave residence was more common among foreign- vs. U.S.-born Latinas (72.0% vs 52.3% in CA and 82.4% vs. 68.5% in TX). In fully adjusted models for both states, foreign- vs. U.S.-born women were more likely to die from breast cancer and all causes. Living in an ethnic enclave and in neighborhoods with higher SES was independently associated with decreased mortality. Patterns were consistent in terms of direction and significance of associations across states for all-cause and breast cancer specific mortality. Latinas residing in higher SES neighborhoods, regardless of enclave status had lower mortality; those in non-enclave and lower SES neighborhoods had higher mortality.

Conclusions: Applying the same methods eliminated previously published inconsistent results about the association of enclave residence and mortality among Latinas with breast cancer. Future studies should focus on identifying the specific protective effects of enclave residence to inform interventions.

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CONCURRENT SESSION 2

IACR
2H1

CANCER SURVEILLANCE DATA OF RARE EPITHELIAL BREAST CANCERS-A REPORT FROM POPULATION BASED CANCER REGISTRIES IN INDIA

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Background: Rare Breast cancer is a divergent group of diseases which presents with varied clinical presentations, morphological characteristics and clinical management. This study aims to identify various rare breast tumors based on morphological characteristics through Population Based Cancer Registries (PBCRs) for the period of 1982-2014 in India. This helps in classifying them according to their relevant morphologies as rare tumors.

Methods: The data from five PBCRs under National Cancer Registry Programme in India was used to identify the rare epithelial tumors based on the morphological subtypes. The analysis was done for a collective period of 1982-2014 from the following PBCRs Bangalore (1982-2012), Bhopal (1988-2013), Chennai (1982-2013), Mumbai (1982-2012) and Delhi (1988-2012) and was stratified based on morphologies, using the codes from International Classification of Diseases for Oncology, 3rd Edition (ICD-O-3). The Crude Rate and Age Adjusted Incidence Rates (AAR per 10,00,000 population) was calculated using in-house developed PBCRD 2.1 software.

Result: The PBCRs data was analyzed for 4 Broad Categories which includes 20 Subtypes and was classified as Rare Epithelial tumors of Breast. A total of 3,309 cases have been reported from the various registries between 1982-2014. The number of cases and AARs were; Mammary Paget's disease of Breast (231 & 0.09), Special types of Adenocarcinoma of Breast (2,740 & 1.05), Metaplastic Carcinoma of Breast (292 & 0.11) and Salivary gland type tumors of breast (46 & 0.02) respectively.

Conclusion: The study gives an insight on the indication of size and burden of rare breast cancer in India, the data was done in Comparison with Rarecare Net for the European population and had similar epidemiological information. We are proposing on creating a repository for such cases where data from India will be pooled in as rare tumors. This exercise gives necessary information to further understand the sub classification, behaviors and rarity of the tumors in Indian scenario. The same approach for classification of rare tumors could be utilized for various other sites and a National Repository can be established.

NAACCR
2H2

BREAST CANCER TREATMENT ACCORDING TO PATHOGENIC VARIANTS IN CANCER SUSCEPTIBILITY GENES IN A POPULATION-BASED COHORT

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Background: Increasing use of germline genetic testing may have unintended consequences on breast cancer treatment. We know little about whether locoregional or systemic treatment deviates from guidelines for women with pathogenic variants (PV) in cancer susceptibility genes.

Methods: SEER data for all women aged ≥20 years, diagnosed with breast cancer in 2014-15 and reported to Georgia and California registries (N=77,588) were linked to germline genetic testing results from 4 laboratories that provided nearly all clinical testing. We examined initial treatment (≤XX months post-diagnosis) of stage <IV patients who linked to a genetic test: bilateral mastectomy (BLM) in candidates for surgery (unilateral, stages 0-III, N=11,385); adjuvant radiation in those with an indication (post-lumpectomy unless age ≥70, stage I, hormone receptor (HR)-positive and HER2-negative; N=4,575); and chemotherapy in those without definitive indication (stage I-II, HR-positive, HER2-negative and 21-gene recurrence score <30, N=5,530). We report the percent treated based on multivariable modeling, adjusted for age, race, stage, grade, insurance and socioeconomic status.

Results: The table shows that 9% of patients who linked to a genetic test result had a PV (N=1,283 of 14,240). Compared to women with negative results, those with *BRCA1/2* PVs were more likely to receive BLM, more likely to receive chemotherapy without definitive indication, and less likely to receive radiation when indicated. Lower-magnitude effects were seen with other PVs but not variants of uncertain significance (VUS).

Conclusions: In this population-based study, women with PVs in *BRCA1/2* or other cancer susceptibility genes may have a higher risk of receiving locoregional and systemic treatment that may not follow practice guidelines.

Test Results (mutually exclusive categories)	N	BLM Use % (95% CI)	Radiation Use% (95% CI)	Chemotherapy Use% (95% CI)
Negative	10,418	10.2 (9.6-10.9)	74.5 (73.1-75.9)	30.5 (29.4-31.6)
VUS	2,539	11.5 (10.1-13.0)	74.2 (71.2-77.2)	30.4 (28.1-32.8)
<i>BRCA1/2</i> PV	850	23.9 (20.7-27.0)	48.0 (38.1-57.8)	40.2 (35.2-45.1)
Other PV*	433	15.2 (11.4-18.9)	68.1 (59.8-76.3)	33.7 (27.9-39.5)

**ATM, CHEK2, PALB2, NBN, TP53, BARD1* and others

NAACCR
2H3

DIFFERENCES IN BREAST CANCER SURVIVAL BY MOLECULAR SUBTYPES IN THE UNITED STATES

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Background: While incidence rates of breast cancer molecular subtypes are well documented, effects of molecular subtypes on breast cancer-specific survival using largest population coverage to date are unknown in the U.S. population.

Purpose: The aims are: (1) Present breast cancer-specific survival by molecular subtypes and important clinical and demographic features using US population-based cancer registry data; (2) Demonstrate use of imputation algorithm to fill in missing biomarker information for survival analysis.

Methods: Using SEER (Surveillance, Epidemiology and End Results) cancer registry data, we assessed survival after breast cancer diagnosis among women diagnosed during 2010-2013 and followed through 12/31/2014. Breast cancer molecular subtypes defined by joint hormone receptor (HR, estrogen receptor [ER] and/or progesterone receptor [PR]) and HER2 status were assessed. Multiple imputation was used to fill in missing receptor status. Four-year breast cancer-specific survival per molecular subtypes and clinical/ demographic factors were calculated. A cox proportional hazards model was used to evaluate survival while controlling for clinical and demographic factors.

Results: The best survival pattern was observed among women with HR+/HER2- subtype (survival rate of 92.5% at four years), followed by HR+/HER2+ (90.3%), HR-/HER2+ (82.7%), and finally worst survival for triple-negative subtype (77.0%). Notably, failing to impute cases with missing receptor status leads to overestimation of survival because those with missing receptor status tend to have worse prognostic features. Survival differed substantially by stage at diagnosis. Among de novo stage IV disease, women with HR+/HER2+ subtype experienced better survival than those with HR+/HER2- subtype (45.5% vs 35.9%), even after controlling for other factors.

Conclusions: Divergence of survival curves in stage IV HR+/HER2+ vs. HR+/HER2- subtype is likely attributable to major advances in HER2-targeted treatment.

NOTES:

Horizontal lines for notes.

NAACCR 3A1

LUNG CANCER INCIDENCE RATES IN YOUNG WOMEN VERSUS YOUNG MEN: A SYSTEMATIC ANALYSIS IN 40 COUNTRIES

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Background: Previous studies in the United States and in few European countries reported higher lung cancer rates in young women than in young men.

Purpose: To examine the lung cancer incidence rates in young women versus young men in forty countries across the five continents.

Methods: Lung and bronchus cancer cases by 5-year age group (30-34, 35-39, 40-45, 50-54, 55-59, and 60-64 years) and 5-year calendar period (1993-1997, 1998-2002, 2003-2007, and 2008-2012) were extracted from Cancer Incidence in Five Continents volumes VIII to XI. Female-to-male incidence rate ratios (IRRs) were calculated by age group, calendar period of diagnosis, and birth cohort. Birth cohort was calculated by subtracting mid-age from mid calendar period, resulting in 10 ten-year overlapping birth cohorts referenced by their mid-year (1933, 1938, 1943, 1948, 1953, 1958, 1963, 1968, 1973, and 1978).

Results: Among men, age-specific lung cancer incidence rates from 1993-1997 to 2008-2012 generally decreased in all 40 countries. Among women, in contrast, trends in age-specific incidence rates during the corresponding periods were variable (increased, stabilized, or decreased) across age groups and countries. As a result, lung cancer rates in women crossed over those in men in several very high-income countries. By birth cohort, the female-to-male IRRs increased in successive younger birth cohorts and changed from less than unity to significantly greater than unity in Canada, Denmark, Germany, New Zealand, the Netherlands, and the United States. For example, the IRR in ages 45-49 years in The Netherlands increased from 0.69 (95%CI, 0.63-0.76) in those born circa 1948 to 1.52 (95%CI, 1.38-1.67) in those born circa in 1963. Similar patterns, though non-significant, were found in 23 additional countries. These crossovers were largely driven by increasing adenocarcinoma rates in females. For those countries with historical smoking data, daily cigarette smoking prevalence in women approached those of men, but rarely exceeded.

Conclusions: The emerging higher lung cancer incidence rates in young women than in young men is widespread across the world and is not fully explained by sex differences in cigarette smoking patterns. Future studies are needed to identify reasons for the higher incidence of lung cancer among young women.

NAACCR 3A2

GLOBAL TRENDS IN COLORECTAL CANCER INCIDENCE RATES IN YOUNG ADULTS

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Colorectal cancer (CRC) incidence rates are increasing in adults younger than age 50 years in the United States, despite rapid declines in older age groups. Although similar patterns have been reported in Australia and Canada, a comprehensive examination of global trends in early-onset CRC is lacking. We used data from Cancer Incidence in Five Continents (CI5), a collection of data from high quality population-based cancer registries, to report on CRC incidence rates and trends by age (20-49 years and >50 years) in 41 countries during 1978 to 2012, in addition to data up to 2016 for select registries (United States, Australia, New Zealand). Among the 22 mostly high-income countries where CRC incidence rates during the most recent decade of data either decreased or were stable in adults aged 50 and older, rates increased in adults 20-49 years in nine countries (United States, Canada, Australia, Germany, Denmark, Iceland, Slovenia, United Kingdom, and New Zealand), with the ten-year average annual percent change (AAPC) ranging from 0.8 (95% confidence interval [CI], 0.38-1.29) in Slovenia to 4.0 (95%CI, 2.1-6.0) in New Zealand. Aside from New Zealand, the most rapid increases in adults 20-49 years occurred in Korea (AAPC, 4.2 [95%CI, 3.4-5.0]) and Cyprus (AAPC, 3.8 [95%CI, 1.4-6.2]), where rates also increased in ages >50 years, but at a slightly slower pace. In contrast, incidence rates in Austria and Italy decreased in adults 20-49 years (AAPCs, -0.9 [95%CI, -1.7- -0.2] and -1.0 [95%CI, -2.0- -0.1], respectively), as well as in ages 50 and older. During 2008-2012, the age-standardized incidence rate in ages 20-49 years ranged from 3.5 per 100,000 (95%CI, 3.2-3.9) in India (Chennai) to 12.9 (95%CI, 12.6-13.3) in Korea. The second- and third-highest incidence rates were in Australia (11.2, 95%CI, 10.9-11.5) and the United States (10.0, 95%CI, 9.8-10.3), where rates are increasing by >2% annually. In conclusion, CRC incidence rates are uniquely increasing in young adults in several high-income countries, signaling changes in early-age exposures that influence large bowel carcinogenesis. Further studies are needed to elucidate specific factors contributing to this trend.

NAACCR
3A3

GLOBAL VARIATION IN PROSTATE CANCER INCIDENCE AND MORTALITY RATES, 1980-2013

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Background: Previous studies documented significant international variation in prostate cancer rates due to differences in detection practices, availability of treatment, and genetic factors.

Purpose: To provide updated contemporary prostate cancer incidence and mortality patterns across five continents using the most recent cancer incidence data from the International Agency for Research on Cancer and mortality data from the World Health Organization (WHO).

Methods: We present estimated age-standardized prostate cancer incidence and mortality rates by country and WHO regions for 2018 based on GLOBOCAN. We examined long-term (1980 onwards) trends in prostate cancer incidence and mortality rates for 38 countries with high quality population-based incidence and mortality data. Trends were expressed as annual percent change using Joinpoint model. We also examined short-term (most recent 5 years) trends in prostate cancer among 44 countries with available incidence data and 71 countries with available mortality data.

Results: The highest incidence rates during the most recent 5 years are found in Brazil, Lithuania, and Australia, whereas the lowest incidence rates are found in Asia. The highest mortality rates are found in the Caribbean, sub-Saharan Africa, parts of former Soviet Union, whereas the lowest rates are found in Asia. Of the 44 countries with high quality incidence data, prostate cancer incidence rates during the most recent five data years increased in 4 countries (with Bulgaria showing the largest increase), decreased in 7 countries (with the biggest decrease in the United States), and stabilized in the remaining 31 countries. During the same time period, in contrast, among the 71 countries considered for the mortality trend, rates decreased in 14 countries, increased in 3 countries, and remained stable in 54 countries.

Conclusions: In 2018, prostate cancer was the most commonly diagnosed cancer among men in 96 countries and the leading cause of death in 51 countries. In the most recent 5 years of data examined, prostate cancer incidence and mortality rates are decreasing or stabilizing in most parts of the world. Future studies should monitor trends in mortality rates and late-stage disease to assess the impact of reduction in PSA testing in several countries.

NAACCR
3A4

U.S. CANCER STATISTICS PUBLIC USE DATABASE — ANNUAL PERCENT CHANGE OF SCREENING-AMENABLE CANCERS BY STATE, UNITED STATES, 2011-2015

Mary Elizabeth O'Neil¹; Sarah Henley¹; Simple Singh¹; Vicki Benard¹; **Reda Wilson**¹; Jessica King¹; Manxia Wu¹

¹Centers for Disease Control and Prevention, Atlanta, GA, United States

Background: Together, the Centers for Disease Control and Prevention's (CDC) National Program of Cancer Registries (NPCR) and the National Cancer Institute's (NCI) Surveillance, Epidemiology, and End Results (SEER) collect high quality cancer incidence data on 100% of the U.S. population. The programs' combined data are referred to as U.S. Cancer Statistics. Researchers can analyze information on several million de-identified cancer cases using the U.S. Cancer Statistics public use database, including trends in incidence rates of screening-amenable cancers by geographic region. Regular screening is recommended for breast, cervical, colorectal, and lung cancers to identify malignancies early when they are easier to treat.

Objective: Analyze 5-year incidence trends of 4 screening-amenable cancers by state.

Methods: We used the U.S. Cancer Statistics public use database, which included data submitted to CDC and NCI in November 2017, to assess trends in age-adjusted incidence rates of invasive, screening-amenable cancers – female breast, cervical, colorectal, and lung – in all 50 states and D.C., during 2011–2015. The annual percent change (APC) was calculated using weighted least squares regression in SEER*Stat (version 8.3.5). Rates were considered to increase if $APC > 0$ ($P < 0.05$) or decrease if $APC < 0$ ($P < 0.05$); otherwise, rates were considered stable.

Results: The APC from 2011-2015 varied among states and by cancer type. By cancer type, female breast cancer increased in 3 states and decreased in 1; cervical cancer increased in 3 states; colorectal cancer decreased in 16 states and increased in 1; and lung cancer decreased in 26 states.

Conclusion: Trends in screening-amenable cancers varied throughout the country. Differences in incidence rate trends might be explained partially by variations in risk factors and partially by use of screening tests. Community-based initiatives can reduce exposure to cancer risk factors over the life course, promote healthy behaviors, and improve adherence to appropriate clinical preventive services such as cancer screening. The impact of such initiatives can be monitored using the U.S. Cancer Statistics public use database available at www.cdc.gov/cancer/public-use.

NAACCR
3B1

ASSESSING POPULATION-BASED CANCER SURVIVAL TRENDS BY USING THE NORTH AMERICAN CANCER SURVIVAL INDEX UNITED STATES, 2005–2014

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Background: Standardized population-based cancer survival indices can help measure characteristics of healthcare delivery systems that impact survival, e.g. early diagnosis and access to care, and monitor progress toward national cancer survival objectives. Standardizing population-based all-site cancer survival summary indices by underlying age, sex, and primary cancer site distributions increases comparability across geographic or temporal estimates. European researchers have used age- and case mix-adjusted survival estimates to compare survival across countries, local areas, and over time. These approaches have been less commonly applied in North America.

Purpose: To identify survival disparities, we assessed United States (U.S.) cancer survival trends by race, sex, and registry via a recently introduced all-site survival summary index, the North American Cancer Survival Index (CSI).

Methods: Forty-two cancer registries' data (covering ~83% of U.S. population) were used to calculate 60-month CSIs during 2005–2011, 2006–2012, 2007–2013, and 2008–2014 cancer diagnosis and follow-up cohorts. CSIs are sums of age-, sex- and cancer site-standardized relative survival ratios, weighted by relative distributions of North American 2006–2008 incident cancer diagnoses. We calculated CSIs and corresponding 95% confidence intervals (CI) and assessed survival differences by Black versus White race, sex, and registry within follow-up and diagnosis cohorts and over time (2005–2011 versus 2008–2014).

Results: Survival increased from 63.5% (95% CI: 63.4%, 63.5%) in 2005–2011 to 64.1% (95% CI: 64.1%, 64.2%) in 2008–2014. CSI estimates for women and men increased by 0.9% and 0.5%, respectively; and the largest survival improvement was reported among black women (1.4%). Disparities in survival among Blacks versus survival among Whites decreased by 0.5% over time. However, during 2008–2014, CSI estimates were 7.7% lower for Blacks (56.9%; 95% CI: 56.7%, 57.1%) compared with Whites (64.6%; 95% CI: 64.6%, 64.7%).

Conclusions: Cancer survival, measured with the CSI, has improved overall and among Blacks and Whites. However, a large survival gap persists between Blacks and Whites. Public health practitioners and decision makers can use the CSI to identify and target interventions to populations experiencing lower than expected survival.

IACR
3B2

EXPLORING THE REASONS FOR THE PERSISTENT CANCER SURVIVAL GAP BETWEEN THE UK AND AUSTRALIA, CANADA, DENMARK, NORWAY AND SWEDEN

Michel Coleman¹; **Claudia Allemani**¹; Veronica Di Carlo¹; Melissa Matz¹; on behalf of the Concord Working Group

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Background: Cancer survival in the UK has been lower than in comparably wealthy European countries since the early 1990s. This deficit has prompted consecutive strategies for cancer control in the UK since 2000. For patients diagnosed with a cancer of the colon-rectum, lung, breast or ovary during 1995-2007, survival in the UK was also lower than in Australia, Canada, Norway and Sweden. The third cycle of the CONCORD programme (CONCORD-3) highlighted a general increase in survival in 71 countries, including the UK, among patients diagnosed with one of 18 malignancies during 2000-2014. However, despite a noteworthy improvement in survival for breast cancer, survival in the UK for several cancers still lags behind that of other countries with similar wealth and health systems.

Purpose: To exploit the CONCORD-3 database to explore the reasons why cancer survival is lower in the UK than in Australia, Canada, Denmark, Norway and Sweden, all of which have universal access to healthcare and longstanding, high-quality cancer registration.

Methods: We will analyse data for over 4 million patients diagnosed during 2000-2014 with a cancer of the stomach, colon, rectum, pancreas, lung, breast or ovary in Australia, Canada, Denmark, Norway, Sweden and the UK.

We will examine trends in 1- and 5-year net survival by age at diagnosis, tumour sub-type or morphology, and whenever possible, by stage at diagnosis. Net survival is the probability for cancer patients to survive their cancer, after controlling for competing risks of death (background mortality). To control for background mortality, we will use the life tables produced for CONCORD-3. When appropriate, survival will be age-standardised using the ICSS weights.

Results: We will report the distribution of age at diagnosis, tumour morphology and stage by country and jurisdiction. We will report net survival trends by country and jurisdiction in relation to these key explanatory variables.

Conclusions: Results are likely to prompt further developments in cancer control strategy in the UK.

IACR
3B3

DISEASE FREE SURVIVAL FOR NON-METASTATIC COLORECTAL CANCER CASES IN THREE REFERRAL HOSPITALS IN IRAN; INTERIM REPORT OF THE CRC QUALITY REGISTRY NETWORK (QRN-CRC)

Mohammad Reza Rouhollahi; Kazem Zendeheidi¹; Mohammad Ali Mohagheghi¹; Seyed Hossein¹; Yahyazadeh²; Farid Azmoudeh Ardalan¹; Shamim Gharagozloo¹; Habibollah Mahmoodzadeh¹; Mehdi Aghili¹; Mehrzad Mirzania¹; Monireh Sadat Seyyedsalehi¹

¹Cancer Research Institute, Iran

²Clinical Cancer Research Center, Milad Hospital, Iran

Introduction: Colorectal cancer (CRC) is the third frequent type of cancer in Iran although there is no survival estimation of CRC in our country. In 2013 relying on the data of the Clinical Cancer Registry the Quality Registry Network for CRC care (QRN-CRC) established to evaluate the quality of care and particularly estimate the survival.

Data & Methods: All non-metastatic CRC cases (M0 – Stage I-III, based on AJCC, 7th ed.) colon and rectum cancer underwent surgery within six months from the diagnosis during the period of 2013-2014 in two academic and one non-academic high-volume cancer centers. We included only laparotomy surgery in this survival study. Five-year disease free survival computed with the Kaplan-Meier method and significant differences respectively to localization and stage of the tumor evaluated through the Log-Rank test.

Results: 481 cases diagnosed in 2013-2014 and operated in the cancer centers, members of the QRN-CRC, of which 427 cases (88.7%) followed up them to the end of 2018. 209 (49%) of them are colon and 216 (51%) are rectum. The classification of patients based on the stage at diagnosis were 22, 164, 229 cases respectively for stages I, II and III and 12 cases were unknown. We did not excluded the margin involved cases. 272 cases were men and 155 (37.3%) women. The patients' age (mean ± SD) was 58.1±0.85 years for men and 57.6±1.03 for women. Five-year DFS in both colon and rectal cancer is about 75% and for stage I, II, III are 88.2, 78.4 and 63.1 percent, respectively. Colon Rectum Colon-Rectum N % N % N % Local recurrence 5 2.39% 17 7.62% 22 5.07% Distant metastasis 51 24.40% 55 24.34% 107 24.49% No recurrence 156 74.64% 171 75.66% 328 75.06%. Table 1. Five-year recurrence rate Fig 1. Five-year disease free survival according to the a) localization of the tumor - colon or rectum; b) stage at diagnosis; c) colon cancers underwent surgery in two academic center and one non-academic but high-volume center. Incidence period 2013-2015. Follow-up date: end of 2018.

Conclusion: This is an interim report of DFS for patients diagnosed at 2013-2014 and underwent surgery in three members of QRN-CRC. Five year disease free survival is significantly associated with both localization and stage of the disease. It can be expected this survival status is more than average of DFS of patients over the country, although it needs a performance and comorbidity adjustment because these centers are referral for low performance and complicated patients.

IACR
3B4

EDUCATION AND STAGE OF CANCER AT DIAGNOSIS: A POPULATION-BASED STUDY IN SOUTH INDIA

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²Canada Research Chair in Population Cancer Care

Background: Lower socio-economic status is associated with inferior cancer survival in high-income countries; whether this applies to low-middle income countries (LMIC) is not well described. Here we use a population-based cancer registry (PBCR) data to explore the association between educational level and stage of cancer at diagnosis in South India.

Materials & Methods: The Trivandrum District PBCR was used to identify all cases of breast and cervical cancer (women) and oral cavity (OC) and lung cancer (men) diagnosed 2012-2014. The primary exposure of interest was educational status classified as illiterate/primary school, middle school, or post-secondary school. The primary outcome was the proportion of patients with advanced stage disease at diagnosis defined as stage III/IV (breast, cervix, OC) or regional/metastatic (lung). The Marascuilo procedure was used to compare multiple proportions.

Results: The study population included 4547 patients with breast (n=2283), cervix (n=481), OC (n=797), and lung (n=986) cancer. Educational status was 22%, 19%, and 26% for illiterate/primary, middle, and post-secondary. Educational status was missing for 33% of patients. The proportion of all patients with advanced stage disease was 37% (breast), 39% (cervix), 67% (OC), and 88% (lung). Patients with illiterate/primary school were considerably more likely to have advanced breast (50% vs 39% vs 36%, p < 0.001), cervix (46%, 43%, 24%, p=0.002) and OC (77%, 76%, 59% p < 0.001) cancer compared to patients with higher educational levels. The proportion of patients with advanced lung cancer did not vary across educational levels (89%, 84%, 88%, p=0.350).

Conclusions: A substantial proportion of patients in South India have advanced cancer at the time of diagnosis; this is particularly true among those with lowest levels of education. Future health awareness and preventive interventions will need to target less educated communities to reduce delays in seeking medical care for cancer.

NAACCR
3C1

CLOUD-BASED SOLUTION FOR REAL-TIME REPORTING OF CANCER DATA

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Background: Cancer registry data are critical for measuring progress and targeting cancer prevention and control actions. All healthcare providers in the US are legally required to report cancer cases, but data are often unavailable for months to years after diagnosis, which limits data utility. Relative to other domains that rely on information technology, the current process of cancer registration has changed little in the last twenty-five years. The manual processes for current data collection and reporting creates time lags and inefficiencies. More timely data publication is achievable if these inefficiencies are removed.

Purpose: To report on the Centers for Disease Control and Prevention National Program of Cancer Registries project plans for real-time reporting to central cancer registries using a national cloud-based computing platform (CBCP).

Methods/Approach: Since pathology reports first identify over 90% of all cancer cases, the CBCP would become a national portal for all pathology labs to report cases. In real-time, the pathology labs send electronic reports to the CBCP, which automatically processes them. The CBCP would also notify the physician that the abstracted data can be requested via an interface. The provider and cancer registry use a common CBCP dashboard to monitor data reporting and completeness; the central cancer registry will have direct access to all CBCP data for their jurisdiction.

Results: Real-time reporting to central cancer registries is not new, but there is a growing consensus to support a CBCP nationally. Implementation of real-time reporting will enable earlier analysis/publication of cancer data, resulting in improved efficiencies, decreased long-term costs, improved data quality, and expansion of core data elements.

Conclusion: This project would have a major impact on public and clinical health. Real-time reporting would allow for: faster identification of cancer cases for the evaluation and improvement of cancer control strategies; better-informed decisions on resource allocation for cancer prevention, control, and treatment; timelier identification of cancer cases for clinical trials; and scalability for real-time reporting of other chronic and infectious disease data.

NAACCR
3C2

AUDITING HPV DATA QUALITY IN SEER VIA TEXT-MINING ALGORITHM

Rebecca Ehrenkrantz; Jennifer Stevens²; Ariel Brest²; Clara Lam¹; Peggy Adamo¹; Valentina Petkov³; Serban Negoita¹

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³NIH/NCI

Background: Human Papilloma Virus (HPV) can be pathognomonic of certain head and neck cancers, most commonly oropharyngeal squamous cell carcinomas. Lab tests can detect HPV through a variety of targets, but the most common test is for the surrogate HPV biomarker p16. The Surveillance, Epidemiology, and End-Results (SEER) program has been capturing HPV for these carcinomas via the Collaborative Stage Site-Specific Factor 10 (SSF 10) data item since 2010. Lack of guidance related to coding p16 within SSF 10 prompted quality concerns that relevant information is being omitted or coded incorrectly.

Objectives: The main objective was to develop an algorithm that can be used to identify missing HPV data and coding errors. Ultimately, this analysis will improve completeness and accuracy for HPV status in SEER and support the establishment of a quality benchmark for data release to the public.

Methods: Cases were selected for inclusion based on Collaborative Stage schemas for years 2010-2015. Cases with scanned reports were excluded from analysis. A text-mining algorithm was developed to identify the terms HPV and p16 within NAACCR abstracts and pathology reports, then the HPV status of all hits was classified as positive, negative, or unknown.

Results: For the five SEER registries that volunteered to participate in this audit, there were 2,349 abstract-only cases, 90 pathology report only cases, and 3,794 cases with both types of report for 6,233 tumors. HPV was not found in the text 68.9% of the time and p16 was not found in the text 56.9% of the time. Of the 1,512 tumors with an algorithm-detected HPV status of positive or negative, HPV was positive in 64.6% of tumors. Of the 2,317 tumors with an algorithm-detected p16 status of positive or negative, p16 was positive in 77.5% of tumors. Out of 3,829 cases for which HPV or p16 status was detected, 72.4% were positive.

Implications/Next steps: Final results will be compared to determine the agreement of extracted and previously coded values. The SEER program will provide registries with access to the final algorithm to use as a data quality tool and to update their consolidated cases if they choose.

NAACCR 3C3

TEXT MINING FOR DATA QUALITY ANALYSIS OF MELANOMA TUMOR DEPTH

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Background: Breslow depth of invasion is the most important determinant of prognosis for melanomas. The Surveillance, Epidemiology and End Results (SEER) program has been capturing this variable for many years. Recent reports on data collected for this variable have identified potential data quality concerns including possible coding errors such as implied decimal errors, transcription errors, possible miscoding of tumor size for tumor depth, and incomplete information. To ensure high quality data in SEER, we initiated an audit to assess the collection and abstraction of melanoma tumor depth.

Objectives: The main objectives of this data quality audit are to develop and test an algorithm to identify accurate melanoma depth measurement values, assess error distribution, and to provide a method for automatic error correction for registries to implement along with improved training materials.

Methods: Malignant melanomas diagnosed between 2010-2014 were selected for algorithm development and testing. Development of a text-mining algorithm involved identifying terms and related phrases to extract the values from NAACCR abstracts and pathology reports. We collaborated with three SEER registries to evaluate the quality of the consolidated Breslow depth value using these text mining methods.

Results: Preliminary results are available from one of the three registries involved. The consolidated registry values were compared to the values identified using the text mining algorithm. A subset of cases was coded by expert abstractors to create a “gold standard” set of cases. The gold standard values were compared to the consolidated values and to the text mining values. 240 cases were identified to conduct a cross comparison between the consolidated value, machine value, and “gold standard” value.

Conclusions/Implications: Final analyses will be conducted and compared using information from all three registries to determine the agreement between the three values. The SEER program will provide the final results, algorithm specifications, recommendations for corrections, and next steps including proposed educational objectives.

IACR 3C4

SUPPORTING PRECISE DATA ANALYSIS WITHOUT RELEASING PATIENT RECORDS: THE SIMULACRUM IN ACTION

Cong Chen¹; Paul Clarke²; Lora Frayling²; Sally Vernon¹; Brian Shand; Pesheya Doubleday¹; Jem Rashbass^{3,1}

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Background: All cancers in England are registered by the National Cancer Registration and Analysis Service. Data on diagnosis, treatment and outcomes is of great value to the NHS, central government, external academic, industrial and third sector analysts. Cancer registration data must be requested through the Office for Data Release, ensuring patient privacy is upheld and requesters meet requirements for security and confidentiality.

Purpose: Individuals and organisations benefit from being able to develop statistical, machine learning or other analyses on cancer registration data without the risks and complexities of accessing real patient-record-level data. We achieve this by creating a synthetic dataset with the same data structure as the analytical datasets by analysing and reproducing distributions of fields and pairs of fields from those datasets: the Simulacrum. This is verifiably safe and does not reveal information about specific cancer patients.

Methods: Data on all tumours diagnosed in England between 2013 and 2015 (around 1.4 million) and associated chemotherapy data were used to create the Simulacrum. This was assessed for compatibility with UK patient privacy regulations and made available to the public for download [1]. A selection of statistical distributions [2] were also made available to document the process and demonstrate how privacy was ensured.

Results: The dataset and supporting documentation were made available in November 2018. External requesters can accurately estimate cohorts and develop statistical code based on the synthetic dataset designed to produce aggregate, non-disclosive data when run on the analytical datasets. This is then assessed and made available to the requester with lower risk to confidentiality than if the requester had needed the individual patient records. The workload of internal and external analysts is also reduced by better understanding of the data and data quality.

Conclusions: The ability to request and create statistics without sharing patient records is a game changer for patient privacy and removes obstacles to cancer research. The Simulacrum allows researchers to write working code and receive statistics while maintaining patient confidentiality. Extensions of the Simulacrum will additionally cover radiotherapy treatment and molecular testing data.

[1] <https://simulacrum.healthdatainsight.org.uk/>

[2] <https://simulacrum.healthdatainsight.org.uk/developing-the-simulacrum/>

IACR
3C5

PSEUDONYMISED MATCHING: ROBUSTLY LINKING MOLECULAR AND PRESCRIPTION DATA TO CANCER REGISTRY DATA IN ENGLAND

Brian Shand; Fiona McDonald¹; Katherine Henson¹; **Cong Chen**

¹Public Health England, Cambridge, UK

Background: Matching cancer registry data to external feeds such as molecular and prescription data is challenging: the English national cancer registration service (NCRAS) cannot reveal who has cancer to external providers and cannot hold identifiable, linked data for patients without cancer. Pseudonymisation techniques help overcome this, transforming key linkage identifiers into anonymised identifiers (pseudo-IDs). We extended the OpenPseudonymiser approach [<https://www.openpseudonymiser.org>], improving patient matching and supporting extra data fields that can be decrypted only when patients in external data match cancer registry data.

Methods: A one-way hash function converts linkage demographics (e.g. national identifier such as NHS number, or postcode and birthdate) into a pseudo-ID. We add cryptographic salt before hashing so pseudo-IDs cannot be re-identified by outside parties. This salt is secret to those doing the pseudonymisation and kept securely in encrypted key bundles. By pseudonymising two data sources using the same salt, matching patients can be found without identifying the remainder.

To encrypt additional demographics or other data, the plaintext linkage demographics and a secondary salt generate a symmetric encryption key. Only someone holding both the secure salt and linkage demographics can decrypt this additional data.

Results: Public Health England has access to pseudonymised national prescription data feeds from NHS Business Services Authority, and BRCA and other genetic mutation screening data. These have been linked to the cancer registry. Decrypted birthdates help validate NHS number matches. Four months of prescription data (332 million prescriptions, 29 million people) matched 1.6 million cancer patients: 88% of living cancer patients had a prescription record.

Non-disclosive fields need not be pseudonymised, so the pseudonymised dataset allows baseline comparisons against the cancer-linked cohort. For BRCA screening data, this identified nearly 1,300 unique variants from 7,000 screening patients, and an overall variant detection rate of about 25%. In prescription data, cancer patients were compared with age-matched controls.

Conclusion: Linking data from external sources to the cancer registry creates a powerful resource to better understand patient experience over their lifetimes. Pseudonymised matching is a powerful tool to unlock data sources which include people without cancer. This has been demonstrated for prescribing and screening data

NOTES:

NAACCR 3D1

THE PROGRESS OF NPCR AUDITS - WHAT WE HAVE DONE, WHAT WE HAVE LEARNED, AND WHERE ARE WE GOING NOW

Mary Lewis¹

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Background: Cancer surveillance data are a crucial part of cancer surveillance systems because they are used for planning, operating, funding and evaluating cancer control programs. The quality of data collected and reported by central cancer registries depends on completeness of reporting; practices in place at the central cancer registry for data quality editing and record consolidation; and adherence to national program standards (i.e. text documentation). Complete and accurate data are essential for estimating variations in and changes among population subgroups over time. Since 1995, NPCR has performed various audits on central cancer registry data in an effort to assess completeness of reporting, evaluate central cancer registry operations, and determine current training needs.

Purpose: This presentation will share the progress of the NPCR audits, the lessons learned, and some future evaluation plans.

Methods: NPCR has utilized various methods over the years ranging from on-site re-abstracting and case-finding audits to submission of standardized data files that include text information.

Results: Assessment has provided NPCR with data for needed changes in education of data reporters, validity of coded material, and enhancement of central cancer registry procedures.

Conclusions: NPCR will continue evaluation efforts in assessing staging and treatment data. Results from future evaluations will identify the type and source of the challenges with data collection to improve and enhance education and training needs.

NAACCR 3D2

EARLY CASE CAPTURE OF PEDIATRIC AND YOUNG ADULT CANCERS: CONSIDERATIONS FOR FUTURE RAPID CASE ASCERTAINMENT STUDIES

Mary Anne Lynch¹; Xiaocheng Wu¹; Brent Mumphy²; Mei-Chin Hsieh¹

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²LSU Health Sciences Center, New Orleans, LA, United States

Introduction: The Center for Disease Control and Prevention's Early Case Capture (ECC) study of Pediatric and Young Adult Cancer (PYAC) was funded in 2011 and 2014 in response to the Caroline Pryce Walker Conquer Childhood Cancer act. The overarching goal was to establish a national childhood cancer registry to build and enhance the infrastructure of seven central registries to capture newly diagnosed PYAC cases within 30 days, and promote public awareness and data use. The approaches used to improve the complete, timely, and accurate reporting of PYAC cases will be discussed.

Purpose: To present innovative strategies developed to optimize rapid case ascertainment (RCA) during the ECC- PYAC study, and discuss how these techniques can inform special studies and registry-wide efforts to enhance and sustain timely reporting.

Methods: The LTR had a multipronged approach to improve the timeliness of PYAC reporting; the most impactful of which was the widespread implementation of e-pathology. Many PYAC cases are diagnosed solely through imaging, making them difficult to identify quickly using traditional case-finding methods. New data sources such as electronic radiology (e-radiology) and monthly Admission, Discharge, Transfer (ADT) ICD-10 cancer diagnosis codes were used to improve timely reporting of clinical diagnoses, which represent 11% of PYAC cases in Louisiana. We will explore the use of AIM's Abrevo software, which may help expand the utilization of e-radiology for casefinding by minimizing the manual screening of such records.

Results: ECC-PYAC case ascertainment has improved from 23% reported within 30 days in 2012 to 85% in 2018. Use of new data sources such as e-radiology and hospital ADT feeds for commonly clinically diagnosed sites is more sustainable than relying on treating facilities to submit cases. Importing e-radiology reports into SEER*DMS reduced manual review substantially. The feasibility and challenges of using novel data sources for future studies and broader surveillance efforts will be discussed.

Conclusions: Timeliness of PYAC case reporting in Louisiana has improved markedly with the implementation of e-pathology, e-radiology, and ADT feeds particularly in RCA of clinical cases. Potential future use of these data sources beyond the ECC-PYAC project will be presented.

**NAACCR
3D3**

IMPROVING MORTALITY REPORTING TO STATE CANCER REGISTRIES THROUGH NATIONAL VITAL STATISTICS SYSTEM MODERNIZATION EFFORTS

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Background: The Centers for Disease Control and Prevention (CDC) National Center for Health Statistics (NCHS) maintains the National Vital Statistics System (NVSS) to assist in monitoring the Nation's health by having states report birth and deaths to NCHS. NCHS initiated a project to improve the timeliness and quality of death reporting through development of application programming interfaces (APIs) to facilitate data exchange between relevant systems within the states. This project is a component of an NCHS-wide initiative to improve the quality of the NVSS. As the NVSS is a major component to the cancer surveillance community's operations and success, the CDC National Program of Cancer Registries (NPCR) is a partner in this project to enable automation of electronic exchange of mortality data between state Electronic Death Registration Systems (EDRS) and state cancer registries using APIs.

Purpose: State cancer registries will be able to receive mortality reports within two days of the State Vital Records Office receiving a coded death certificate to: 1) improve timely death information for existing records, and 2) improve timely identification of records that require follow-back activities.

Methods: NPCR is working with the Vital Records Offices and cancer registries in 14 states participating in NCHS' implementation project to develop a single standard for format and content of coded death records for transmission to state cancer registries, using the Health Level Seven (HL7) Fast Healthcare Interoperability Resources (FHIR) standard. Making use of the APIs developed for the EDRS, NPCR will develop tools for state cancer registries to receive and process death records. NPCR will also work with NCHS on developing natural language processing (NLP) methods for literal text in death records.

Results: We will provide an update on the status of development and implementation by participating states.

Conclusions/Implications: Building on the NCHS efforts to modernize the national and state mortality reporting systems, central cancer registries will be able to receive death records from their state EDRS's in a more timely and automated manner. The impact will be enhancement of cancer registry data quality and usefulness of death information and improved timeliness by reducing the time in identifying unreported cancer cases.

**IACR
3D4**

ACTIVE CASE FINDING TO ACHIEVE COMPLETENESS, THE CURRENT MODEL DEPLOYED IN NAIROBI POPULATION BASED CANCER REGISTRY

Nathan Mauti¹; Anne Korir²

¹Kenya Medical Research Institute, Nairobi, Kenya

²Nairobi Cancer Registry, Kenya

Background: Nairobi Population-based cancer registry (NPBCR) collects data on the occurrence of cancer on Nairobi County, the 47th county in Kenya. Cancer registry staff (Cancer Registrars) visit various health facilities and other sources to collect data on cancer occurrence. In Africa cancer registries have no uniform or standard way of collecting cancer data. Different cancer registries have different methods on how they obtain cancer information.

Objective: The aim of this project was to describe the processes used by NPBCR to collect/document cancer occurrence in Nairobi County and analyze sources of information to measure the burden of case finding and abstraction to achieve completeness on confirmed cancer cases with mandatory variables captured by NPBCR.

Methods: Cancer registry staffs (Cancer Registrars) were interviewed on the methods of data collection used during case finding and abstraction. A sample of data from the cancer registry database (canreg5) was obtained. Cases year of diagnosis 2014-2016 were subjected to analysis using scientific package social scientist (SPSS) to determine the number of sources each case was collected from, this helped the study to understand the level of efforts and completeness strategies put in place to obtain mandatory variables as described by the registry.

Results: Case finding consisted of both electronic and manual depending on health information systems from various health facilities, however transmission to the registry was purely manual. To achieve completeness as classified by NPBCR 80% of cancer cases registered had multiple sources of information, while 20% accounted for cases that were obtained from single sources. Some cases had up to a 4th source especially updating information such as vital status and treatment.

Conclusion: Cancer registration in Kenya, NPBCR is still manual due to existing different information systems challenges which do not talk to each other from the sources of data. To achieve completeness for most cases cancer registrars have a task to synthesize information from various sources, health facilities, labs, registration of births and deaths and private doctor's clinics. Further stable funding is necessary and synchronizing of information systems (Health and others) to achieve proper transmission of cancer data to registries.

CONCURRENT SESSION 3

WEDNESDAY, JUNE 12

8:00 AM - 9:30 AM

VIRTUAL POOLED REGISTRY

E

NAACCR

3E1

VPR-CLS PILOT TESTING AND NEXT STEPS

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Background: The Virtual Pooled Registry Cancer Linkage System (VPR-CLS) is an online service that efficiently connects researchers with multiple cancer registries to perform minimal risk linkage studies using a standard linkage methodology and streamlined application process. The VPR-CLS has been developed in two distinct phases. Phase I supports a secure, standardized linkage and release of aggregate match counts to the researcher. Phase II streamlines and tracks applications for release of individual-level cancer data on matched cases.

Purpose: The author will provide information on VPR-CLS pilot testing of both Phase I and Phase II functionality.

Methods: NAACCR contacted study investigators who have expressed interest in the VPR-CLS to determine their interest in pilot testing when Phase I functionality was finalized and again when Phase II was nearing completion. A core VPR workgroup evaluated the study details and determined the best test candidates. A successful test of the Phase I functionality was completed in the fall of 2018 using Match*Pro linkage software. Two additional Phase I tests will be completed in early 2019 and two additional cohorts will begin pilot testing through to Phase II. Thirty-five registries have agreed to participate.

Results: In the first Phase I pilot test, 86% of registries linked with a cohort of 35,649 childhood cancer survivors within a 2-week timeframe and uploaded their resulting match count reports. Because the cohort includes cancer survivors with self-report of subsequent cancer, these reports provided the number of matches with the cohort's index cancer and the number of matches with a subsequent cancer. Match counts from all 35 registries indicate that the number of subsequent cancers is nearly doubled through linkage with registries prior to manual review. Twenty-one registries performed manual review to assess linkage performance in relation to completeness of linkage variables. These results, along with the status of the additional pilot linkages will be presented and next steps will be discussed.

Conclusions: Pilot testing the VPR-CLS functionality has successfully demonstrated proof of concept, provided feedback on areas for enhancement, and engaged both registries and researchers in these important initiatives.

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3E2

WEB PORTAL FOR VIRTUAL POOLED REGISTRY CANCER LINKAGE SYSTEM (VPR-CLS) PHASE I AND PHASE II FUNCTIONALITY

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Background: The Virtual Pooled Registry Cancer Linkage System (VPR-CLS) has been created to address the inability of researchers to efficiently perform linkages with multiple registries. Funded by NCI and managed by NAACCR, the VPR-CLS provides a single portal through which researchers apply to link their data with multiple registries. Researcher study data files are securely transmitted to registries, linkages are run simultaneously, and reports on the number of matched cases are sent back to the researchers. The match counts enable researchers to prioritize which registries to approach for IRB/Registry approval and release of individual-level data on the matched cases.

Purpose: The author will provide an update on the progress in developing a portal and tracking system for VPR-CLS. The presentation will provide an overview of the system workflow and how the workflow was partitioned into two development phases: Phase I and II. Phase I provides the researcher with a secure process of transmitting their study data file to select registries, standardized linkage with those registries, and release of match counts. Phase II provides an efficient mechanism for researchers to apply to select registries for release of case-level data and to track the application process for each. A demonstration of the website will then be conducted by creating a test linkage request, stepping the request through the workflow, and displaying the tracking functionality implemented in the website.

Methods: The VPR-CLS portal uses a customized instance of Bioshare software developed by IMS, Inc. The goal of this project is to develop an intuitive system where applications are submitted, reviewed, and approved; provide a way for registries to receive files and share match results; create a streamlined IRB/Registry application process; and allow NAACCR staff to monitor the status of linkages.

Results: The result of this portal is a robust web application with secure data transmission, auto-notifications, voting, commenting, tracking of linkage requests, and a streamlined IRB/Registry application process.

Conclusions: Providing a web portal that is directly connected to cancer registries will facilitate the process for conducting registry linkages. The streamlined IRB/Registry application process will also assist researchers in coordinating multi-state approval for release of cancer data.

E VIRTUAL POOLED REGISTRY

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3E3**

STATUS OF THE TEMPLATED IRB/REGISTRATION APPLICATION, IMPLEMENTATION OF THE CENTRAL IRB AND LOCAL CONTEXT ISSUES

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Background: To streamline the review and approval of minimal risk multi-state/registry linkage studies submitted through the Virtual Pooled Registry Cancer Linkage System (VPR-CLS), NCI will set up a Central IRB (CIRB) and NAACCR will promote use of the Templated IRB/Registration Application (TIRA) of common questions from across state-specific applications. After a 2018 NCI solicitation for applicants to manage the CIRB did not result in a contracted entity, efforts turned to better understanding the mechanism required to establish the CIRB as the IRB of record and increasing adoption of the TIRA in states where use of the CIRB is not possible.

Purpose: In order to most effectively streamline the VPR-CLS application and review process, the CIRB contract description must specify to what degree the CIRB will interact/negotiate with local IRB's to be established as the IRB of record and adoption of the TIRA must be expanded

Methods: The NCI/NAACCR-team are currently holding calls with several registries, including local IRB staff, to gather information on 1) What (if any) agreements needs to be set up for the local IRB to cede review to CIRB, 2)Who will negotiate the agreements, and 3)How will local context issues be addressed. In early 2019, NAACCR will send out the revised TIRA that incorporated prior registry feedback and contact individual registries to discuss further adoption of the TIRA.

Results: The information collected to-date show that local requirements to accept CIRB vary widely and some states have yet to determine if acceptance of the CIRB or TIRA is possible. We will present results of the state interviews, increases in TIRA acceptance, and next steps for the project. Development of the CIRB contract Request for Proposal will be finalized and released after incorporating knowledge gained from the interviews. The revised TIRA has been incorporated into the VPR-CLS online portal and the system will be updated to reflect the latest status of registry acceptance.

Conclusions: The information collected will 1)Enable appropriate requirements to be written into the contract so the CIRB can quickly initiate agreements, and 2)Facilitate increased use of the TIRA to ensure the most streamlined VPR-CLS application process possible.

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3E4**

CANCER ASCERTAINMENT BY U.S. POPULATION-BASED CANCER REGISTRIES, SELF-REPORT AND DEATH CERTIFICATES IN THE NATIONWIDE U.S. RADIOLOGIC TECHNOLOGISTS COHORT: A PRELIMINARY REPORT

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Background: For cohort studies conducted in the United States, the lack of a nationwide cancer registry presents a major obstacle in the complete ascertainment of incident cancers during follow-up. To investigate the feasibility of utilizing state and regional cancer registries for a nationwide cohort study, we linked the U.S. Radiologic Technologists (USRT) cohort (N=146,021), which followed participants for cancer incidence and mortality from 1983 to 2004 using self-reported information collected from four mailed surveys and linkage with the National Death Index, with individual state and regional registries.

Methods: The errors of cancer reporting were assessed using the preliminary data from 32 of 42 participating registries. Among the registry-identified cancers, we examined the agreement of cancer types by self-report or death certificate, and differences in date of diagnosis. We examined all cancers combined and major cancer types. For registry-identified female breast, prostate and lung cancers, logistic regressions estimated the odds ratios of misreporting by demographic variables (age, race and marital status).

Results: Of the 13,647 registry-identified first primary cancers, 4,789 (35.0%) subjects self-reported the correct cancer type, and 4,394 (32.1%) accurately reported the date of diagnosis (less than 2-year difference). Death certificate correctly identified an additional 2,329 (17.0%) cancers. An additional 5,517 (40.3%) cancers were not self-reported because of questionnaire nonresponse, or the cancer being diagnosed after the last completed questionnaire. Misreporting of cancer type occurred in 1,039 subjects (7.6%), who self-reported in-situ carcinoma, no cancer, or other cancer types. The reporting patterns differed by cancer types: 46.0% (1,751/3,806) registry-identified female breast cancers were self-reported, and death certificate added 6.8% (258/3806); in contrast, 50% (700/1,384) lung cancers were identified by death certificate and only 15% (208/1,384) by self-report. Misreporting did not differ by demographic variables except for age. The odds of misreporting female breast and prostate cancer increased by 17% (95% CI: 5-31%) and 50% (95% CI: 13-100%), respectively, with 10-year increase in age at diagnosis.

Conclusion: Relying on self-report and death certificates may not be sufficient to identify cancer cases in studies that include multiple states. A comprehensive nationwide registry linkage would greatly improve the completeness and accuracy of cancer ascertainment in U.S. cohort studies.

IACR 3F1

ESSENTIAL TNM - EVALUATION OF A TRAINING EXERCISE IN SUB-SAHARAN AFRICA

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Information on cancer stage at diagnosis is largely missing or poorly documented among population-based cancer registries (PBCRs) in Sub-Saharan Africa (SSA). In an early field trial of Essential TNM staging, it was observed that some training was needed to enable cancer registrars to abstract the correct TNM from case records. In November 2018, the Addis Ababa City Cancer Registry (AACCR) hosted a training course, attended by 17 participants from 16 cancer registry in SSA. The participants were asked to stage 16 cancer cases (anonymised photocopies of case records obtained from GICR) before and after the training. The discrepancy of the stages from before and after were scored and compared. Results show that there was a significant improvement in the participants' performance after the training. The application of the Essential TNM staging system, with training in its use, would allow cancer registrars in SSA to abstract cancer stage at diagnosis in a clinically recognised format, which is crucial information for cancer control and public healthcare policy making.

IACR 3F2

IMPROVEMENTS IN NATIONAL STAGING ASCERTAINMENT IN ENGLAND (2011-2016)

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Background: Anatomic stage is an important variable to be collected by cancer registries as it is both an important predictor of prognosis and a proxy for early/late diagnosis. It is necessary to have high levels of stage ascertainment for any analysis, as missing data is unlikely to be missing at random and thus likely to bias findings. English cancer registry data in 2011 showed regional variability in stage ascertainment (lowest ascertainment 25%; highest ascertainment) and an overall national ascertainment of 51% (denominator is all malignant tumours excluding non-melanoma skin cancer).

Purpose: This project aims to summarise the steps taken to improve stage ascertainment.

Approach: Multiple strategies were used to improve stage ascertainment. These included working closely with Hospitals to educate and support data flows of stage data, training cancer registration officers in handling stage data and identifying stage information in raw sources (such as pathology and imaging) and re-organisation of national cancer registration with harmonisation of rules and methods.

Results: National stage ascertainment improved to 80% in 2016. There is however, still variability by site, with breast cancer and melanoma around 95% complete, but liver cancer is 58% complete.

Conclusion/Implications: Stage ascertainment by cancer registries can be improved by relatively simple steps. Similar strategies may be employed to improve ascertainment of other high-value data items. Implementation of TNM version 8 will extend the number of cancers which can be staged.

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3F3

NEOADJUVANT TREATMENT RESULTS – ONLY PART OF THE STORY /THE MISSING PIECE

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Researchers studying the effectiveness of neoadjuvant treatment from registry data are only getting part of the story; they only see the good results. Both unsuccessful and exceptional responses from neoadjuvant are not captured in registry treatment data items, and there are no staging data items to identify these cases. This presents a skewed picture of patient outcomes and could lead to erroneous conclusions about the success of neoadjuvant treatment across patient populations.

Unsuccessful neoadjuvant therapy: Not all patients respond to neoadjuvant therapy and are not able to have the planned surgical resection. There is no mechanism to determine if a patient had neoadjuvant therapy if the surgical resection cannot be coded in the surgery data item and therefore the postneoadjuvant therapy yp cannot be assigned.

Exceptional response to neoadjuvant therapy: Some patients have such an excellent response to neoadjuvant therapy that their planned surgical resection is cancelled. Rectal cancer is one site where this is happening, and there are clinical trials documenting the “no-cut” option where the surgical resection is not performed.

For both of these types of patients, it is important to be able to assign the “yc stage” to document and stage a more accurate representation of the case. All neoadjuvant therapy patients should be analyzed, not just the subset that were able to go on to have their planned surgical resection, or those that still needed a surgical resection.

This is a treatment completeness quality issue. It appears all patients respond to neoadjuvant therapy if failures and exceptional responses are not staged.

IACR
3F4

POPULATION BASED CANCER REGISTRY SURVIVAL DATA ARGUE FOR SUBDIVISION OF TNM STAGE III PROSTATE CANCER AND MERGING CT2-SUBCATEGORIES

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Background: An important tumour related prognostic factor for prostate cancer (PC) is the TNM Classification besides histopathological grade group and PSA level. The 8th Edition of the UICC TNM classification introduced two important changes for PC. PC classified as T4N0M0, previously regarded as Stage IV, should be grouped now as Stage III together with T3N0M0. pT2a-pT2b-pT2c categories were collapsed into a single pT2-category. The purpose of this study is to verify with cancer registry data if there is any prognostic difference between T3N0M0 and T4N0M0 PC and to evaluate if the clinical T2-category could also be collapsed.

Methods: All PC patients diagnosed between 2004 and 2016 were selected in the Belgian Cancer Registry database. 5- and 10- year relative survival (RS) rates were calculated and stratified according to clinical and pathological TNM stage (8th edition).

Results: A total of 114,548 PC were diagnosed in Belgium over the period 2004-2016 with a stage availability of 75%. 7,781 PC were classified as clinical stage III (7,006 cT3N0M0 and 775 cT4N0M0 cases). The corresponding 5-y and 10-y RS rates are 94% (95%CI 92.9-95.7%) and 86% (95%CI 83.6-88.9%) for cT3N0M0; 65% (95%CI 59.7-70.1%) and 43% (95%CI 35.9-50.0%) for cT4N0M0. 11,653 PC were classified as pathological stage III of which 11,240 pT3N0M0 and 413 pT4N0M0 cases. The corresponding 5-y and 10-y RS rates are 101% (95%CI 100.0-101.4%) and 101% (95%CI 99.2-102.0%) for pT3N0M0; 74% (95%CI 67.9-79.8%) and 64% (95%CI 56.0-72.3%) for pT4N0M0.

1,962 PC were considered pathological stage IV node positive disease (anyTpN1M0), with 5-y and 10-y RS rates of 93% (95%CI 91.0-95.3%) and 76% (95%CI 71.3-81.1%), respectively. 6,831 PC were classified as cT2aN0M0, 2,611 as cT2b and 5,738 as cT2c: 5-y and 10-y RS rates are all \geq 100%.

Conclusions: RS rates for clinical as well as pathological stage T3N0M0 and T4N0M0 PC differ substantially. T4N0M0 appears as prognostic inferior entity, showing RS rates even worse compared to node positive PC. Survival results offer arguments to collapse also the cT2-categories. This study demonstrates the feasibility of cancer registries to contribute in evaluation of discriminatory power of new stage classification.

IACR
3G1

RARE CANCERS ARE ALSO NOT RARE IN ASIA: THE RARE CANCER BURDEN IN EAST ASIA

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Introduction: Epidemiologic information on rare cancers is scarce out of the Western countries. The project of surveillance of rare cancers in Asian countries (RARECAREnet Asia) provides the first standardized incidence in Asia based on the latest list of these diseases defined by the RARECARE group.

Material and Methods: We analyzed population-based cancer registry data on patients diagnosed from 2011 to 2015 in Japan, Korea and Taiwan in comparison with the data in EU. With recent difficulty of data centralization in international studies, the analysis was performed in each country based on SEER*Stat ver. 8.3.5.

Results: Data quality in the three Asian countries were as high as EU. Based on the revised RARECARE definition (crude incidence < 6/100,000/year in tier-1), the incidence of all rare cancers was 93.9 in Japan, 106.1 in Korea and 103.5 in Taiwan and 67.8 in EU corresponding to 14%, 24.0%, 24% and 11% of all cancer diagnoses. Among rare cancer families, epithelial tumours of nasopharynx, oropharynx and oral cavity and lips were not rare in Taiwan. Epithelial tumours of oral cavity and lip was not rare in Japan, either. Epithelial tumours of gallbladder and extra hepatic biliary tract was not rare in Japan and Korea. Thyroid cancer was not rare in all three Asian countries. As for the common cancer families, epithelial tumours of esophagus was not common in Korea. Epithelial tumours of corpus uteri was not common in Korea and ovary was not common in Korea and Taiwan. Skin melanoma was not common in Asia. Even among 215 cancer groups in tier-2s, 197 was rare in Japan, 203 was rare in Korea and 201 was rare in Taiwan patients, and 198 in EU. 197 was rare in all the 4 areas in the world.

Conclusion: Most of the continental gaps found in the current study were due to well known risk factors, and we conclude that EU based RARECARE rarity threshold fits well to cancer incidence in East Asia.

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3G2

PRIMARY MALIGNANT CARDIAC TUMORS IN CALIFORNIA

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Background: Primary malignant cardiac tumor (PMCT) refers to cancer occurring in the heart. It is a rare and highly fatal disease. Effective control of PMCTs depends on much needed research to better understand its natural history and identify risk and prognostic factors to improve diagnosis and treatment.

Purpose: Taking advantage of the large and racially/ethnically diverse population of California and the population-based California Cancer Registry (CCR) data, this study examine the disparities in PMCT incidence and survival.

Methods: Using the CCR's August 2018 Research File, we identified 232 PMCT cases diagnosed during 1988-2015 among Californians. We examined the distributions of sociodemographic and tumor characteristics, calculated age-adjusted and age-specific incidence rates (AAIRs and ASIRs) by sex and race/ethnicity, evaluated treatment patterns, and Kaplan-Meier survival curves. Multivariate Cox regression analysis was conducted to assess the effect of a given variable on survival while controlling for covariates.

Results: There was no significant difference in AAIR (per 100,000) between males and females (0.027 vs. 0.024). Non-Hispanic (NH) blacks and Hispanics had higher AAIRs than NH whites and NH Asians/Pacific Islanders (APIs). The trend of AAIR was rising during 1988-2015 with an average annual percent change (AAPC) of 1.3% for males and 0.8% for females. The risk of developing PMCT increased with age. Only 26% of PMCT cases were diagnosed at early/localized stage. The observed 2-year survival of PMCT varied greatly by tumor stage: 41.2% for localized, 26.3% for regional, and 9.7% for metastasized. Most (58%) of the PMCT patients had surgery, of them most also had chemo and/or radiation. Multivariate analysis showed significantly better survival for patients who were treated by adjuvant chemotherapy and/or radiation than surgery alone.

Conclusions: Population-based central cancer registry database offers valuable opportunities to study rare cancers such as PMCT. The observed increasing incidence trends and dismal survival of late stage PMCT warrant focused research for better understanding and improved diagnosis of this fatal cancer.

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3H1

A NEW STATISTICAL METHOD FOR ESTIMATING CANCER MORTALITY RATES BY IMMIGRATION STATUS

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Background: The heterogeneity of immigrants affects their vulnerabilities to inadequate health care and undesirable health outcomes. For in the progress against cancer, one of the best indicators is the age-standardized rate (ASR) of cancer mortality. However, lack of suitable statistical methods has limited the ability to examine cancer mortality rates and trends among immigrant populations.

Methods: In this presentation, we developed a new variance estimator of ASR using Taylor linearization method that considers sampling errors in the population estimates and classic Poisson errors in the death counts. We obtained 2006-2013 annual national female breast cancer death counts from the National Center for Health Statistics' National Vital Statistics System for demographic groups by 5-year age group, race/ethnicity (Non-Hispanic (NH)-White, NH-Black, NH-American Indian and American Natives (AIAN), NH-Asian Pacific Islander (API), and Hispanic), and nativity (US-born and Foreign-born). We estimated corresponding populations and their standard errors using American Community Survey Public Use Microdata Samples. The ASR (2000 US Standard) of female breast cancer mortality and their standard errors were calculated by calendar year, nativity and race/ethnicity using the newly developed methods.

Results: The US-born NH-Blacks have the highest female breast cancer mortality rates. US- and foreign-born NH-Whites have the second and third highest rates. For all the years examined, rates were lowest among foreign-born NH-API and Hispanics, which could be explained by the well-documented "Immigrant Paradox" phenomenon. Within racial/ethnic groups, the nativity difference is greatest for NH-Blacks and smallest for NH-API. The ratio of estimated variances of the new method and exiting method is greater than one for all racial/ethnic and nativity groups. The percent of increase in variance ranges from around 12% in US-born NH-AIAN to 2% in foreign-born API. Both the populations and death counts for foreign-born NH-AIAN are too scarce to yield meaningful statistics since most H-AIAN is US-born.

Conclusions: The sampling errors inherent in population estimates were incorporated in making statistical inferences on mortality rates among immigrants, thus providing scientific assurance to researchers on the validity of their substantive conclusions.

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3H2

EXCESS HAZARD IN THE BELGIAN CANCER POPULATION

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Background: The total mortality hazard in a cancer patient cohort is the sum of the excess hazard due to cancer and the expected hazard due to other death causes. The cumulative excess hazard defines the net survival, the survival one would expect in a hypothetical world where the only cause of death is cancer. Examining the excess hazard directly as a continuous function of survival time allows a more detailed analysis and interpretation of the cancer mortality.

Study goal: Estimate, describe and compare the excess hazard as a function of survival time and age at diagnosis in the Belgian cancer population 2004-2016 for the most common cancers: colorectal, lung, prostate and female breast.

Methods: The excess mortality was modelled by regression splines, using the R package flexrsurv according to Remontet et al [1]. The spline knot positions were optimised by running models over a grid of plausible values and selecting the set that resulted in the best AIC value. Non-proportionality due to age at diagnosis was allowed with an age spline with one knot, set at the age quantile with the best model fit.

Results: In general, the excess hazard decreases fast during the first 6 months since diagnosis, followed by a broad peak or shoulder ranging up to 2-3 years since diagnosis. This peak is much broader for female breast cancer, up to 6 years, showing the long term impact on mortality of breast cancer. Deaths within the first 6 months are mainly due to clinical stage IV cases, while clinical stage I and II predominated at longer follow up. The excess hazard is higher for older patients, although this difference becomes much smaller after 2-3 years. However, excess hazard remains higher for older breast cancer patients (70+ years) compared to younger women.

Conclusions: The excess hazard as a continuous function of survival time and age at diagnosis reveals more details in the cancer mortality among cancers sites and between age groups, which remain hidden in the relative survival curve which is based on the cumulative excess hazard.

References

[1] Remontet L. et al. (2007) Stat Med 26(10): 2214-2228

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3H3

SURVIVAL AMONG ADOLESCENTS AND YOUNG ADULTS USING JPSURV AND SEER9 DATA, 1975-2015

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Background: Survival among individuals diagnosed with cancer as adolescents and young adults (AYA; defined as age 15-39 at diagnosis) has been reported to lag behind that of younger and older patients.

Purpose: This study evaluated long term survival trends from 1975 to 2015 among the AYA population using the Surveillance, Epidemiology, and End Results (SEER) SEER9 data. The analysis focused on cancer sites associated with the highest mortality in the AYA population.

Methods Mortality rates were calculated among two age groups and gender, for 15-19 and 20-44 years (extended to allow for additional time to death for individuals diagnosed at age 39) to identify the five cancers with highest mortality. JPSurv software was used to estimate relative survival trends. Cumulative relative survival was estimated for the five cancer types with highest mortality for gender and ages 15 to 19 and 20 to 39 in SEER9 data for 1975 to 2014. We report the absolute change in percent on 5-year cumulative relative survival. Significant trends were noted at the $p < 0.05$ significance level (*).

Results: Males and females aged 15 to 19 shared the same top five cancers for highest mortality. Acute lymphocytic leukemia (ALL) had the greatest survival improvement, 1.29%* for males and 1.29%* for females; no joinpoints were observed. The other top 4 types, NHL, AML, osseous and soft tissue sarcoma, and CNS showed less significant survival improvement. Top 5 cancers varied for YA ages 20-39. For males, although associated with HIV, NHL showed the largest survival improvement recently (1.24%*, 1998-2014). CNS, trachea, lung and bronchus, CRC, and melanoma had significant improvements, less than 1.0%*. Survival improvements for the top female mortality causes included trachea, lung, and bronchus cancer (2.12%*, 2001-2014), followed by CNS, female breast, and CRC (all less than 1.0*%). No joinpoints were observed for CNS and CRC. Cervix uteri and ovarian cancer had no survival improvement.

Conclusions: Among the deadliest cancers for AYAs, 40-year survival trends revealed improvements, variability and some lack of improvement for certain cancers. Attention is needed to understand and address cancer specific survival disparities in AYAs including breast, cervical, and ovarian cancer.

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3H4

BAYESIAN MAPPING OF CANCER MORTALITY IN JAPAN: A SMALL AREA ANALYSIS

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Background: Disease maps might be useful to describe the spatial distribution of disease and identify unknown risk factor. The pattern of exposure to cancer risk has differed across various areas. Therefore, cancer mortality and incidence may vary at the subnational level. It is necessary to monitor the suspected cancer clusters periodically. In this study, we aimed to estimate the small-area cancer risk and develop an interactive mapping tool for cancer mortality.

Methods: We used vital statistics in Japan for the years 2008-2012 to calculate cancer mortality rate and standardized mortality rate (SMR). These rates were estimated by sex, site (stomach, colon, liver and lung) and specific area units (prefecture, secondary medical area and city). To avoid small sample problems, empirical Bayes estimation method with nearest neighbor procedure was used. Based on the results, we developed an online interactive mapping tool that allows users to graphically compare the Bayesian estimated mortality rates by sex, site and municipality.

Results: We showed large spatial variation in cancer mortality and strong clustering area. Bayesian estimated SMR among males by city ranged from 30-220 for stomach, 30-310 for colon, 10-590 for liver and 20-580 for lung. Among females, the SMR ranged from 30-470 for stomach, 30-310 for colon, 30-570 for liver and 40-340 for lung. Especially, there were larger difference in SMR for lung cancer among males and liver cancer among both males and females. Our interactive mapping tool also had functions to display the designated cancer hospital location as point and some basic descriptive statistics in bar chart.

Discussion: We showed small-area variation and spatial clustering in cancer mortality by mapping visualization. Our results indicate a possibility for geographical variations in cancer incidence. The Japanese government introduced a national cancer registry (NCR) in 2016 and started providing the data in 2018, and the NCR enables us to obtain highly reliable incidence data and analyze cancer incidence in detail. Using the empirical Bayesian mapping method, we will be able to develop an interactive mapping tool that show small-area cancer incidence, which will be useful for planning more focused cancer control policies.

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4A1**MONITORING OF INCIDENCE AND MORTALITY OF CANCERS AROUND FUKUSHIMA NUCLEAR PLANT ACCIDENT AREA: INTER-REGIONAL ANALYSIS****Tomohiro Matsuda**; Kumiko Saika¹; Eisaku Sasaki²; Emiko Ando³; Tomotaka Sobue³¹Center for Cancer Registries, Center for Cancer Control and Information Services, National Cancer Center²Department of Medical Oncology, Fukushima Medical University, Fukushima, Japan³Graduate School of Medicine, Faculty of Medicine, Osaka University, Suita, Japan**Background:** We observed a trend of incidence and mortality of cancers in several prefectures around Fukushima in order to figure out the effect of the nuclear plant accident in 2011.**Methods:** We calculated the age standardized incidence rate (ASIR), age standardized mortality rate (ASMR) and annual percentage change (APC) in rates by 4 regions (Hamadori, Nakadori, Aizu and the evacuated area) in Fukushima prefecture, by major sites (stomach, colorectum, lung, liver, female breast, cervix, prostate, thyroid and leukemia), by sex, and by age-group using population-based cancer registry (PBCR) data and vital statistics between 2008 and 2015. Then we conducted a statistical test of average APC before (-2011) and after (2012-) the accident to assess the change of tendency to increase or decrease. In consideration of refugees from Fukushima, we observed the figures in 9 neighboring prefectures and entire country as a reference. In view of the successive quality improvement of PBCR data, we confirmed quality indicators in association with APC.**Results:** By region, Aizu showed the highest ASIR, followed by Nakadori, Hamadori and the evacuated area. Both ASIR and ASMR of all sites in Fukushima leveled off from 2008 to 2015 in male. In female, ASIR of colorectal cancer increased significantly after the accident. Increase in ASIR of colorectal cancer was also observed in male before the accident, and decreasing trend was observed in liver and prostate cancer in female before the accident as well. However there was no statistically significant change before and after the accident. In the entire prefecture of Fukushima, ASIR of some tumor sites, including thyroid, showed increasing trend after the accident, and APC demonstrated a significant change.**Discussion/conclusion:** The areas closest to the nuclear power plant (the evacuated area and Hamadori) showed the lowest ASIR. The furthest area (Aizu) had originally higher ASIR. We only observed original geographical gaps in cancer incidence and a probable effect of organized screening programs for thyroid cancers in the analysis.IACR
4A2**RADIATION RISK OF COLORECTAL CANCER BY ANATOMICAL SITE AMONG ATOMIC BOMB SURVIVORS: 1958-2009****Hiromi Sugiyama**¹; Munechika Misumi¹; Alina Brenner¹; Eric Grant¹; Ritsu Sakata¹; Atsuko Sadakane¹; Mai Utada¹; Dale Preston²; Kiyohiko Mabuchi³; Kotaro Ozasa¹¹Radiation Effects Research Foundation, Hiroshima, Japan²Hirosoft International Corporation³National Cancer Institute, Bethesda, MD, United States, U.S**Background:** Ionizing radiation, lifestyle factors and anthropometric characteristics are risk factors for colorectal cancer. We examined the radiation risk of colorectal cancer by anatomical subsite adjusting for other risk factors among the atomic bomb survivors.**Subjects and Methods:** Subjects were the Life Span Study (LSS) cohort members of atomic bomb survivors with follow-up from 1958 to 2009. The first primary colorectal cancer was the outcome of interest. Cancer cases were ascertained mainly from the Hiroshima and Nagasaki cancer registries. Colorectal cancers were divided into 3 major anatomic subsites: proximal colon, distal colon, and rectum. Individual estimates of weighted absorbed colon and bladder dose were used for analyses of colon and rectal cancer, respectively. Information on smoking, alcohol intake, diet habits, and body mass index (BMI) was obtained from periodic questionnaires. Poisson regression analysis estimated the excess relative risk (ERR) for radiation exposure, after adjusting for lifestyle factors and BMI, in addition to conventional risk factors such as sex, attained age and calendar year.**Results:** Among the 105,444 eligible LSS subjects, 2,960 colorectal cancer cases (894 cases for proximal colon, 871 cases for distal colon, and 1,046 cases for rectum) were observed from 1958 to 2009. In addition to the conventional risk factors, high BMI ($> 25\text{kg/m}^2$) was positively associated with proximal colon cancer, while smoking and alcohol intake were positively associated with distal colon cancer. Alcohol drinking and rectum cancer were positively associated. Significant linear radiation dose responses were observed for total, proximal and distal colon cancer, whereas no significant dose response was observed for rectum cancer. The ERR decreased with calendar time for distal colon cancer, but not for proximal colon cancer. The ERRs for colon cancer did not change after adjustment for lifestyle factors and BMI.**Conclusion:** Ionizing radiation is associated with increased risk of proximal and distal colon cancers, even after adjusting for smoking, alcohol intake and BMI. The ERR for proximal cancer persists over time, but that for distal colon cancer decreases with calendar time. There continues to be no indication of radiation effects on rectal cancer incidence in this population.

**NAACCR
4A3**

INVESTIGATION OF A POSSIBLE LINK BETWEEN POLLUTION FROM FIREFIGHTING FOAM AND CANCER IN THE GREATER FAIRBANKS AREA, ALASKA

David O'Brien¹

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Background: The Alaska Environmental Public Health Program (EPH) has been addressing health-related concerns of the residents in specific communities in the greater Fairbanks area. The concerns were regarding the chemicals perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), commonly found in firefighting foam used in the area for many years. The chemicals were present in residents' drinking water wells in concentrations that exceed the U.S. EPA lifetime health advisory (LTHA).

Purpose: One of these communities expressed concerns about potential health effects of the contamination, including cancer. EPH asked the Alaska Cancer Registry (ACR) to conduct a cancer study of the area.

Methods: ACR reviewed annual cancer case counts and cancer types for the community to determine if there was an unusual cluster or large number of uncommon cancers. ACR also calculated the number of expected cancer cases and compared that to the number of observed cases, using the standard incidence ratio (SIR) to test for statistical significance. A challenge in conducting this study was that this community did not have a unique town name, zip code, or census tract to delineate it from the greater Fairbanks area. ACR conducted extensive research on post office box addresses to determine their corresponding street addresses, and used MapInfo to perform a GIS spatial query to select only cancer cases that fell within the community's geographic boundary.

Results: A case count review indicated nothing unusual about the number of cases occurring annually or the types of cancers observed, though the number of lung cancer cases were unusually high, comprising of 30.8% of all cancer cases compared to 12.6% statewide. When number of expected cases was calculated and compared to the number of observed cases, the additional observed cases were not found to be statistically significant. However, the additional observed lung cancer cases were found to be statistically significant.

Conclusions: When ACR reviewed the BRFSS smoking data from the affected community, the percent of former or current smokers was statistically significantly greater than for statewide. Therefore, smoking may have been a contributing risk factor to the increased lung cancer prevalence of the community.

**NAACCR
4A4**

CANCER RISK AMONG MALE FLORIDA FIREFIGHTERS (1981-2014): EVIDENCE FROM THE FLORIDA FIREFIGHTER CANCER REGISTRY

David Lee¹; Tulay Koru-Sengul²; Monique Hernandez^{1,3}; Alberto Caban-Martinez²; Erin Kobetz²; Laura McClure³; Jill MacKinnon¹

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³University of Miami Miller School of Medicine, FL, United States

Background: Firefighters face a range of work-related hazardous exposures that are known to be or are potentially carcinogenic. There can also be considerable study variability in the types of cancer shown to be elevated in firefighters.

Purpose: To describe the cancer risk among male Florida firefighters using a unique data linkage between the Florida Cancer Data System (FCDS) (1981-2014; ~3.3 million records) and the Florida State Fire Marshal's Office employment records (n=109,009).

Methods: Over 99% of Florida firefighter employment records were linked with LexisNexis to obtain social security number (SSN) and other missing information. A probabilistic linkage using FastLink software was used to link records to FCDS data by using SSN, address, date of birth, gender, and name, identifying 3,963 male firefighters with cancer. As done previously (AJIM: 2015; 58:715-729) a case-control approach was taken identifying controls as males with primary pharynx, stomach, liver, or pancreas diagnoses--cancers which have not been shown to be elevated in firefighters in previous research. Selected controls also had a documented work history at the time of diagnosis (n=51,688). We calculated age and year of cancer diagnosis adjusted odds ratios (aOR) and 95% confidence intervals (CI).

Results: Firefighters had significantly elevated cancer risk for overall (aOR=1.22; 95%CI=1.09-1.36), thyroid (2.18; 1.73-2.74), melanoma (1.87; 1.60-2.18), testicular (1.63; 1.19-2.22), prostate (1.52, 1.34-1.71), kidney (1.31; 1.09-1.58), & colon (1.23; 1.04-1.45). Firefighters had significantly lowered odds of laryngeal cancer (0.60, 0.43-0.85).

Conclusions: Findings confirm the elevation in melanoma, prostate, and kidney cancer risk noted in the California study using similar methodology; there were disparate results noted for acute myeloid leukemia. Findings highlight the need for continued surveillance and research of cancer risk among firefighters in other state and regional registries.

**NAACCR
4A5****THE CAMP LEJEUNE CANCER INCIDENCE STUDY: A RETROSPECTIVE COHORT STUDY****Frank Bove¹**¹Division of Toxicology and Human Health Sciences, ATSDR/CDC, Atlanta, GA, United States

During the early 1980s, high concentrations of volatile organic compounds (VOCs) such as trichloroethylene (TCE) and tetrachloroethylene (PCE) were discovered in drinking water serving some areas at U.S. Marine Corps Base Camp Lejeune in North Carolina. Based on extensive modeling, the Agency for Toxic Substances and Disease Registry (ATSDR) determined that two drinking water systems at the base were contaminated from the early 1950s through February 1985. In 2014, ATSDR published mortality studies of marines, navy personnel, and civilian workers stationed or employed at Camp Lejeune during 1975-1985. The mortality studies found associations with several cancers including cancers of the kidney, rectum, lung, prostate, multiple myeloma and leukemias when the Camp Lejeune cohorts were compared to similar but unexposed cohorts from U.S. Marine Corps Base Camp Pendleton in California.

ATSDR has initiated a retrospective cohort study of cancer incidence. The study will include marines who were stationed at either Camp Lejeune or Camp Pendleton anytime during 1975 – 1985 and civilian workers employed at either base anytime during 1972 – 1985. Information on cancers will be obtained from data linkage with federal and state cancer registries. Cancer data will be requested from the earliest date the registry has complete data or January 1, 1973, through December 31, 2017. ATSDR will supply personal identifier data for the cohorts (i.e., social security number, name, date of birth, sex, vital status, and date and state of death, if applicable) and will request that each registry provide ATSDR with cancer data linked to the personal identifier information.

NOTES:

IACR
4B1

PROGNOSTIC FACTORS OF RENAL IMPAIRMENT IN MULTIPLE MYELOMA PATIENTS WITH NOMOGRAM PREDICTION: A POPULATION-BASED STUDY

Muhammed Elfaituri¹; Sara Morsy²; Abdelaziz Abdelaal³; Amr Ehab El-Qushayri⁴; Hazem Abdelkarem¹; Minh-Duc Nguyen Tran⁵; Amr Ebied⁶; Nguyen Tien Huy⁷;

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⁷Department of Clinical Product Development, Institute of Tropical Medicine (NEKKEN), Leading Graduate School Program, and Graduate School of Biomedical Sciences, Nagasaki University, Japan

Background: Renal impairment (RI) is a common complication in patients with multiple myeloma (MM) with around 50% of MM patients present with RI, and up to 5% require dialysis treatment. The median survival time is significantly improved in patients who retain their renal functions compared to those who fail to retain their normal function.

Purpose: We conducted this study to determine the prognostic factors of renal involvement in MM patients and to develop a nomogram to predict the overall survival of that subset of patients.

Methods/Approach: This is a cohort study of 41653 patients with MM with concurrent renal impairment at the time of presentation, identified in the Surveillance, Epidemiology, and End Results (SEER) Program database. We classified the causes of renal impairment in MM patients into two categories. Kidney and renal pelvis diseases fell into the first category, while nephritis, nephrotic syndrome, and nephrosis fell into the second one.

Results: Out of 41653 patients with MM, a total of 523 patients died of renal failure of whom, 507 had nephritis, nephrotic syndrome or nephrosis, while kidney and renal pelvis disorders were the underlying causes of renal impairment in 17 patients. Age, marital status at diagnosis, race, grade of MM, and type of radiation differed significantly between the two categories of renal impairment. However, the mean survival time did not significantly differ between the two categories. Based on the Cox regression model, age (HR = 1.04, SE = 0.004, p-value = <0.001), radiation prior to surgery (HR = 11.86, SE = 1.12, p-value = 0.02), married patients (HR = 0.67, SE = 0.176, p-value = 0.02) and type of radiation were the only significant predictors of survival. Based on these predictors, a nomogram was built with acceptable discrimination ability (c-index = 0.7; 95%CI: 0.67-0.72) with minimal differences from the actual observations of 1-, 3-, and 5-year survival probabilities.

Conclusions/Implications: our nomogram could predict 1-, 3-, and 5-year survival probability of multiple myeloma patients who present with renal impairment based on the significant predictor of survival of age, marriage status, and type of radiations parameters.

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4B2

SURVIVAL OUTCOMES IN ADOLESCENT HEMATOLOGIC CANCER PATIENTS IN ESTONIA: DOES PLACE OF TREATMENT MATTER?

Keiu Paapsi; Kaire Innos¹

¹National Institute for Health Development

Cancer in teens is not common, but a variety of cancers do occur in this age group and treating them can be a challenge. Hematologic malignancies in adolescents have been shown to have better survival outcomes when treated by pediatric oncologists rather than in adult centers. Our study aimed to compare the survival of 15–19 year old cancer patients to those aged 10–14 years and to estimate the proportion of adolescents in Estonia getting treatment at pediatric centers, as a proxy for the applied treatment regimen.

Estonian Cancer Registry provided data on all cases of hematologic malignancies diagnosed between 2000–2014 in adolescents aged 15–19 years, with follow-up for vital status through 2014. Period approach was used to estimate survival. The patients were considered to be treated at a pediatric hospital if at least one notification was received from such hospital.

In 2000–2014, 35 cases of leukemia and 74 cases of lymphoma were diagnosed in adolescents aged 15–19 years. Five-year survival for 2000–2014 in adolescents was 41% (95% CI 26–56) for leukemias and 86% (95% CI 76–92) for lymphomas, both being lower than the estimates for the 10–14 age group (68% and 89%, respectively). The gap in survival between the two age groups was remarkable for acute myeloid leukemias (AML) (26% compared to 60%) and also notable for non-Hodgkin lymphomas (NHL) (83% vs 100%). Among patients aged 15-19, 57% of leukemias (57% for AML) and 59% of lymphomas (54% for NHL) were treated at pediatric hospitals. Younger patients were more likely to be treated in pediatric centers (p < 0.001). No differences were found between boys and girls (p=0.98).

Receiving multimodal and multidisciplinary treatment is important for adolescents with cancer to ensure good outcomes in terms of survival and quality of life. Our study showed that even though recommended, a large proportion of this age group was still not treated by pediatric oncologists, which may explain some of the survival deficit compared to younger children. Further analysis of diagnosis and treatment data in more detail would be of high value.

CONCURRENT SESSION 4

THURSDAY JUNE 13

8:00 AM - 10:00 AM

IACR
4B4

TREND IN SURVIVAL FROM LEUKEMIA IN CHILDREN, ADOLESCENTS AND YOUNG ADULTS IN OSAKA, JAPAN: IS THE AGE-RELATED GAP NARROWING?

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Background: Recent reports show the lower and less-improved survival for leukemia in adolescents and young adults (AYAs) compared with children (the age-related "survival gap"). However, it has not been examined in Japan. Our aim is to determine whether there has been any improvement in this "survival gap" for leukemia in adolescents and young adults compared with children, using population-based cancer registry data in Osaka.

Methods: Study subjects were 2,273 children (aged 0-14 years) and 3,007 AYAs (15-39 years), who were diagnosed with leukemia during 1975-2011 and registered in the Osaka Cancer Registry. Leukemia were divided into three types: acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), and chronic myeloid leukemia (CML). We analyzed the five-year survival from the three types of leukemia (ALL, AML, and CML) using the Kaplan-Meier method, for five periods of diagnosis (1975-1983, 1984-1990, 1991-1997, 1998-2004, 2005-2011).

Results: Overall, five-year survival of leukemia was improved both in children (from 26% to 83%) and AYAs (from 10% to 72%) between 1975-1983 and 2005-2011. Improvement was remarkable in CML in children (from 10% to 100%) and AYAs (from 15% to 92%). Five-year survival of ALL was also improved in AYAs (from 8% to 63%), but still had lower survival than that in children (from 34 % to 86%). For survival of AML, improvement was observed but slower in AYAs (from 8% to 67%) than that in children (from 10 % to 79%).

Conclusion: Our result confirmed an improvement in survival from leukemia both in children and AYAs, particularly for CML. However, an age-related survival gap remains for AYAs with ALL and AML, compared to children. More detailed data collection is needed to elucidate the underlying factors of this survival gap.

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NAACCR
4C1**TRACKING RECURRENCE IN POPULATION-BASED CANCER SURVEILLANCE: WHERE TO START? LITERALLY!**

Loria Pollack¹; Trevor Thompson¹; Christopher Johnson²; Xiaocheng Wu³; Judith Rees⁴; Randi Rycroft²; Mei-Chin Hsieh³; Reda Wilson¹; MaryBeth Freeman⁵; Kevin Zhang⁶; Vicki Benard¹; Manxia Wu¹

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Background: Cancer recurrence is an important outcome to assess treatment effectiveness and quality of life. The National Programs of Cancer Registries' (NPCR) Patient Centered Outcomes Research (PCOR) project supported enhanced, longitudinal follow-up of breast and colorectal cancers in five states to determine the feasibility and best practices related to the collection and analysis of recurrence in population-based registries.

Methods: Central cancer registries in CO, ID, LA, NH, and RI collected the diagnosis date, first surgery date, and first and last "disease-free" dates by active follow-up of all 2011 diagnosed breast and colorectal cancer cases. After evaluating the completeness and variability by state, we considered which of the above dates to use as the start point when calculating the time interval to recurrence.

Results: There were 10,367 female breast and 4,091 colorectal cancer cases who became disease-free. Assuming patients are not at risk for recurrence until they achieve disease-free status (DFS), we eliminated diagnosis date as a starting point because the length of time from diagnosis to treatment and subsequent DFS artificially inflates the time without a recurrence. The median time from diagnosis to DFS was 126 days for breast and 76 days for colorectal cancer, with significant variability across registries. One registry assigned the disease-free date as the surgery date for the majority of patients. Among the remaining states, the median time from surgery to DFS ranged from 147 to 208 days for breast cancer and 54 to 242 days for colorectal cancer. Surgery date provided a consistent start date, not subject to abstractor interpretation; however, patients who have residual disease or require adjuvant treatment are not truly "at risk" post-surgery.

Conclusion: Disease-free date as a starting point for examining recurrence is vulnerable to the availability of evidence, dates, and abstractor interpretation of DFS, making it an unreliable starting point for examining recurrence. Although there may be some delay until surgery (e.g., neoadjuvant therapy), using surgery date, a defined event, as a starting point is less dependent than other options on documentation or interpretation.

NAACCR
4C2**DEFINING CANCER RECURRENCE IN A POPULATION-BASED CANCER SURVEILLANCE STUDY**

Trevor Thompson¹; Loria Pollack¹; Christopher Johnson²; Xiaocheng Wu³; Judith Rees⁴; Randi Rycroft²; Mei-Chin Hsieh³; Reda Wilson¹; MaryBeth Freeman⁵; Kevin Zhang⁶; Vicki Benard¹; Manxia Wu¹

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Background: Cancer recurrence is an important outcome for patients and physicians. However, this information is not routinely collected by central cancer registries due to a shortage of resources. The National Programs of Cancer Registries' (NPCR) Patient Centered Outcomes Research (PCOR) project collected active follow-up data on recurrence and progression for breast and colorectal cancer (CRC) cases diagnosed in 2011 providing a unique opportunity to analyze cancer recurrence in a population-based setting.

Purpose: Capturing complete timing information on disease-free status throughout the follow-up period is difficult. Using NPCR PCOR data, we explored the impact of varying assumptions on censoring recurrence during the active follow-up period.

Methods: Central cancer registries in CO, ID, LA, NH, and RI performed active follow-up for 32 to 60 months following diagnosis to collect disease-free, recurrence, and progression status. Among surgery patients who achieved disease-free status, we defined the time from surgery to recurrence in two ways: 1) assuming no recurrence through the last active follow-up date (AFU) unless otherwise documented and 2) censoring patients without a known recurrence at the last documented disease free date (LDF). Four-year recurrence percentages are presented as Kaplan-Meier estimates.

Results: We estimated 4-year recurrence for disease-free patients with known cancer stage (9,850 female breast and 3,732 CRC cases). Assuming no recurrence through the active follow-up date, 4-year recurrence for breast cancer varied by stage (stage 0 - 1.2%, stage I-III - 6.5%, stage IV - 28.9%). Results were similar using the last observed disease-free date with no assumptions (stage 0 - 1.3%, stage I-III - 6.9%, stage IV - 29.1%). Differences were slightly larger for CRC but still relatively small (AFU: stage 0 - 1.3%, stage I-III - 13.3%, stage IV - 58.6% versus LDF: stage 0 - 1.4%, stage I-III - 14.2%, stage IV - 59.5%).

Conclusions: Due to difficulties in capturing accurate disease-status throughout active follow-up, we compared censoring non-events at the last known disease-free date versus the active follow-up date. We recommend using the AFU assumption which seems reasonable and yielded similar results. The PCOR study provides a much-needed population-based data source for examining recurrence and recurrence-free survival.

NAACCR 4C3

CAPTURING CANCER RECURRENCES USING UTAH CANCER REGISTRY DATA

Mia Hashibe; **Carrie Bateman**¹; Judy Ou¹; Serban Negoita²; Clara Lam²; SuAnn McFadden¹; Kimberly Herget¹; Steven Friedman²; Lynne Penberthy²; Carol Sweeney¹; Jennifer Doherty³

¹Utah Cancer Registry, Salt Lake City, UT, United States

²National Cancer Institute, Bethesda, MD, United States

³Huntsman Cancer Hospital, Salt Lake City, UT, United States

Background: Recurrences of first primary cancers have not historically been a required reportable data item to SEER registries. However, abstracts from Commission on Cancer (CoC) hospitals do include recurrence variables. Novel data linkages include information that potentially can facilitate the identification of recurrences. Capturing recurrences can be of great value to future projects that seek to identify the factors contributing to patient recurrence.

Purpose: To evaluate feasibility of capturing cancer recurrence from data reported to central cancer registries.

Methods: We identified multiple data sources of potential relevance: abstracts from CoC facilities, pathology reports, radiology imaging reports, and health care claims. We began collecting follow up abstracts in 2017. We assessed the completeness of CoC variables date and type of first recurrence by type of reporting facility, class of case, cancer type and patient demographic. We also analyzed the availability of relevant pathology reports by examining reportability of diagnosis and time from diagnosis date. In future work we will evaluate radiology images and claims as data sources.

Results: Of 49,479 reportable cases diagnosed between 2013 and 2016 in Utah, 32,684 cases (66.1%) had at least one abstract from a CoC facility. Almost all of these abstracts had the recurrence variable filled (99.7%). There were 13,328 follow up abstracts received in 2017, 2018 and January 2019 for CoC facility cases. The recurrence variable for all cancers showed 6.4% recurrence, 62.5% no recurrence, 27.9% never disease free, 3.1% unknown and 0.2% blank. Of the 49,479 cases, 5,579 cases (5.8%) had a linked pathology report one year after cancer diagnosis. Of all pathology reports received, 85.1% were within 3 months of diagnosis, 4.7% between 3 to <6 months, 2.7% between 6 to < 9 months, 1.7% between 9 months < 1 years, 3.6% between 1 to <2 years and 2.2% at > 2 years.

Conclusions: Recurrence has traditionally been challenging to collect, but the potential contribution of pathology reports, radiology imaging reports, and claims databases to assess recurrence status for cancer patients is significant. The next steps will be to estimate inter-method reliability for recurrence documented from various sources.

NAACCR 4C4

PREDICTING RECURRENCE OR SECOND BREAST CANCER FROM LINKED REGISTRY-CLAIMS DATA TO AUGMENT SEER: THE RECAPSE PROJECT

Bin Huang²; Jessica Chubak³; Teresa A'mar¹; Catherine Fedorenko¹; David Beatty⁴; Daniel Markowitz⁴; Christopher Li¹; Kathy Malone¹;

Ruth Etzioni¹

¹Fred Hutchinson Cancer Research Center, Seattle, WS, United States

²Kentucky Cancer Registry, Lexington, KY, United States

³Kaiser Permanente Northwest Health Research Institute, Portland, OR, United States

⁴Swedish Cancer Institute, Seattle, WS, United States

Objective: To develop and implement a scalable, supervised learning algorithm to predict breast cancer recurrence status using information from registry data and medical claims.

Data: Medical claims from private insurers and Medicare (2011-2016) linked with the Puget Sound SEER Cancer Registry were made available via the Hutch Institute for Cancer Outcomes Research (HICOR). Gold-standard information on breast cancer recurrence was obtained from the BRAVO study of breast cancer survivors diagnosed 2004-2016 in the Puget Sound area.

Methods: A gradient-boosting algorithm (XGBoost) was harnessed to predict month-level recurrence status, i.e., whether any given month was before or after a recurrence event. Features included registry information on demographics and disease features at diagnosis and engineered features based on diagnosis and procedure claims grouped using Clinical Classification Software (CCS) groupings defined by the HCUP project, and drug claims within customized groupings defined for this application. Time-varying features included monthly counts of codes within each group, months since the most recent and until the subsequent occurrence of each code group and cumulative sums of each code group. Subjects were split into a training (n=94) and test (n=17) set for reporting performance results. Monthly predicted probabilities of being post recurrence were segmented and the first month at which a predicted probability exceeded a specified threshold R was selected as the predicted month of recurrence. Individuals for whom no months had a predicted probability above R were classified as non-recurrent.

Results: The list of most important variables included secondary malignancy, time since breast biopsy, and codes related to catheter placement, and time until mammography. The month-specific AUC on a validation subset was 0.81; individual-level (sensitivity, specificity) ranged from (0.762, 0.892) for R=0.1 to (0.714, 0.950) for R=0.5.

Conclusions: Data sources that link claims, cancer registry and gold-standard disease status information permit the development of novel, automated approaches for detecting cancer recurrence. Gradient-boosted learning with engineered time-varying features shows promise for identifying recurrence events in administrative claims. Proper coding of procedure and drug groups is likely to be key to the performance of such algorithms.

**NAACCR
4D1**

OPPORTUNITIES TO IMPROVE PLACE OF BIRTH, RACE, AND ETHNICITY WITH ELECTRONIC BIRTH CERTIFICATE LINKAGE

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¹Utah Cancer Registry, Salt Lake City, UT, United States

Background: Monitoring cancer trends by race, ethnicity, and birthplace is important for understanding and addressing cancer disparities. In 2017, Utah Cancer Registry (UCR) had a large proportion of missing birthplace data. Whereas obtaining death certificates is a longstanding practice for central cancer registries, birth certificate data is not typically accessed for cancer surveillance. UCR used electronic linkage with birth certificates to supplement cancer registry patient data with birthplace, race, and ethnicity information.

Purpose: To improve completeness of cancer registry data on birthplace and evaluate the utility of birth certificate race and ethnicity data.

Methods: UCR initiated a data sharing agreement with the Utah Department of Health Office of Vital Statistics for birth certificate data. UCR took advantage of a unique data resource, the Utah Population Database, to link cancer case identifiers to individuals named as parent or child on a Utah birth certificate.

Results: Of the 313,723 individuals in UCR from 1973 to 2016, we found 190,522 high-quality matches to Utah birth certificates. From this linkage, the registry determined that 49,660 cases with previously unknown birth state and country were born in Utah. An additional 24,302 cases with previously unknown country of birth matched as a parent on a birth certificate and self-reported country of birth was obtained. Known birthplace state increased by 18.5% and birthplace country by 27.4%. For race and ethnicity, 1,814 cases with previously unknown race or ethnicity matched as a parent on a birth certificate and self-reported race or ethnicity was obtained.

Conclusion: Using a research resource that links multiple databases, we were able to match a high proportion of Utah cancer cases as a parent or child on a Utah birth certificate. Challenges of this approach include possible increased work load reviewing partial matches or if discordance between place of birth, race, or ethnicity between a cancer registry and birth certificate information triggers manual review. This linkage enabled completion of previously unknown place of birth for a large proportion of cases in a central cancer registry. Race and ethnicity are usually self-reported by parents for a birth certificate, providing high quality data for these variables.

**NAACCR
4D2**

FURTHERING THE UNDERSTANDING OF THE BURDEN OF CANCER AMONG THE AMERICAN INDIAN AND ALASKA NATIVE POPULATION IN MAINE: ASSESSING THE IMPACT OF CASE IDENTIFICATION THROUGH IHS LINKAGE AND DIFFERENCES DUE TO CASE AND REGIONAL INCLUSION CRITERIA

Denise Yob¹
¹Maine Cancer Registry, Augusta, ME, United States

Background: Cancer registries that have one or more IHS Contract Health Service Delivery Area (CHSDA) counties are required to link data with IHS annually. Three Maine counties are designated as CHSDA counties where four Native tribes reside, representing 19% of the population, 45% of the AI/AN population, and 49% of the malignant cancers among the AI/AN population in Maine.

Of 175,827 individuals in the Maine Cancer Registry (MCR) between 1995 and 2017, 490 (0.28 percent) were classified by MCR as having AI/AN ancestry, 272 (55.51 percent) of MCR identified AI/AN cases were linked to IHS records. Among the 175,337 individuals who were not classified as AI/AN by the MCR, the IHS Linkage located 136 individuals, resulting in a 28% increase of AI/AN individuals. NAACCR /NPCR data submission protocols update race based on IHS linkage status and is reflected in Maine data accessed through national sources; the MCR has not updated the race field in the registry to reflect the additional linkage information. We sought to determine the impact of changing the MCR protocol to update registry data to conform to this practice.

Purpose: To improve the Maine CDC's ability to produce and disseminate cancer data by race to better meet the needs of the state and other stakeholders in determining the burden of cancer in Maine.

Methods: We used SEER*Stat to analyze data from the 1995-2015 MCR database, the NAACCR Incidence-CiNA Public File, and the National Cancer Institute 1969-2015 Mortality file. Additional data sources included 1995-2017 results from the IHS linkage and aggregated query data from national cancer data resources including the United States Cancer Statistics: 1999 - 2015 Incidence, WONDER Online Database, the U.S. Cancer Statistics Data Visualizations Tool, (1999-2015), and NAACCR Fast Stats, 2011-2015 Cancer Incidence Data.

Results: We present proportions and rates for all invasive cancers combined and common cancer sites by AI/AN status, IHS linkage status, sex, CHSDA county and stage of diagnosis.

Conclusions: Recommend that MCR update the race variable for non AI/AN records that have linked with the IHS data file, which if left uncorrected, underestimates the burden of health outcomes for this population.

NAACCR 4D3

FEASIBILITY OF USING A PATIENT PORTAL DISTRIBUTED BY THE STATEWIDE CANCER REGISTRY TO COLLECT PATIENT GENERATED HEALTH DATA (PGHD)

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Background: PGHD can be used to extend research, support behavioral interventions and add depth to surveillance activities. Patient portals can be used to collect data over time, and provide value to patients by providing a summary of their contributed data for management of their own cancer care.

Purpose: To assess the feasibility of recruiting breast, prostate and colorectal cancer survivors through the Iowa Cancer Registry to report symptoms, comorbidities, cancer care, medication adherence and quality of life at two time points via the previously established Iowa Personal Health Record portal.

Methods: Of 3,610 first primary breast, prostate, or colorectal cancers diagnosed among Iowans in 2015, a sample of 2,363 patients were mailed recruitment materials including login instructions for the portal. Those who completed Survey #1 were asked to complete Survey #2 four months later, which included questions on ease/usability of the reports/functions provided by the portal. Subjects were offered \$10 for each survey completed.

Results: Overall, 17% (n=395) completed Survey #1, ranging from 23% among younger breast cancer survivors (< 65), to 9% among older (65+) colorectal cancer survivors. Within each cancer type, younger survivors were more likely to participate. Slightly more metro (vs nonmetro) breast and prostate cancer survivors completed the survey, while the trend was reversed with colorectal cancer. 91% of patients who completed Survey #1 also completed Survey #2; 55% found the portal somewhat or very useful, with no difference by age, health literacy, or rurality. Survey summary reports were accessed by 41%, symptom management information by 19% and informational pamphlets by 8%. Overall portal satisfaction was rated 7 out of 10. Those with lower health literacy reported lower ratings, but more often reported portal information helped them make a decision about how to treat/manage a symptom/illness (28%) vs. medium (24%) or high (16%) literacy patients (p = 0.057).

Conclusions: Our approach to collect PGHD is highly replicable and readily scalable for future research or cancer surveillance efforts. Younger patient populations and breast cancer patients are likely to be better represented in this approach. As e-technology is increasingly adopted, the ability to recruit via email could enhance scalability.

NAACCR 4D4

INNOVATIVE ELECTRONIC DATA CAPTURE TO COLLECT SCREENING AND DIAGNOSTIC FOLLOW-UP FOR WOMEN WITH BREAST OR CERVICAL CANCER

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Background: Cancer registry variables do not include history of cancer screening. Surveillance of screening would be valuable for cancer control. In collaboration with the Centers for Disease Control and Prevention and four other state registries, Utah Cancer Registry is examining feasibility of collecting screening and diagnostic information for female breast and cervical cancer cases. Utah's strategy is to use All Payer Claims Data (APCD) which include all large private payers in the state and Medicaid.

Purpose: Develop and implement a strategy to use innovative electronic data capture to collect variables representing screening and diagnostic follow-up for breast and cervical cancer cases.

Methods: Approval to use APCD for this purpose was obtained from the Utah Department of Health. Eligible cases were women diagnosed with breast or cervical cancer in 2013 through 2016. Cancer patient identifiers were linked to APCD through a unique data resource, the Utah Population Database. Relevant procedure codes were obtained from the National Breast and Cervical Cancer Early Detection Program and from review of code books. A sample of cases was selected for medical record review by a certified tumor registrar for validation.

Results: Of 8,034 breast and 348 cervical cancer cases, 5,744 (71%) and 214 (61%) respectively linked to APCD claims. Twenty-two relevant screening codes were identified. A screening mammogram claim was found for 3,347 breast cases (58% of those linked). The proportion with a mammogram claim was highest for cases diagnosed at ages 55-64 (68%) or for those diagnosed at in situ stage (72%). A claim for cervical cancer screening was found for 145 cervical cases (68% of those linked). Lessons learned in obtaining approval to use APCD for this purpose will be discussed.

Conclusions: APCD linkage is a strategy to obtain data on health care procedures across a state population. Breast and cervical cancer screenings have distinct procedure codes, which supports feasibility. Lack of completeness is a limitation: despite the name, APCD does not represent all care. Another limitation is that claims provide evidence that a test or procedure was performed but do not include results of the test. Additional data collection and validation to further evaluate feasibility are ongoing.

E DATA USE: LINKAGE

4E1

CANCER IN YOUNG PEOPLE IN CANADA: BROADENING THE RESEARCH AND SURVEILLANCE POTENTIAL BY LINKING TO OTHER ADMINISTRATIVE DATABASES

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⁵The Hospital for Sick Children, Toronto, ON, Canada

Background: The Cancer in Young People in Canada (CYP-C) program is a national population-based surveillance system in which information on children and youth (ages 0-14) diagnosed with cancer in Canada is captured. CYP-C is a collaboration between the Public Health Agency of Canada, the Canadian Partnership Against Cancer, and the C17 Council, a network of the seventeen children's cancer hospitals in Canada that treat pediatric cancer. CYP-C includes information on cancer diagnosis, treatment, complications and outcomes for five years following diagnosis, with an aim to better understand risk factors, improve outcomes, enhance the quality and accessibility of care and reduce late effects.

Statistics Canada (StatCan) is collaborating with PHAC and C17 to create linked datasets that can be used to assess longer term outcomes for children with cancer beyond five years and into adulthood, including health care utilization, financial implications, complications, cancer, multimorbidity in adulthood, and death.

Methods: The record linkage will be conducted at StatCan within the Social Data Linkage Environment. Data from CYP-C will be linked to the Canadian Cancer Registry, the Discharge Abstract Database, the National Ambulatory Care Reporting System, the Ontario Mental Health Reporting System and the Canadian Vital Statistics Death Database to obtain information on cancer recurrence, health care utilization and death outcomes. In addition, linkage to income information from the parents of children with cancer will be undertaken to assess the economic impact of cancer on the family. Linkage of all datasets is expected to complete by March 2020.

Results: For the first time in Canada, childhood cancer data will be linked to key population-based datasets containing information that will allow a greater depth of research on the impact of cancer on the child and family. The challenges with linkage and data limitations will be discussed, along with the application of these linked databases to answer current research and surveillance questions.

Conclusion: This initiative illustrates the value of collaboration between data custodians as well as how linkage of existing datasets can leverage the full potential of available data and broaden cancer research and public health surveillance.

NAACCR

4E2

EARLY- AND LATE-AGE ONSET COLORECTAL CANCER IN KENTUCKY: USING HEALTH ADMINISTRATIVE CLAIMS-LINKED CANCER REGISTRY DATA TO BETTER UNDERSTAND RISK FACTORS AND COMORBIDITIES

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²Kentucky Cancer Registry, Lexington, KY, United States

Background: Kentucky has the highest incidence rates of both early- and late-age onset colorectal cancer (CRC) in the U.S., but notable progress has been made to reduce late-onset CRC incidence and death rates by screening persons aged 50 – 75 years. People at high risk for CRC due to family history of CRC, inherited mutations, or inflammatory bowel disease (IBD) may be advised by their physician to begin screening before age 50.

Purpose: To better understand these trends, we sought to examine risk factors, comorbidities, and screening test use among Kentucky CRC patients.

Methods: We used Kentucky Cancer Registry data that were linked to health administrative claims data, including Medicare, Medicaid and large private insurers. Cases diagnosed in 2007-2011 were included if they were continuously enrolled for one year prior to their cancer diagnosis, had at least one claim, and were first primary CRC cases. We compared early-onset CRC (aged < 50 years) to late-onset CRC (aged ≥ 50 years) patients on demographic and tumor characteristics, comorbidities, CRC risk factors, family history of CRC, and screening test use. We conducted a descriptive analysis using SAS.

Results: Patients with early-onset CRC were more frequently male (56.2% vs. 49.9%), diagnosed with rectal cancer (33.8% vs. 18.4%), and most had no comorbidities (73.6% vs. 51.1%) compared to late-onset CRC patients. Early-onset CRC patients more frequently had a history of IBD (3.7% vs. 1.6%), higher obesity (11.0% vs. 7.7%), and family history of CRC (14.4% vs. 6.2%) compared to late-onset CRC patients. Diabetes and tobacco use history were relatively common in both groups (early-onset: 14.7% and 45.5%, respectively; late-onset: 28.8% and 42.0%, respectively). Early-onset CRC patients more frequently had colonoscopy (69.6%) compared to late-onset patients (63.6%).

Conclusion/implications: Although claims data may potentially underestimate health conditions that can contribute to higher CRC risk, it can be used to identify comorbidities and screening test use that are not often collected by central cancer registries. Given that family history of CRC, obesity, and IBD were more prevalent in early-onset CRC patients, improved recognition of these risk factors in this population may allow for healthcare discussions about earlier screening.

CONCURRENT SESSION 4

THURSDAY JUNE 13

10:30 AM - 12:00 PM

NAACCR
4E3

INVESTIGATING THE EFFECTS OF SOCIOECONOMIC FACTORS ON CANCER TREATMENT PATTERNS AND OUTCOMES IN CANADA USING INDIVIDUAL-LEVEL LINKED NATIONAL DATA

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¹Canadian Partnership Against Cancer, Toronto, ON, Canada

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³Canadian Cancer Registry, Ottawa, ON, Canada

Background: The Canadian Partnership Against Cancer (the Partnership) reports on pan-Canadian system performance across the cancer control continuum, including how sociodemographic disparities create barriers in access and utilization of cancer control services. For the first time in Canada, record-level data from the Canadian Cancer Registry (CCR) has been linked by Statistics Canada (STC) to other administrative data allowing for more precise and insightful analysis of social, economic and geographic disparities.

Purpose: Data linkage allows the study of persons diagnosed with cancer in relation to their income, education, immigrant status and ethnicity.

Methods: The record linkage was conducted at STC within the Social Data Linkage Environment. Data from the Canadian Cancer Registry (CCR) were linked to the inpatient and outpatient hospitalization records (Discharge Abstract Database (DAD), the National Ambulatory Care Reporting System (NACRS) and the Canadian Vital Statistics Death Database (CVSD) to obtain treatment and death information. Sociodemographic information was added by linking to: T1 Family File (income), Immigrant Landing File (immigrant status, class and category) and the Census Long Form (education, ethnicity, etc.).

Results: The maximum number of CCR patients were linked is 2.2 million to DAD, 1.4 million to NACRS, and 3 million to T1 family file, between 1992 and 2014. Poorer survival outcomes for the four most common cancer sites were shown among lower-income populations compared with higher income. Lower-income patients are more likely to be diagnosed with later-stage cancer compared to higher-income patients. Differences in wait times from diagnosis to treatment and disparities in guideline concordant treatment practices between patients of high and low income will be available at the time of the conference. Additionally, changes in employment status and income following a cancer diagnosis will be examined between income groups.

Conclusion: This study found that lower-income patients were more likely to be diagnosed at an advanced stage and have poorer outcomes. Inadequate access to treatment, both in terms of timelines and quality of care may affect survival in this population. Identifying disparities between those diagnosed with cancer will allow cancer control strategies to be targeted to reach at risk populations in the future.

NOTES:

NAACCR
4E4**LUNG CANCER INCIDENCE AND RISK FACTORS IN NEVER-SMOKING ASIAN AMERICAN, NATIVE HAWAIIAN, AND PACIFIC ISLANDER WOMEN: THE DEVELOPMENT OF A MULTILEVEL INTEGRATED DATASET OF ELECTRONIC HEALTH RECORD, CANCER REGISTRY, AND ENVIRONMENTAL DATA**

Mindy DeRouen; Caroline Thompson¹; Alison Canchola²; Anqi Jin³; Siaxiang Nie⁴; Jennifer Jain²; Salma Shariff-Marco; Daphne Lichtensztajn^{2,5}; Yihe Daida⁴; Carmen Wong⁴; Yuqing Li²; Laura Allen²; Robert Haile⁶; Manali Patel⁷; Peggy

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⁵Greater Bay Area Cancer Registry, San Francisco, CA, United States

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⁷Stanford University, CA, United States

Background: For Asian American, Native Hawaiian and Pacific Islander (AANHPI) females, lung cancer is one of the most common cancers and the leading cause of cancer death. More than half of lung cancers among AANHPI females occur among never-smokers. Until now, there was no single sufficiently-large data source to document lung cancer incidence rates by smoking status and sex among detailed AANHPI groups.

Purpose: We assembled a large-scale cohort to quantify the burden of lung cancer by smoking status among single- and multi-ethnic AANHPI groups and to identify the underlying factors driving lung cancer risk among never-smoking AANHPI females.

Methods: Assembly of the cohort involved (1) harmonizing and pooling electronic health record (EHR) data on known and putative lung cancer risk factors from two large health systems (i.e., Northern California Sutter Health system and Kaiser Permanente Hawaii (KPH)), (2) linking EHR data from Sutter and KPH with tumor and diagnosis data from the California Cancer Registry and Hawaii Tumor Registry, respectively, (3) geocoding and linking Sutter records to regional air pollutant data and data on specific neighborhood contextual factors from the California Neighborhoods Data System, and (4) developing neighborhood contextual variables to enhance the geocoded data for KPH cohort members. We calculated incidence rates stratified by sex, detailed race/ethnicity, and smoking status.

Results: The cohort comprises over 2.3 million individuals (250,000 AANHPI females) followed up to 15 years for incident lung cancer. It includes over 6,000 incident lung cancer cases, of which 558 are AANHPI females. Among AANHPI female groups, proportions of lung cancers among never-smokers range from 31% among Native Hawaiian to 88% among Chinese females. Incidence rates of never-smoking lung cancer area highest among multi-race Asian females (AAIR, 22.5) and Korean females (AAIR, 20.9).

Conclusions: We have assembled a large, integrated dataset to study multi-level risk of lung cancer to serve as a critical evidence base to inform screening, research, and public health priorities, especially among AANHPI females. Ongoing work will include longitudinal analyses of lung cancer risk among never-smoking AANHPI females, including absolute risk modeling, examining six exposure domains representing known and putative lung cancer risk factors.

CONCURRENT SESSION 4

THURSDAY JUNE 13

10:30 AM - 12:00 PM

PREVALENCE

F

IACR
4F1

ESTIMATING THE NUMBER OF PEOPLE IN ITALY LIVING AFTER A CHILDHOOD CANCER USING THE SOFTWARE COMPREV

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²Istituto Tumori del Veneto, Italy

³CRO Aviano National Cancer Institute, Italy

Background: Childhood cancer survival grew during the last decades. Consequently, there is an increasing number of adults requiring appropriate follow-up care due to possible late effects of treatments many years after cancer cure.

Purpose: This study contributes to the ongoing discussion about the design and delivery of care to long-term childhood cancer survivors, by evaluating their number, features and age distribution in Italian areas covered by cancer registration.

Methods: We computed 15-year Limited Duration Prevalence by applying the SEER*Stat software on data from 15 Italian population-based cancer registries (covering 19% of population) and estimated complete prevalence of people living after surviving childhood cancer (age 0-14), by using the CHILDPREV method [1], implemented in ComPrev.

Results: Over 44,000 persons in Italy were estimated alive at January 1st, 2010 after a cancer diagnosed during childhood. This number corresponds to 73 per 100,000 and to 2% of prevalent cases diagnosed at any age. Males were 54% and 64% survived after being diagnosed before 1995, the start of the observation period. A quarter of all cases were diagnosed with brain and CNS tumors, a quarter with acute lymphoid leukemia, and 7% with Hodgkin lymphoma. Nearly a quarter of prevalent patients were aged 40 years and older in 2010 [2]. Use of the software ComPrev will be illustrated in details.

Discussion and Conclusion: A method to estimate prevalence of people diagnosed with cancer in their childhood, based on observed prevalence as well as on modeling of survival and incidence through the completeness index, is proposed. Information about the number of people living after a childhood cancer by cancer type and their specific health-care needs may be helpful to health-care planners and clinicians in the development of guidelines aimed to manage the burden of late effect of treatments.

This study was funded by the Italian Ministry of Health (CCM 2011) and by Italian Association of Cancer Research (AIRC).

References:

[1] Simonetti, Gigli, Capocaccia, Mariotto (2008). *Stats Med.*

[2] Francisci, Guzzinati, Dal Maso, Sacerdote, Buzzoni, Gigli (2017). *Int J Cancer*

NAACCR
4F2

USING NAACCR CINA DATA TO ESTIMATE BLOOD CANCER PREVALENCE IN THE UNITED STATES USING MORE COMPLETE GEOGRAPHIC COVERAGE AND PROVIDE LOCAL ESTIMATES

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Recinda Sherman³; Angela Mariotto⁴

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⁴National Cancer Institute, Bethesda, MD, United States, US

Background: Cancer prevalence is the number of persons alive on a certain date who have a history of cancer, so is a function of both incidence and survival. Historically, SEER data have been used to estimate U.S. national complete prevalence. Now that NAACCR Cancer in North America (CiNA) survival statistics cover almost all registries, we can estimate prevalence for the U.S. and also provide local limited duration (LD) prevalence estimates.

Purpose: To describe methods and estimates of 5-year LD cancer prevalence for blood cancers for the U.S. and for the individual Leukemia & Lymphoma Society (LLS) Chapters, patient outreach/service delivery areas that often correspond to states. This is the first use of CiNA data to estimate prevalence.

Methods: We estimated 5-year LD prevalence on January 1, 2014 by LLS Chapter for Hodgkin lymphoma, non-Hodgkin lymphoma, leukemia, and myeloma. We used 2009-2013 incidence cases and survival from CiNA data based on the November 2017 NAACCR submission, which included survival data from 41 states and the Detroit registry. For the geographic areas not included in the CiNA Survival Volume, we estimated prevalence using data from nearest neighbor Chapters by age, sex, and race. We used the counting method to estimate prevalence from incidence and follow-up data. For registries meeting SEER follow-up standards, survival estimates were used to adjust for loss to follow-up. For other registries, it was assumed that all deaths were ascertained through the study cutoff date and remaining persons were presumed to be alive, which may slightly overestimate prevalence.

Results: For the total U.S. population, we estimated 5-year prevalence on January 1, 2014 of 37,073 cases of Hodgkin lymphoma, 230,823 of non-Hodgkin lymphoma, 139,885 of leukemia, and 70,346 of myeloma. LLS Chapter-specific results will be communicated using maps during the presentation.

Conclusions/Implications: Limited-duration prevalence statistics were shared with LLS for distribution to Chapters and use in outreach for patient support services. The success of this project hinged on collaboration between NAACCR, the National Cancer Institute, cancer registries, and Information Management Services, Inc. This project demonstrated the feasibility of estimating national and local LD prevalence statistics using NAACCR data.

NAACCR
4F3

**LIFETIME RISK OF DEVELOPING CANCER AMONG ALASKA
NATIVE PEOPLE**

Sarah Nash¹

¹SEER Alaska Native Tumor Registry, Anchorage, AK, United States

Background: Lifetime risk is the probability that an individual will be diagnosed with a cancer during the course of his or her lifetime. Lifetime risk can show how common cancer is in a population, and is a useful metric for communicating cancer risk to the public. Lifetime cancer statistics are not always reported for minority population groups, and have never been calculated for Alaska Native (AN) people.

Purpose: To estimate lifetime risk of developing all cancers for AN people.

Methods: We used the DevCan software (Surveillance Research Program, National Cancer Institute) to estimate lifetime risk of developing all cancers, and selected leading cancer sites, including breast, colorectal, lung, and kidney cancers, for AN people. We also calculated age-conditional lifetime risk estimates. Incidence data were collected by the Alaska Native Tumor Registry, and mortality data were from the National Center for Health Statistics.

Results: We estimated that AN people have a 43% chance of developing cancer (all sites) during the course of their lifetime (39% among men, 47% among women). This is slightly higher than observed among U.S. whites (39% total, 39% among men, 38% among women; NCI Surveillance Research Program). Lifetime risk varied by cancer site, with the highest we observed for lung cancer (10% among men, 9% among women). The probability of developing cancer was highest for those cancers for which AN people are at high risk: for example, AN people have twice the risk of developing colorectal cancer than U.S. whites, and lifetime risk was also higher for this cancer (8% among AN, versus 4% among U.S. whites; NCI Surveillance Research Program).

Conclusions: Lifetime risk of cancer among AN people is slightly higher than has been reported for other U.S. populations. These data will be used for communicating cancer risk information to AN people by both clinicians and public health practitioners.

NOTES:

CONCURRENT SESSION 4

THURSDAY JUNE 13

10:30 AM - 12:00 PM

SES & CANCER

G

NAACCR

4G1

NEIGHBORHOOD ARCHETYPES FOR UNDERSTANDING DISPARITIES IN PROSTATE CANCER MORTALITY

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Background: Neighborhood factors shape and perpetuate disparities in prostate cancer mortality. However, existing approaches have made it challenging to assess the synergistic effects of multiple neighborhood factors on health outcomes. An alternative approach is to define neighborhood archetypes that encompass multiple dimensions within a single classification system and capture meaningful distinctions across neighborhoods.

Purpose: We developed neighborhood archetypes for 2000 and 2010 California block groups and census tracts and examined all-cause and prostate cancer-specific mortality among men with prostate cancer according to these archetypes, using data from the California Cancer Registry.

Methods: Leveraging a comprehensive database of small-area level data on neighborhood social and built environments (the California Neighborhoods Data System), which includes socioeconomic status, racial/ethnic composition, immigration/acclimation factors, urban/rural status, population density, street connectivity, walkable destinations, food environment, recreational opportunities, traffic density, and green space), we applied latent class analysis (LCA) to develop neighborhood archetypes. Geographic variability in all-cause and prostate cancer-specific mortality by neighborhood archetypes was assessed using multivariable Cox proportional hazard models with geocoded cancer registry data. Models were stratified by race/ethnicity and, among Hispanics and Asian American/Pacific Islanders (AANHPIs), by nativity (US- or foreign-born).

Results: We identified 5-class and 9-class neighborhood archetype models for census tracts that showed significant associations with mortality after prostate cancer. For all cases using the 9-class archetype model, compared to those residing in Upper middle class suburban neighborhoods, all other neighborhood types, except High Status, had statistically significant higher mortality (for all cause and for prostate cancer-specific mortality), with Hispanic Small Town neighborhoods having the highest mortality (HR=1.39, 95% CI=1.35-1.43 for all cause; HR=1.37, 95% CI=1.29-1.45 for prostate cancer-specific). The classes with the highest mortality were defined by lower SES, but also other characteristics such as rural/urban status, race/ethnicity or age of residents, commuting and traffic patterns, residential mobility, and food environment. Associations of neighborhood archetypes with all-cause and prostate cancer-specific mortality varied by race/ethnicity and nativity.

Conclusion: The archetype approach yields insights into how neighborhood characteristics work synergistically to influence prostate cancer mortality. This research contributes a more fundamental understanding of how place affects health and can inform multilevel interventions.

**IACR
4G2**

SOCIO-ECONOMIC POSITION AND COMORBIDITY PREVALENCE AMONG COLON, RECTUM, LUNG AND HODGKIN LYMPHOMA CANCER PATIENTS IN ENGLAND: A POPULATION-BASED STUDY USING CANCER REGISTRY DATA AND ELECTRONIC HEALTH RECORDS

Helen Fowler¹; Aurelien Belot¹; Libby Ellis¹; Camille Maringe¹; Miguel Angel Luque-Fernández²; Edmund Njeru Njagi¹; Neal Navani³; Diana Sarfati⁴; Bernard Rachet¹

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²Granada Cancer Registry, Andalusian School of Public Health. Biomedical Research Institute of Granada (ibs.Granada), University of Granada. CIBER of Epidemiology and Public Health (CIBERESP), Spain

³University College London Hospital, UK

⁴University of Otago, Dunedin, New Zealand

Background: Having one or more chronic health conditions (i.e. comorbidities) in addition to cancer can influence a patient’s care and ultimate prognosis. Healthcare guidelines may not always accommodate management of two or more simultaneous chronic conditions¹. The purpose of this study was to describe comorbidity and multiple comorbidity in cancer patient cohorts using electronic health records (EHR), and identify patterns in the presence of specific comorbid conditions, particularly in respect to socio-economic deprivation level.

Methods: English cancer registry data were linked with population-based EHR of 331,665 adults diagnosed with cancers of the colon, rectum, lung or Hodgkin lymphoma in England between January 2009 and December 2013. We defined comorbidity as the presence of any one of seventeen specific conditions, diagnosed up to six years prior to the cancer diagnosis.

For each cancer site, we estimated the odds of having each of the comorbid conditions using logistic regression, and the probability of having each of the conditions in isolation or as one of multiple comorbidities using ordinal logistic regression. All analyses were adjusted for age at cancer diagnosis, sex and deprivation level.

Results: The most prevalent comorbidities were hypertension, chronic obstructive pulmonary disease (COPD) and diabetes. Among male lung cancer patients aged 70 years at diagnosis, the most deprived group had higher odds of having hypertension (OR 1.22, 95%CI: 1.18, 1.27), COPD (OR 1.96, 95%CI: 1.89, 2.03) or diabetes (OR 1.29, 95%CI: 1.23, 1.36) compared with the least deprived group of these patients. The most deprived group of these patients had a 29.4% probability of having COPD as one of multiple comorbidities, versus a probability of 17.6% in the least deprived group.

Conclusions: In our study, the odds of having a comorbidity and probability of multiple comorbidity were consistently highest in the most deprived cancer patients. Insight into socio-economic patterns of comorbidity prevalence can highlight key comorbid conditions to consider when investigating factors influencing receipt of cancer treatment in the more deprived patients.

References:

[1] Tinetti ME, Fried TR, Boyd CM. Designing health care for the most common chronic condition--multimorbidity. *Jama*. 2012 Jun 20;307(23):2493-4

**NAACCR
4G3**

THE SOCIAL GRADIENT OF CANCER INCIDENCE IN NEW YORK STATE

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Background: Researchers at the University of Wisconsin recently calculated and published an Area Deprivation Index (ADI) for the entire United States. The index uses 17 census variables to classify each of the more than 200,000 census block groups in the country by percentile. This resource allowed us to make what is to our knowledge the most precise measurement of the social gradient of cancer incidence ever undertaken.

Methods: Each incident cancer case within the New York State Cancer Registry diagnosed between 2010 and 2016, including in situ cases, (n=849,923) was assigned a percentile value. Age- and sex-adjusted rates were calculated for 23 cancer sites and further stratified by stage. Results were fit to a third-order polynomial to capture nonlinear relationships.

Results: The roughly 100 graphs that we created defy easy summary, but reveal numerous relationships that are masked by more commonly used broader categorizations like the four-category NAACCR Poverty Indicator. For a number of cancer sites, notably breast and thyroid, the major distinction is not between “affluent” and “poor”, but rather between “most affluent” and “affluent”.

Conclusions: Large differences in cancer rates at the high end of the social gradient may suggest differences in health-seeking behaviors even among those with reliable health insurance. Given its ease of use and geographical precision, the ADI shows strong promise to become a routine feature of cancer surveillance in the future.

**NAACCR
4G4**

USING RESIDENTIAL HISTORIES TO ESTIMATE AREA-BASED POVERTY: AN EXPLORATORY ANALYSIS OF COLON CANCER SURVIVAL IN NEW JERSEY

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²Rutgers Cancer Institute of New Jersey, Hainesport, NJ, United States

³Temple University, Philadelphia, PA, United States

Background: Researchers using population-based cancer registry data routinely use residential address at time of diagnosis to assign area-based socioeconomic measures (SES). Although area-based SES based on address at diagnosis is associated with patient survival, less is known about whether these associations would change when incorporating residential moves that may be result in changing SES over time.

Purpose: We evaluated differences in colon cancer survival, comparing estimates based on census tract SES at diagnosis to estimates based on census tract SES from residential histories.

Methods: Cases included 4,049 New Jersey residents aged 21-83 diagnosed with regional stage colon cancer from 2006-2011. Residential histories were obtained from LexisNexis public records and linked to cancer surveillance data from the New Jersey State Cancer Registry. Area-level poverty was assigned based on geocoded census tracts using Census definitions of the percent of the population living below the federal poverty level. Area poverty was measured as a continuous variable four different ways: (1) poverty at address at diagnosis; (2) average poverty over all addresses from 5 years prior to dx until end of follow-up; (3) time-weighted average poverty based on all addresses from 5 years prior to dx until end of follow-up; and, (4) time-varying poverty for addresses after diagnosis. Cox proportional hazard regression models were used to estimate the risk of colon cancer death by poverty. Poverty was the primary predictor with adjustment for age, sex, and stage.

Results: Cases had an average of 2.1 addresses after diagnosis: 53% had 1 address, 20% had 2 addresses, and 27% had 3+ (range 1-15). Regardless of poverty measure, our models showed a significant, positive association between poverty and risk of colon cancer death ($p < 0.05$). Hazards for each poverty measure varied slightly, ranging from 1.009 ($p=0.027$) for average poverty (Model 2) to 1.015 for poverty at diagnosis (Model 1). We found that for every 10% increase in area poverty, the risk of death increased by 16%, 9.5%, 13%, and 12% in Models 1-4, respectively.

Conclusion: This study is one of the first to demonstrate how residential histories linked to population-based cancer registry data can be used to estimate time varying census tract poverty measures.

CONCURRENT SESSION 4

THURSDAY JUNE 13

8:00 AM - 10:00 AM

IACR
4H1

COMING TO AMERICA: CANCER TRENDS AMONG FILIPINOS IN MANILA AND LOS ANGELES

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¹Los Angeles Cancer Surveillance Program -USC, CA, United States

Background: The first recorded Filipino in the US was in 1587 in California. By 2018, the US Filipino population exceeded 4 million, becoming the largest population outside of the Philippines, with 406,943 residing in Los Angeles County (LAC). With 35% of the entire LAC population being immigrants, the Los Angeles Cancer Surveillance Program (LACSP) has documented rapid changes in cancer rates as compared to those in the countries of origin. 59% of the LAC Filipino population are immigrants, providing sufficient numbers to examine these trends for many cancers.

Purpose: Given that cancer incidence rates among immigrants tend to shift toward those in the new country, we may expect site-specific Filipino-American (FA) rates to both increase and decrease. Thus, opportunities for intervention should be explored.

Methods: Using the most currently available population-based data from LAC and Manila, we will calculate site-specific incidence, mortality, and survival trends while examining screenable cancers more prevalent in Manila than LAC.

Results: Since 1973, the overall cancer incidence rates for Filipinos have risen in LAC for both males and females, while rates have declined in Manila. Among FA males in LAC the most common cancer sites are prostate, lung, colorectal, and non-Hodgkin lymphoma, differing from those in Manila which are lung, liver, prostate, colorectal, and leukemia. For FA females the ranking is breast, colorectal, thyroid, lung, and uterus, contrasting with Manila females as breast, cervix, colorectal, lung, and ovary.

Of the above-mentioned cancers with US screening recommendations, colon cancer incidence rate has increased since 1973 in males and females in both LAC and Manila, with LAC showing higher rates. Efficient methods for population-screening of colorectal cancers continues to be non-existent in Manila. For female breast cancer, rates have also risen, again higher in LAC than in Manila. The extraordinarily high rates of cervical cancer in Manila have steeply declined but remain well above the LAC rates which are gradually decreasing. Cervical cancer screening rates in Manila are low.

Conclusion: A comparison of cancer trends among Filipinos in Manila and Los Angeles may identify opportunities for intervention in both places.

IACR
4H2

LIVER CANCER STATISTICS IN CHINA, 2015: AN UPDATED ESTIMATE BASED ON 368 POPULATION-BASED CANCER REGISTRIES

Lan An¹

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Background: Liver cancer is a common cancer in China over many years. Accurate statistics of liver cancer may provide important clues on the disease prevention and control.

Purpose: Using the most recent population-based cancer registration (PBCR) data collected from National Central Cancer Registry (NCCR) of China, we presented national estimate of liver cancer burden of China in 2015.

Methods: Qualified PBCR data of liver cancer in 2015 which met the data quality criteria were stratified by geographical locations, sex, and age groups. Age-specific incidence and mortality rates by sex and area for 18 age groups were calculated. The numbers of new cases of liver cancer and liver cancer deaths were computed by multiplying these rates by the year of 2015 population. World segi's population was used for the calculation of age-standardized incidence and mortality rates.

Results: Qualified 368 cancer registries covered a total of 309 553 499 populations in China, accounting for 22.5% of the national population. It is estimated that there were 370 000 new cases (274 000 males and 96 000 females) of liver cancer in China. The age-standardized incidence rate was 17.35 per 100 000. Rural areas showed higher incidence (19.67 per 100 000) than urban areas (15.67 per 100 000). Subgroup analysis showed that western areas of China had highest incidence rate of liver cancer, with age-standardize rate of 20.65 per 100 000 of the country. For new cases of liver cancer deaths, there were 326 000 new deaths (242 000 males and 84 000 females) in China, with age-standardized mortality rate of 15.09 per 100 000 (22.88 per 100 000 for male and 7.35 per 100 000 for female). Rural areas showed higher mortality (16.86 per 100 000) than urban areas (13.81 per 100 000).

Conclusions: There is still a heavy burden of liver cancer in China. Rural residents have higher incidence and mortality of liver cancer compared with urban counterparts. It is likely that many factors such as Hepatitis virus infection, and aflatoxin exposure plays a dominating role. Prevention and control strategies should be enhanced in the future.

IACR
4H3

CANCER REGISTRATION AND ITS ROLE IN CANCER PREVENTION AND CONTROL IN CHINA

Wenqiang Wei; Hongmei Zeng¹; Siwei Zhang
¹National Cancer Center of China, Beijing, China

Background: In the last 30 years, the role of PBCRs in China has expanded to embrace the national health plans’ formulation and evaluation of cancer control program.

Purpose: The purpose of this presentation is to provide an overview of the history of cancer surveillance, current cancer burden and the role of cancer registration in cancer control programs in China.

Methods: We retrieved the key milestones in the development of cancer registration in China. We described the current status of cancer registration framework in China. Updated cancer burden was estimated based on the qualified 368 cancer registries’ data from National Central Cancer Registration (NCCR) of 2015. Trends of cancer in China from 1973 to 2015 were reported based on data from three nation-wide retrospective death surveys and NCCR of China.

Results: Since 2008, the central national Chinese government set up National Cancer Registration and Follow-up Program to support the cancer registration in China with sustainable funding inputs. All 31 provinces in mainland China has established cancer registration framework. The numbers of cancer registries had increased from 95 in 2008 to 574 in 2018, covering 40.5% of the national population. There was an increasing burden of cancer during the past 40 years, with crude cancer mortality rate rising from 74.20 per 100 000 to 170.05 per 100 000. Improved cancer surveillance network of China provided important information for policy formulation and evaluation. Meanwhile, expansion of PBCRs and improved data quality were part of the goals of the national plans. With cancer registries’ continuous data, trends in cancer statistics were used to evaluate the overall progress of cancer control in the country. As a goal of the national control plans to strengthen the national cancer surveillance network, the nationwide cancer registration system has been expanded, with more representative population coverage and enhanced data quality. Systematic network for national cancer control and prevention has been built up.

Conclusion: Through the cancer control framework, efforts are underway to ensure sustainable development of PBCR in China. Cancer registries remain an effective means to inform and evaluate national cancer control policies.

NOTES:

IACR
5A1

TRENDS OF CANCER OBSERVED IN A PREMIER INSTITUTE IN MUMBAI, INDIA DURING LAST THREE DECADES

Ganesh Balasubramaniam¹; Sushama Saoba¹; Sandhya Cheulkar¹; Rajendra Badwe¹; Pramesh CS¹

¹TATA Memorial Center, Navi Mumbai, Maharashtra, India

Background: Tata Memorial Hospital (TMH) being the Asia's leading centre in diagnosis, treatment, and research since its inception in 1941. TMH has a hospital-based registry functional ever since 1941 and has collaborated with the Indian National Cancer Registry Programme in 1984. To elucidate the different types, pattern and trend of cancer cases observed in TMH over the years.

Material and Methods: All cancer cases registered in TMH since 1984 till 2014

Results: The hospital registered 7,87,527 patients in the last 30 years of which 5,52,591 (70%) were diagnosed as cancer cases: 3,10,479 (56.2%) males, 2,42,439 (43.8%) females. Of these, 21.6% were head and neck cancers, 18.4% were gastro-intestinal cancers, 12.8% were haemato-lymphoid malignancies, 11.4% were female breast cancers and 5% were cervical cancers. Pediatric cancers contribute to approx. 4.7 % of the all cancers. Oral cavity cancers contribute 68% of all head and neck cancers, oesophageal cancers contribute 17% of all gastro-intestine cancers, cervical cancers contributing 31% of genitor-urinary cancers and 53 % are leukemias of the hematopoietic malignancies. The leading cancers among females were breast and cervix while lung and oesophagus were leading cancers amongst males. There has been a substantial increase in the frequency of head and neck cancers, breast cancers, lung cancers, leukemia, lymphomas, gall bladder cancers and reduction in cervical cancers over the years.

Discussion and Conclusion: The huge voluminous data collected and analysed provide good opportunity for research in terms of changing patterns of cancers and also the treatment provided over the years. A detailed insight will be provided at the presentation of the data.

IACR
5A2

PATTERNS OF CANCER INCIDENCE AND MORTALITY RATES AND TRENDS IN CHINA

Siwei Zhang; Kexin Sun¹; Rongshou Zheng; Hongmei Zeng²; Xiaonong Zou¹; Ru Chen¹; Xiuying Gu¹; Wenqiang Wei; Jie He¹

¹National Cancer Center/National Clinical Research Center for Cancer/Cancer Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, China

²National Cancer Center of China, Beijing, China

Background: The National Central Cancer Registry of China (NCCR) is responsible for the collection, evaluation and publication of cancer registry data in China.

Purpose: To estimate the incidence and mortality of cancer in 2015.

Methods: 501 cancer registries submitted cancer registry data, among which 368 registries' data with high quality were included in analysis. Numbers of nationwide new cancer cases and deaths were estimated using incidence and mortality rates and corresponding national population stratified by area, gender, age group and cancer site. The world Segi's population was applied for the calculation of age-standardized rates.

Results: 3,929,000 new cancer cases were diagnosed. The crude incidence rate was 285.83/100,000 and the age-standardized incidence rate by world standard population (ASIRW) was 186.39/100,000. ASIRW was higher in urban areas than in rural areas (191.38/100,000 vs. 179.17/100,000). Age-specific incidence rate was higher in female for population between 20-49 years but was higher in males for population younger than 20 years or over 49 years. From 2000 to 2015, the ASIRW for esophageal cancer, gastric cancer and liver cancer decreased significantly. The ASIRW for colorectal cancer in whole population and for lung cancer, breast cancer, cervix cancer, uterus cancer and thyroid cancer in females increased significantly. 2,338,000 cancer deaths were reported. The crude mortality rate was 170.05/100,000 and the age standardized mortality rate by world standard population (ASMRW) was 105.84/100,000. ASMRW was higher in rural areas than in urban areas (109.57/100,000 vs. 102.97/100,000). Mortality rates in males were higher than that in females in every age group. From 2000 to 2015, the ASMRW for esophageal cancer, gastric cancer, liver cancer and lung cancer decreased significantly. The ASMRW for colorectal cancer, pancreas cancer and prostate cancer in males and for breast cancer, cervix cancer and thyroid cancer in females increased significantly.

Conclusion: Cancer has become a major life threatening disease in China. Disease burdens for esophageal cancer, gastric cancer and liver cancer have decreased, while disease burdens for colorectal cancer, female breast cancer, cervix cancer and thyroid cancer have increased over the last 15 years. National and regional initiative for cancer prevention and control should be prioritized.

**NAACCR
5A3**

THE RISING INCIDENCE OF TESTICULAR CANCER AMONG YOUNG MEN IN CANADA, DATA FROM 1971-2015

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¹Cancer Epidemiology and Prevention Research, CancerControl Alberta, Alberta Health Services, Calgary, AB, Canada

²Alberta Health Services, Calgary, AB, Canada

Background: Testicular cancer is relatively rare in the general population, but is the most common malignancy among young men aged 15-44 in Canada. Increasing incidence has been well-documented in many high-income countries, even though there have been no changes in diagnostic or screening practices.

Purpose: The goal of this study was to examine incidence rate changes and age-period-cohort effects of testicular cancer between 1971 and 2015 among Canadian men.

Methods: Incidence rates were compiled using data from the National Cancer Incidence Reporting System and the Canadian Cancer Registry and age-specific annual percent changes were estimated using the Joinpoint Regression Program (version 4.5.0, NCI). Birth cohort effect was modeled using the National Cancer Institute's Web Tool for Age-Period-Cohort Analysis.

Results: Incidence of testicular cancer has been increasing steadily since 1971 among all age groups, with larger changes in younger age groups. An uninterrupted birth cohort effect was observed for men born in the years after 1945, with more recent cohorts having higher risk for testicular cancer. The rate of testicular cancer peaks at age 35 and declines with increasing age.

Conclusions: Testicular cancer incidence has risen dramatically in Canada in recent decades and more recent cohorts are at heightened risk. Given our limited understanding of the etiology of testicular cancer, future studies should focus on risk factors that may have increased since 1945. The presence of a cohort effect suggests a possible early life or in utero exposure that may affect gonadal development. Other areas of research should focus on changes in lifestyle factors and the effect of environmental contaminants.

**IACR
5A4**

TRENDS IN CANCER INCIDENCE IN THE REPUBLIC OF MAURITIUS, 1991-2015

Marvin Koon Sun Pat¹; Manraj Meera¹; Jasmine Fauzee²; Shashi Sewsoorn³; Max Parkin⁴; Shyam Manraj⁵

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Small states make up 40% of the world's countries and face a unique set of healthcare challenges and yet there remains a dearth of literature relating to their cancer control challenges and solutions. The Mauritius National Cancer Registry (MNCR) is among the few African countries where cancer registration is of population based and nationwide basis. We reported trends in cancer incidence in the small state country for twenty five years as well as the mortality to incidence ratio (MIR) as quality indicator of the registry.

Our analysis included all patients registered in the MNCR from 1991 to 2015. The age standardised incidence rates (ASRs) of cancer were calculated by sex and by 5 year age group for five successive year periods from 1991-1995 to 2011-2015. The average annual percentage change (AAPC) over the 25 year period were calculated by sex and cancer sites. MIRs were compared for the period 2001-2004 and 2012-2015.

Over the study period, a total of 36,901 cases (57.5% females) were observed. In males, the most common cancer sites (in terms of ASRs per 100,000) were those of the colon-rectum (17.0) followed by prostate (16.5), trachea-bronchus-lung (13.0), stomach (8.4) and lip-oral cavity-pharynx (7.7). The AAPC was +3.9%, +4.2%, +0.5%, -0.1% and -1.3% respectively. In females, the most frequent sites were breast (53.7), colon-rectum (13.2), cervix uteri (11.2), corpus uteri (7.7) and ovary (5.7). The AAPC was +3.4%, +4.4%, -2%, +5.2% and -0.1% respectively. The most significant decreasing MIRs for the period 2001-2004 compared to 2012-2015 among males were liver (1.9 to 1.0), stomach (1.3 to 0.8) and lung (1.7 to 1.2) cancers while among females, they were pancreas (3.4 to 1.3), liver (1.8 to 1.2) and stomach (1.5 to 0.8) cancers. Lowest MIRs among males for the period 2012-2015 were seen for colon-rectum (0.5) and bladder (0.5) cancers while being corpus uterus (0.2) and breast (0.3) cancers among females.

Cancer associated to 'westernisation' of lifestyle were superior in Mauritius. Our figures contrast with other Sub-Saharan Africa countries where HIV and other infection related cancers are most predominant. The MNCR has improved its data quality over time.

IACR 5B1

GLOBAL TRENDS IN SURVIVAL FROM ASTROCYTOMA IN YOUNG PEOPLE: A POPULATION-BASED ANALYSIS (CONCORD-3)

Fabio Girardi¹; Veronica Di Carlo¹; Michel P Coleman¹; Claudia Allemani¹ on behalf of the CONCORD Working Group

¹London School of Hygiene and Tropical Medicine, London, England, United Kingdom

Background: Several studies have suggested that adolescents and young adults (15-24 years) may experience poorer outcomes after a brain tumour diagnosis than children or older adults.

Purpose: We aimed to investigate survival disparities at a global level in a potentially vulnerable age group, using data contributed to the third cycle of the CONCORD programme (CONCORD-3).

Methods: We included patients aged 10-24 years who were diagnosed during 2000-2014 with an astrocytic tumour. Net survival by age (10-14, 15-19 and 20-24 years) was estimated using the non-parametric Pohar-Perme estimator, correcting for background mortality by single year of age, sex and calendar year in each country. We included only countries where, for each combination of calendar period and age group, at least 10 patients were diagnosed with an astrocytic tumour, and the proportion of patients lost to follow-up or censored before five years was less than 15%.

Results: We estimated survival for 18,002 patients in 41 countries. During 2000-2004, five-year net survival ranged from 45% (Japan) to 91% (Spain) in older children (10-14 years); from 43% (Korea) to 92% (Latvia) in adolescents (15-19 years), and from 46% (Taiwan) to 81% (Norway) for young adults (20-24 years).

During 2005-2009, five-year net survival varied between 37% (Thailand) and 91% (Slovakia) for older children, between 6% (Ecuador) and 94% (Puerto Rico) for adolescents, and between 25% (Thailand) and 86% (Austria) for young adults.

During 2010-2014, five-year net survival ranged from 42% (Korea) to 92% (Israel) for older children, from 23% (New Zealand) to 89% (Norway) for adolescents, and from 33% (Portugal) to 78% (Sweden) for young adults.

Conclusions: Global disparities in survival from astrocytic tumours in patients aged 10-24 years are extremely wide. The survival difference between older children and young adults was persistent throughout the period 2000-2014. In most countries, older children had worse outcomes than young adults. Disparities in access to care and variation by age in the distribution of astrocytoma subtypes with different clinical behaviour may account for these findings. In some countries, however, survival in older children was lower than in young adults, suggesting under-registration of more benign tumours.

NAACCR 5B2

RELATIVE SURVIVAL AFTER DIAGNOSIS WITH A PRIMARY BRAIN OR OTHER CNS TUMOR IN THE NATIONAL PROGRAM OF CANCER REGISTRIES, 2001-2014

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¹Central Brain Tumor Registry of the United States, Houston, TX, United States

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Background: The majority of reported cancer survival statistics in the US are generated using the National Cancer Institute's publicly available Surveillance, Epidemiology, and End Results data, which prior to 2019 represented 28% of the US population (now 34%). In the case of rare cancers or special subpopulations, datasets based on a larger portion of the US population may allow for detailed analyses and contribute new insights into cancers with low incidence. As many specific brain and other CNS tumor histologies are relatively rare, use of large dataset may allow for more detailed analyses.

Purpose: To characterize the histology-specific survival patterns for malignant and non-malignant primary brain tumors in the US using the CDC's National Program of Cancer Registries (NPCR).

Methods: Survival data were obtained from the NPCR (includes data from 39 state cancer registries, representing 81% of the US population). Survival time was calculated by either linkage with the National Death Index and/or active patient follow-up, depending on registry. Five-year relative survival rates (RS) with 95% confidence intervals (95%CI) were generated using SEER*Stat 8.3.5 from 2001-2014 (2004-2014 for non-malignant tumors) by behavior, histology, and age-groups.

Results: Overall, there were 224,609 malignant and 314,614 non-malignant cases from 2001-2014. RS was 35.4% (95%CI=35.2%-35.7%) for malignant and 89.8% (95%CI=89.6%-90.0%) for non-malignant tumors. For malignant tumors, pilocytic astrocytoma had the best RS (RS=94.2% [95%CI=93.6%-94.6%]), while glioblastoma had the worst RS (RS=6.1% [95%CI=6.0%-6.3%]). For non-malignant tumors, nerve sheath tumors had the best RS (RS=99.3% [95%CI=99.1%-99.4%]), while unspecified neoplasms had the worst RS (RS=64.2% [95%CI=63.0%-65.4%]). Patients 0-14 years old at diagnosis had the best RS (RS=74.2% [95%CI=73.6%-74.8%]) for malignant tumors, while patients 15-39 years old at diagnosis had the best RS (RS=97.4% [95%CI=97.1%-97.6%]) for non-malignant tumors.

Conclusions: Survival after diagnosis with primary brain tumor varied by behavior, histology, and age. The worst five-year survival outcomes are in glioblastoma, while non-malignant nerve-sheath tumors have the best survival outcomes. Younger age is associated with increased survival. These survival outcomes in a database that includes over 80% of the US likely accurately represents national survival patterns.

NAACCR

5B3

GLIOMA INCIDENCE AND SURVIVAL VARIATION BY COUNTY-LEVEL SOCIOECONOMIC MEASURES

Quinn Ostrom¹; David Cote²; Haley Gittleman¹; Carol Kruchko¹; Kelsey Duncan³; Travis CreveCoer⁴; Timothy Smith⁵; Meir Stampfer²; **Jill Barnholtz-Sloan**¹

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Introduction: Multiple studies have reported higher rates of glioma in areas with higher socioeconomic status (SES) but have not stratified by other important factors, including race and ethnicity or urban versus rural location.

Purpose: To evaluate differences in incidence of and survival after glioma diagnosis in the United States.

Methods: We used data from the Central Brain Tumor Registry of the United States, the American Community Survey, and the National Cancer Institute's Surveillance, Epidemiology, and End Results program to identify the average annual age-adjusted incidence rates and calculate hazard ratios for death for glioma of various subtypes, stratified by a county-level index for SES, race/ethnicity, US region, and rural/urban status.

Results: Rates of glioma were highest in counties with higher SES (age-adjusted incidence rate=6.05, 95%CI=6.00-6.10 in the highest SES quintile compared to 5.13, 95%CI=4.99-5.27 in the lowest quintile, rate ratio=1.18, 95%CI=1.15-1.22, $p < 0.001$). When stratified by race/ethnicity, differences in incidence by county-level SES persisted for White non-Hispanic individuals, with higher rates in high SES counties. When stratified by urban/rural status, differences in incidence by SES were more pronounced among urban counties. Survival was higher for residents of high SES versus low SES counties after adjustment for age and extent of resection (HR=0.82, 95%CI=0.76-0.87 comparing highest to lowest quintile of SES, $p < 0.001$). Survival was higher among White Hispanic (HR=0.88, 95%CI=0.81-0.95, $p=0.002$), Black (HR=0.86, 95%CI=0.77-0.95, $p=0.005$), and Asian or Pacific Islander individuals (HR=0.75, 95%CI=0.67-0.84, $p < 0.001$) compared to White non-Hispanic individuals, after adjustment for age, SES, extent of resection, and when restricted to those diagnosed with glioblastoma who received radiation and chemotherapy.

Conclusion: Incidence of glioma was higher in US counties of high SES compared to counties of low SES. These differences were most pronounced among White non-Hispanic individuals and, to a lesser extent, White Hispanic individuals, in urban areas. We observed better survival in high SES counties, even when adjusting for extent of resection, and when restricting to those who received radiation and chemotherapy for glioblastoma. Differences in incidence and survival were driven by both SES and race, rather than urban versus rural status.

IACR
5C1

THERAPY-RELATED ACUTE MYELOID LEUKEMIA FOLLOWING TREATMENT FOR CANCER IN CHILDHOOD: A POPULATION-BASED REGISTRY STUDY

Joanne Aitken¹; Catherine Brown¹; Danny Youlden²; Andrew Moore¹

¹Children's Health Queensland Hospital and Health Service

²Cancer Council Queensland

Background: Therapy-related acute myeloid leukemia (t-AML) is defined as AML that develops after exposure to cytotoxic chemotherapy and/or radiation therapy. There is a paucity of available literature, particularly for t-AML following childhood cancer.

Methods: Data from the population-based Australian Childhood Cancer Registry was used to examine all childhood patients (ages 0-14 at diagnosis) treated with chemotherapy and/or radiotherapy for other cancers who received a subsequent diagnosis of AML between 1983-2014. Standardised incidence ratios (SIRs) were calculated to approximate the relative risk of being diagnosed with AML compared to the general population, matched by age, sex and calendar year. Estimates of 5-year observed survival were obtained using the Kaplan-Meier method, with differences determined by the log-rank test.

Results: Fifty-eight of 11,753 patients in the study cohort (0.5%) were diagnosed with t-AML, an almost 50-fold higher risk than expected (SIR=45.6, 95% CI=35.3-59.0). Most diagnoses (78%) of t-AML occurred within 5 years of the first primary cancer. Five-year observed survival from the date of t-AML diagnosis was 31.2% (95% CI=19.6%-43.5%). A significant survival advantage was found for patients who underwent hematopoietic stem cell transplantation (HSCT) following diagnosis of t-AML, with 5-year survival of 52.4% (29.7%-70.9%) compared to 5.7% (0.4%-22.6%) for those who did not have HSCT ($p < 0.001$).

Discussion and Conclusion: Although rare, t-AML is an important potential late effect of childhood cancer therapy with a relatively short latency period. Prognosis is generally poor, with HSCT offering some survival benefit.

NAACCR
5C2

QUANTIFYING THE RISK OF SECOND PRIMARY MELANOMA IN CALIFORNIA, 2000-2015

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¹Cancer Registry of Greater California, Sacramento, CA, United States

Background: Cutaneous melanoma is a leading contributor to the cancer burden in California, ranking 6th among all malignancies in terms of incidence. Melanoma patients tend to have some of the best survival of any cancer type as melanoma in its early stages is highly curable. Overall 5- and 10-year survival for people with melanoma are 92% and 89%, respectively. Because melanoma has relatively high survival compared to other, more lethal cancer types, melanoma survivors are unique in their susceptibility to subsequent malignancies.

Purpose: To quantify the risk of second primary melanoma (SPM) in California, and to create material to be utilized by dermatologists in their treatment of patients.

Methods: The California Cancer Registry was used to identify patients diagnosed with a first primary malignant melanoma between 2000-2015. Standardized incidence rates (SIR) were calculated to estimate risk of being diagnosed with a subsequent melanoma after an initial melanoma diagnosis relative to the general population. SIRs were calculated by time since first diagnosis, age, sex, race, histology, and anatomic site of first cancer. All analysis was performed in SEER*Stat version 8.3.5.

Results: A total of 88,860 first primary melanoma cases were identified, of which 3,901 (4.4%) developed a SPM during the study period. Melanoma patients in California had an 11.35-times greater risk of being diagnosed with a SPM compared to the general population (SIR 11.35, 95% CI 11.02-11.70). The risk was highest within 2-11 months of diagnosis, with an 18.60-times greater risk of being diagnosed with a subsequent melanoma (SIR 18.60, 95% CI 17.36-19.90). Risk was greatest for younger patients (age 0-29), men, those with tumors of the head and neck or lower limb sites, and patients with a histologic type of nodular melanoma.

Implications: These results indicate that patients with a first primary melanoma are at significantly greater risk of subsequent malignancies. In addition, these findings give insight into factors most associated with SPM risk and can be used to create educational materials utilized by dermatologists to encourage routine skin examinations following a melanoma diagnosis.

IACR
5C3**HOW TO INTERPRET THE GEOGRAPHICAL VARIATIONS IN THE INCIDENCE OF BLADDER TUMOURS IN EUROPE**

Francesco Giusti¹; Emanuele Crocetti²; Giorgia Randi¹; Luciana Neamtii¹; Tadeusz Dyba¹; Nadya Dimitrova¹; Raquel Negrao Carvalho¹; Manuela Flego¹; Manola Bettio¹; **Carmen Martos Jiménez**¹
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Objective: Registration criteria such as inclusion of non-invasive bladder tumours and rules for multiple primary tumours (MPT) could have an impact on incidence estimations and can explain, at least partially, geographical variations in bladder tumours (BT) across Europe. We explored the impact of different registration practices and case reporting criteria among European cancer registries (CRs).

Material and Methods: Data from the European Cancer Information System (ECIS), for 52 CRs from four European regions and covering at least 20 years were included in the analysis. Three scenarios were compared: 1) only invasive tumours; 2) all tumours provided by the CRs, invasive and non-invasive and 3) all tumours after applying the current MPT rules and correction of the warnings identified by the JRC-ENCR Quality Check Software. Age standardized rates (ASR) and 95% confidence intervals, using the 2013 European Standard Population, were computed for the period 2008-2012 by CR. The percent ratio between the highest absolute difference in region-specific ASRs (range) and the overall ASR of the region (range/ASR*100: r/R%) were computed for each scenario, by region and sex.

Results: A total of 724544 BTs were analysed. The lowest ASRs were found in the Northern European region (25.6) among men and in the Southern region (4.7) among women for scenario 1. As a term of comparison, the lowest variability between European regions was found for scenario 1. The lowest r/R% (relative lowest within-region variability) was obtained in the Eastern European CRs for scenario 1 in men (27%) and in the Western CRs in scenario 1 in women (54%). The highest r/R% was found in the Southern European region among women in scenario 1.

Conclusions: This study shows a wide variability of BT incidence, within and between European regions, which could be, at least in part, due to different case definition and registration practices. To improve comparability and interpretation of BT incidence rates in Europe, an ENCR (European Network of Cancer Registries) working group in collaboration with the Joint Research Centre (European Commission) has been established for harmonisation of registration practices and data reporting criteria.

IACR
5C4**THYROID CANCER EPIDEMIOLOGY IN THE NORTHEAST OF SÃO PAULO STATE, BRAZIL: A POPULATION-BASED TIME TRENDS STUDY**

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²IARC

Background: Thyroid cancer is the most common malignant disease of the endocrine system. In recent decades, the number of diagnoses has increased substantially and despite advances in the knowledge of this type of comorbidity, the etiology of this disease is still not well understood.

Objective: The aim of this study was to analyze incidence and mortality trends of thyroid cancer in Barretos region (Northeast of State of São Paulo State, Brazil) during the period 2000–2015, by sex, age, and histological type.

Methods: This was a population-based time trends study. Incidence data were obtained from the Population-based Cancer Registry of Barretos (PBCR-Barretos) that cover 18 cities around Barretos city (São Paulo, Brazil). All newly diagnosed cases of thyroid cancer over the period 2000–2013 were included. Joinpoint regression analysis with age-standardized rates were used to estimate average annual percentage change (AAPC), CI 95% and turning points in trends. Results are presented by sex, age group, and histological type.

Results: During the study period, 381 cases of thyroid cancer were reported in the PBCR-Barretos; 16% among men and 84% among women. A significant increase in the incidence of thyroid cancer over the years (AAPC: 4.6, 95% CI: 1.4 to 7.9) was observed, and when the trend of incidence stratified by sociodemographic and clinical characteristics was evaluated, (AAPC: 3.6; 95% CI: 0.0: 7.3), for individuals diagnosed between 20 and 55 years of age (AAPC: 4.6; 95% CI: 1.7: 12.0) and histological papillary type (AAPC: 4.7; 95% CI: 1.1: 8.3).

Conclusions: Our data showed an increasing trend in incidence of thyroid cancer in Barretos Region and our study is in accordance with the worldwide trends in thyroid cancer incidence. (FAPESP: 2017/03787-2)

CONCURRENT SESSION 5

THURSDAY JUNE 13

1:30 PM - 3:00 PM

IACR
5C5

**CANCER MORTALITY IN THE CANADIAN ARMED FORCES:
RESULTS FROM THE 40-YEAR RETROSPECTIVE CANADIAN
FORCES CANCER AND MORTALITY STUDY II (CF CAMS II)**

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Background: Epidemiologic studies that attempt to describe the cancer mortality experience within a full military population over a long follow-up period are currently lacking. As a result, the understanding of the epidemiology of cancer mortality within military populations is limited.

Purpose: To describe the burden of cause-specific cancer mortality in still serving and released Canadian Armed Forces (CAF) personnel recruited between 1976 and 2012.

Methods: The CF CAMS II study used military pay data to create a cohort file that included all Regular Force personnel and Reservists enrolled in the CAF between 1976 and 2012, inclusive (n=228,685). The cohort file was linked to the Canadian Vital Statistics Database (Mortality). From this linked data file, sex-specific standardized mortality ratios (SMRs) were generated, using the Canadian general population (CGP) as the reference. Age- and sex-adjusted rates were also calculated for the CAF cohort.

Results: 230 females and 1,220 males with a history of CAF service died of cancer during 36 years (approximately 5 million person-years) of observation. Compared to the CGP, both CAF female and male overall cancer mortality was lower (SMR = 0.78 and 0.77, respectively). CAF Females had a significantly lower risk of breast cancer; all other cancer groups were non-existent or non-significantly different from the CGP. For CAF males, military service appeared to be protective for a number of cancers (lip, oral cavity and pharynx; digestive organs; respiratory and intrathoracic organs; bone and articular cartilage; and mesothelial and soft tissue). However, a significantly increased group-level risk for neoplasms of the central nervous system and lymphoid cells, as well as for certain specific cancer diagnoses (testicular, brain, leukemia, and lymphoma) was identified.

Conclusions: This study is one of the first to describe the epidemiology of cancer mortality in a military population. Although military service appeared to be protective overall, there are some exceptions to this observation that warrant future investigation. Specifically, future research will include multivariate analysis to delve into underlying military and non-military risk factors contributing to the patterns described here. Additionally, describing and comparing cancer morbidity and mortality patterns in this cohort is also planned.

NOTES:

NAACCR
5D1**WILMS' TUMOR: THE VALUE OF ABSTRACT TEXT FIELDS FOR DETERMINING PROGNOSIS BASED ON HISTOLOGY**Martin Whiteside¹; Harold Lovvorn²¹Tennessee Cancer Registry, Nashville, TN, United States²Vanderbilt University Medical Center, Nashville, TN, United States

Background: Wilms' Tumor, also called nephroblastoma, is the most commonly diagnosed malignant neoplasm affecting the kidneys of children, representing about 90% of all diagnosed kidney cancers in children. Histologic presentation whether favorable or unfavorable is an important prognostic factor. Children diagnosed with nephroblastoma presenting with favorable histology have a significantly better prognosis for a complete cure than those with unfavorable histology. There is currently no NAACCR data item that captures this critical information, thus documentation in the text field is crucial.

Methods: Nephroblastoma cases—C64.9 and M-8960/3—were obtained from the TN Cancer Registry for the diagnosis period 2004-2015. Only children less than 20 years of age were selected. Text from submitted cancer abstracts was evaluated to determine whether there was appropriate documentation of favorable versus unfavorable histology. All cases extracted were histologically confirmed at diagnosis.

Results: There were a total of 130 initial nephroblastoma cases extracted; however, during quality control evaluation, it was determined that one of the cases was incorrectly coded as a nephroblastoma and thus was excluded from the study, yielding 129 total nephroblastoma cases. Overall, a total of 62 cases (48.1%) had text documentation of favorable/unfavorable histology, whereas 67 cases (51.9%) did not. A total of 8 facilities submitted case information of nephroblastoma patients. For those facilities that submitted at least 10 cases (4 facilities out of a total of 8 facilities that submitted case information on nephroblastoma patients), the following percentages of cases received from that facility included sufficient text documentation of histologic presentation: 15.8%, 11.8%, 45.5% and 90.2%.

Conclusion: This preliminary study demonstrates that sufficient text documentation of nephroblastoma histologic presentation is lacking and less than 50% of all incoming abstracts have such text documentation. The majority of reporting facilities in Tennessee need to be more detailed when documenting this critical piece of prognostic information. Education/Training staff should include discussion of nephroblastoma abstraction principles in presentations to reporting facility staff, including the importance of adequate text documentation of favorable/unfavorable histology.

NAACCR
5D2**UTILIZATION OF MICROSATELLITE INSTABILITY TESTING AND ASSOCIATED FACTORS AMONG COLORECTAL CANCER PATIENTS**Xiaocheng Wu¹; Mary Anne Lynch¹; Lili Bao²; Meijiao Zhou²; Mei-Chin Hsieh¹; Jordan Karlitz³¹Louisiana Tumor Registry, New Orleans, LA, United States²LSU Health Sciences Center/Louisiana Tumor Registry, New Orleans, LA, United States³Division of Gastroenterology, School of Medicine, Tulane University, New Orleans, LA, United States

Background: Research has indicated the importance of microsatellite instability (MSI) testing in diagnosing Lynch Syndrome and predicting prognosis and responses of colorectal cancer (CRC) to chemotherapy. The National Comprehensive Cancer Network guidelines in 2015 recommended MSI testing for all colorectal cancer patients under age 70. Although MSI is collected by cancer registries, its completeness is unclear.

Objectives: 1) To assess the completeness of MSI data routinely collected; 2) to describe MSI testing utilization in CRC patients and associated factors using MSI data after supplementation of pathology reports.

Methods: Data on patients aged under 70 and diagnosed with CRC pathologically in 2016 were from Louisiana Tumor Registry (LTR), excluding lymphoma, endocrine, and death certificate only/autopsy only cases. For CRC cases with MSI coded as test not done or unknown test status, we manually reviewed their pathology reports to obtain MSI information and used it to supplement MSI data that LTR routinely collected. Univariate and multivariable Logistic regression analyses were employed.

Results: Out of 1,409 CRC cases, 24.8% received MSI testing, 34.4% had no testing, and 40.9% unknown test status, based on LTR routinely collected data. After supplementing MSI data from pathology reports, the use of MSI testing increased to 42.7% overall; 2.1% unknown test status due to no pathology reports to verify MSI status. Based on 1,380 CRC cases with known testing status, the utilization of MSI testing was lower in patients aged 51-69 than those age < 50 (40.1% vs. 60.2%; $p < 0.01$), lower for Medicaid than privately insured (38.5% vs. 48.5%; $p < 0.01$), and lower in high poverty census tract than low poverty areas (39.1% vs. 46.8%; $p < 0.01$). Race, sex, urban/rural areas, and CoC status were not significantly associated with MSI utilization. The multivariable model including age, insurance, poverty, stage, and grade shows that age 51-69, Medicaid, and high poverty were still significantly associated with lower use of MSI.

Conclusions/implications: MSI data routinely collected by cancer registries is incomplete. Pathology reports are a good source to supplement MSI data, especially when the vast majority of CRC having pathology reports available. The utilization of MSI testing varies by socio-demographic factors.

**NAACCR
5D3**

EVALUATING THE UTILIZATION OF LOWER ANOGENITAL SQUAMOUS TERMINOLOGY (LAST) TWO-TIERED CLASSIFICATION FOR PRE-INVASIVE CERVICAL CANCER AND ITS IMPACT ON REPORTING IN A POPULATION-BASED CANCER REGISTRY

Mei-Chin Hsieh¹; Elizabeth Van Dyne²; Christina Lefante¹; Mary Anne Lynch¹; Jean Shapiro²; Paran Pordell²; Natalie Gomez¹; Brent Mumphrey³; Lauren Maniscalco¹; Rachna Jetly-Shridhar⁴; Xiaocheng Wu¹

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Background: Worldwide, over 95% of cervical neoplasia are human papillomavirus (HPV)-related. The 3-tiered classification (CIN1, CIN2, and CIN3) has been used by pathology laboratories to describe pre-invasive cervical lesions. However, in 2012 the Lower Anogenital Squamous Terminology (LAST) Project recommended a 2-tiered nomenclature, low-grade and high-grade squamous intraepithelial lesion (LSIL and HSIL), to replace the 3-tiered system for HPV-associated lesions. In addition, p16 immunohistochemistry (IHC) testing was recommended to assist in categorization of possible CIN2. The Louisiana Tumor Registry has been collecting data on pre-invasive cervical lesions, but lesions classified exclusively as HSIL had not been collected.

Objectives: To evaluate the use of the 2-tiered terminology and p16 IHC testing in cervical biopsy specimens by laboratories, assess the search criteria needed to identify advanced pre-invasive cervical lesions, and gauge the impact of underreporting caused by terminology changes on collection of advanced pre-invasive cervical cancer cases.

Methods: Equal number of positive and negative cervical biopsy pathology reports received in 2015 were randomly selected by an artificial intelligence (AI) search engine using pre-2019 eligibility terms including CIN3, carcinoma in situ, adenocarcinoma in situ, and severe dysplasia. Pathology reports were reviewed for the use of 2-tiered terms and p16 IHC testing. Positive and negative predictive values (PPV and NPV) were computed to evaluate the reportable terms used in the search criteria. The proportion of reportable terms found on pathology reports was calculated.

Results: Six out of 9 laboratories used 2-tiered terminology on biopsy pathology reports and 7 performed p16 IHC tests. Of the 1,947 selected reports from 5 laboratories, 987 were flagged as positive by AI and 987 negative using pre-2019 criteria. By adding the "high-grade" term in search criteria, positive reports increased by 29%. 822 (41.6%) were reportable precancerous cervical cases with a PPV of 0.65 (95% CI 0.62, 0.67). 42% were identified solely based on 2-tiered terms and 13.6% had p16 IHC staining performed. This resulted in a 73% increase in reportable precancerous cervical cases.

Conclusions: In order to capture all reportable precancerous cervical cases, both 2-tiered and 3-tiered terminology would need to be included in search criteria.

**NAACCR
5D4**
QUALITY REVIEW OF PANCREAS SURGERY CODES

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Background: Pancreas cancer surgery coding anomalies were identified by the Quality Control Coordinator in hospital data submitted to a regional population-based central cancer registry.

Purpose: We evaluated whether pancreas cancer surgery coding errors were attributable to specific facilities and whether specific case characteristics predicted surgeries likely to be miscoded.

Methods: We randomly assigned 286 pancreas cancers diagnosed 2015-2016 that received surgery to two quality reviewers to review the Surgery Primary Site Code. A procedure worksheet was designed that both reviewers followed, to standardize evaluation. Documentation reviewed included: abstract text and operative and pathology reports when available. After evaluation, reviewers compared the original abstractor surgery code, the surgery code later assigned by the central cancer registry editor and the surgery code assigned by the reviewer. The reviewer assigned two summary codes to distinguish whether there was a change in coding between the original abstract surgery code and the central registry editor review and whether there was a change between the original abstract code and the study quality reviewer. Frequencies by outcome codes and graphs were generated in Excel[®]. The reviewer data was linked to hospital identity, tumor and patient demographic characteristics using SAS[®] v.9.4. Frequencies, overall percent agreement, chi-square and Kappa test statistics were generated using SAS[®]. Following removal of non-analytical cases and duplicates, 276 remained for analysis.

Results: Overall percent agreement between the original abstractor and study quality reviewer was 61% (Kappa=0.48, $p < 0.0001$), indicating only moderate agreement. Agreement occurred more frequently in females (67%, $p=0.0454$) but there was no statistical difference by quality reviewer, year of diagnosis, race, ethnicity, age, primary site, histology or stage. Due to small sample sizes, differences by individual hospital were not evaluated. Overall percent agreement between the central registry editor and study quality reviewer was slightly higher at 69% (Kappa=0.55, $p < 0.001$). Highest errors were with pancreatectomy/duodenectomy codes '36' (without distal/partial gastrectomy) and '37' (with partial gastrectomy/Whipple), followed by '30' (partial pancreatectomy, nos).

Conclusions: Our review of pancreas cancer surgery codes revealed misunderstanding of coding pancreatic surgery amongst both hospital and central registry staff. Additional training and feedback to hospital and registry staff is in progress.

**NAACCR
5D5**
COMPLETENESS OF MOLECULAR TESTING INFORMATION AMONG METASTATIC COLORECTAL CANCER PATIENTS – A COMPARISON OF DATA SOURCES AT AN ACADEMIC MEDICAL CENTER

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Background: Targeted molecular cancer therapies represent an important treatment advance, and it is important to understand how well they have been disseminated to eligible cancer patients, such as those with metastatic colorectal cancer. To do this, it is essential to store and track this information from electronic data sources.

Purpose: To assess completeness of molecular testing/therapy information from a single academic hospital's electronic medical record (EMR) and billing data by comparing data from those sources to data obtained from a statewide cancer registry that integrates data from multiple institutions.

Methods: Patients diagnosed with metastatic colorectal cancer between 2013 and 2016 were identified through the academic medical center tumor registry, and a gold standard dataset containing information related to molecular testing (KRAS, NRAS, HRAS, BRAF, MSI/mismatch repair (MMR)) and treatments was manually created from review of the academic institution's EMRs and the statewide cancer registry records. Completeness of EMR, registry, and hospital billing data were compared to the gold standard dataset.

Results: 138 patients met inclusion criteria. Overall, it was found that 67%, 47%, 45%, 37%, and 80% of patients received KRAS, NRAS, BRAF, HRAS, and MSI/MMR testing, respectively. EMR data captured all but 3 instances of KRAS testing (all 3 were done at an outside facility). State registry data only captured 40% of patients who received KRAS testing, because testing mostly occurred >6 months after diagnosis for 27% of patients. 15% of patients received molecular-guided therapy, 39% received other targeted therapy (not dependent on molecular testing), and 36% received systemic chemotherapy only. All patients who received EGFR inhibitors had normal KRAS testing results, which is in accordance with treatment guidelines.

Conclusion: EMRs at this institution contained 98% of patients' molecular testing/therapy information. Between the EMR and statewide registry all molecular testing performed was found. In the future, electronically pulling in biomarker tests could increase efficiency and completeness of these data items in cancer registries. However, the timing component of the SEER KRAS Site Specific Data Item (< 6 months post-diagnosis) may not align well with the timing these tests are typically performed and may need to be reviewed.

**NAACCR
5E1**

MEDICAL CHART REVIEW FOR SCREENING HISTORY AMONG WOMEN WITH INVASIVE CERVICAL CANCER IN THREE STATES: CICC STUDY, 2013-2016

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Objective: To examine medical chart abstraction of the 5 years of a woman's medical history up to and including the date of diagnosis with invasive cervical cancer to determine screening history.

Methods: The study included women with cervical cancer diagnoses reported in state cancer registries in Louisiana, Michigan and New Jersey (2013-2016) who consented to have their medical chart data reviewed and for whom medical records could be obtained. We defined a valid screening test as one that was conducted 6 months prior to the date of diagnosis. We analyzed data from 376 women, assessing Pap or human papillomavirus (HPV) testing in the 5 years prior to diagnosis.

Results: A majority of the women (n=311; 83%) had a Pap or HPV test recorded in their medical charts in the 5 years prior to their cervical cancer diagnosis. However, the majority (n=178; 57%) of these women had only one test confirmed in their record. Of those with 1 Pap or HPV test for whom testing date was available (n=161), most (n=149; 92%) were collected within 6 months of the cancer diagnosis. Based on our definition, 60% of the women diagnosed with invasive cervical cancer in our study were not screened in the 5 years prior to diagnosis.

Conclusions: This is the only population-based study to measure screening history in the 5-years prior to cervical cancer diagnosis. Medical chart abstraction combined with a mailed survey of behaviors provided additional insight on how to address increasing regular and timely cervical cancer screening.

**IACR
5E2**

ESTIMATING THE EFFICIENCY OF THREE NATIONAL CANCER SCREENING PROGRAMMES USING THE POPULATION-BASED CANCER REGISTRY DATA IN SLOVENIA

Vesna Zadnik; Sonja Tomsic¹; Katarina Lokar¹; Franciska Skrlec¹; Tina Zagar¹

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Background: There are three nation-wide organised cancer screening programmes operating in Slovenia: cervical cancer screening (ZORA) for women aged 20-64 since 2003, colorectal cancer screening (SVIT) for population aged 50-74 since 2009 and breast cancer screening (DORA) on regional scale since 2008, and nationally since 2018 for women aged 50-69. Population-based cancer registry (PBCR) of reputable quality monitors incidence, prevalence and survival of cancer patients since 1950 in Slovenia.

Purpose: The aim of our research was to estimate the incidence time trends of cervical, colorectal and breast cancers with focus on possible change after the introduction of organised screenings and in addition, to evaluate the differences in survival comparing patients diagnosed within screening programmes and the screening non-responders.

Methods: The time trends of age-standardised incidence rates for cervical cancer (ICD10: C53), colorectal cancer (ICD10: C18-C20) and breast cancer (ICD10: C50) were evaluated for the 15-years period 2001-2015 using the data from Slovenian PBCR. Only the patients diagnosed in screened age groups were taken into account in the analysis. The information on the attendance in screening programmes has been linked from screening registries to PBCR. The average annual percentage change for the time before and after screening introduction has been evaluated. The net survival was calculated using Pohar-Perme method.

Results: Fifteen years after ZORA started, the incidence of cervical cancer has decreased more than 50%. The average annual increase in colorectal cancers in males in the period 2001-2010 was 7.6%, but there was an average annual decrease of 5.2% in the following years 2010-2015. Similar is true for females. Five-year net survival is significantly higher in patients diagnosed within screening programme in comparison to the screening non-responders: ZORA: 92.1% vs 63.7%; SVIT: 88.4% vs 57.1%; DORA: 100% vs 89%.

Conclusions: Soon after the introduction of organised cancer screenings in Slovenia the two basic cancer burden indicators incidence and survival have improved dramatically. The two presented and many other cancer burden indicators reported by the PBCRs are (also in Slovenia) most important for planning and evaluation of national cancer screening programmes.

**NAACCR
5E3**

CANCER REGISTRY COLLABORATION WITH CANCER CONTROL PROGRAM ON A POPULATION-BASED SURVEY OF UTAH CANCER SURVIVORS

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Background: The Behavioral Risk Factor Surveillance System (BRFSS) cancer survivor module provides information about the health status of cancer survivors. However, anonymous BRFSS data cannot be linked to cancer registry diagnosis information. Utah Cancer Registry (UCR), in cooperation with the Utah Department of Health (UDOH), is implementing a cancer survivor survey based on cases identified through the UCR. We report results from the first year (2018) of a planned multi-year survey.

Purpose: Improve our understanding of Utah cancer survivors' long-term health status and provide evidence to evaluate cancer control needs.

Methods: The questions addressed common health problems and concerns among cancer survivors using questions from BRFSS and other validated instruments. Questions were included to measure targets for change in Utah's State Cancer Plan. Eligible participants were adults living in Utah who were diagnosed with cancer between 2012 and 2016. Participants were mailed a \$2 incentive along with either a link to a web-based survey or a paper survey, and web-based group was later given an option to complete a paper survey. Responses were weighted by sampling stratification and results were age-adjusted.

Results: We contacted 807 eligible participants and 485 (60%) completed the questionnaire. Breast cancer patients had the highest response rate (71%) and brain tumor patients had the lowest response rate (35%). The proportion of respondents reporting good, very good, or excellent physical health was 87%. 25% of respondents said they currently had pain, but of those, 69% said the pain was under control. Pain also varied by cancer site, with more leukemia and breast patients reporting pain (48% and 40% respectively) than prostate or melanoma patients (12% and 6% respectively). Almost half (48%) of respondents reported that they were limited in some way because of their physical or mental health.

Conclusion: By conducting this collaborative cancer survivor survey through the cancer registry, we were able to target a population of survivors with known cancer diagnosis information. A response rate of 60% supports validity of the data. This survey will increase our understanding of the health status of Utah's cancer survivors.

**IACR
5E4**

IS THERE A DOWN STAGING OF FEMALE BREAST AND UTERINE CERVICAL CANCERS IN INDIA? A HOSPITAL BASED ANALYSIS

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Breast and cervix are the leading cancers amongst Indian women accounting for nearly 50% of all female cancers in the country. Both these cancers are amenable for prevention and early detection. In the absence of mass screening programs for control of these cancers in our country, alternative strategies such as, clinical down staging has been suggested. Therefore, the objective of the present communication was to assess if there is any down staging of female breast and cervical cancers in India due to better awareness. Several hospital based cancer registries are operating under the National Cancer Registry Programme (NCRP) of ICMR. The published material from seven successive reports of NCRP served as the source for obtaining number and proportion of female breast and cervical cancers by clinical extent of disease. The data pertained to the years 1984-1993, 1994-1998, 1999-2000, 2001-2003, 2004-2006, 2007-20011 and 2012-2014. Chi-square tests and significance of linear trend in proportions were carried out. Annual percent changes were worked out to find the quantum of changes in the proportions. An evidence of down staging of female breast and cervical cancers from 1984-93 to 2001-02 was observed in Mumbai and Chennai. Proportion of localized cancers of breast increased from 32 to 53% in Mumbai and 3 to 15% in Chennai during the above period. In case of cervical cancer, proportion of localized cancers increased from 12 to 25% in Mumbai. Other centers also, although not clear cut, revealed an indication of down staging of these two cancers during the same period. Post 2000 however, by and large, there was no evidence of down staging. Observed down staging during late 1980's and 1990's may be attributed to improvement in literacy, awareness about risk factors and symptoms, etc. The same may be due to serious efforts in the direction of achieving second and third objectives of NCRP. Post 2000, cancer control efforts focused at primary and secondary prevention seems to have stabilized. Results suggest the need for renewed efforts for clinical down staging of leading sites of cancer in India till the mass screening programmes, the ultimate goals, are materialized.

NAACCR

5E5

MAXIMIZING RESEARCH IMPACTS ON CANCER PREVENTION: AN INTEGRATED KNOWLEDGE TRANSLATION APPROACH USED BY THE CANADIAN POPULATION ATTRIBUTABLE RISK OF CANCER (COMPARE) STUDY

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Background: The Canadian Population Attributable Risk of Cancer (ComPARE) study quantified the current (2015) and future (up to 2042) burden of cancer in Canada that could be prevented by modifying a series of lifestyle, environment and infectious disease risk factors. The findings are relevant for guiding future cancer prevention and control research, developing health promotion programs and advocating for and implementing new policies aimed at decreasing the impact of cancer. To maximize the utility of the results across diverse stakeholders, an effective knowledge translation approach is needed.

Purpose: ComPARE employed an integrated knowledge translation (iKT) approach that engaged knowledge users throughout the research process. The objective of this analysis was to assess and report on the feasibility, approach and potential impact of iKT in an epidemiological study.

Methods: Knowledge users representing the areas of health policy, public health practice, advocacy, and academia, among others, were members of ComPARE's KT Advisory Committee. They helped inform planning, knowledge product development, dissemination and evaluation, through facilitated activities led by several co-investigators who were also integrated knowledge users and who helped broker information exchange with the broader ComPARE study co-investigators. The value these activities provided to stakeholders was measured using surveys and informal feedback and was used to recalibrate the engagement with the Committee.

Results: Enablers of the iKT approach included leadership of co-investigators, support and financial commitment from the funding agency, establishing partnerships with stakeholders early on, understanding of and experience in each other's area of expertise, clearly delineated roles, and having advisory committee buy-in.

Conclusions: The ComPARE study's iKT approach capitalized on both researchers' and knowledge users' expertise, thereby resulting in findings that are contextually relevant and integrated in cancer prevention planning and decision-making. The study contributes to evidence on the practical application of iKT in population health research and could be used a model by others interested in collaborative research. The study's evaluation will be undertaken in the period following dissemination.

**NAACCR
5F1**

PROGRESS IN CANCER SURVIVAL IN SEVEN HIGH-INCOME COUNTRIES 1995-2014: THE ICBP SURVMARK-2 PROJECT

Melina Arnold¹; Isabelle Soerjomataram¹; **Freddie Bray**; Mark Rutherford¹; Aude Bardot¹; Jacques Ferlay¹

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Introduction: Population-based cancer survival estimates provide valuable insights into the effectiveness of cancer services, and can reflect the prospects of cure. The ICBP SURVMARK-2 project uses a multidisciplinary approach to international survival comparisons, providing up-to-date estimates and looking into potential drivers of observed differences.

Methods: Data on 3.9 million cancer cases were collected from population-based cancer registries in 21 jurisdictions in seven countries (Australia, Canada, Denmark, Ireland, New Zealand, Norway and the UK) for cancers of the oesophagus, stomach, colon, rectum, pancreas, lung and ovary diagnosed during 1995-2014 and followed up until 31 December, 2015. Age-standardized net survival 1 and 5 years after diagnosis were calculated by cancer site, age group and 5-year diagnosis period. Changes in incidence and mortality rates were mapped to changes in survival for each jurisdiction to assess progress in cancer control.

Results: For all seven cancer sites, 1- and 5-year net survival increased in all countries over the 1995-2014 period, with, for example, 5-year rectal cancer survival increasing more than 14 percentage points in Denmark, Ireland and in the UK. Survival was consistently higher in Australia, Canada and Norway, followed by New Zealand, Denmark, Ireland and the UK. While international differences in 1-year survival narrowed over time for all cancer types other than pancreas, these differences at 5 years closed only for oesophageal and rectal cancer. Overall, larger improvements were observed for patients aged less than 75 years at diagnosis, most notably for poorer prognosis sites, with, for example, a 14 percentage point increase in 5-year oesophageal survival in the younger age group compared with 7 percentage point increase in patients aged over 75. Assessing concomitant trends in incidence, mortality and survival, progress in cancer control was evident for stomach, colon, lung (in males) and ovarian cancer in all included countries.

Conclusion: While cancer survival continues to increase across high-income countries, international disparities persist even for cancers associated with a poorer prognosis. Stage of disease at diagnosis, access to effective treatment, the extent of comorbidity as well as differences in registration practices, classification and coding all contribute to the observed survival differences.

**NAACCR
5F2**

EVOLVING PROGNOSIS SINCE TIME OF COLORECTAL CANCER DIAGNOSIS: ASSESSING CONDITIONAL SURVIVAL OF CANCER PATIENTS IN SEVEN HIGH INCOME COUNTRIES (ICBP SURVMARK-2 PROJECT)

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Background: Information on patients' prognosis updated according to the time since diagnosis – commonly referred to conditional relative survival – provides valuable and relevant information for patients and clinicians.

Purpose: Here, we show 3- and 5-year survival conditional on 1-year survival for colon and rectal cancer using the ICBP-SURVMARK-2 database, covering data from seven high income countries.

Methods: Data of colorectal cancer patients from 21 population-based cancer registries in Australia, Canada, Denmark, Ireland, New Zealand, Norway and the UK diagnosed between 2010 and 2014 were included. Three- and five-year net survival conditional on having survived one-year after diagnosis (3(1), 5(1)-year survival) for colon (C18) and rectal (C19-20) cancer was computed by age group and country. The results were compared to estimated survival at the time of diagnosis.

Results: Across countries, current conditional survival (all ages) varies between 77%-81% for colon and 72%-79% for rectal cancer 5(1)-year net survival being highest in Australia, Canada and Denmark. While for all patients diagnosed below 75 years slight country disparities were observed, international differences became evident for patients over 75 years with 5(1)-year survival ranging between 73%-88% for colon cancer and 62%-77% for rectal cancer with higher survival found in Norway and Denmark. Comparing survival at 1 year after diagnosis to that at the time of diagnosis, noticeable improvement in survival prospect was seen. For example while 5-year survival at diagnosis was 59% for patients diagnosed with colon cancer in the UK, the respective value if patient survives the first year after diagnosis was 77%.

Conclusion: Conditional on time since diagnosis survival markedly improved for colorectal cancers in all countries, yet disparities persist by country and age, highlighting the importance to improve long-term patient management and care. Furthermore, reporting conditional survival might reduce registration bias has been suggested to impact short-term survival and could therefore provide a useful and relevant survival indicator in international benchmarking.

NAACCR**5F3****PROGRESS IN CANCER SURVIVAL ACROSS CANADA: THE ICBP SURVMARK-2 PROJECT**

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Background: Population-based estimates of cancer survival provide valuable insights into the effectiveness of early-detection strategies and the cancer control system as a whole. In the International Cancer Benchmarking Partnership (ICBP)-SURVMARK-2 project, clinicians, policy-makers, researchers, and cancer data experts come together, seeking to quantify and explain differences in cancer survival across and within countries with similar health systems.

Purpose: We provide trends and most recent estimates of survival from seven cancer sites across 8 Canadian provinces.

Methods: Data on 740,000 cancer cases diagnosed during 1995-2014 and followed-up until 31 December 2015 were collected from eight cancer registries in Canada (Alberta, British Columbia, Prince Edward Island, Manitoba, New Brunswick, Nova Scotia, Ontario and Saskatchewan). Age-standardized net survival at one and five years after diagnosis was calculated for seven cancer sites (oesophagus, stomach, colon, rectum, pancreas, lung and ovary) by period of diagnosis. Concurrent trends in incidence and mortality rates were explored to assess progress in cancer control across Canadian provinces.

Results: Cancer survival improved over the 20-year period in all provinces, even for cancers associated with poorer prognosis and most notably for patients aged under 75. The largest absolute improvements in 1-year survival were observed for lung and pancreatic as well as colorectal cancer in all provinces, but particularly in Alberta and Saskatchewan. Improvements in 5-year survival for colon and rectal cancers were evident in all provinces, however, some interprovincial differences in 5-year survival persisted up to the most recent period (cases diagnosed in 2010-2014). Cancers of the ovary also showed inter-provincial variation in recent 5-year survival (from 36.4% in Alberta to 43.6% in Manitoba) as well as variation in improvement overtime with a range of absolute increases from 0% to 11% across provinces.

Conclusion: Although improvements in 1- and 5-year cancer survival have been observed across all included provinces, the observed interprovincial variation requires further research. Possible explanations for the survival differences include cancer system differences (e.g. early detection and clinical management of cancer) or differences in the approach to cancer registration and data collection.

F ICBP SURVIVAL MARK STUDY

**NAACCR
5F4**

COLORECTAL CANCER SURVIVAL IN SEVEN HIGH-INCOME COUNTRIES 2010-2014: UNCOVERING THE IMPACT OF AGE AND STAGE AT DIAGNOSIS (THE ICBP SURVMARK-2 PROJECT)

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Background: International differences in survival from colorectal cancer persist, even across high-income countries. The International Cancer Benchmarking Partnership (ICBP) brings together clinicians, policy-makers, researchers, and cancer data experts seeking to explain these differences in countries with similar health systems.

Purpose: We provide the most recent estimates of colorectal cancer survival by age and stage at diagnosis in seven high-income countries.

Methods: Data of 377,665 patients diagnosed during 2010-2014 from 21 cancer registries in seven countries (Australia, Canada, Denmark, Ireland, New Zealand, Norway, and the United Kingdom) were analysed. Net survival at one and five years after diagnosis by stage at diagnosis, age, and country, was estimated using flexible parametric models for colon and rectal cancer.

Results: International differences in overall 1-year survival varied between 77.0-87.0% and 84.8-89.8% for colon and rectal cancer, respectively, with survival being consistently higher in Australia, Canada and Norway. While differences in one- and five-year survival were only marginal for localized and regional disease, survival from distant colon cancer ranged from 55.8-40.6% and 8-17%, respectively, with higher survival observed in Australia and in Denmark and consistently lower estimates in Ireland and the United Kingdom. Similar patterns were also observed for rectal cancer. The proportion of colon cancer patients with distant disease was highest among those aged 80-99 years, with pronounced survival differences across countries in this age group (colon: 57.6-76.3%; rectal: 68.8-79.0%).

Conclusion: Survival differences in CRC across high-income countries were evident and are mainly driven by patients diagnosed with distant disease and/or at older age. Future research should focus on increasing the comparability of staging systems and to subsequently explore the role of stage-specific determinants of survival to improve effectiveness of the health system and prevent potentially avoidable deaths.

**NAACCR
5F5**

IMPACT OF AGE AND STAGE AT DIAGNOSIS ON OVARIAN CANCER SURVIVAL ACROSS SEVEN HIGH-INCOME COUNTRIES: A STUDY FROM THE ICBP-SURVMARK-2 PROJECT

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Background: International differences in survival from ovarian cancer persist, even across high-income countries. The International Cancer Benchmarking Partnership (ICBP) brings together clinicians, policy-makers, researchers, and cancer data experts seeking to explain these differences in countries with similar health systems.

Objective: The study aims to evaluate the influence of age and stage at diagnosis on the international disparities in ovarian cancer survival.

Methods: We analysed data from 58,161 women diagnosed with ovarian cancer during 2010-2014, followed until December 31, 2015, from 21 population-based cancer registries in Australia, Canada, Denmark, Ireland, New Zealand, Norway and United Kingdom. A mapped stage was determined using a stage conversion algorithm and the remaining unknown stage was imputed using multinomial logistic regression method. We compared the 1-year and 3-year age-specific and stage-specific net survival (NS) between countries, using the Pohar Perme estimator.

Results: Only minor variation in the stage distribution was observed between countries in the study. Most women were diagnosed with distant stage ranging between 67% in Canada and 71% in Norway, and distant stage was more commonly diagnosed in women aged 75-99 years ranging between 77.1-86.8%. The 3-year overall net survival ranged between 45-57%. The oldest age group (75-99 years) had the lowest survival ranging between 20-34% 3 years after diagnosis. Norway, Australia, and Denmark showed the highest overall survival and age-specific survival for the oldest age group. International gap in survival was widest for distant stage, with 3-years NS ranging from 32% in New Zealand to 47% in Norway. Differences in survival between countries were most pronounced in the oldest age group with distant stage, with 3-year NS ranging from 11% in Ireland to 24% in Norway. Similar patterns were observed 1 year after diagnosis.

Conclusion: The study highlights the importance of age and stage at diagnosis in explaining the international disparities in ovarian cancer survival. Survival difference was most distinct in the oldest age group diagnosed with advanced disease, suggesting potential linked to variation in diagnosis, quality of treatment, healthcare system (i.e. centralisation), and prevalence of comorbid condition.

IACR
5G1

A FIRST LOOK AT CANCER INCIDENCE RATES AND TRENDS IN BERMUDA OVER THE 10-YEAR PERIOD 2007-2016

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Bermuda, a British Overseas Territory and Associate Member of the Caribbean Community (CARICOM), is a high-income country with over 98% population-wide health insurance coverage and one of the highest per capita health expenditure rates worldwide [1]. Using data from the Bermuda National Tumour Registry, a population-based cancer registry (PBRC) that began data collection in 1979, age-standardized (world) cancer incidence rates per 100,000 (ASR) were calculated for 2007-2016 [2]. ASR for the combined period 2014-2016 were then compared to worldwide GLOBOCAN 2018 estimates [3].

Over the 10-year period, excluding non-melanoma skin cancer, prostate cancer was the most commonly diagnosed cancer (ASR: 80.9) among men, followed by lung (ASR: 28.6), colon (ASR: 22.6), bladder (ASR: 16.3) and melanoma of the skin (ASR: 12.3). Among women, breast cancer was the most commonly diagnosed cancer (ASR: 87.9) followed by colon (ASR: 21.3), lung (ASR: 11.8), corpus uteri (ASR: 11.3) and melanoma of the skin (ASR: 10.3).

For all cancers combined, 2014-2016 cancer incidence in Bermuda (ASR: Males 356.4, Females 256.6) is higher than that estimated worldwide (ASR: Males 218.6, Females 182.6). The Bermuda PBCR incidence rate for men is about 40% higher than for women whereas worldwide this ratio is about 20%. Among women in Bermuda, the ASR for breast cancer, colorectal cancer, melanoma of the skin and Non-Hodgkin's lymphoma are each roughly double the worldwide estimates. Among men, prostate cancer rates are roughly three times higher in Bermuda than worldwide, while colorectal cancer rates are twice as high. Among both sexes, rates for liver cancer and leukemia were lower in Bermuda than worldwide estimates.

Reasons underlying disproportionately high incidence rates for some cancers in Bermuda require further investigation. Health financing that supports health seeking behavior for increased screening and detection as well as a high prevalence of certain risk factors may be contributory factors.

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IACR
5G2

FINDINGS OF FIRST POPULATION BASED CANCER REGISTRY IN NEPAL

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Background: Cancer is the fifth leading cause of death for Nepal, with estimated 11,525 deaths in 2015 (1). Hospital Based Cancer Registry, established since 2003 (2), was not inclusive to whole population having limited significance in providing cancer incidence and mortality and formulate long-term cancer prevention and control plans/policies by the government. Estimates on incidence and prevalence are based on small scale studies, data from neighbouring countries and Globocan. Thus, Nepal Health Research Council, Government of Nepal has initiated PBCR with financial support by GoN, and technical support by WHO, IARC, France/Regional Hub, Mumbai.

Objective: To develop mechanism of PBCR for assessing incidence, trends, pattern and mortality of cancer cases in Nepal.

Method: The data collection is both active and passive. Data is obtained through health facilities and community. Registry personnel visit data sources at regular intervals to abstract the data. Female Community Health Volunteers who are working at grassroots level is mobilized to obtain data from the community. Collected data is verified for residence, accuracy and completeness then entered into CanReg5 software.

Result: Established in January 2018, PBCR is extended to eight districts of Nepal. Interim analysis (Jan – May 2018) of Kathmandu valley cancer registry is completed. Some major findings follow: of total 702 cases, cancer incidence in females is higher than in males. The highest incidence is among the age group 70-74 years, and top leading cancer sites in males and females are of lungs and breasts respectively.

Conclusion and Implication: As PBCR is a pioneer project in Nepal, data generated will be useful to plan cancer control policy and programs though challenging. Multiple locations to diagnose cancer and for treatment, no dedicated staffs at data source locations, lack of coordinating bodies at provincial levels are major challenges. However, collaborations with internal/external agencies, management of fully dedicated staffs at data source locations might become milestones to establish and strengthen PBCR.

References

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**NAACCR
5G3****COST OF OPERATING POPULATION-BASED CANCER REGISTRIES:
RESULTS FROM FOUR SUB-SAHARAN AFRICAN COUNTRIES**

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⁴Kampala Cancer Registry, Kampala, Uganda

⁵Seychelles National Cancer Registry, Victoria, Seychelles

⁶Zimbabwe National Cancer Registry, Zimbabwe

⁷African Cancer Registry Network, Oxford, UK

Background: Large inequalities exist in the coverage and quality of cancer surveillance systems across the world, with limited data currently available in the low resource setting, such as in Sub-Saharan Africa. Information on the resources required to register cancer cases is needed in order for global, national, regional, and local stakeholders to adequately support cancer registry operations.

Purpose: The objective of this study is to estimate the cost of cancer registration in four Sub-Saharan African countries: Kenya, Uganda, Zimbabwe, and Seychelles.

Methods: The CDC's International Registry Costing Tool (IntRegCosting Tool) was used to assess the costs and resources used by registries in Zimbabwe, Uganda, Kenya and Seychelles. The costing data collected was used to calculate the cost per cancer incident case, the cost per inhabitant in the area covered by the registry and cost allocated to specific registry activities.

Results: The cost of registering a cancer case ranged from \$9 to \$96, with lower costs in low- and middle-income countries (Kenya, Uganda, and Zimbabwe) than in the high-income country (Seychelles). The cost of cancer registration at the population level is very low, ranging from 1 to 17 cents per person.

Conclusions/Implications: The detailed cost information provided in this manuscript can help registries in SSA to understand the cost of their registry operations and identify approaches to improve efficiency to meet program priorities. Furthermore, it provides additional evidence-base to inform funding and resource allocation decisions to advance cancer registration in the region.

**IACR
5G4****ROLE OF THE POPULATION CANCER REGISTRY IN THE
OBSERVATION OF CANCER PATIENTS IN THE SOUTHERN URALS -
A LARGE INDUSTRIAL REGION OF RUSSIA**

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Background: South Urals (Chelyabinsk region), located in the southern part of the Ural Mountain chain, has a population of about 3.5 million people and plays a leading role in the Russian Federation in terms of metallurgic production. It has the highest level of suspended particles in the atmospheric air in the country and is in second place in terms of carbon monoxide. The incidence and mortality rates of malignant tumors in the South Urals are much higher than the averages for the Russian Federation.

Methods: Lifetime surveillance of cancer patients in primary oncological offices of hospitals at patient places of residence using the population cancer register (PCR).

Results: In accordance with the orders of the Ministry of Health of Russia, one of the functions of the PCR is to monitor patients from the time of diagnosis to the time of death. Each cancer case is recorded in the PCR database, and a Registration Card is generated. At the moment, there are more than 240,000 of these in the Chelyabinsk PCR, and about 90,000 patients are currently living under the supervision of an oncologist. Each card contains information about any special treatment performed, the dates of visits to an oncologist, the observation group, and in the event the date and cause of death. Patients are treated at different hospitals, but all relevant information is entered into the one PCR database. After the end of special treatment, cancer patients are observed for 1 year every 3 months, for 2 years every six months, and for 3 years and thereafter once a year. In the entire territory of the South Urals, oncologists in primary oncology offices have access (with limited rights) to the PCR database, which allows tracking of the timeliness of a patient's appearance, the amount of treatment received and the state of the oncological management process, facilitating choice of correct tactics for further monitoring.

Conclusion: Use of the PCR in the process of monitoring cancer patients can guarantee the quality of surveillance and improve oncological management across entire geographical regions.

CONCURRENT SESSION 5

THURSDAY, JUNE 13

1:30 PM - 3:00 PM

**NAACCR
5G5**

COSTS AND RESOURCES USED BY POPULATION-BASED CANCER REGISTRIES IN THE U.S.-AFFILIATED PACIFIC ISLANDS

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Background: The costs of cancer registration have previously been estimated for registries in the continental U.S. and many international registries; however, to date, there has been no economic assessment of population-based registries in the U.S.-Affiliated Pacific Islands.

Purpose: The aim of this study is to estimate the costs and factors affecting the operations of U.S.-Affiliated Pacific Island population-based cancer registries.

Methods: The web-based International Registry Costing Tool was used to collect costs, resources used, cancer cases processed, and other registry characteristics from the Pacific Regional Central Cancer Registry (PRCCR), Federated States of Micronesia National Cancer Registry, and 9 satellite jurisdiction registries within the U.S. Pacific Islands. The registries provided data on costs for the year June 30, 2016 to June 29, 2017 and cases processed during 2014.

Results: Local host institutions provided a vital source of support for U.S.-Affiliated Pacific Islands registries, covering substantial fixed costs, such as management and overhead. The cost per cancer case processed had an almost tenfold variation across registries, with the average total cost per case of about \$1,413. The average cost per inhabitant in the U.S.-Affiliated Pacific Islands was about \$1.77 per person.

Conclusions & Implications: The challenges of collecting data from dispersed populations spread across multiple islands of the U.S.-Affiliated Pacific Islands are likely leading factors driving the magnitude of the registries' cost per case. The economic information from this study provides a valuable source of activity-based cost data that can inform resource allocation decisions as well as guide improvements in registries' operational efficiency.

NOTES:

**NAACCR
5H1**

SURVEILLANCE OF HPV-ASSOCIATED OROPHARYNGEAL CANCERS IN SOUTH CAROLINA

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Background: Human papillomavirus (HPV) is associated with cancer. Primary prevention of HPV infection is receipt of the HPV vaccine; CDC recommends to begin at age 11 [1]. There are HPV-related screening recommendations for cervical cancer, but not for other HPV-associated cancers, e.g., oropharynx [2]. CDC estimates that 70% of HPV-associated oropharyngeal cancers (OCs) are attributable to HPV infection [3].

Purpose: This study aims to compare the national estimated proportion of HPV-associated OCs with the measurable proportion in SC.

Methods: Incident OCs diagnosed in 2011-2015 (n=1,880) were obtained from the SC Central Cancer Registry and were analyzed using SASv9.4. Age-adjusted incidence rates were obtained and analyzed using SEER*Statv8.3.5. CDC's HPV-associated cancer definitions and national proportion estimates were used to estimate the number of HPV-attributable OCs [3]. The HPV site-specific factor (SSF-10) was used to classify HPV-attributable oropharyngeal cancers.

Results: From 2011-2015, there were 1,723 HPV-associated OCs (age-adjusted incidence rate of 5.8 per 100,000). This was significantly higher than the national incidence, 4.9 per 100,000 ($p < 0.05$). Of those, 1,403 (81.4%) were male. The measurable number of HPV-positive OCs was lower than the CDC's estimate (596 vs. 1,206). The proportion of HPV-attributable OCs in SC was 60.9%, compared to the 70.0% estimated by CDC. The SSF variable had a high number of unknown test status (overall: 43.1%; males: 41.6%; females: 50.0%).

Conclusions: The measurable number of HPV-attributable OCs in SC is lower than CDC estimates with males having a higher burden. This conclusion may be skewed, due to the high proportion of unknown HPV status, highlighting the need to explore factors that contribute to missingness or unknown values, possibly due to the evolution in the guidelines for coding SSF-10 during this time. Further, the disparity of HPV vaccination coverage in SC between males and females is stark [4]. There is a need to increase vaccinations among males to further decrease the number of HPV-attributable OCs.

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**NAACCR
5H2**

CERVICAL CANCER IN ADOLESCENT AND YOUNG ADULTS IN CALIFORNIA, 2005-2014

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Background: With HPV vaccination and Pap test screening, cervical cancer should be prevented or diagnosed at an early stage (\leq IB) when it is largely curable. However, cervical cancer still presents beyond stage I, including among adolescent and young adults (AYAs: ages 15-39 years) who have historically been highly uninsured and account for 25% of all cervical cancer diagnoses.

Purpose: To describe characteristics of AYAs with cervical cancer and investigate factors associated with later stage disease and survival.

Methods: We identified AYAs with cervical cancer (2005 to 2014) using California Cancer Registry data. We linked the cohort to Medicaid enrollment files and Office of Statewide Health Planning and Development hospitalization data. We used multivariable logistic regression and Cox proportional hazards models to investigate associations.

Results: Of the 3,584 AYAs with cervical cancer, 37.6% were diagnosed at stages II, III, or IV; 44.4% had Medicaid insurance (29.6% enrolled at diagnosis); 44.8% were Hispanic; and 42.0% resided in low socioeconomic status neighborhoods. AYAs enrolling in Medicaid at diagnosis (vs private insurance) (Odds Ratio [OR] =2.97), blacks (OR=1.76), and Hispanics (vs whites) (OR=1.23) were significantly more likely to be diagnosed at later stages (II, III, IV vs I). Hispanics were nearly two times more likely to enroll in Medicaid at diagnosis (OR=1.93). AYAs diagnosed at later stages (OR=1.32) and Hispanics (OR=1.29) were significantly more likely to have a hospital admission within six months of diagnosis. Significantly worse survival was experienced by blacks (Hazard Ratio [HR] =1.43), AYAs treated at non-National Cancer Institute designated centers (HR=1.51), and AYAs diagnosed at later stages (HR=2.21).

Conclusion: Young women continue to be diagnosed with later stages of cervical cancer over 25 years after the start of a national screening program and over 10 years after the introduction of HPV vaccines, with later stage associated with increased hospitalizations and worse overall survival. The large proportion of AYAs enrolling in Medicaid at the time of diagnosis suggests that they were uninsured and without access to screening. Further research is warranted to investigate sociodemographic barriers to health care that impact stage at diagnosis and survival in young women with cervical cancer.

IACR
5H3

RISK OF HPV-RELATED EXTRA-CERVICAL CANCERS IN WOMEN WITH A REMOVED INTRAEPITHELIAL CERVICAL LESION

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The infection from human papillomavirus (HPV) causes several cancers including, first of all, cervical cancer, but also vaginal, vulval, penile and oropharyngeal cancers. Understanding the burden of HPV-related cancers is important for guiding cancer prevention and treatment interventions.

We collected a cohort of 5745 resident women who underwent cervical conisation for dysplasia (mild and severe: CIN 2 and 3) at the S. Anna University Hospital of Turin since 1992. They were linked to the cases of the Piedmont Cancer Registry (RTP) that covered incidence of Turin municipality since 1985, extended to the Metropolitan area since 2008, and finally covering the rest of the region starting in 2013 (4363916 inhabitants at the 2011 census). It resulted in 3185 patients potentially linkable to the RTP, with more than 20000 person-years of follow-up (end of the year 2014). Risk of subsequent HPV-related cancers was then calculated as Standardised Incidence Ratio (SIR) using age-specific rates by population and period for calculation of expected cases.

We found 7 HPV-related cancers: 3 cancers of the tongue, 1 oropharyngeal, 1 anal, 1 vaginal and 1 vulval cancer. Compared to an expected of 0.47 cases, we measured an overall SIR of 14.8 (95% CL 5.9-30.5). Also statistically significant were risks for cancer of the tongue (SIR=23.9; 95%CL 4.7-68.0) and for mouth overall (SIR=15.2; 95%CL 4.1-39.1). The risk for anal (SIR=8.7), vulval (SIR=18.2) and vaginal (SIR=25.2) cancers, confidence limits included the null effect.

Results support the study hypothesis of an increased risk of HPV-related cancers in women who underwent conisation for a mild to severe cervical dysplasia. However, we also found a statistically significant risk increase for lung cancer (SIR=9.5), bladder (SIR=5.4) and upper respiratory and digestive tract cancers (SIR=8.8). Other risk factors such as tobacco smoking and alcohol consumption could be suspected. The association with these risk factors can be speculated through low social class. However, there is evidence in the literature that HPV infection, especially HPV 16 and HPV 18 infection, also significantly increases the risk of lung cancer.

NAACCR
5H4

MONITORING OF HPV GENOTYPE PREVALENCE TEN YEARS AFTER HPV VACCINE IMPLEMENTATION

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Background: In the U.S., population-based tracking of human papillomavirus (HPV) genotypes among HPV-associated cancers does not currently exist, but CDC has supported two special studies in central cancer registries (CCRs) pre-vaccine and 10 years post-vaccine. Results from the first study raised concerns about whether all HPV found in oropharyngeal (OP) cancers was causal and whether HPV plays a role in scrotal and rectal squamous cell carcinomas (SCCs).

Objectives: To assess HPV genotype distribution in HPV-associated cancers from CCRs and to correlate HPV DNA presence with p16 overexpression (marker for HPV oncogene expression) in OP, rectal, and scrotal SCC.

Methods: Archived tissue from cervical, OP, anal, rectal, scrotal, and cervical carcinoma in situ (CCIS) incident cases between 2014 and 2015 were provided by CCRs in Iowa, Kentucky, and Louisiana. HPV genotyping was performed using Linear Array (Roche Diagnostics), with follow-up testing of HPV-negative samples using the INNO-LiPA HPV Genotyping Assay (Innogenetics). Weighted HPV prevalence was estimated for any HPV and the hierarchical attribution to genotypes in all vaccine formulations (16/18) and types in the 9-valent vaccine (31/33/45/52/58). P16 immunohistochemistry was performed in OP, rectal, and scrotal SCCs; percent agreement and Cohen's kappa (κ) coefficients were calculated.

Results: 363 cervical, 73 anal, 315 OP, 6 scrotal, 39 rectal, and 348 CCIS were successfully genotyped. Prevalence of HPV types were: cervical: [any HPV: 89%, 16/18: 69%, 31/33/45/52/58: 10%]; anal: [any HPV: 91%, 16/18: 85%, 31/33/45/52/58: 3%]; OP: [any HPV: 65%, 16/18: 63%, 31/33/45/52/58: 0.8%]; rectal SCC: [any HPV: 82%, 16/18: 71%, 31/33/45/52/58: 11%]; scrotal: [any HPV: 67%, 16/18: 50%, 31/33/45/52/58: 0%]; and CCIS: [any HPV: 98%, 16/18: 68%, 31/33/45/52/58: 22%]. The agreement and κ coefficients between HPV and p16 for OP, rectal, and scrotal samples were 86% (κ=0.66), 92% (κ=0.75), and 83% (κ=0.67), respectively, which corresponds to substantial agreement (κ=0.61-0.80).

Conclusion: HPV was present in over 80% of cervical, anal, rectal, and CCIS cases. Substantial agreement between HPV and p16 results was observed in OP, rectal, and scrotal SCCs, supporting the role of HPV. Monitoring HPV genotype prevalence will be important for documenting the impact of the HPV vaccine.

**NAACCR
5H5**

BRIDGING COLORADO’S CANCER AND IMMUNIZATION REGISTRIES TO IMPROVE THE DISSEMINATION OF A SUCCESSFUL HPV VACCINATION INTERVENTION

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Background: Vaccinating against human papilloma virus (HPV) infection is the optimal primary prevention strategy for preventing cervical cancer. While it is recommended that adolescents receive the vaccine by ages 11-12, vaccination rates among adolescents are low. A previous cluster randomized control trial of a clinic-based physician communication (PCOM) intervention in Colorado demonstrated increased initiation and completion of the HPV vaccine series among adolescents in the intervention practices.

Purpose: Determine locations in Colorado that may benefit most from strategies aimed at increasing adolescent HPV vaccination, and identify clinics in these areas to which we can expand the evidence-based PCOM intervention.

Methods: Incidence data for cervical cancer in females under age 65 from 2006 to 2015 in Colorado was obtained from the Colorado Central Cancer Registry, the State’s population-based cancer registry, that includes the geocoded residence of cases at the time of their diagnosis. Zip-code level HPV vaccination data from 2017 for females aged 11-17 years was obtained from the Colorado Immunization Information System, the State’s population-based immunization registry. Geospatial analysis combining the geographic distributions of vaccination coverage and cancer incidence was used to identify locations with both low HPV vaccination rates and high incidence of cervical cancer. These high risk areas were intersected with the locations of clinics that are part of Colorado’s large Practice-based Research Network (PBRN).

Results: Using local vaccination rates, the distribution of the population at-risk and eligible for vaccination, and local cervical cancer rates, we determined the likely effectiveness of the PCOM intervention if it was to be conducted throughout Colorado and the potential effectiveness of the vaccination intervention in areas surrounding existing PBRN clinics. We highlight the ten PBRN clinics identified as being most beneficial to target with the intervention.

Conclusions/Implications: This method of using cancer registry data to improve dissemination of cancer prevention interventions provides a unique opportunity to identify and target specific high-risk areas for expanding a proven strategy on a population basis.

NOTES:

Horizontal lines for taking notes.

NAACCR YOUNG TALK #1

TUESDAY, JUNE 11

10:05 AM - 10:25 AM

NAACCR
NYT1

THE IMPACT OF THE DELAYS IN THE IMPLEMENTATION OF THE 2018 CHANGES ON THE TIMELINESS OF REPORTING TO THE CENTRAL REGISTRIES

Tonya Brandenburg¹

¹Kentucky Cancer Registry, Lexington, KY, United States

Background: The Kentucky Cancer Registry requires hospitals to report cancer cases to the central registry within 6 months of the date of first contact of the patient with that facility. For non-hospital facilities (clinics, physician offices, freestanding pathology laboratories, etc.), the reporting timeframe is 15 months from the patient visit. Non-hospital files submitted to KCR in the spring of 2018 will contain patients seen from January to June, 2017; likewise, the files submitted in the fall of 2018 will contain patients seen in the last half of 2017. This delay allows for more efficient abstracting and processing at the central registry, since a hospital abstract may already have been reported and the non-hospital abstract is linked and consolidated with it. The impact of the 2018 changes on non-hospital reporting is unknown, but not expected to be significant.

The out-of-state data exchange files are requested quarterly, but not always received in a timely manner. The proportion of Kentucky resident cases which are reported solely through out-of-state data sources is, on average, 5% annually. These cases may be significantly delayed by the 2018 changes, since KCR has little or no control over the timeliness of reporting to central registries in other states.

Purpose: A study is being conducted to compare the number of cases reported to the central registry in six month intervals by diagnosis year, starting with 2016 diagnoses. This will help us to evaluate whether delays in availability of the 2018 coding Manuals, reporting software, and on line resources may have a significant impact on cancer case reporting to the central registry and how that would impact completeness estimates for the year. The results will be presented at the conference.

NAACCR YOUNG TALK #2

TUESDAY, JUNE 11

3:05 PM - 3:25 PM

NAACCR
NYT2

FUNDAMENTAL LEARNING COLLABORATIVE FOR THE CANCER SURVEILLANCE COMMUNITY (FLccSC)

Susan Bolick¹; Gary Levin²; Steve Peace^{2, 3}; **Jill MacKinnon**²; Mike Castera¹; Paul Stearns⁴; Jaime Prats⁴; Netta Apedoe⁵

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²Florida Cancer Data System, Miami, FL, United States

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⁴Advanced Consulting Enterprises, Inc. Miami, FL, United States

⁵Centers for Disease Control and Prevention, Atlanta, GA, United States

Background: FLccSC is a stand-alone, web-based learning management system (LMS) developed collaboratively by the Florida Cancer Data System and the South Carolina Central Cancer Registry for the specific distance-learning needs of our respective states in lieu of diminishing funding and limited personnel.

Purpose: FLccSC provides a program-specific, web-based, distance-learning platform and is administered and maintained on a central server by Florida. Education/training can be targeted for diverse audiences (e.g., registrars, data reporters, epid and statistical staff) using FLccSC.

Methods: FLccSC is scalable and customizable. With a click of a button, course developer can share their content with all members of the FLccSC collaborative. Then, with a click of a button, any member of the collaborative can include the shared course on their FLccSC site. The student will receive a customized certificate of completion for work successfully completed, with CEUs if applicable.

Results: The CDC and the National Association of Chronic Disease Directors recently funded FLccSC for two years, enabling access by each NPCR- funded Central Cancer Registry (CCR) in the nation and four branches at CDC. All CCRs that join the FLccSC collaborative will have a stand-alone and customized platform (including their web address, logos, branding and content), utilizing their own original content and/or shared resources from other member registries. We will provide a live demonstration of the features of FLccSC from both the front-end (student) and back-end (development) perspectives and further demonstrate the benefits of becoming a participant of the FLccSC collaborative to maximize efficient on-line education/training resources to a large audience.

NAACCR YOUNG TALK #3

WEDNESDAY, JUNE 12

9:35 AM - 9:55 AM

NAACCR
NYT3

FROM EXCEL TO EXCEPTIONAL: INTERACTIVE BUSINESS INTELLIGENCE TOOL USE IN THE MINNESOTA CANCER REGISTRY

Paula Lindgren¹; Judy Punyko¹; Mona Highsmith¹

¹Minnesota Cancer Reporting System, St Paul, MN, United States

Background: Cancer registries are overflowing with valuable data and statistics. These data are in the form of database queries, Excel tables, SEER*Stat output, Joinpoint analyses, SAS output and a plethora of other sources. Minnesota Cancer Reporting System (MCRS) analytic staff spend time and resources combining the data into meaningful, static displays for dissemination to stakeholders, the public and internal registry staff. The creation of interactive displays enables rapid evaluation of data.

Objective: To provide interactive displays to analyze, visualize, and evaluate data to provide insights into the understanding of data related to cancer rates, trends and burden. The tool will also be used for internal workload assignments to manage allocation of staff.

Methods: Tableau business intelligence software was the tool piloted by the Minnesota Department of Health (MDH). Data from Excel, SEER*Stat, JoinPoint and SEER*DMS were used as the source for the visualizations. Examples of the visualization of the data sources will be demonstrated: 1. Trends in the collection of clinical and pathology based diagnoses; 2. Top ten cancer incidence and mortality rates by race and sex; 3. HPV related counts and trends; 4. Mortality by country of birth and frequency of last name; 5. Staff allocation based on workload

Results/Conclusion: This powerful tool will help MCRS staff evaluate trends, outliers, inconsistencies and share insights of its databases with public health partners and the public in a fast, easy, and interactive manner. There is also a need to implement this tool for internal QA/QC evaluation. This is an ongoing project within the MDH that will continue to grow as it is more widely adopted. Future implementation of Tableau will have capacity for public deployment on MCRS webpage.

NAACCR YOUNG TALK #4

THURSDAY, JUNE 13

10:05 AM - 10:25 AM

NAACCR
NYT4

DESIGNING SUB-COUNTY ZONES FOR CANCER SURVEILLANCE REPORTING

David Stinchcomb¹; Eric J "Rocky" Feuer²; Mandi Yu²; Denise Lewis²; Li Zhu²; Zaria Tatalovich²; Scarlett Gomez³; Salma Shariff-Marco; Xiaocheng Wu⁴; Lauren Maniscalco⁴; Matt Airola¹

¹Westat, Rockville, MD, United States

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³Greater Bay Area Cancer Registry, San Francisco, CA, United States

⁴Louisiana Tumor Registry, New Orleans, LA, United States

Geographic areas typically used for reporting of cancer surveillance data are not always ideal. In the U.S. most geospatial cancer reporting is based on counties which can vary in size from a few hundred people to several million. Breaking the large counties into smaller reporting areas would provide greater spatial resolution for cancer reporting and more meaningful data for communities and stakeholders. The NCI SEER program is exploring methods to combine small geographic areas (U.S. census tracts) having similar population characteristics into a set of cancer reporting zones that would have relatively constant populations with enough people to provide stable cancer rates and minimize risk of individual identification. The SEER Program has explored possible approaches, methods, and tools for designing such cancer reporting zones. This presentation will share preliminary results of the project. We will describe objectives for the reporting zones including minimum and maximum population sizes, compactness, and population homogeneity; we will describe the results of an evaluation of several available zone design software tools; and we will present sample zone design results for a number of U.S. states including two states with a small number of census tracts (Vermont and Wyoming), a relatively urban state (Connecticut) and a relatively rural state (Iowa). The preliminary results are promising and the SEER program is working with several registries to develop a set of cancer reporting zones using these methods. Although the examples in the presentation are based on geographic areas in the U.S., the methods are equally applicable to other countries.

NAACCR POSTERS

Kitsilano Salon D

NAACCR

P-1

USING CDC'S FRAMEWORK FOR PROGRAM EVALUATION TO ASSESS PROGRESS AND STRATEGICALLY PLAN FOR THE FUTURE: CDC'S NATIONAL PROGRAM OF CANCER REGISTRIES (NPCR) EVALUATION

Eva Trinh¹; Paron Pordell¹; Netta Apedoe¹; Loria Pollack¹; Vicki Benard¹
¹Centers for Disease Control and Prevention, Atlanta, GA, United States

Background: Evaluation assesses program progress, helps identify needed support, identifies successes and gaps, and informs future priorities. Over 26 years, CDC has supported numerous state and territorial central cancer registries through the National Program of Cancer Registries (NPCR). Since 2017 marked a new funding cycle, the time was opportune to plan and conduct a formal evaluation to pinpoint NPCR's progress towards meeting its mission of providing high quality cancer data to address the nation's cancer burden.

Purpose: To describe the rationale for NPCR Evaluation, share the logic model, evaluation priorities, and activities conducted by the NPCR evaluation work group thus far.

Approach: We created a mixed methods evaluation using a phased approach based on the CDC Framework for Evaluation. Phase I entails document reviews and secondary data analyses to help answer questions about staffing, grantee infrastructure, training, education, and data quality, timeliness, and completeness. Phase II focuses on primary data collection through in-depth interviews and focus groups with grantees, done in coordination with a feasibility assessment on electronic reporting processes and costs, and a registry operations assessment to identify registry best practices and challenges. Phase III and IV activities include data collection, review, analysis, and evaluation report write up and sharing of recommendations.

Results: Prioritized questions for phase I of the evaluation focused on understanding registry staffing and infrastructure and provided preliminary results to inform phase II primary data collection. We found that health departments serve as the organizational location for more than 80% of central cancer registries and these particular registries had a low-medium average caseload reporting approximately 2,930-40,634 annual cancer cases. Health departments experienced the greatest number of staff vacancies when compared with academic institutions and hospital associations. Program Director and Certified Tumor Registrar salaries as well as years of experience varied widely across the country.

Implications: Evaluation findings will assess progress, strengths, challenges, and technical assistance needs to grantees as they work to improve 12- and 24-month data quality. Findings will help ensure accountability, shape program implementation and standards, inform resource allocation, and, most importantly, provide evidence to promote cancer registry best practices.

NAACCR

P-2

FINDING MEANING IN MEANINGFUL USE: UPDATING PATIENT DEMOGRAPHICS FROM ELECTRONIC HEALTH RECORDS

Stephanie Hill¹; Jamal Johnson¹; Henry Lewis¹; Mireille Lemieux¹; Antoinette Stroup¹

¹New Jersey State Cancer Registry, Trenton, NJ, United States

Background: The New Jersey State Cancer Registry (NJSCR) has expanded electronic reporting by independent laboratories in order to capture otherwise unreported cases. These cases have a higher rate of unknown Social Security Number (SSN), race, and ethnicity. These fields are critical for record consolidation, quality control, data linkages, and cancer surveillance.

Purpose: NJSCR declared its readiness for Meaningful Use (MU) in 2014 and began receiving test data in 2015. Since then, 129 practices have submitted test data, and 15 are actively in production. To date, NJSCR has received over 330,000 MU reports, matching over 28,000 existing patients and 14,000 primary cancers. The purpose of this project was to assess the utility of MU data for obtaining missing demographic information.

Methods: MU Clinical Data Architecture messages (CDA-m) are transmitted to NJSCR via secure file transfer protocol. Production CDA-m data are imported into the SEER*DMS registry database via an autoloader. Auto-linking routines within SEER*DMS link CDA-m data to existing patients and tumors using patient identifiers and SEER multiple primary and histology rules. Structured Query Language was used to identify existing patients with unknown SSN, race, or ethnicity in SEER*DMS with a linked CDA-m. Cases from diagnosis years 2016 and 2017 were manually reviewed to update SSN, race, and/or ethnicity in the existing patient record.

Results: 700 patients with missing information had a linked CDA-m: 175 unknown race, 249 unknown ethnicity, 276 unknown SSN. After manual review, 130 (74.3%), 158 (61.0%), and 179 (64.9%) were updated with a known race, ethnicity or SSN, respectively. The review required approximately 8 hours of staff time to complete.

Conclusions: MU data has potential as a reliable data source for completing unknown demographic variables and improving registry operations by reducing the need for active follow-back.

NAACCR

P-3

DEEP DIVE INTO DATA QUALITY - CALIFORNIA'S APPROACHCheryl Moody¹; Marilyn Scocozza¹California Cancer Registry, Sacramento, CA, United States

Background: The National Program of Cancer Registries (NPCR) routinely provides a data quality indicator report which illustrates California's data quality percentages in specific data fields as compared to the median percentage across all NPCR registries. California Cancer Registry (CCR) reviews the report to determine data fields that meet the following criteria: California's data quality percent for a data field is higher than the NPCR Median Range OR California's data quality percent for a data field is within the NPCR Median range, but has been increasing over time. The aim of this poster is to evaluate and analyze specific data fields meeting one of these criteria.

Method: CCR received an NPCR report on cases diagnosed 2011-2016. An analysis of this report is in process based on SQL queries run on one or more of the three data fields identified meeting the above criteria. This poster will illustrate the results of the analysis for one or more of the following data fields: Spanish Origin, Birthplace Country, and Diagnostic Confirmation.

Results: The number of cases coded to unknown for Spanish Origin has risen from 1.74% to 2.30% over this time period. The number of cases coded to unknown for Birthplace Country has risen from 47.47% to 54.26 percent and the number of cases coded to 5, 6, 7 or for Diagnostic Confirmation is higher in California than the NPCR median for 2012-2015.

Recommendations: Our poster will illustrate the results of our analysis focusing specifically on any patterns or trends identified; corrective actions implemented; and outline our plan for eliminating the root cause of any coding issues identified.

NAACCR

P-4

CALIFORNIA'S FOCUSED AUDIT OF COLORECTAL CANCER CIRCUMFERENTIAL RESECTION MARGIN (CRM) - WHEN POSITIVE MAY MEAN NEGATIVE, AND OTHER MISCODING PATTERNS NOTED IN DATA COLLECTION OF CRMDonna Hansen¹; Mary Brant¹¹California Cancer Registry, Sacramento, CA, United States

Background: The California Cancer Registry (CCR) conducted a recoding audit to review accuracy for twenty (20) colon cancer data items, including required Collaborative Stage Site Specific Factors (CS SSFs), for data year 2015. Results identified CS SSF #6-Circumferential Resection Margin as the variable with the highest overall discrepancy rate. There were several discrepancy patterns identified accounting for miscodes. The most frequent discrepancy was coding margins other than the CRM, discrepancies in converting centimeters to millimeters when documenting distance of a negative CRM, and CRM coded as Positive (NOS), yet text review clearly stated the CRM was negative. The number of cases coded as CRM positive with documentation indicating CRM was negative, were of particular concern since this is an important prognostic factor for recurrence after surgery. Therefore, a larger focused audit of CS SSF#6-CRM code 000/positive NOS for colorectal cancers was conducted to assess coding accuracy.

Method: All colorectal cases for 2016 with CRM coded to 000 were audited using a text to code review. Initial findings revealed 44% of cases overall did not have a positive CRM per text review; in 31% CRM status was not mentioned, and in 13% CRM was actually described and documented as negative in text. Based on these results, the CCR is expanding the audit to include additional years. In addition, the SEER Quality Improvement Experts Group identified five potential areas of interest to examine for CRM, and our expanded audit will also review a few of these potential areas of concern.

Results Provide details on error patterns, percentages of errors by type and identification of potential root causes for miscodes from both the initial audit, in addition to findings from the expanded audit, along with review of other SEER CRM coding areas of interest.

Recommendations: Our poster will illustrate the results of our data analysis focusing specifically on pattern or trends identified and corrective actions recommended or implemented to improve data quality.

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P-5

SOURCE ABSTRACT CODED RACE - ACCURACY AND CONCORDANCE WITH OTHER SOURCES

May Ting Liu¹; Kevin Ward¹

¹Metropolitan Atlanta SEER Registry, Atlanta, GA, United States

Background: The completeness and accuracy of race coding within cancer registry data is critical in order to produce rates by racial groups. The accuracy of the data collected from the incoming source abstract versus other sources (i.e. voters tapes, vital status tapes) has not been thoroughly examined.

Purpose: We will assess the accuracy and concordance of race coding from the source abstract with the information reported by voters registration tapes and mortality tapes.

Methods: 2016 data that has a valid coded race in the source abstract will be assessed. Multiple abstracts for the same case who have different race codes will be excluded. This cohort will be matched against our voter registration files. A second source of 2016 data of deceased patients who have race coded will be extracted and matched against our 2016 death data.

Results: Findings from the linkages will be presented.

Conclusions: Findings will help assess the accuracy and concordance of race as coded by the source facility versus other sources. As we receive more data from sources that are missing race, namely dermatology and urology clinics, we may be able to use these outside sources to code the records in an effort to improve our data completeness.

NAACCR

P-6

RAPID CASE REPORTING: BARRIERS ENCOUNTERED IN IMPLEMENTATION IN RHODE ISLAND

Nancy Lebrun¹; Lisa Garcia¹; Nicole Witherell¹; Stephanie Rego¹

¹Rhode Island Cancer Registry, Providence, RI, United States

Background: The Rhode Island Cancer Registry (RICR) is funded through the National Program of Cancer Registries (NPCR). Until 2017, RICR had required reporting facilities to submit newly diagnosed cancers within 180 days of diagnosis. While this requirement provided somewhat timely data, an extended period of time required to perform quality assurance activities and case consolidation had delayed access to data for public health officials, decision makers, and researchers.

The Rapid Quality Reporting System (RQRS) was established by the Commission on Cancer (CoC) of the American College of Surgeons (ACoS) to ensure data quality and adherence to quality cancer care measures. This web-based data collection and reporting system provides for concurrent abstracting to ensure complete and accurate data and quality care delivered in a much faster turnaround time.

Purpose: The implementation and regulation of rapid case reporting is essential in providing the RI Department of Health with greater cancer surveillance capability, as well as providing researchers with more timely data.

Methods: The new reporting regulation (216-RICR-10-10-2) was passed, and includes case reporting a set of initially available information within 30-45 days from the date of a case first seen by provider, beginning January 1, 2018.

Results: There are barriers RI will face along the way to full application of these reporting rules. Barriers include an inability to regulate reporting timeframes for cases that are diagnosed and treated in out of state facilities (most notably, neighboring states of Rhode Island) and less influence or ascendancy in non-CoC accredited Rhode Island facilities.

Utilizing a similar data set as RQRS to ensure rapid reporting. Currently, RQRS focuses on breast and colorectal cancers but is anticipated to expand into more primary sites in the future. The implementation of RQRS at CoC-accredited hospitals in RI has opened a door for a greater potential of concurrent and rapid case capturing.

Conclusion: Rhode Island intends to display a timeline of when and how regulation changes came into play for rapid case reporting in Rhode Island by 2020, status of regulation implementation, and future goals for full application and utilization of rapid case reporting within Rhode Island facilities through efforts of the Central Registry.

NAACCR

P-7

USING CHANGES MADE IN THE VISUAL EDITING PROCESS TO CREATE MORE TARGETED QUALITY CONTROL METHODS**Scott Wood**¹¹UC Davis CalCares, Sacramento, CA, United States

Background: As the California Cancer Registry (CCR) moves more and more towards automatic processes, the organization needs to identify new methods for quality control activities. Previously all incoming hospital abstracts uploaded into Eureka (CCR's Database Management System) were "visually edited" to ensure that all coded values were supported by the incoming text related to the diagnosis. The sheer volume of data makes it impossible to manually perform this method of quality control on all cases. Currently the criteria for requiring this quality control step is limited to a specific group of abstractors and other randomly selected cases. In total only around 15%-20% of incoming hospital abstracts require this text to code review.

Purpose: By analyzing the changes made to the data during this quality control process, we hope to be able to create a method to help better target the visual editing process to cases that likely need to be looked at, without increasing the amount of manual work required.

Methods/Approach/Results: Categorizing the types of changes made during the visual editing process will allow us to discern patterns and trends in the conditions that cause coding changes based on text to code review. A team consisting of a programmer and business analyst (CTR) will identify patterns in the data to select for additional quality control activities, whether they replace existing selection criteria or create a screening process for cases that may require additional analysis.

Conclusions/Implications: The results of this analysis should serve to provide new methods and pathways for quality control moving forward, with the potential for a more automated and accurate selection criteria for abstracts that may require manual quality control activities.

NAACCR

P-8

THE IMPACT OF THE 2018 SOLID TUMOUR RULES FOR COLORECTAL CANCER IN CANADA**Bal Sidhu**; Sheila Fukumura¹; Gail Noonan²; Kim Vriends³; Leona Douglas⁴; Joanne Turner⁵; Claudie Hamel; Ketsia Ly⁴; Grace Liu⁶; Valerie Blanchette⁷; Christine St-Pierre⁷; Theresa Anderson⁸¹Manitoba Cancer Registry, Winnipeg, MB, Canada²CancerCare Manitoba³PEI Cancer Registry⁴Saskatchewan Cancer Agency, Regina, SK, Canada⁵CancerCare Nova Scotia⁶CancerCare Ontario⁷Registre québécois du cancer⁸CancerControl Alberta-Alberta Health Services

Background: The SEER 2007 Multiple Primary and Histology (MPH) rules were developed to promote consistency and standardization of cancer registrar coding. In 2018 the SEER Solid Tumour Rules (STR) for coding multiple primaries and histologies was released for use as of the 2018 diagnosis year. These rules were a revised and expanded version of the 2007 MPH rules and included detailed general instructions, site specific guidelines and hyperlinked tables for reference. A review was undertaken to assess the impact these newly expanded rules may have on the Canadian cancer registries.

Purpose: To identify the effect of change that may result from the updated rules with the focus being on one module: Colon, Rectosigmoid, and Rectum. This set of rules was chosen due to Canada's collection of high grade dysplasia as insitu carcinoma, the discontinued use of the "in a polyp" codes and the moving of the rectosigmoid, rectum sites from the Other Sites rules into the Colon rules. It was felt that this module may prove to have the greatest effect with regard to multiple primaries and histologies.

Method: The exercise was conducted with use of an Excel spreadsheet, distributed to eight provincial cancer registries, each of whom provided 20 colon and rectum cases from their 2017 incidence. These cases were put through both sets of rules; results recorded and analyzed.

Conclusions: Cases to be included were equally divided between insitu and invasive behaviour; on review of the insitu cases it was discovered that a very high percentage of these were high grade dysplasia (HGD) in a polyp structure. Applying the new rules to these insitu cases would result in a marked decrease in incidence of insitu colorectal primaries if the HGD were not reportable in Canada. Canada will continue to collect high grade dysplasia as insitu cancer given these results. The expected noticeable change, for all behaviours, will come when applying rule H2 that states to ignore the polyp and code the specific histology. Thus, we anticipate the analysis of the Canadian cohort to show no notable change in the number of primaries registered, but a definite change to the histologies assigned.

NAACCR POSTERS

Kitsilano Salon D

NAACCR

P-9

CAN AUTOMATED CASE-FINDING FULLY REPLACE MANUAL SOURCES AT UROCARE (UROLOGICAL CANCER REGISTRY) AT SINGAPORE GENERAL HOSPITAL?

Saajida Begum; Mei Ying Ng¹; Honghong Huang¹; Kheng Sit Jay Lim¹; Kam On Weber Lau¹

¹Singapore General Hospital

Introduction and Objectives: Eleven manual sources were previously used to search for potential eligible new cancer cases at UroCaRe at Singapore General Hospital from January-June 2018. With the introduction of a new automated case-finding system, we aim to determine whether it is superior to the existing manual sources based on case-finding completeness and efficiency.

Methods: The potential eligible new cancer cases from the manual case-finding system were compared with the cases from 2 automated sources: SingHealth Electronic Health Intelligence System (eHINTS) and Problem Lists from Sunrise Clinical Manager. eHINTS retrieved cases (n=488) using Oracle Business Intelligence Enterprise Edition based on surgical procedures, lab marker mnemonic, SNOMED international T Codes, drug names, ICD-10 AM codes, first attending doctor specialty and discharge specialty description. Problem List retrieved all inpatient and outpatient cases (n=418) admitted and/or discharged from the hospital between January to June 2018 with SNOMED SCT diagnosis codes. All data were processed in R version 3.3.1.

Results: The automated case-finding is a satisfactory replacement as all 521 potential eligible new January-June 2018 cancer cases from the manual sources were found in the 2 automated sources. In addition, full automation was able to provide 3.6% (n=19) more cases than the manual system. The efficiency also increased by 75.1% upon full automation of case-finding.

Conclusion: The automated case-finding system is superior to the manual system in case finding completeness and efficiency and therefore has been implemented by UroCaRe.

NAACCR

P-10

MEANINGFUL USE CANCER CASE REPORTING IN TENNESSEE - WHAT IS THE VALUE?

Jake Richards¹; Martin Whiteside¹

¹Tennessee Cancer Registry, Nashville, TN, United States

Background: Cancer case information from physicians has become more important for overall cancer surveillance as more cancer patients are being diagnosed and treated outside of the traditional hospital setting. As of January 2019, 398,010 electronic cancer case reports have been sent to the Tennessee Cancer Registry (TCR) in the Health Level 7 (HL7) Clinical Document Architecture (CDA) format, which requires testing, conversion, and linkage in order to determine the meaningfulness of the cancer case reports from ambulatory physicians participating in the Electronic Health Record (EHR) Incentive Payment Program also known as Meaningful Use.

Purpose: The TCR aims to determine the value realized and cost associated with collecting cancer case information from ambulatory providers participating in cancer case reporting under the EHR Incentive Programs using the CDC's Registry Plus™ software suite.

Methods: Electronic cancer case reports received during June 2017 through July 2017 by ambulatory physicians participating in cancer case reporting were used in the analysis. Cancer case reports with critical level errors identified in testing with CDA Validation Plus were excluded from the analysis. Cancer case reports with non-critical errors were imported and parsed in eMaRC Plus prior to the analysis. Link Plus was used to link an export of the cancer case reports from eMaRC Plus to the TCR data repository based on social security number, last name, first name, middle name, sex, race, cancer primary site, and diagnosis date.

Results: The TCR identified 352 new cancer patients and updated treatment information or multiple primaries for 1,734 cancer patients in the TCR's data repository. As a result, the TCR abstracted and submitted 38 new cancer diagnoses for the 2016 diagnostic year in the 2018 North American Association of Central Cancer Registries (NAACCR) Call For Data Submission from electronic cancer case reports received in the HL7 CDA format.

Conclusions: It is important to evaluate informatics concerning cancer case reports in the HL7 CDA format to identify areas for improvement in data storage and processing.

**NAACCR
P-11**

DEVELOPING THE PUERTO RICO CLL PROFILE

Carlos Torres-Cintrón¹; Karen Ortiz-Ortiz¹; Yadira Román-Ruiz¹; Omar Centeno¹

¹Puerto Rico Central Cancer Registry, San Juan, Puerto Rico

Chronic lymphocytic leukemia (CLL) is the most frequent type of leukemia among older age population. CLL is characterized by a heterogeneous clinical course. In the past decades, the use of markers for CLL patients have provided important disease prognosis information and they have stimulated the development of more appropriate targeted therapies. The current standard of care combines cytogenetic results with targeted testing for mutations to determine prognostic subgroups. There is no information about the use and impact on these prognostic factors for CLL in Puerto Rico (PR) due to lack of a comprehensive database.

The objective of this project is to develop PR CLL Profile in order to assess the epidemiologic and clinical characteristics, treatment patterns, and outcomes of patients diagnosed with CLL in PR.

A new layout of the Puerto Rico Central Cancer Registry (PRCCR) database will be created to add new clinical variables. We will take advantage of pathology laboratories that report electronically using PathPlus, a PRCCR in-house software with exhaustive protocols for identification of incident cases. This software will be modified to include thorough algorithms to comprise terminology related to CLL specific clinical information. The PR CLL Profile will include data from PRCCR's main database and the PRCCR Health Insurance Linkage Database.

A meeting with oncologists and specialized PRCCR staff was held to evaluate the pathology reports and determine the prognostic factors and variables to be included in the PR CLL database. The variables to be collected as part of the PR CLL database will include CBC results like CD38, and specific tests to identify mutations such as trisomy 12, 11q-, 13q-, 17p-, IgHV, TP53, ZAP-70, and Beta2. Furthermore, we will collect demographic, clinical, treatment, and healthcare utilization information like type of health insurance, socioeconomic position index, comorbidities, secondary malignancies, among others.

The PR CLL Profile will expand the quantity and quality of data regularly collected by the PRCCR to include additional clinical, biologic, and genetic characteristics. It also will serve as an invaluable component of monitoring and improving CLL-related health outcomes in PR. In the future, we plan to expand this project to include Acute Myeloid Leukemia.

**NAACCR
P-12**

A FOUNDATION FOR INTERNATIONAL CANCER SURVEILLANCE RESEARCH COLLABORATIONS: A FEASIBILITY STUDY PROGRESS REPORT

Jim Martin¹

¹(retired) Director, Virginia Cancer Registry, Virginia Department of Health, Richmond, VA, United States

Goals, methods, materials: NAACCR, IARC and IACR support nurturing national cancer surveillance systems. This proposal approaches the practice by examining practical facts and acts that should precede, keep pace with, and sustain indigenous surveillance system development. Facts and acts include legal, regulatory, ethical, clinical, analytical, and operational components a functioning central registry surveillance system requires. The Taiwan Cancer Registry (台灣癌症登記中心) is the real-world example. Research employed deep analysis of published resources and in-depth interviewing methods. IARC, NAACCR, NPCR, and SEER materials contributed critical information for these components. The NAACCR International Registry Review Questionnaire contributed contextual, individual topics. Critical IARC resources included its Code of Good Scientific Practice and multiple volumes of Cancer in Five Continents. Equally important was closely reading the US Federal Cancer Registries Amendment Act that authorizes and structures NPCR. A Taiwan equivalent to each topic was identified and analyzed. Critical resources included the Executive Yuan's national Cancer Prevention and Control Act (癌症防治法) of 2003, Taiwan Health Promotion Administration, Ministry of Health and Welfare (衛生福利部國民健康署) documents, and the Taiwan Cancer Registry Longform Coding Manual.

Significance and next steps: This study of an East Asian cancer surveillance system makes direct, point-by-point comparisons with best practices global and North American authorities promulgate. It is preliminary to further work and provides a framework for further questions: Do surveillance structures and standards, which primarily are Euro-American constructs, transparently translate across international boundaries? How does a relatively young central registry system ensure data completeness, validity, and accuracy? What roles do public health laws and administrative structures perform in emerging systems? Does a single-payer insurance system affect diagnoses and services delivery, registry data capture, and public health initiatives? What should transnational, collaborative research agreements specify to assure scientific validity and public health utility? Ethnographic research through participant observation is required to begin outlining answers to such questions. NAACCR / IACR meeting participants will hear a more complete report containing conclusions and recommendations based on work performed through Spring, 2019.

NAACCR POSTERS

Kitsilano Salon D

NAACCR

P-13

VISIONING THE FUTURE OF CANCER SURVEILLANCE: HOW TO BRING ABOUT CHANGE WHEN RESOURCES ARE LIMITED

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Background: There is wide recognition that central cancer registries (CCRs) need to adapt to meet funding agency standards (e.g., the state has legislation/regulations that authorize a CCR, 100% of hospitals report electronically by 2022) and the needs of data users (e.g., make data available sooner, collect more information on biomarkers, treatment, etc.). To remain relevant, CCRs must also maintain data quality, e.g., meet National Data Quality Standards and Advanced Standards, and often must do so with limited budgets. Missouri Cancer Registry (MCR) staff searched for a cost-effective means of adapting to meet registry needs.

Purpose: To describe how MCR developed and implemented a logic model and evaluation plan to facilitate changes needed to maintain or increase data completeness, timeliness and accuracy.

Methods: Starting in late 2017, we adapted CDC's National Program of Cancer Registries (NPCR) Logic Model outlined in funding announcement DP17-1701 and developed and implemented an MCR Evaluation and Performance Measurement Plan. We focused on three key initiatives that would evaluate: our 12-month data submission completion rate, data quality as a function of audit and education effectiveness; and electronic capture of cancer cases. A fourth initiative was to identify collaborations and actions needed for improvement of 12-month data and completeness of data, particularly non-hospital data.

Results: We determined that a much-needed action, revision of cancer reporting regulations, could be facilitated by involving Missouri's Leadership Team (LT; developed under DP17-1701) and the Missouri Cancer Consortium (MCC). A change in LT personnel delayed action but planning is now underway and revised regulations will be drafted in late 2019. With support from the MCC, we anticipate a successful revision to the Missouri code of state regulations that will increase penalties for facilities reporting late or failing to report new cancer cases and may allow MCR to charge for abstracting such cases.

Conclusions: Development and use of a logic model and an evaluation and performance measurement plan have led us to focus on how we can bring about needed change without filling unfunded positions. Revised regulations will improve 12-month completion, should increase non-hospital reporting and may bring in needed revenue.

NAACCR

P-14

PUERTO RICO CANCER REGISTRY AUTOMATED AUDIT TOOL

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As part of Puerto Rico's Central Cancer Registry (PRCCR) overall program of quality assurance and in compliance with the National Program of Cancer Registries Program Standards, audits including case finding and re-abstracting of selected case information is carried out in selected hospitals of large, medium and small volume of cancer cases yearly.

Analysis and report writing of the resulting audits is time consuming and requires a meeting via conference call with the corresponding hospital staff responsible for reporting to the PRCCR. In the past, PRCCR's IT Unit has been able to provide a diverse set of tools for electronic pathology reports (PathPlus), develop procedures for receiving information from electronic medical records, create and manage more than 100 million records in health insurance claims. The latest tool developed by IT is an automated audit tool that provides a complete and detail analysis of the audit results using PowerBi®.

The Automated Audit Tool (ATT) produces a PowerBi dashboard with several panels with tables and charts showing dynamically the audit results for the audited institution. The dashboard includes the overall score and specific scores by primary site and each audited field. The ATT was developed integrating a Visual Studio Application, Excel template and PowerBi that access data stored in our Cancer SQL Server Database. Also, for re-abstracting of the cases, we use a customized version of AbstractPlus, provided by CDC, configured by PRCCR IT Staff that include only the fields to be audited.

The ATT can easily show an audit score for re-abstracted audit data, including variables with the lowest score depicting important differences between the reported and audited information. The ATT provides a quick and complete analysis of audits that is used for writing a report for the corresponding health institution highlighting the most common mistakes and recommendations to improve the quality of the future abstracts to be produced.

NAACCR
P-15

TRENDS IN INCIDENCE AND MORTALITY RATES FOR THE TOP 4 CANCERS IN NEW BRUNSWICK

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Background: Trends in incidence and mortality rates provide useful information on cancer burden and cancer-related program evaluation and policy development.

Objective: To examine trends in age-standardized incidence and mortality rates (ASIRs/ASMRs) by sex for breast, prostate, lung and colorectal cancers in New Brunswick between 1986 and 2013.

Methods: Average Annual Percentage Change (AAPC), developed by the National Cancer Institute, is calculated for each individual cancer site. AAPC is a summary statistic that allows us to investigate cancer trends over time. The increasing or decreasing trends in cancer rates are detected through statistically significant testing using the Joinpoint model.

Results: (Figures 1-4 and Table 1)

1) Between 1986 and 2013, the ASIR for prostate cancer fluctuated with an AAPC of +0.6% annually; whereas the ASMR for prostate cancer decreased with an AAPC of -1.8%; 2) The ASIR for female breast cancer slightly increased (AAPC: +0.8%); however, the ASMR for female breast cancer showed a significant decrease with an AAPC of -2.4%; 3) Significant decreases were observed for the following cancers (males: lung incidence (-1.2%) and mortality (-2.1%) and colorectal mortality (-1.6%); females: colorectal incidence (-0.7%) and mortality (-2.2%)); 4) Significant increases were seen in female lung cancer for incidence (+1.8%) and mortality (+1.3%); and, 5) The ASIR for male colorectal cancer was relatively stable with an AAPC of 0.0% annually.

Conclusion: AAPCs have shown improvements in cancer mortality in New Brunswick except for female lung cancer. Further progress from the implementation of a provincial, population-based colon cancer screening program to complement the breast cancer screening program would be expected in the upcoming years.

NAACCR
P-16

FIVE-YEAR RELATIVE SURVIVAL RATIOS FOR THE TOP 4 CANCERS IN NEW BRUNSWICK

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Background: Cancer survival is a useful and important indicator for cancer control, especially for cancer-related early detection and effective treatment.

Objective: To examine the five-year relative survival ratios (RSRs) for breast, prostate, lung and colorectal cancers by sex in New Brunswick between 2009 and 2013.

Methods: Period analysis method is used to estimate the RSRs for patients who were diagnosed with one of these four cancers between 2009 and 2013. This method provides more up-to-date estimates of long-term patient survival compared to other traditional approaches (i.e., cohort method). Study cohorts were defined from the New Brunswick Provincial Cancer Registry.

Results: For males (Figure 1), the five-year RSRs were highest for prostate cancer (95.4%), followed by colorectal (66.2%) and lung cancers (18.4%). In females (Figure 2), breast cancer (88.8%) had the highest five-year RSR in comparison to colorectal (65.7%) and lung cancers (24.5%). The five-year RSRs tended to be poorer for those patients diagnosed with these cancers at an older age (Tables 1 and 2).

Conclusion: Study results have shown that patients diagnosed with prostate or breast cancer had more favorable survival rate when compared to those diagnosed with colorectal or lung cancer. Early detection with effective treatment may contribute to improved survival. The New Brunswick Cancer Network oversees a population-based breast cancer and colon cancer screening programs.

NAACCR POSTERS

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NAACCR

P-17

AN ASSESSMENT OF SURVIVAL ANALYSIS FOR VIRGINIA CANCER DATA, 2001-2016

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Background: Analysis of cancer survival data and related outcomes is necessary to assess cancer treatment programs and to monitor the Virginia Cancer programs. While VCR has had national cancer survival data from CDC and SEER, we have never had the ability to create our own survival data. Since Virginia Cancer Registry (VCR) completed NDI match in 2018, our data now has the complete information it needs to evaluate survival in Virginia.

Methods: The data were obtained from the VCR database with about 460k cases from 2001-2016, excluding DCO (Death Certificate Only deaths) cases. The descriptive statistics were obtained from analyzing the data. The association between survival time and sociodemographic factors such as race, sex and age category, and stage at diagnosis was investigated using Cox regression and Lifetest Procedure in SAS.

Results: Each patient is counted one time using the first diagnosis information. The observed five-year overall survival rate was 61.5%. Cox regression showed that race (black vs white; OR = 1.14, 95%CI; 1.12–1.15), sex (men vs women; OR = 1.19, 95%CI; 1.18–1.20), stage (distant vs local; OR = 10.5, 95%CI; 10.4–10.6 and regional vs local; OR = 3.60 95%CI: 3.55–3.65), and age group (40-64 vs 0-39; OR = 2.5, 95%CI; 2.4–2.6 and 65+ vs 0-39; OR = 4.6, 95%CI; 4.5–4.8) were significantly related to survival.

Conclusions: This is the first time VCR has been able to analyze Virginia's cancer survival. A wide range of explanatory factors were included. The results demonstrate that survival is relatively lower than national average and is associated with diagnosis at an older age, late stage disease, and African American male. We hypothesize that this is due to low level of awareness, lack of screening programs and subsequent late access to treatment. As a result of this project, tables, charts and graphs related to this project will be publicly available on the VCR website. Local hospitals, clinics, state and local agencies/programs, and researchers are encouraged to access this information and use it as a tool for cancer surveillance, research, and promoting screening and early detection for all Virginians.

NAACCR

P-18

TRENDS IN ALCOHOL-ASSOCIATED CANCERS, 2001-2015, UNITED STATES

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Background: A recent PubMed review of published studies of alcohol and cancer showed molecular factors and consumption factors were the primary focus. While some manuscripts reported on cancer trends and possible risk factors, none specifically examined trends in alcohol-associated cancers or used a comprehensive population-based database such as the United States Cancer Statistics (USCS). It is difficult to quantify the number of cancers associated with alcohol consumption, though, attributable fractions can be estimated from other information which are then multiplied by the number of associated cancers to estimate the number of attributable cancers. Alcohol consumption is linked with increased risk of cancers of the lip, oral cavity, pharynx; esophagus; colon and rectum; liver; larynx; and female breast.

Purpose: The aim of this study is to examine trends for alcohol-associated cancers in the United States during 2001-2015.

Methods: Data from USCS (as reported to CDC or NCI in 2017), covering the entire U.S. population, were used to calculate age-adjusted incidence rates (standardized to the 2000 US population) by race and sex for each alcohol-associated cancer site, using the pre-defined SEER*Stat risk factor variable, created by CDC. Joinpoint regression was used to calculate the annual percent change during 2001-2015.

Results: Preliminary SEER*Stat results show significant decreases in incidence for four – lip, oral cavity, pharynx; esophagus; colon and rectum; larynx – of the six cancer sites with males having larger decreases than females.

Conclusions: Cancers associated with risk factors – including alcohol, tobacco, and obesity – can be analyzed using the U.S. Cancer Statistics public use database available at www.cdc.gov/cancer/public-use. Evaluating cancer incidence by risk factors may assist the cancer control community in identifying populations at highest risk and enhancing tailored interventions and education opportunities to groups with largest disparities.

NAACCR
P-19**CANCER INCIDENCE IN THE OLDER ADULT POPULATION IN THE UNITED STATES**

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Background: The number of new cancers diagnosed in the population aged ≥ 65 years is likely to continue to increase due to demographic trends related to a growing and aging U.S. population. The National Cancer Institute's Surveillance, Epidemiology, and End Results Program recently released special population estimates for ages > 95 years.

Purpose: To better characterize the cancer burden in the older adult population, we examined case counts and cancer incidence rates by age, sex and race/ethnicity.

Methods: Using data from North American Association of Central Cancer Registries member registries, we calculated age-specific incidence rates for patients diagnosed 2001-04 and 2011-14 by sex and race/ethnicity (Hispanic, non-Hispanic white, non-Hispanic black).

Results: Between 2001-2004 and 2011-2014, the population of the United States aged ≥ 65 years increased 25%. The number of new cancers diagnosed at these older ages increased 11% from 2,960,644 to 3,272,692: 8% in males and 14% in females. The largest percentage increase in cases occurred among Hispanics (39%) followed by 21% for non-Hispanic blacks and 10% for non-Hispanic whites. Incidence rates for all cancers combined peaked among men and women aged 80-89 years in all race/ethnic groups, and declined in the oldest old (aged ≥ 90 years).

Conclusion: The burden of cancer is increasing in the older adult population as the number of cancers diagnosed is increasing. In general, age-specific rates declined for the oldest old. Our results will be updated to include the 8 leading cancers diagnosed in the older adult population (bladder, colorectal, female breast, leukemia, lung and bronchus, non-Hodgkin lymphoma, pancreas, and prostate).

NAACCR
P-20**PREDICTORS OF FEMALE LATE-STAGE BREAST CANCER: A MULTI-LEVEL STUDY**

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Background: Breast cancer is the second leading cause of cancer death among females in South Dakota (SD). Over one-third of these cases were reported as late-stage. Understanding the factors associated with late-stage diagnosis is needed to better plan interventions to reduce the burden of female breast cancer morbidity and mortality in SD.

Purpose: The aim of this study is to investigate the main factors at the individual and community level associated with the likelihood of being diagnosed with late-stage breast cancer.

Methods: Secondary data analysis, using data from the South Dakota Cancer Registry Data and American Community Survey by the U.S. Census Bureau. Predictors include individual characteristics, demographic and economic context of the community. Multi-level logistic regression was performed to estimate the effects of the main predictors associated with late-stage breast cancer, after controlling for covariates.

Results: From 2005 to 2014, 5,964 invasive cases of female breast cancer were diagnosed. Of the 5,826 cases with reported stage information, 2,004 cases were late-stage at first diagnosis (34.4%). By each of the factors (age, race, marital status, insurance type, and access to mammography facilities), the following groups had higher percentage of late-stage cases compared to their counterparts: younger, American Indian, single/separated/divorced, uninsured or covered by Medicaid, no access to mammography facilities. After controlling for community socioeconomic context, married people remained to be associated with lower odds of being diagnosed late-stage compared to other status; women with no insurance or being covered by Medicaid were associated with higher odds compared to women with other types of health insurance; having mammography facilities nearby was associated with lower odds, but the association was not statistically significant.

Conclusions: Our findings suggest that insurance status was the strongest predictor of late-stage of breast cancer diagnosis after controlling for other factors. Conversely, no association was found with access to a mammography facility after controlling for individual- and community-level covariates. Providing access to preventive cancer services like breast cancer screening among underinsured and uninsured is vital to reduce disparities in breast cancer stage in SD.

NAACCR POSTERS

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P-21

ACCESSING AND ANALYZING SSF/SSDI DATA OVER TIME

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In 2018, the registry community changed from Site Specific Factors (SSFs) to Site Specific Data Items (SSDIs). A SSDI recode has been developed by SEER which will allow researchers to review SSF/SSDI over time in SEER*Stat without having to set up merge variables.

When moving to SSDI, the code structures for many of the SSFs was changed. The recode has already considered the changes and has converted the data so that common codes are used for the data over time. This will make it easier for researchers to review the data prior to 2018 and for data 2018+ at one time.

The original SSF data and SSDI data will still be available. This recode will be in addition to the original data in its original format.

The presentation will review how the SSDI recode was developed, discuss some of the limitations of the SSDI recode and show participants how to use it.

NAACCR

P-22

IMPACT OF RACE, POVERTY AND FOREIGN BORN ON CANCER CLUSTERS IN NEW YORK STATE

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Background: Areas identified as cancer clusters are concerns of both residents and public health officials, and from the cancer registry perspective, it takes a lot of resources to identify and study these apparent cancer disparities. Many researchers have found that race, poverty and percent of foreign born are significantly associated with cancer risks. In this study, we investigate the magnitudes of the roles of race, poverty level and percent of foreign born on cancer clusters.

Methods: NYS Cancer Registry invasive cancer cases diagnosed between 2011-2015 were used to calculate the observed and expected cancer case counts at the Census Block Group level for 23 major cancer sites. Age- and sex-adjusted expected case counts were directly computed based on the state level cancer incident rates stratified by age and sex. Due to the lack of person-level information, we applied census-block-group values to adjust for race, area deprivation index (ADI) and percent of foreign born (PFB,) using the Poisson Regression Model. Final identification of statistically significant cancer clusters was carried out using the SaTScan software.

Results: 119 statistically significant cancer clusters were first detected for 20 out of 23 cancer sites. After adjustment for race, the number of clusters was reduced to 62 (~48% reduction), and after further adjustment for ADI and PFB, the number of clusters was further reduced to 47 (~12% more reduction). The number of cancer sites for which clusters persisted was down to 13 once all three block-group-level adjustments were incorporated.

Conclusion: Due to the appreciable contributions of Race, ADI and PFB to cancer clusters, adjusting for these variables should be considered as the first step to reduce the burden of investigating cancer clusters.

NAACCR
P-23**INFLUENCE OF NEIGHBORHOOD CHARACTERISTICS ON GYNECOLOGIC ONCOLOGIST INVOLVEMENT IN CARE OF OVARIAN CANCER PATIENTS IN THE MIDWEST**Diane Ng¹; Wilhelmina Ross¹; Maricarmen Traverso-Ortiz¹¹Westat, Rockville, MD, United States

Background: For ovarian cancer, Gynecologic Oncologist (GO) consult is associated with receipt of guideline care, and receipt of treatment from a GO is the established standard of care and is associated with longer survival.

Purpose: We sought to investigate whether there were differences in GO involvement in the care of ovarian cancer patients in the Midwest based on neighborhood characteristics.

Methods: The current study collaborated with three central cancer registries (CCRs) in the Midwest: Iowa, Kansas, and Missouri. We obtained a sample of ovarian cancer cases from each of the CCRs; they provided available data from their registry and performed additional data abstraction of study-specific items. To measure neighborhood characteristics, patient addresses were linked to median income data from the American Community Survey at the census tract level and to the 2013 National Center for Health Statistics Urban-Rural Classification Scheme using state and county FIPS codes. GO involvement was measured by whether a GO performed the patient's surgery, a GO was involved in the planning or administration of the patient's chemotherapy, or the patient had a consult with a GO. We used logistic regression models to measure the association between census tract median income and urban vs rural residence with GO involvement. We adjusted for age, FIGO stage, and insurance status in the models. Patients were included in the analysis if they did not have missing data for any of the variables of interest (n=910).

Results: There was an association between GO involvement and both neighborhood characteristic measures. After adjusting for age, FIGO stage, and insurance status, those who lived in an area with a median income of \$1-39,999 were less likely to have a GO involved in their care compared to those at the highest median income level of \$66,000+ (OR=0.44, 95% CI: 0.24-0.81). In addition, those who lived in a rural area were less likely to have a GO involved in their care (OR=0.57, 95% CI: 0.37-0.90).

Conclusions: Neighborhood characteristics are associated with GO involvement in ovarian cancer care in the Midwest. Research should further explore disparities in GO involvement and possible interventions to address this topic.

NAACCR
P-24**GEOGRAPHIC CO-OCCURRENCE OF MESOTHELIOMA AND OVARIAN CANCER INCIDENCE, UNITED STATES 2003–201**Manxia Wu¹; Sarah Henley¹; Lucy Peipins¹; Sun Hee Rim¹; Jacqueline Miller¹; Theodore Larson²¹Centers for Disease Control and Prevention, Atlanta, GA, United States²Agency for Toxic Substances and Disease Registry

Background: Asbestos contributes to the development of ovarian cancer, as well as mesothelioma, the sentinel asbestos-associated cancer. Mesothelioma incidence varies by state, likely reflecting different levels of asbestos exposure. We hypothesized that states with high mesothelioma incidence may also have high ovarian cancer incidence.

Purpose: To examine the geographic co-occurrence of ovarian cancer and mesothelioma, using data from U.S. Cancer Statistics (USCS).

Materials and Methods: Using USCS, which includes new cancer cases from the Centers for Disease Control and Prevention National Program for Cancer Registries and the National Cancer Institute Surveillance, Epidemiology and End Results program population-based cancer registries, we examined the geographic co-occurrence of microscopically confirmed mesothelioma and ovarian cancer incidence rates by U.S. state for 2003–2015.

Results: By state, mesothelioma incidence ranged from 0.5 to 1.3 cases per 100,000 persons and ovarian cancer incidence ranged from 9 to 12 cases per 100,000 females. When states were grouped by quartile of mesothelioma incidence, the average ovarian cancer incidence rate was 10% higher in states with the highest mesothelioma incidence than in states with the lowest mesothelioma incidence. Ovarian cancer incidence tended to be higher in states with high mesothelioma incidence (Pearson correlation $r=0.54$; $P < 0.0001$).

Conclusions: Data from U.S. population-based cancer registries show that ovarian cancer incidence rates were positively correlated with mesothelioma incidence, suggesting asbestos may be a common exposure. The greatest impact to reduce mesothelioma and ovarian cancer incidence may come from cancer control efforts directed at primary prevention of established risk factors, including asbestos.

Impact: The potential for asbestos exposure has declined since the 1970s because fewer products contain asbestos; however, some products, materials, and buildings may still release asbestos and thousands of workers and their family members may be exposed. Ensuring that people are protected from exposure to asbestos in their workplaces, homes, schools, and communities may reduce the risk of several cancers, including mesothelioma and ovarian cancer.

NAACCR POSTERS

Kitsilano Salon D

NAACCR

P-25

U.S. CANCER STATISTICS DATA VISUALIZATIONS TOOL: CANCER INCIDENCE AND MORTALITY ESTIMATES BY UNITED STATES CONGRESSIONAL DISTRICTS

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²Perspecta

Background: The U.S. Cancer Statistics (USCS) data visualizations tool provides user-driven access to the official federal cancer statistics. The tool includes cancer incidence and mortality data at the national, state, and county levels. A newly added module now allows users to query the latest incidence and mortality data at the U.S. Congressional district (CD) level. Two previous studies published mortality rates at the CD level, but not cancer incidence rates.

Purpose: We describe a recent USCS data visualizations tool enhancement, cancer incidence and mortality estimates by U.S. Congressional district.

Approach: USCS combines cancer incidence data from CDC NPCR and NCI SEER and mortality data from CDC's National Vital Statistics System. Using previously published methodology, CDC calculated estimates for over 400 CDs according to the boundaries for the 115th Congress of the United States. Rates and counts for CDs that did not follow state boundaries were estimated using Census block-level data. The rates were calculated by assigning county-level age-adjusted rates to the census block and weighting those by the block population proportion of the CD. The weighted rates were then aggregated over the blocks within the CD. To estimate counts, weights were calculated as the county population in the CD divided by the total county population. The weighted counts were then aggregated over the counties in the CD.

Results: Estimated rates and counts at the CD-level are presented by sex and race and ethnicity, by all cancers combined, and by 20 leading cancer sites. The data are displayed by maps of incidence and mortality estimates for CDs in each state, by ranking of leading cancer sites for each CD, and by graphs ranking rates by sex and race for each CD. The data behind the maps and graphs can be viewed in tables and exported.

Conclusions: Surveillance data are vital for measuring progress and targeting public health action. CDC's USCS data visualizations tool is designed to make cancer data more accessible and usable. We will continue to add enhancements to the tool and data are updated annually. It is available at www.cdc.gov/cancer/dataviz.

NAACCR

P-26

USING MULTIPLE YEARS OF NATIONAL PROGRAM OF CANCER REGISTRIES (NPCR) SUBMISSION DATA TO MONITOR DATA QUALITY FOR SURVIVAL ANALYSIS

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Introduction: Survival analysis is an important part of cancer surveillance activities. High quality data submissions from the central cancer registries funded by NPCR are critical before they can be included in survival analyses. Using historical NPCR data submissions, the presentation visualizes and detects data patterns that may facilitate data quality control and improvements in variables for survival analysis.

Purposes: To showcase several ways to detect data quality issues related to survival analysis and help improve data quality before a registry's data submission.

Methods: We compared key variables for survival analysis across consecutive data submission cycles. Data submissions from November 2016 through November 2018 were selected. Key variables such as date of last contact and vital status as well as case reporting were analyzed and visualized to detect unusual patterns. Data patterns were classified based on reported changes to vital status (based on patient IDs) and other data quality factors.

Results: Different data reporting patterns will be displayed and their respective impact on survival estimates will be described. These include the discussion of identified outliers and case extraction if further investigations are needed.

Implications: These quality checks can be adapted by central cancer registries for variables associated with survival analysis and have the potential to be expanded to other variables. The improvement of data quality from the cancer surveillance systems can provide more accurate data for comprehensive cancer prevention and control plans.

NAACCR
P-27**USING SUCCESS STORIES TO PROMOTE NPCR CANCER REGISTRIES' VALUE AND IMPACT**Netta Apedoe¹; Olivia Marr¹; Vicki Benard¹¹Centers for Disease Control and Prevention, Atlanta, GA, United States

Background: Compelling success stories, rich with in-the-field experiences, are an impactful tool that registries may use to promote their progress, value and impact. CDC's CSB has been collecting and promoting success stories from their National Program of Cancer Registries (NPCR) funded programs since 2010. This year (2018) every funded cancer registry submitted a success story to CDC.

Purpose: To describe the ways that NPCR Success Stories are used to engage and inform the program stakeholders; increase program visibility; demonstrate the value and impact of cancer data; and, share best practices.

Approach: Each year, CSB sends out an updated success story outline template for grantees to use in developing their own narratives, along with guidelines to enrich the storytelling. Grantees are encouraged to focus on highlighting specific areas of success, such as: Registry Operations, Public Health Impacts, Stakeholder Collaborations, Specific Cancer Conditions, Adversely Affected Vulnerable Populations, Data Collection, and Electronic Reporting. CDC reformats and shares these stories with partners and other stakeholders, and displays success stories at conferences, and features them on CDC websites.

Results: By creating, curating, and distributing success stories of NPCR Cancer Registries, CDC has been successful in telling the story of the critical role that cancer registries play in quantifying, describing and reducing the burden of cancer in the United States. Moreover, the success stories have been critical to illustrating program progress over time and highlighting major accomplishments. The success stories have been featured on partner websites, in articles, illustrated disparities, promoted peer-peer learning and contributed to increasing the visibility of cancer registries. Examples of success stories that have been impactful will be shared.

Implications: NPCR success stories may be used in many ways to promote cancer registries' progress, value, and impact to national and international audiences. They continue to provide us with real life examples of how complete and accurate cancer data are a central part of making real progress in reducing the burden of cancer.

NAACCR
P-28**WORLDWIDE TRENDS IN CANCER INCIDENCE AMONG YOUNG ADULTS AGED 15 - 39 YEARS OLD BETWEEN 1998 - 2012**Miranda Fidler-Benaoudia¹; Yibing Ruan¹; Sumit Gupta²¹Department of Cancer Epidemiology and Prevention Research, Cancer Control Alberta, Alberta Health Services, Alberta, AB, Canada²The Hospital for Sick Children

Objective: Trends in cancer incidence among young adults worldwide have rarely been investigated. We aimed to describe the age-standardized rates and the average annual percent changes in cancer incidence among young adults aged 15 to 39 years old between 1998 to 2012 in 41 countries worldwide.

Methods: Cancer incidence data and population counts were obtained by sex, age (in 5-year bands), year of diagnosis (1998 – 2012), and cancer type for 92 cancer registries in 41 countries worldwide from the International Agency for Research on Cancer's Cancer Incidence in Five Continents. We estimated the age-standardized incidence rates (ASR) per 100,000 person-years and the average annual percent changes (AAPC) with 95% confidence intervals at the country level.

Results: From 1998-2012, 1,873,780 incident cases of cancer occurred among young adults aged 15 to 39 in the registries investigated. The overall ASR for all cancers ranged from 22.7 to 58.5 per 100,000 person-years. A significant increasing trend in the incidence of all cancers was observed in North America (Canada and USA), Asia (China, Japan, South Korea, and Turkey), and 13 of 22 European countries. Among the cancer types assessed, significant increasing trends were noted for thyroid, kidney, testicular, and breast cancer among 31 of 38, 15 of 31, 17 of 36, and 17 of 41 countries that reported the incidence of these cancers, respectively. In contrast, decreasing trends were observed for lung, laryngeal, bladder, and stomach cancer among 11 of 29, 5 of 14, 9 of 26, and 7 of 35 countries. In North America, significant increasing trends were also observed for colon, rectum, anus, pancreas, and uterine cancers.

Conclusion: The decreasing trends in certain cancer types highlighted the success of past interventions on smoking and certain infections. Observed increases in the incidence of specific cancers may be partly due to changing profiles of risk factors such as obesity.

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P-29

ESTIMATING RELATIVE SURVIVAL AND HETEROGENEITY IN TREATMENT EFFECT FOR STAGE

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Background: In this study, we evaluated the post-chemotherapy survival rate of a cohort of stage IV non-small cell lung cancer (NSCLC) patients obtained from the cancer registry data. In addition to this, we also explored the subgroups of patient who are more prone to benefit from the chemotherapy treatment than others. Unlike the conventional subgroup analysis study evaluating the prognostic factors, we focus on the predictive factors that provide information on the outcome of interest under the effect of the treatment.

Method: We applied relative survival analysis to evaluate the overall average treatment effects. The Ederer II method and Hakulinen-Tenkanen additive model was used to compare the cumulative relative survival and model the effect of covariates, respectively. In terms of the heterogeneity of treatment effect, the stabilized inverse probability weighting method was adopted first to balance the baseline covariates in two groups, in order to eliminate the selection bias caused by the potential treatment assignment difference. Furthermore, a subgroup analysis method called FindIt was applied to the weighted dataset to identify subgroups of patients who can most benefit from the chemotherapy treatment.

Results: Patients who received chemotherapy treatment had a higher relative survival rate during the first year after the diagnosis, followed by a lower relative survival at the second year, compared to the patients who did not receive any chemotherapy treatment. There is no observed difference between the relative survival rates for the two groups of patients beyond three years after diagnosis. Those most likely to benefit from chemotherapy were female patients between age 60 and 70, with a Charlson index smaller than or equal to 2, and an upper or lower lobe tumor.

Conclusion: Our study shows that NSCLC patients tend to have a short-term higher survival rate after receiving chemotherapy treatment. The subgroup analysis results could provide research hypotheses for future studies as well as developing personalized medicine.

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P-30

NORTHWEST TERRITORIES CANCER REPORT 2000-2016

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Introduction: The Northwest Territories (NWT) is a Canadian territory spanning over 1,000,000 km², north of the 60th parallel. While the population exceeds 44,000, the territory has the second lowest population density in Canada. Fifty percent of the population is Indigenous, which can further be divided into Dene (33%), Inuit (12%), and Metis (6%) persons. In the NWT, cancer rates are increasing and cancer is the leading cause of death. The objective of this analysis is to examine cancer incidence in the NWT, to determine trends and compare to national rates, as well as characterize cancer mortality and screening in the territory.

Methods: Descriptive methods were used for cancer rates, cancer mortality, and screening. Age-standardized cancer rates by sex, ethnicity, region and cancer type from 2000-2016 were calculated. For comparisons between the NWT and Canada, the 2012 estimates for cancer types were used, and for geographical estimates StatsCan tables were used.

Results:

Conclusion: This report aims to provide a descriptive view of cancer incidence, cancer mortality and cancer screening in the NWT, thereby informing future effective and culturally-appropriate cancer management, control and prevention programs.

NAACCR

P-31

**A ROAD TO BREAST CANCER SURVEILLANCE ENHANCEMENT
– NATIONAL PROGRAM OF CANCER REGISTRIES (NPCR)
COMPONENT 2 BREAST AND CERVICAL CANCER SCREENING
DATA COLLECTION PILOTS**

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Background: Rhode Island Cancer Registry (RICR) is one of the twelve grantees awarded for NPCR Component 2 surveillance enhancement pilot projects. A surveillance gap that currently exists is not having women's cancer screening history, risk factors and other predisposing factors prior to cancer diagnoses. Availability of these information linked with cancer outcomes can facilitate studies on screening adherence, quality, and impact on reducing the cancer burden.

Purpose: To provide practical and empirical insights in advancing breast cancer surveillance activities

Methods: Using four different sources, RICR reviewed breast cancer screening and diagnostic follow-up (SDF) procedures (with dates, results, and frequency/intervals), and risk factors (comorbidity, family history, menopause status, parity, breast density, etc.):

1. Patient medical records from 3 small-medium sized pilot hospitals, for women who had breast cancer diagnosed during 2016 (n=250)
2. RI Women's Cancer Screening Program (WCSP) Minimum Data Elements, for women who had cancer diagnosed via WCSP from 2004-2016 (n=400)
3. Cancer diagnosis and treatment text supplements in RICR, for the cases included in #1 and #2 (n=650)
4. Medicaid claims linked with cancers reported in RICR, 2011-2016 (n=TBD)

Results:

1. In 7 out of 10 hospital medical records, dated breast cancer SDF procedures were available, but from scattered places (physician exam report, discharge summary, or breast health center report); 100% of WCSP records provided complete and specific data, including diagnostic procedures, dates, results, and reason for non-compliance (if applicable).
2. Of risk factors, family cancer history was affirmatively documented for half of the cases reviewed; RICR text supplements were main sources in obtaining family cancer history. Other risk factors (comorbidity, parity, menopausal status, etc.) were rarely documented in any data source.

Conclusion: Concluding Phase 1 screening data assessment that focused on frequency and consistency of record keeping across different hospitals and sources, RICR takes next phase approaches; (1) Hospitals with community-based screening programs that will provide better quality and high volume of screening information are being recruited, (2) Electronic and systemic record extract will be used, and (3) In-depth analyses with cancer outcome linked-screening, by procedure type, frequency, interval and results, will be conducted, particularly among vulnerable population, such as WCSP participant women and Medicaid beneficiaries.

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P-32

RACIAL/ETHNIC DIFFERENCES IN SURVIVAL AMONG GASTRIC CANCER PATIENTS IN CALIFORNIA

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Background: Gastric cancer is an important cause of death worldwide and among racial/ethnic minorities in the U.S. Several studies suggest differential survival across race/ethnicity, but it is not entirely clear if and how demographic and disease characteristics account for disparate survival in gastric cancer patients of different races.

Purpose: To investigate racial disparities in survival among gastric cancer patients within demographic and disease subgroups.

Methods: Patients diagnosed with invasive epithelial gastric cancer between 2006-2015 were identified from the California Cancer Registry. Cox proportional hazards regression was used to identify factors associated with survival among non-Hispanic whites (NHWs, n=7,475), non-Hispanic blacks (NHBs, n=1,246), Hispanics (n=6,274), and Asians/Pacific Islanders (APIs, n=4,204). Survival was compared across race/ethnicity within subgroups of demographic and disease factors. Five-year relative survival was also calculated within subgroups.

Results: There were notable differences in patient characteristics by race/ethnicity, but predictors of survival were similar for each group. Overall, APIs (HR=0.86, 95% CI: 0.82, 0.91, p<0.0001) and Hispanics (HR=0.95, 95% CI: 0.91-1.00, p=0.0407) had better survival than NHWs, but NHBs and NHWs did not have different prognosis (HR=1.01, 95% CI: 0.94-1.09, p=0.7493). The survival advantage of APIs persisted in nearly every demographic and disease subgroup, but Hispanics and NHBs had similar survival as NHWs in most groups. Race was not a significant predictor of survival among young patients, those with public or no insurance, and patients with cardia tumors.

Conclusions: There are some differences in survival by race/ethnicity, but race/ethnicity alone cannot explain disparate outcomes in gastric cancer. Future studies, particularly ones that investigate the role of population-specific etiological factors and molecular tumor profiles, are needed to further understand factors associated with survival.

NAACCR

P-33

ISLANDS IN THE STREAM: UTILIZING NEAR-TIME DATA STREAMS TO DELIVER AND EVALUATE A LIFESTYLE INTERVENTION FOR BREAST CANCER SURVIVORS

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For nearly a decade, the Kaiser Permanente Lifestyle Medicine Department (KPLMD) has been developing and delivering successful lifestyle interventions that have effectively improved health biometrics and quality of life within targeted audiences. Their most recent clinical trial in 2017 and 2018 has shown significant outcomes with improvements in targeted diabetic and cardiac patients. The Cancer Registry of Greater California (CRGC) and KPLMD share a common goal to utilize near-time and real-time qualitative and quantitative data to design, develop, deliver, and evaluate an effective lifestyle intervention that improves the quality of care and long-term outcomes of breast cancer survivors. All program development within Kaiser Permanente Lifestyle Medicine is specifically designed to be shared and spread in order to leverage learnings and successful practices.

By undertaking this collaboration, CRGC and KPLMD will share data for multiple purposes: To review of successful practices within the industry and the organization and identification of standard setting interventions; To align with the California Cancer Registry goals to demonstrate effective utilization of near and real time qualitative and quantitative data to impact cancer survivor's quality of care, health and outcomes; and utilizing existing KPLM programs and clinical trials leveraging experience and success in lifestyle interventions targeting other audiences.

This demonstration project will have preliminary results demonstrating early findings, technology solutions, and early patient experiences.

NAACCR
P-34**AN ASSESSMENT OF SELECTION BIAS IN THE CANCER INCIDENCE IN LOUISIANA BY CENSUS TRACT REPORT**

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Background: In 2017, lawmakers passed a bill requiring that the Louisiana Tumor Registry (LTR) release cancer incidence rates by census tract. Previously, cancer statistics were released at the parish (county) level. Thus, the LTR produced its first annual census tract cancer incidence report in March 2018. Cases were excluded in the calculation of census tract incidence rate if the census tract certainty of the residential address was low. To address this limitation, this study aimed to assess whether the excluded cases differ by sociodemographic or clinical characteristics from the cases that were included in the report.

Methods: For diagnosis years 2005-2015, cases were divided by their census tract certainty: high (census tract certainty score = 1) and low (census tract certainty score > 1). Sociodemographic and clinical characteristics of the two groups were compared using the Chi-Square test or Students' t-test.

Results: Overall, 244,634 Louisiana cancer cases were included in the analysis for diagnosis years 2005-2015, with 2.5% of cases having low census tract certainty. Compared to the patients with high census tract certainty, the patients with low census tract certainty were more likely to be male (58.4% vs. 53.5%, $P < 0.0001$), black (33.1% vs. 27.7%, $P < 0.0001$), younger than 69 years (68.1% vs. 62.6%, $P < 0.0001$), living in high poverty census tracts (39.5% vs. 37.7%, $P = 0.006$) or living in rural areas (35.4% vs. 17.5%, $P < 0.0001$). There were no differences in the stage at diagnosis between the groups. Of the cancers included in the report, the proportion of cases with low census tract certainty was highest for bladder cancer (3.1%) and lowest for pancreatic cancer (1.8%); highest in the Central Louisiana region (4.9%) and lowest in the New Orleans region (0.9%).

Conclusions: Despite observing significant differences in sociodemographic characteristics between cases with high or low census tract certainty, the overall proportion of cases with low geographic certainty was less than 3%. No differences in tumor characteristics were observed. The large sample size could result in highly statistically significant differences, although the change in the frequency of sociodemographic characteristics between the two groups was still small.

NAACCR
P-35**INCREASING RATES OF COLORECTAL CANCER (CRC) AMONG YOUNG PEOPLE IN CALIFORNIA**

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Background: Colorectal cancer (CRC) incidence among persons older than 50 years old has decreased in California and nationally, but incidence rates have increased among persons younger than 50. Previous studies present incidence rates among younger persons using a wide age group of 20-49 years. Incidence rates for such a wide age group do not provide enough detail about risk among specific segments of the population, nor allow for tailored recommendations about CRC screening among young adults.

Purpose: To identify CRC rates by 10-year age intervals (20-29, 30-39, and 40-49) to better understand incidence trends among younger persons.

Methods/Approach: We used SEER*Stat and Joinpoint software for people diagnosed from 1989 to 2015 identified in the California Cancer Registry. Year of diagnosis was grouped by three years (1989-1991, 1992-1994, etc.) for statistical analysis. Joinpoint trends in incidence were examined by age and race, and the average annual percentage change (AAPC) in rates was quantified by age group. Age was divided into 10-year intervals (20-29, 30-39, 40-49), and race was categorized as Non-Hispanic White, Non-Hispanic Black, Hispanic, Asian/Pacific Islander, and American Indian groups.

Results: Significant AAPC increases in CRC incidence rates were observed among the 20-29, 30-39, and 40-49 age groups in both Non-Hispanic White (+3.5, +3.2, +1.9) and Hispanic (+3.5, +2.7, +1.4) populations, respectively. Significant increases were observed among the 40-49 year old Asian/Pacific Islanders (+1.0) and American Indians (+4.6). No significant increases were seen in the 20-29 and 30-39 groups among Non-Hispanic Blacks and Asian/Pacific Islanders, although the number of CRC cases in these groups was quite small.

Conclusion: CRC is significantly increasing among several young age groups. Since there is no formal CRC screening recommendation for persons less than 50 years old and since evidence suggests that younger adults present with more advanced disease, these results may be useful for educating healthcare providers about CRC risk in specific population subgroups, and suggest that CRC screening recommendations should be developed for this population. Continued surveillance of CRC incidence rates among young adults is warranted.

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P-36

CANCER STATISTICS FOR US ADULTS 85 AND OLDER

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Background: Adults ages 85 and older are the fastest-growing population group in the US, yet relatively little is known about the cancer burden in this group.

Methods: Using data from the National Cancer Institute, the North American Association for Central Cancer Registries, and the National Center for Health Statistics, we provide information on cancer incidence, stage at diagnosis, treatment, mortality, survival, and screening for adults 85 and older, as well as for ages 65-84 for comparison.

Results: In 2019, there will be approximately 140,690 cancer cases diagnosed and about 103,250 cancer deaths among the oldest old in the US. The top cancers in ages 85+ (lung, breast, prostate, and colorectum) are the same as for those overall. The overall cancer incidence rate peaked in the oldest men and women around 1990 and has subsequently declined, with the pace accelerating during the past decade. These trends largely reflect declines in cancers of the prostate and colorectum, and more recently, lung among men and for breast and colorectum among women. Cancers diagnosed in patients ages 85+ are often more advanced than those diagnosed at younger ages. Patients 85+ are also 2-4 times more likely to be missing information on stage at diagnosis compared to patients 65-84. The oldest cancer patients have the lowest survival of any age group, with the largest disparities observed for regional- and distant-stage. They are also less likely to receive surgical treatment for their cancers. For example, only 65% of patients 85+ received surgery compared to 89% of patients 65-84. This in part reflects the complexities of treating patients ages 85+ due to the presence of multiple comorbidities and age-related functional declines, as well as competing risks for mortality.

Conclusions: More research on cancer in the oldest Americans is needed to improve outcomes and anticipate the complex health care needs of this rapidly growing population group.

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P-37

COMORBIDITY AND SURVIVAL OF OVARIAN CANCER AMONG PATIENTS IN THE U.S. MIDWEST

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Background: Comorbidity may negatively influence survivorship among patients with ovarian cancer (OC). However, evidence supporting comorbidity as a prognostic factor for OC survival while accounting for other known clinical prognostic factors is inconclusive.

Purpose: To examine the role of comorbidity in OC survival using a population-based sample from three Midwestern states.

Methods: The Missouri, Kansas and Iowa state cancer registries participated in a project led by the Centers for Disease Control and Prevention (CDC) and its contractor (Westat) to collect more detailed data about a random sample of OC patients diagnosed 2011-2012 (N=1,003). Comorbidity was measured using the Charlson Comorbidity Index (CCI), which includes 19 chronic conditions that are weighted based on their association with mortality. CCI was categorized into 0 (none), 1 (mild) or 2+ (moderate/severe) in the analysis. Covariates included age, education, urban vs. rural residence, cytoreduction outcome (<1 vs. 1+ cm), neoadjuvant vs. adjuvant chemotherapy, stage, grade, histology and surgeon specialty. We used chi-square or Fisher's exact tests to compare differences of sample characteristics by CCI categories. We used Cox-proportional hazards regression models to estimate hazard ratio and 95% confidence intervals of CCI for the risk of all-cause mortality.

Results: Compared to patients without comorbidity, patients with mild or moderate/severe comorbidity were significantly older and living in urban areas, less likely to have chemo therapy but more likely to be diagnosed in late stage and with higher grade of tumor. Patients with mild comorbidity had significantly higher percentage of suboptimal cytoreductive surgery outcome than those without or with moderate/severe comorbidity. Patients with mild comorbidity had a statistically significantly higher risk of death and the risk was even higher for those having moderate/severe comorbidity than those without comorbidity. After accounting for all covariates, having moderate/severe comorbidity was still significantly associated with a higher mortality risk. The multivariable result seemed more evident in lower educational stratum. A more detailed analysis will be presented.

Conclusion: Comorbidity is an important prognostic factor, independent of age, sociodemographic, tumor-specific and treatment factors and has a negative impact on the survival of OC in the Midwest cohort.

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P-39

ESTIMATING THE CANCER BURDEN IN CANADA IN 2015 DUE TO LIFESTYLE, ENVIRONMENTAL AND INFECTIOUS DISEASE RISK FACTORS

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Objective: In the Canadian Population Attributable Risk of Cancer (ComPARE) study, we estimated the proportion of incident cancers attributable to major modifiable risk factors in 2015.

Methods: We identified relevant exposure–cancer associations from the literature and obtained risk estimates from collaborative panels, existing meta-analyses, or we meta-analyzed individual studies. Age-sex-specific incidence Canadian Cancer Registry data were combined with exposure prevalence data from national population-based surveys. Using a population attributable risk (PAR) framework, we estimated the burden of cancer attributable to smoking, alcohol, excess body weight, physical inactivity, sedentary behavior, hormones, unhealthy eating habits (i.e. insufficient fruit, vegetable, vitamin D, and calcium intake, as well as excess red and processed meat intake), air pollution, radon, ultraviolet radiation, and seven infections.

Results: An estimated 34.8% of cancers diagnosed in Canada in 2015 were attributable to modifiable lifestyle and environmental risk factors, and infections. Specifically, PARs were 18% (n=32,700) and 1% (n=1,410) for active and passive tobacco smoking, 2% (n=3,280) for excess alcohol intake, 3% (n=5,740) for excess body weight, 5% (n=9,250) for physical inactivity, 2% (n=3,230) for sedentary behaviour, and 1% (n=1,370) and 0.3% (n=487) for insufficient fruit and vegetable intake, respectively. An estimated 0.6% (n=1,190) and 0.6% (n=1,058) of cancer was attributable to red and processed meat. Air pollution and radon were each responsible for 7% (n=1,740) of lung cancer cases and 62% of melanomas were attributable to

ultraviolet radiation. Approximately, 2% (3,825 cases) were attributable to human papillomavirus, 1% (2,052) to *Helicobacter pylori*, 0.3% (543) to hepatitis B and C virus, and 0.4% (701) to other infections.

Conclusion: A considerable proportion of the cancer burden in Canada is attributable to modifiable risk factors. Our comprehensive results help inform and prioritize policy and interventions targeting these risk factors, with the potential to substantially reduce the burden of cancer in Canada.

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P-40

BMI AND CANCER RISK IN ALASKADavid O'Brien¹¹Alaska Cancer Registry, Anchorage, AK, United States

Background: The Alaska Cancer Registry (ACR) was one of 10 registries that participated in CDC's Comparative Effectiveness Research (CER) project for 2011 cases. The project required the collection of patient height and weight, among other new data items. ACR currently has six years of height and weight data, and continues to collect these two data items although the project has ended. No CER registry has used height and weight data outside the CER project.

Purpose: To promote collaboration with healthcare partners, ACR explored its height and weight data in a way that might be useful to the state obesity prevention program since Alaska ranks 8th in the U.S. with the most obese adults in 2017. Specifically, this study tries to answer this question: Do patients with cancers that are associated with overweight and obesity have higher than normal BMIs compared to the general Alaska population?

Methods: ACR calculated patient Body Mass Index (BMI) from height and weight, and grouped cases into categories of underweight, healthy weight, overweight, and obese in accordance with CDC guidelines. Data quality was evaluated by reviewing the percentage of cases with unknown BMI to maximize the number of diagnosis years with the most robust data.

Results: ACR first evaluated female breast, prostate, lung, and colorectal cancers as they comprise about half of all new cancers in Alaska. For each cancer type, overweight and obesity were compared between cancer cases and the general Alaska population. Obesity and overweight estimates for lung cancer were below those for the Alaska population, since lung has a low survival rate and is usually reported at late stage. Given these findings, additional cancer types were evaluated with varying survival rates, obesity associations, and stages at diagnosis. It was found there is a strong negative correlation between percent of cases reported as obese and percent reported at late stage.

Conclusions: Not all patients with cancers associated with overweight and obesity have higher than normal BMIs in Alaska, though this appears to be the case for some cancer types. Lower BMI is associated with late stage diagnosis, presumably due to disease progression.

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P-41

EXTENT AND POTENTIAL CONSEQUENCES OF INACCURATE COUNTY AT DIAGNOSIS ASSIGNMENTSue Lai¹; John Keighley¹; Andrea May¹; Sarma Garimella¹¹Kansas Cancer Registry, Kansas City, KS, United States

Background: County level cancer burden is an important indicator for cancer prevention and control. Social determinants of health at the county level have been widely studied in relation to cancer. Unfortunately, limited information exists on the data quality of patient's resident county at diagnosis.

Purpose: This study examined the accuracy of county data for 2015 diagnosed cancer cases reported to the Kansas Cancer Registry.

Methods: Kansas residence cases were geocoded for selected sites including: breast, colorectal, lung and bronchus, prostate, and leukemia. ArcGIS and a Kansas based geocoder were used to ascertain geolocations and corresponding county. Post Office (PO) boxes were geocoded to the Post Office corresponding to the provided city and zip code. Other errors were manually reviewed for inaccurate entry and formatting. For each case, the geocoded county was compared to the original database county. Following these results, accuracy of the county codes for unincluded sites were estimated using the county-specific error rates from the geocoded sites.

Results: In 2015, there were 16,430 total cases in Kansas, 8,682 (52.84%) of which were geocoded. When analyzed at the county-level a [AM1] 4.2% (366/8,682) error rate was found. An estimated 324 not-geocoded cases (out of 7,748) were interpolated to have an inaccurate county code [AM2]. The overall county code errors for all 2015 diagnosed cases was estimated to be 690 [AM3]. No statistically significant changes in age adjusted rates at county levels were observed (likely due to small case counts and/or population sizes). Thirteen counties had an error rate > 20% and only 26/105 counties (24.76%) had all cases accurately reported to the registry. The 10 counties with the highest error rates were 5 frontier, 3 rural, 1 densely-settled rural, and 1 semi-urban.

Implications/Conclusion: Inaccurate assignment of county at diagnosis was confirmed. Inaccuracy may not only affect the county level age-adjusted rates, but could also pose challenges and/or distortions in studying social determinants of health in relation to cancer using county level characteristics. Using geocoded data as a tool to assess quality of county data identifies problem areas and prevents misclassification.

[AM1] This rate double counts the errors. 366 errors occurred on 183 cases

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P-42

REGISTRY DATA: COMMUNICATION, THE MEDIA, AND PUBLIC HEALTH RESPONSE

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On Wednesday, June 27th, 2018, a blast email from the CDC was sent to the larger population cancer surveillance community announcing the release on Thursday, June 28th online and then on Friday June 29th in Morbidity and Mortality, a paper entitled “Geographic Variation in Pediatric Cancer Incidence — United States, 2003–2014.” The paper stated that, “pediatric cancer incidence was highest in the Northeast (188.0) and lowest in the South (168.0), whereas by state (including the District of Columbia [DC]), rates were highest in New Hampshire, DC, and New Jersey.” The poster first examines the rapid responses by the New Hampshire media, the local political community, the NH Department of Health and Human Services and the cancer registry. Secondly, the poster demonstrates the analysis that was done to describe the incidence rates in a larger context for agency and political leaders. Third, we compare the rates reported in the paper compared to rates as seen in New Hampshire. The poster will conclude with lessons learned about the impacts of the paper on individual states.

NAACCR

P-43

CANCER SYSTEM PERFORMANCE REPORTING: AN ENGAGING APPROACH TO MAKING CANCER DATA COUNT!

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Background: Cancer registry data have long been used for surveillance and research purposes, but they are increasingly being used in reports that speak to the effectiveness of the cancer control system, from prevention to palliation. The incorporation of these data into public and policy reports is becoming an expectation of many cancer registries, including the Manitoba Cancer Registry, a population-based cancer registry in Canada.

Methods: CancerCare Manitoba is the provincial cancer agency Manitoba (Canada), responsible for the delivery of cancer services, research and education for the population. A new ‘Manitoba cancer system performance report’ uses cancer registry and other data to report a wide range of indicators, using an engaging easy-to-read format. Standard cancer surveillance measures are integrated with measures from other sources and clinical- and policy-relevant text to tell the story of the cancer experience in Manitoba.

Results: Cancer registry data are featured in metrics of the impact of cancer using traditional surveillance statistics (incidence, mortality, survival, projections). In addition, the incorporation of stage and treatment data has facilitated the production of measures of treatment rates, concordance with clinical practice guidelines, the prevalence of biomarkers and other cancer control ‘success’ indicators. Variability is shown over time, by region and by population characteristics. Examples of the approach and format will be shared in this presentation.

Conclusions: The availability of population-wide data is an asset that is increasingly being used to monitor and report on the success of cancer services. This both raises the profile of the cancer registry and increases demands for comprehensive and timely data.

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CASE INVESTIGATION OF CERVICAL CANCER (CICC) IN NEW JERSEY- A LOOK AT WHO PARTICIPATEDAmanda Crosbie¹; Gerald Harris²; Karen Pawlish³; Lisa Paddock³;**Antoinette Stroup³**¹Cancer Epidemiology Services, New Jersey Department of Health, Trenton, NJ, United States²Rutgers Cancer Institute of New Jersey, New Brunswick, NJ, United States³New Jersey State Cancer Registry, Trenton, NJ, United States

Background: Cervical cancer is preventable through vaccination, routine pap and HPV testing. About 370 women are diagnosed with invasive cervical cancer in New Jersey (NJ) each year, and it is most common in Hispanic women, followed by Black and then White women.

Purpose: In collaboration with the Battelle Memorial Institute, the Centers for Disease Control and Prevention, and the state cancer registries of Louisiana and Michigan, the New Jersey State Cancer Registry (NJSCR) enrolled eligible women in a population-based, observational, survey research study to better understand the screening and follow-up practices of women diagnosed with invasive cervical cancer. To determine the generalizability of the findings, we conducted an analysis to establish how well the consented women represented all NJ women with invasive cervical cancer.

Methods: 1,155 women were diagnosed with invasive cervical cancer in NJ from 2014-2016. Of these, 809 women aged 21-85 were given the opportunity to participate in the study after exclusions (i.e. death, older age). Women who participated in the study were compared to women who did not participate (through ineligibility or refusal) on demographic and tumor characteristics using chi-square tests and multivariable logistic regression.

Results: 168 eligible women consented to the study. Stage at diagnosis was the strongest predictor of participation. After controlling for race and ethnicity, age, histology, site, tumor sequence number, year of diagnosis, primary payer at diagnosis, and census tract poverty category, women who had never been married (OR 0.61, 95% CI: 0.40-0.96) or diagnosed at distant stage (OR 0.27, 95% CI: 0.12-0.63) had significantly lower odds of participation compared to married women and women diagnosed at earlier stages, respectively. The odds of participation were not significant for the remaining variables.

Conclusion: Although enrollment was low, CICC participants offer a reasonable demographic representation of NJ women with invasive cervical cancer. However, generalizability may be limited to married women and women who are diagnosed at earlier stages. Survey methods should consider strategies to increase enrollment of single women and patients who may be facing more advanced disease and poor prognosis.

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WHAT'S IN A NAME? IMPROVING GEOCODING QUALITY USING THE NAACCR GEOCODER MUNICIPAL ALIAS TABLES IN NEW JERSEY**Pamela Agovino^{1,2}**; Gerald Harris^{2,1}; Daniel Goldberg³; Recinda Sherman⁴; Lisa Paddock^{1,2}; Antoinette Stroup^{1,2,4}; Payton Baldrige³¹New Jersey State Cancer Registry, Hainesport, NJ, United States²Rutgers Cancer Institute of New Jersey, New Brunswick, NJ, United States³Texas A&M University, College Station, TX, United States⁴North American Association of Central Cancer Registries, Springfield, IL, United States

Background: Geocoding New Jersey State Cancer Registry (NJSCR) case addresses has presented challenges particular to NJ. Often addresses cannot be accurately geocoded because 1) NJ zip codes often do not follow municipal boundaries, 2) the common use of historical or alternative place names in lieu of the city names used by current street address databases, and 3) common misspellings of city names. In collaboration with the NAACCR Geocoding Work Group, the authors proposed the creation of a NJ-specific Municipal Alias (NJ-MA) to address these challenges.

Purpose: Evaluate changes in geocoding quality after implementation of the NJ-MA table.

Methodology: The NJ-MA table was assembled using a list of historical local names that linked to at least 30 address municipal values in the NJSCR from 1979-2016. This process also identified common misspellings of local and municipal names that occurred in NJSCR which were used to supplement the NJ-MA table. The geocoding scientists from Texas A&M University modified the NAACCR geocoder to include an option for the address search to account for the NJ-MA table. Using a subset of cases diagnosed between 2000-2017, we compared the results of geocoding with vs. without the NJ-MA table to determine if there was an improvement in the NAACCR Development Geocoder (NDG).

Results: The addition of the NJ-MA table in the NDG resulted in over 19,000 additional matches, over 18,000 fewer reviews, and over 500 fewer non-matches among NJSCR cases from 2000-2017.

Conclusions: Inclusion of an MA table has been shown to improve geocoding accuracy and reduce the amount of staff effort in state cancer registries.

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COLLABORATION IS KEY: EXPLORING THE DELAWARE CANCER REGISTRY'S STRATEGIC PARTNERSHIPS TO ADVANCE CANCER SURVEILLANCE AND CONTROL IN DELAWARE

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Background: Cancer registry data are integral for assessing cancer burden, planning interventions, directing resources, and evaluating the impact and effectiveness of outreach. This makes registries a keystone partner in cancer surveillance and state initiatives against cancer. Cancer surveillance and control is a multifaceted effort bringing together stakeholders to collect complete, quality and timely data that is used to reduce cancer incidence and improve cancer outcomes. Delaware's cancer surveillance and control infrastructure is based upon strong partnerships with multiple agencies, committees, facilities, programs and the general public.

Purpose: We seek to explore the extent of the Delaware Cancer Registry (DCR)'s partnerships, tracing the inward flow of data that increases data quality, timeliness, and completeness and the outward flow of registry data to advance evidence based decision making and outreach in the state. We will outline DCR partnerships and reveal the flow of registry data as well as the impact it has on creating and evaluating initiatives to combat cancer.

Methods/Approach: The architecture of Delaware's cancer surveillance system and control initiatives were analyzed to identify DCR strategic partnerships within the state. The nature of these partnerships was described qualitatively and quantitatively through the lens of data collection and flow; committee participation; data dissemination, and key outreach programs. Frequencies and rates were calculated to display impact on cancer burden and other evaluation metrics.

Results: The DCR has partnerships with the Delaware Cancer Consortium, Delaware Health Information Network; Delaware Cancer Registrars Association; and other inter-organizational and outreach programs. The DCR fulfilled more than 25 data requests for providers, researchers, programs, and legislators in 2018. Ninety percent of the reporting hospitals met the completeness and timeliness goals. The DCR has met and exceeded the expected cancer completeness necessary for gold certification for more than 10 years.

Conclusions/Implications: The DCR partnerships have been key in cancer surveillance. Collaborations also lead to linkages, publications, and presentations. The partnerships impact the status of cancer in the state in a multi-disciplinary approach. Existing partnerships were determined to be essential to registry data quality, timeliness, completeness, and decision making as well as influencing partner decisions. We will identify desired next steps.

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SPATIOTEMPORAL TRENDS OF STAGE-SPECIFIC INCIDENCE RATE OF NON-SMALL CELL LUNG CANCER (NSCLC) IN NEW YORK STATE (1995-2015)

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Background: Cancer stage at diagnosis of Non-Small Cell Lung Cancer (NSCLC) provides important information about the treatment options and prognosis. Early detection is particularly important for early stage NSCLC patients as treatment options with curative intent are available. We aim to investigate the spatiotemporal variations in overall and stage-specific NSCLC incidence rates in New York State (NYS).

Methods: We obtained county level age-adjusted incidence rates for NSCLC and a composite socioeconomic index, the Yost index, in NYS between 1995 and 2015. Data were retrieved from SEER*Stat maintained by the National Cancer Institute. We applied a scan-statistic approach to assess spatial clustering of NSCLC incidence rates. We conducted both weighted space-only normal model using the inverse of the age-adjusted rate standard error, and unweighted, space-time covariate-adjusted normal model, adjusting for the Yost Index. Models were ran separately for overall and each cancer stage (local, regional, and distance).

Results: We provided detailed incidence mapping and ranking and summary statistics for sex-specific and race-specific incidence results in a publicly accessible webpage. Significant ($p < 0.01$) high/low incidence clusters were detected, with variations seen in the cluster sizes and locations between space-only vs space-time models. Regardless of cancer stage, the most likely high-incidence area occurred in the northeast section of the state, while low-incidence cluster around the New York City metropolitan area.

Conclusions: We found significant spatiotemporal variations of NSCLC in NYS after adjusting for socioeconomic factors. The results may be useful for identifying areas where further investigation and targeted NSCLC prevention and interventions, such as lung cancer screening programs, are needed.

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P-48**HEPATOCELLULAR CARCINOMA AND HEPATITIS B AND C VIRUS: RESULTS FROM A PILOT LINKAGE IN LOUISIANA**

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Background: In the last 5 years (2011-2015), Liver Cancer was the sixth leading cause of cancer deaths in the U.S., of which 88% were Hepatocellular carcinomas (HCC). HCC incidence rates have been steadily on the rise for the past 35 years. Several studies have shown that one of the main risk factors for HCC is hepatitis B and C virus (HBV, HCV) infections. However, due to limited resources, cancer registries do not collect HBV and HCV data routinely. Thus, the Louisiana Tumor Registry (LTR) explored the feasibility of obtaining the data through a linkage with the Infectious Disease Epidemiology (IDE) Hepatitis B and C Surveillance Program. The objective is to describe the status of HCC and HBV/HCV using data from the above linkage.

Methods: We conducted the pilot linkage using data from LA cancer cases diagnosed in 2016 that were matched to Hepatitis B/C surveillance data collected between 1988 and March 2018. Matched cases were ascertained and reviewed using linkage algorithms as well as probabilistic linkage strategies agreed upon by LTR and IDE with Match*Pro software. Hepatitis B and C diagnosis data and cancer characteristics were collected and analyzed to identify cancer cases diagnosed with HCC. Chi-Square analyses were conducted using SAS 9.4.

Results: In total, 504 HCC cases were diagnosed in Louisiana in 2016, of which 38.3% (193) were positive for HCV, 4.9% were positive for HBV, and 56.8% had no hepatitis viral infection. Among patients with HCC, black patients are more likely to be HCV positive compared to their white counterparts (50.9% vs 32.4%, $p < 0.05$). However, males and females with HCC are equally likely to be HCV positive (39.1% vs 35.5%).

Conclusions: The pilot linkage of cancer registry data with the IDE data demonstrated the feasibility of the linkage and the subsequent usefulness of the data. Preliminary statistics showed that 38.3% of HCC cases were positive for HCV in Louisiana, which is higher than the nation at 22.9%. Thus, access to this data on a larger scale will enable further investigation of the relationship between HCC and HBV/HCV while addressing racial, gender, and geographic disparities.

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P-49**TRENDS IN STOMACH CANCER INCIDENCE IN NEW JERSEY BY SEX, AGE AND RACE/ETHNICITY, 1990-2016**

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Background: Stomach cancer incidence has declined significantly in New Jersey (NJ) men and women since 1979.

Purpose: To further characterize stomach cancer trends by sex, age, race/ethnicity, primary site, and stage at diagnosis.

Methods: We used New Jersey State Cancer Registry data to calculate age-adjusted stomach cancer incidence rates in SEER*Stat and estimated annual percent changes (APCs) and changes in time trends using Joinpoint regression.

Results: Stomach cancer incidence increased significantly ($p < 0.05$) in younger NJ women aged < 50 years from 1990-2016 (APC=2.9), but decreased significantly in older women aged 50+ (APC= -1.8) and men aged 50+ (APC= -2.0). Stomach cancer incidence did not change significantly in younger men (APC= -0.5) during the same time period. Significant increases in stomach cancer incidence were observed in younger Hispanic (any race) and non-Hispanic White women (APC=2.6 and APC=2.3, respectively) but not in younger Black or Asian/Pacific Islander women. Subsite analysis showed significant increases in the incidence of non-cardia stomach cancer (APC=2.8) and overlapping lesions/stomach cancer, NOS (APC=3.1) in younger NJ women. Local- and distant-stage stomach cancer increased significantly in younger women, but regional-stage cancer incidence did not change significantly in this group.

Conclusions: It is concerning that stomach cancer incidence is increasing in younger women, which could reverse the overall long-term declines in NJ in the future, especially if increased risk continues as this cohort of younger women ages. It is important to monitor changes in stomach cancer incidence, and research is needed to identify the role of antibiotic use, dietary factors and other possible causes of increasing incidence in younger women.

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SURVIVAL TRENDS AND DISPARITIES IN NEW JERSEY FEMALES DIAGNOSED WITH BREAST CANCER BY STAGE, RACE/ETHNICITY, AND CENSUS TRACT POVERTY, 1995-2011

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Background: Breast cancer survival has increased due to improvements in treatment and earlier detection.

Purpose: To characterize breast cancer survival trends by stage, race/ethnicity and census tract poverty level (CTPL) in New Jersey (NJ) women.

Methods: We used New Jersey State Cancer Registry data to estimate 5-year relative survival rates for women diagnosed with invasive breast cancer. Rates were generated using SEER*Stat and annual percent changes (APCs) were estimated using Joinpoint regression. Census tract of residence at diagnosis was categorized into 4 groups by CTPL: 0-<5%, 5-<10%, 10-<20% and 20%+.

Results: Five-year breast cancer survival rates increased significantly ($p<0.05$) for all NJ women from 1995-2011. Non-Hispanic Black (NHB) women had significantly lower survival compared to other women. Over time, survival has improved significantly in Hispanic (APC=0.4) and Non-Hispanic White women (1995-1998: APC=1.2; 1998-2011: APC=0.3), but not for NHB or Asian/Pacific Islander women. Breast cancer survival increased significantly for women diagnosed with local (APC=0.2), regional (APC=0.7), and distant stage (APC=2.6). Although survival improved significantly among all CTPLs, survival in the areas of highest poverty (20%+) were consistently lower than in areas with lower poverty.

Conclusions: Breast cancer survival improved in NJ women from 1995-2011, but disparities remain, with worse survival observed in NHB women, women residing in areas of higher poverty, and women diagnosed with late stage cancer. Access to breast cancer screening and optimal treatments for all NJ women remains an urgent public health issue.

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MOVING CANCER STAGING BEYOND THE BOOK – FROM PRINT TO ELECTRONIC

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In October 2016, the AJCC first published the electronic version of the 8th Edition Cancer Staging content through its Application Programming Interface (API) Portal. For the first time, software developers were able to get accurate TNM definitions and stage tables in an XML format directly from the AJCC. While the information was accurate, the AJCC learned quickly that for many software developers, interpretation was still needed.

The Cancer Staging Manual was designed with the intention that stage tables are interpreted with an understanding of the Principles of Cancer Staging (Chapter 1). This additional knowledge is not explicitly stated in the stage tables and thus a challenge for software developers who are attempting to program stage tables into software. Additionally, questions arose about the inclusion of category/subcategory (T1 and T1a, T1b, etc.) in stage tables. These issues are important for surveillance because more detailed information is not always available at the central registry level.

The AJCC worked closely with developers and our partners at the CDC to identify a solution for these issues. The answer was to provide API users expanded stage tables so that information is explicit and better suited for machine reading and programming software.

The AJCC is completing the process of expanding every valid permutation of the stage tables for every disease site in full compliance with the Principles of Cancer Staging and footnotes in the chapters. This manual process takes rather compact tables, which fit neatly on a printed page, and expands them to up to 37,000 lines of code per stage table. The meticulous validation process is critical to ensure software developers are provided AJCC stage tables in a form that facilitates development of the software tools used in EMRs and Cancer Registries across North America.

NAACCR
P-52**LEVERAGING CURRENT SURVEILLANCE EPIDEMIOLOGY AND END RESULTS (SEER) DATA ELEMENTS TO CHARACTERIZE RECEIPT OF NEOADJUVANT TREATMENT****Melissa Bruno**; Clara Lam¹; Catherine Wang¹; Donna Rivera¹; Serban Negoita¹¹National Cancer Institute, Bethesda, MD, United States

Background: Neoadjuvant therapy, also referred to as induction therapy, is generally defined as systemic therapy given before localized cancer treatment. Routine and accurate collection of this treatment sequence is essential to better understand therapeutic effectiveness and guide strategies in treatment plan for cancer care; however, a standardized definition for neoadjuvant data collection does not exist in the literature.

Objective: We aim to leverage existing Surveillance, Epidemiology and End Results (SEER) data elements to investigate the development of an algorithm using data items collected and transmitted through SEER to calculate a score to characterize the likelihood a patient received neoadjuvant treatment.

Methods: This study will use NAACCR volume 2 and restrict to variables reported and submitted to the National Cancer Institute (NCI). The algorithm will use a set of 35 elements selected as the most neoadjuvant-informative variables the score calculation. The chosen indicator variables will then be translated into the following categories to help calculate neoadjuvant treatment scores: no neoadjuvant treatment, unlikely, possible, definite neoadjuvant treatment, unindicative, and unknown. The variable set will be ranked based on how strongly the data items correlate with neoadjuvant treatment. If necessary, site-specific categories will be assigned for greater precision. The algorithm will be tested on SEER 2015 cases for a specific set of sites using a subset of currently collected indicative variables (NAACCR treatment sequence variables) and then evaluated in a future comparison study using the SEER*Medicare linked dataset.

Results: Preliminary results will include a detailed process flow of the algorithm and corresponding neoadjuvant treatment score categories by cancer site. Additional analyses will include cross examinations of the newly developed algorithm with current SEER variables, specifically radiation sequence with surgery (RX SUMM-Surg/Rad Seq) and systemic treatment surgery sequence (RX SUMM-Systemic Sur Seq).

Conclusion: Obtaining complete and accurate neoadjuvant treatment information is increasingly important for cancer surveillance to understand sequences of therapy. This project will support research on the creation of a standardized variable to enhance capturing detailed treatment information for patients in future data collection.

NAACCR
P-53**USING CANCER REGISTRY DATA TO DEVELOP A FIRST OF ITS KIND STATE CERVICAL CANCER STRATEGIC PLAN****Caylie Simon**¹; Keylee Wright¹¹Indiana State Cancer Registry/Indiana State Department of Health, Indianapolis, IN, United States

background: Cervical cancer is almost 100 percent preventable through regular screening, avoidance of controllable risk factors, and vaccination against the human papillomavirus (HPV). Nationally, in 2018, there were an estimated 13,240 cases of cervical cancer diagnosed and 4,170 deaths due to cervical cancer. In Indiana, approximately 264 new cases of cervical cancer and 88 cervical cancer-related deaths occur annually.

Purpose: To address the state's cervical cancer burden and to develop a strategic plan to identify and significantly reduce morbidity and mortality from cervical cancer in Indiana. The Indiana State Department of Health (ISDH) Cancer Epidemiologist analyzed Indiana State Cancer Registry (ISCR) data to determine the extent of the cervical cancer burden in the state for the strategic plan.

Methods: Cases were pulled from the ISCR from 2012-2016 from a recent evaluation, and from 2002-2016 to determine the burden over a longer time period. Items assessed were incidence, mortality, affected ages, stage at diagnosis, race/ethnicity, and rural/urban counties.

Results: During 2012-2016, the average yearly cervical cancer incidence and mortality rates were 8.0* and 2.5* per 100,000 women, respectively. Most cervical cancers were diagnosed during the regional or distant stages (54%). Approximately 43% of cervical cancers were diagnosed among women aged 45 to 64 years.

During 2002-2016, African American women had significantly higher incidence and mortality rates (9.6* and 3.6* per 100,000 women, respectively) compared to White women (8.0* and 2.5* per 100,000 women, respectively). Additionally, rural counties had significantly higher incidence rates compared to urban counties (8.6* versus 8.0* per 100,000 women, respectively).

Conclusion: The ISDH used ISCR data to develop the first of its kind state cervical cancer strategic plan. The plan includes four focus areas across the cancer control continuum. One of the 10 objectives is to reduce late-stage (regional and distant) cervical cancer diagnoses in Indiana from 54% to 40% by 2028 as measured by the ISCR.

* Rates are per 100,000 women; age-adjusted to the 2000 U.S. standard population.

Sources:Indiana State Cancer Registry, <https://www.in.gov/isdh/24968.htm>Indiana Cervical Cancer Strategic Plan, 2019-2028, <https://www.in.gov/isdh/22689.htm>

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RECENT TRENDS IN PROSTATE CANCER IN CANADA

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Background: Prostate cancer is the most common type of cancer in Canadian men. Screening recommendations have changed substantially over the last 25 years. Since 2011 (United States) and 2014 (Canada), taskforce guidelines have recommended against screening using the prostate-specific antigen (PSA) test in low-risk men of all ages. This work reports on trends in prostate cancer incidence, mortality, and stage at diagnosis in Canada from 1992 to 2015.

Data and methods: Prostate cancer incidence, mortality, and stage at diagnosis were retrieved from Statistics Canada's Canadian Cancer Registry and the Canadian Vital Statistics - Death Database Statistics Canada). Joinpoint analysis was used to examine trends over time.

Results: The age-standardized incidence rate (ASIR) of prostate cancer peaked in 1993 and 2001, and declined thereafter. From 2011 to 2015, the ASIR declined by 9.3% per year. The age-standardized mortality rate (ASMR) decreased continuously from 1992 to 2015, but fell most rapidly (2.9% per year) after 2001. Data from two provinces show that, from 2005 to 2015, the rate of Stage I and Stage II cancers decreased by 3.2% per year, while the rate of Stage III and Stage IV cancers remained relatively stable.

Interpretation: Incidence of prostate cancer has declined substantially in recent years. Most of the decline seems to be in localized cases (Stage I and Stage II). Changes in incidence have mirrored changes to PSA screening recommendations. Future work should continue to monitor trends over time at the national level, especially as they relate to screening recommendations

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VALIDATION OF SHORT-TERM CANCER INCIDENCE PROJECTIONS (CANPROJ)

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The Public Health Agency of Canada (PHAC) has projected cancer incidence and mortality rates and counts for the Canadian Cancer Statistics Publication for the past 30 years. Recently, PHAC adopted the use of the CanProj package which offers more options than the traditionally used NordPred package, in particular for small geographic areas and/or rare cancers. The Canproj package makes available three generalized linear models: the Nordpred model that incorporates age, drift, period and cohort effects; the age-cohort model; and the hybrid models incorporating age and potentially period effects. The objectives of this analysis was to evaluate the accuracy of the Canproj models using cross validation techniques and to evaluate the automatic model selection features of the Canproj decision trees. Cancer incidence data (1986 to 2014) from the Canadian Cancer Registry (CCR) and National Cancer Incidence Reporting System (NCIRS) were used. The projected (expected) values for the last five years of data (2010-2014) were compared to the observed (true) value by calculating the mean and median relative bias by model, cancer type and sex. Four of the six models presented proved to be generally good at predicting cancer rates in the Canadian population over the five-year period, namely Nordpred, the age-cohort model, the hybrid common trend model and hybrid age-specific trend model. More variation was observed in the relative bias when the accuracy of the projection models was compared by cancer site, especially in sites with significant recent changes in trends. The range and flexibility of models offered in Canproj allowed for increased accuracy of short term cancer incidence projections across various geographic locations and cancer sites.

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ACQUIRING REMOTE ACCESS TO NON-REGISTRY HOSPITALS' EMR BY THE NEW HAMPSHIRE STATE CANCER REGISTRY IN RESPONSE TO LIMITED RESOURCES

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Remote access to non-registry hospitals' Electronic Medical Record (EMR) has improved data quality and accuracy, time and resources expended on traveling, and cost of traveling to non-registry hospitals throughout New Hampshire. In 2015, the NHSCR had remote access to only one non-registry hospital and performed site-visits to ten other non-registry hospitals to review both electronic and paper medical records. This approach became unsustainable due to the cost incurred by traveling to the various sites.

Acquiring remote access to non-registry hospitals prior to 2015 was difficult, considering that many of these hospitals mostly had paper charts. Many non-registry hospitals began transitioning to EMRs in 2014-2015, which allowed for integrated review of paper and electronic records. In 2016, the NHSCR began requesting remote access to non-registry hospitals who had established an EMR.

As of 2018, the NHSCR has remote access to seven of eleven non-registry hospitals in New Hampshire. Acquiring remote access has reduced or eliminated the need to budget for lodging, car rentals, and mileage reimbursement. Remote access allowed for a flexible schedule to abstract for each non-registry hospital; fewer time constraints consequently improved data quality.

As a result of remote access, the NHSCR has been able to improve on timeliness, completeness, and quality of cases seen at New Hampshire's small hospitals. The NHSCR continues to work on obtaining remote access to the remaining four hospitals.

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CANCER MORTALITY: SOURCES OF MISCLASSIFICATION IN DEATH CERTIFICATES

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Purpose: The purpose of this project is to identify the main sources of bias and misclassification in the completion of the cause of death section on death certificates.

Background: Death certificates are important medical documents used widely as the basis for mortality statistics and health care policy¹. Although several aspects of the death certificate are standardized across the United States, the completion of the cause of death section varies widely across health care centers and between practitioners^{2,3}. This variation is influenced by practical considerations and inadequate training and has led to significant misclassifications and errors in the cause of death section on death certificates^{2,3}. These misclassifications are a significant concern for cancer research and public health because statistics based on death certificates are widely used to monitor trends and carry out epidemiologic studies on the etiology, prevention, survivorship and control of cancer⁴.

Methods: Although there is ample evidence of misclassification in death certificates, it is not clear what is causing these errors or how they should be addressed. We will conduct focus group discussions to identify the sources of error and bias relating to cancer patients. Potential participants include general physicians, oncologists, pathologists, palliative care providers, nurse practitioners and physician assistants. A qualitative study analysis software will be used to identify common themes. We will describe the findings of the focus groups with respect to the accuracy of death certification as it affects cancer registration and public health statistics.

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THE LUNG CANCER SURVIVAL HAS IMPROVED IN THE PAST DECADE IN ALBERTA

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Background: In 2011, the Lancet published an international study on cancer survival which indicated that Alberta has the lowest survival rate for lung cancer among the four Canadian provinces (Alberta, British Columbia, Manitoba and Ontario) included in the study. In the same year, a program known as Alberta Thoracic Oncology Program (ATOP) was launched. It was aimed at helping lung cancer patients get faster access to treatment.

Objective: This study is 1) to examine the survival for lung cancer patients and 2) to compare the survival for patients in ATOP program with non-ATOP patients.

Methods: All cases of lung cancer diagnosed between 2005 and 2016 were identified from the Alberta Cancer Registry and linked to the ATOP data.

The age-standardized relative survival was calculated for four cohorts – lung cancer patients diagnosed between 2005 and 2007, between 2008 and 2010, between 2011 and 2013 and 2014-2016. Cox regression was used to compare the survival for ATOP patients with non-ATOP patients diagnosed between 2011 and 2016, adjusting for age, stage, the receipt of chemotherapy, comorbidity, social economic status etc.

Results: The one-year age-standardized relative survival ratio was 40.2% (95% CI: 39.1%-41.3%) for 2005-2007, 40.9% (95% CI: 39.8%-42.1%) for 2008-2010, 45.7% (95% CI: 44.6%-46.8%) for 2011-2013 and 48.2% (95% CI: 47.1%-49.2%) for 2014-2016. The descriptive statistics for cohort 2011-2016 will be included. The results from cox regression will be presented.

Conclusion: In the period 2014-2016, the one-year survival has improved significantly from those diagnosed in 2005-2007, 2008-2011, and 2011-2013. The results from cox regression will be useful in understanding the association between the ATOP and survival.

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THE EMERGENCY CARE USE AMONG CANCER PATIENTS WITH RECENT DIAGNOSIS IN ALBERTA

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Background: Emergency care plays a substantial role in care delivery. Understanding the emergency care use among cancer patients is important to help improve the quality of care and reduce unnecessary emergency department (ED) visits. However, little is known about the use of ED for cancer.

Objective: The study objective is to improve our knowledge about ED use by cancer patients in Alberta and the subsequent hospitalization.

Methods: A cohort of 34,946 adult patients diagnosed with invasive cancer (excluding non-melanoma of skin) in Alberta from 2015 to 2016 was identified from the Alberta Cancer Registry and then linked to the National Ambulatory Cancer System (NACRS) for the cancer related ED visits. The identification of cancer related visits was based on the diagnoses collected in NACRS.

Results: Among 34,946 cancer patients, 10,902 (31.2%) had at least one ED visits within six months prior to and one year after diagnosis. Among those patients with ED visits, 49.2% had more than one ER. The average number of ED visits is 2.1. In total, there were 23,195 ED visits. The most responsible providers for 89.7% of those ED visits were either the Emergency Medicine Physicians or the General Practice Medicine Physicians. The most common cancer associated with the ED visits were gastrointestinal (27.4%), intrathoracic (21.6%), hematology (18.2%), genitourinary (10.0%) and breast (7.2%). Among those visits, 49.4% were discharged to the place of residence (include home, nursing home, private dwelling with home care, etc.), 44.7% were admitted to hospitals, 0.8% left without treatment and 0.5% died after arrival.

Conclusion: These findings help understand the ED use by cancer patients in Alberta and provide baseline information for investigating unnecessary emergency visits. Further analysis regarding reasons for ED visits by cancer type is needed.

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REPORT ON CANCER STATISTICS IN ALBERTA

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Background: Surveillance & Reporting, CancerControl Alberta has published Report on Cancer Statistics in Alberta biennially since 2011. This biennial report provides the most current comprehensive and detailed information regarding the burden of cancer in Alberta. It was previously published in PDF. Since 2017, it has been converted to Tableau dashboards. The latest report will be published on the 2019 World Cancer Day (Feb 4th, 2019).

Methods: All cancers, excluding non-melanoma of skin cancer, diagnosed between 1996 and 2016 were identified through the Alberta Cancer Registry. Age-standardized incidence and mortality rates were calculated using 2011 Canadian Standard Population. Joinpoint was used to examine the incidence and mortality trends. Canproj method was used to project incidence and mortality for years 2016 and 2021. Relative survival and probability of developing & dying from cancer were also calculated.

Results: It was estimated that 20,473 new cancer cases would be diagnosed in Alberta and 6,637 Albertans would die from cancer in 2019. About 1 in 2 Albertans is expected to be diagnosed with cancer in their lifetime and 1 in 4 Albertans is expected to die from cancer.

Alberta's cancer incidence rates have steadily declined by about 0.5% annually between 2001 and 2016. The mortality rates have also decreased over the past 20 years, falling by 0.8% annually between 1996 and 2004 and 1.8% annually between 2004 and 2016.

Conclusion: This report provides valuable information that can be used to support health professionals, researchers and policy makers in the planning, monitoring and evaluation of cancer-related health programs and initiatives.

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INCIDENCE AND MORTALITY OF SMOKING-RELATED CANCERS AS SMOKING DECLINES: AN ECOLOGICAL ANALYSIS BASED ON U.S. REGIONS WITH LOW HISTORIC SMOKING PREVALENCE

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Background: Declining smoking in the United States (U.S.) has led to a lower incidence of smoking-related cancers. Utah has the nation's lowest historic and current smoking prevalence. Patterns in the current incidence and mortality of these cancers in low-smoking geographic areas may provide information relevant to the future national burden of smoking-related cancers.

Purpose: Describe the incidence and mortality of smoking-related cancers in Utah, a low-smoking state and examine the ecologic relation between county-level historic smoking prevalence throughout the U.S. and current incidence of smoking-related cancers.

Methods: We defined lung, oral cavity, esophagus, stomach, colorectal, liver, pancreas, larynx, cervical, bladder, kidney, and acute myeloid leukemia as smoking-related cancers. We calculated the percent differences in the age-standardized incidence and mortality of smoking-related cancers for Utah compared to other U.S. states. Linear regression models described the slope of county-level smoking with cancer incidence. Current adult smoking prevalence with a 20-year time lag was obtained from county-level estimates derived from the Behavioral Risk Factor Surveillance System; county-level incidence for 2011 through 2015 was from SEER*Stat.

Results: The 20-year lagged current smoking prevalence was 15.2% in Utah and 23.4% in the U.S.; the 2015 smoking prevalence was 9.1% in Utah and 17.2% in the U.S. Smoking-related cancer incidence and mortality were respectively 33.9% and 38.1% lower in Utah than the U.S. A significantly higher proportion of cancer deaths were attributed to smoking-related cancers in the U.S. (60.5%) than Utah (49.3%). Lung cancer incidence and mortality have declined over time in Utah and the U.S., yet lung remains the largest contributor to cancer deaths in Utah (15.9% of cancer deaths). Ecologic models found a significant increase of 8.4 incident smoking-related cancers per 100,000 per percent current smokers. In 2017, fifteen states reduced their current adult smoking prevalence to <15%, comparable to Utah 20-year lagged data.

Discussion: Regions with current smoking prevalence of <15% may expect their future cancer burden to approximate Utah's current significantly lower incidence and mortality. However, lung cancer is still the leading cause of cancer death in Utah and can be expected to present a significant burden in other regions even as smoking declines.

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DISTINCT CHARACTERISTICS OF RHABDOMYOSARCOMA AMONG ADOLESCENT AND YOUNG ADULTS COMPARED TO CHILDREN

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Background: Rhabdomyosarcoma (RMS) is a cancer of skeletal muscles that occurs commonly among children and accounts for more than 50% of pediatric cancers arising from soft tissues. However, among adults, RMS is extremely rare and survival probability is markedly lower than in children partly due to lack of age appropriate treatment improvements. For adolescents and young adults (age 15 to 39, AYA) whose cancer care overlaps between pediatric and adult setting, detection and treatment for RMS are likely to be delayed. As of date, incidence and survival patterns of RMS for AYAs has not been well characterized.

Purpose: In this study, we describe trends and characteristics of RMS among AYA and pediatrics.

Method: Using the California Cancer Registry database, we identified 977 pediatric and 493 AYA RMS cases diagnosed 1988-2015. We assessed age specific incidence rates using US Census and estimated 5-year survival probability using non-parametric Kaplan Meier survival functions among AYA and pediatric patients.

Results: AYA patients were more likely to be diagnosed with distant disease than pediatric patients (44% vs 32%, $p < 0.0001$). There was an increasing trend in incidence of pediatric and AYA RMS (AAPC 0.78%, 0.88%, respectively) over the last 27 years. Incidence rates for the pediatric RMS decreased with higher socioeconomic status level (SES), but there was no difference in incidence rates by SES for AYAs. AYA patients with RMS had lower 5-year survival probabilities than pediatric patients (66% pediatric and 35% AYA). This survival deficit for AYA patients consistently persisted across sex, ethnicity, SES, cancer stage and histologic subtypes. Furthermore, pediatric RMS patients had distinctively disparate survival pattern by ethnicity ($p = 0.01$), sex ($p = 0.04$), and SES ($p = 0.1$), however, AYA patients did not show such disparate pattern as expected ($p = 0.6, 0.9, \text{ and } 0.9$, respectively).

Conclusion: The survival pattern of RMS in AYA lacks the distinctive pattern seen in pediatric patients, suggesting that treatment response for AYA is not as heavily influenced by patient characteristics such as sex, ethnicity and SES. Future research to address the unique needs of this vulnerable AYA patients diagnosed with RMS may include other prognostic factors such as molecular markers.

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CHARACTERISTICS AND TREND OF EARLY ONSET COLORECTAL CANCER INCIDENCE: IMPLICATION FOR ADOLESCENT AND YOUNG ADULTS

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Background: Incidence of early onset colorectal cancer (CRC) under age 50 has been increasing in recent years. Previous reports indicate that the rise is more prominent for cancers of distal colon and rectum. For adolescents and young adults (AYA, age 15-39), CRC is considered a rare disease with poor outcome.

Purpose: We investigated characteristics of CRC incidence across different age groups with a specific focus on the AYA population to understand factors associated with the recent increase in this young and vulnerable population.

Method: From the California Cancer Registry datafile, we identified 752,860 patients who were diagnosed with CRC at age 15 or older from 1988 to 2015. We used the Joinpoint Regression Program to analyze annual incidence trends in five age groups (15-29, 30-39, 40-49, 50-64, 65+) by patient demographic and tumor characteristics.

Results: Generally, younger patients with early onset CRC under age 50 are more likely to be diagnosed with regional and distant diseases compared to patients over age 50 ($p < 0.0001$). During 1988-2015, the incidence rate increase was the highest for patients aged 30-39 (AAPC=1.9) followed by patients aged 15-29 (AAPC=1.3). These increases were most prominent for distal colon cancer or cancers of the left side of the colon and rectum (AAPC=2.6 and 2.7, respectively). Among AYA, left colon cancer was more likely to be local and distant. AYA patients with left colon cancer were more likely to be females than those with right colon cancer. However, among patients aged 50 or older, left colon cancer patients were more likely to be males. For cancers of the left colon, female patients under age 50 experienced a higher incidence rate trend but after age 50, there was more clear male dominance in incidence trend. For cancers of the right colon, male dominance persisted over all age groups.

Conclusion: The rise in colorectal cancer incidence among the AYA population is mostly due to increase in incidence rates of the left colon and rectal cancer, and the risk is higher among females. AYA have a distinctively unique incidence pattern compared to older patients, thus further research effort is warranted to understand risks of CRC among AYA.

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P-64**THE “SWEET SPOT” FOR DIGITAL SCREENING MAMMOGRAPHY
RECALL RATES AND CANCER DETECTION IN THE METRO
CHICAGO BREAST CANCER REGISTRY (MCBCR)****Therese Dolecek**; Teresita Macarol¹; Hai Nguyen²; Garth Rauscher²; Nila Alsheik¹; Anne Marie Murphy³¹Advocate Health Care²University of Illinois at Chicago³Metropolitan Chicago Breast Cancer Task Force

Background: The Metro Chicago Breast Cancer Registry (MCBCR) contributes screening, diagnostic and outcomes data to the national Breast Cancer Surveillance Consortium (BCSC). Probabilistic linkages to the Illinois State Cancer Registry identify incident breast cancer cases in MCBCR. Federal regulation requires mammography facilities to conduct annual audits to evaluate performance in detecting breast cancer. At the individual radiologist level, cancer detection rates are unstable due to few cancers identified by each but recall rates can be estimated precisely and serve as performance measures. The current optimal recall rate recommendation by BCSC is 10%.

Purpose: The study goal is to provide data driven visual aids that demonstrate the trade-offs of varying recall rates relative to cancer detection and biopsy recommendation among radiologists across a large multi healthcare system with multiple radiologist groups.

Methods: Outcomes were assessed for women aged 40-79 years without breast cancer history receiving screening 2D and 3D digital mammography during 2005-2017. Eligible radiologists (N=90) each read at least 1000 screening mammograms. Average recall rate (abnormal interpretations/1000 mammograms) was calculated for each radiologist. Likewise, cancer detection rates (screen-detected in situ and invasive cancers/1000 mammograms) and biopsy recommendation rates (biopsy recommendations/1000 mammograms) were calculated. Scatter plots at the radiologist level were created to visually compare how cancer detection rates and biopsy recommendation rates (y-axis) change as recall rate (x-axis) increases, and plotted smoothed curvilinear (best fitting fractional polynomial) representations of those relations.

Results: Among 1,243,051 screening mammograms, there were 148,698 abnormal interpretations (recall rate=12.0%) and 21,922 recommendations for biopsy (1.76% screens), yielding 6,131 cancers (0.49% screens). As recall rate increased from 5% to 15%, cancer detection rate increased by 1.6 per 1000 screens (from 3.6 to 5.2 per 1000 screens), whereas biopsy recommendation increased by 10 per 1000 screens (from 10 to 20 per 1000 screens). Recall rates between 6-8% maximized cancer detection while minimizing unnecessary biopsies; recall rates above 8% disproportionately increased biopsies with little increase in cancer detection.

Conclusion: The “sweet spot” for optimal cancer detection in MCBCR is in the recall rate range 6-8%. The study exemplifies a practical use of cancer registry data with other data sources to inform public health.

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P-65**INCIDENCE OF TESTICULAR CANCER HISTOLOGIC SUBTYPES
OVER TIME ACCORDING TO NEIGHBORHOOD FACTORS AMONG
HISPANICS IN CALIFORNIA****Mindy DeRouen**; Meg McKinley¹; Sumit Shah²; Hala Borno³; Daphne Lichtensztajn^{1,3}; John Leppert⁴; James Brooks⁴; Benjamin Chung⁴; Scarlett Gomez¹; Iona Cheng¹¹Greater Bay Area Cancer Registry²Stanford University School of Medicine³University of California, San Francisco⁴Stanford University School of Medicine

Background: Hispanic men in the U.S. experience the second-highest incidence rate of testicular cancer, behind non-Hispanic (NH) White men. Incidence of testicular cancer is increasing in the U.S., despite reports of a plateau during the 1990’s, and increases are especially steep in the Hispanic population. To date, the literature does not address whether the incidence of testicular cancer or the observed increases in incidence differ according to neighborhood factors.

Purpose: We examined incidence rates and changes in incidence over time for testicular cancer histologic subtypes (i.e., seminoma and nonseminoma) according to neighborhood socioeconomic status (nSES) among Hispanic and, for comparison, NH White men, and according to neighborhood ethnic enclave among Hispanic men, using California Cancer Registry Data.

Methods: We conducted a population-based study of 12,228 Hispanic and NH White men diagnosed with testicular cancer in California during three pericentral periods 1988-1992, 1998-2002, and 2008-2012. We calculated incidence rates according to nSES and, among Hispanics, according to ethnic enclave. Incidence rate ratios were calculated to compare incidence rates across nSES and ethnic enclave and to examine changes in incidence rates over time.

Results: Hispanic men residing in high SES neighborhoods, compared to low SES neighborhoods, had greater incidence of both seminoma and nonseminoma testicular cancer across pericentral periods (2008-2012, high to low nSES, seminoma IRR, 1.67; 95% CI, 1.38-2.02 and nonseminoma IRR, 1.22; 95% CI, 1.00-1.48). Hispanic men residing in low ethnic enclave neighborhoods also had higher incidence of both seminoma and nonseminoma across pericentral periods. Between the periods 1998-2002 and 2008-2012, Hispanic men residing in low SES neighborhoods experienced increased incidence of seminoma (IRR, 2008-2012 compared to 1998-2002, 1.39; 95% CI, 1.17-1.65) while those residing in both low and middle SES neighborhood experienced increased incidence of nonseminoma (IRR, 2008-2012 compared to 1998-2002 for low nSES, 1.87; 95% CI, 1.57-2.20 and for middle nSES, 1.48; 95% CI, 1.21-1.79).

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RESULTS FROM A FIFTEEN-YEAR POSTMARKETING DRUG SAFETY STUDY OF ADULT OSTEOSARCOMA AND TERIPARATIDE IN THE US

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Background: This study was initiated in 2003 at Forteo's time of approval in the United States (US) to monitor for a potential association between teriparatide (an osteoporosis treatment) and osteosarcoma, which occurs in the US in adults aged 40 years or older at a background incidence rate of approximately 2.5 cases per million per year.

Objective: To provide final study results, including descriptive characteristics of patients with osteosarcoma aged 40 years or older.

Methods: All state cancer registries, plus targeted regional and comprehensive cancer registries in the US, were invited to participate in this patient-contact study. Incident cases of osteosarcoma diagnosed between January 1, 2003, and December 31, 2016, identified through cancer registries were reported to RTI once all requirements for releasing patient identifying information were met. Exposure to teriparatide was ascertained during telephone interview. Information about demographics, medication use prior to osteosarcoma diagnosis, and other possible risk factors for osteosarcoma were ascertained. Requirements necessary for contacting patients (patient-access pathways) varied among cancer registries from passive notification to active permission from the patient and/or physician.

Results: As of September 30, 2018, 3,809 incident cases of osteosarcoma in patients aged 40 years or older were identified by 30 cancer registries. After cancer registries completed individual requirements to release contact information, 2,545 patients were available to be interviewed. Of these, interviews were completed for 1,165 patients (46%). The mean age at the time of diagnosis was 61 years of age, and more than half were men (53%). The most common ICD-O-3 morphology codes were for osteosarcoma NOS (71%) and Chondroblastic osteosarcoma (13%). Of those interviewed, three patients reported use of teriparatide prior to diagnosis of osteosarcoma, which is within the expected range assuming no increased risk with treatment.

Conclusions: Drug safety surveillance studies that involve both a rare drug exposure and a rare cancer outcome require participation by many cancer registries. Results from this study indicate that, while resource-intensive, patient-contact studies with multiple cancer registries are feasible. Data from this study contributed to evidence about the long-term safety of teriparatide that is valuable to patients and physicians considering treatment with this product.

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"OUT, OUT, BLACK SPOT!"

Holly Kulhawick¹

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I am sitting on the exam table in my Oncologist's office, listening to her cheerfully point out why I would not be needing chemotherapy. She cites the TAILOR study, good stuff, and then tags on, "And after a review of other Registry data, adjuvant chemotherapy does not seem to have a major impact on survival in Stage 1 breast cancer with tumor sizes of 2 cm or smaller."

As she finished this confident statement, she looked to me for corroboration, and sees the hesitation, "What's wrong?"

"How sure are you?"

At this, she laughs, "It's your data, you tell ME!"

There is a long silence. Then she says, "You look like a deer in the headlights."

How good is our data? Hospitals keep pushing for faster abstracting times and the new crop of CTRs seems intent on breaking the abstracting speed barrier, but to those of us involved in QA of this data, the news is not all good. Faster abstracting seems to save money, but does it negatively impact our results incurring costs down the line?

Depending on software and primary site, the 2018 abstract has between 100 and 200 fields that need to be filled in to pass edits for an analytic case. This includes over 20 text fields that can handle up to 1000 characters each. A time study shows it can take 30 to 40 minutes just to fill in the non-text fields. How much time in addition to that needs to go into typing in text, reading the medical record and reviewing reference manuals? How much time does it REALLY take to complete an abstract and at what point do we have a problem? What will a pressured CTR do to save time and what effect will this have on our outcomes? On our patients' futures?

This question is begging an answer and we will attempt to provide one through a mix of time studies, sharing of QA results and interviews with actual abstractors. Everyone wants to know the answer and lives are depending on our getting this right.

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RISK OF SECOND CANCER AFTER BREAST, COLORECTAL AND GYNECOLOGIC CANCER: A POPULATION-BASED STUDY

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The last three decades have witnessed dramatic improvements in cancer survival, mainly due to improvements in treatment and the increasing detection of cancer at an early stage. As the population of cancer survivors continues to grow, there is a great need to understand the long-term health outcomes of this population. As the risk of developing cancer increases with age, longer lifetimes are associated with increased likelihood of the occurrence of second primary cancers. Therefore, there is a pressing need to understand the occurrence of second primary cancers and determine the optimal duration of follow-up of cancer patients. A retrospective cohort study is proposed that will extend the pilot study to including women diagnosed with uterine corpus (UCC), colorectal and ovarian cancer to reveal the patterns among subsequent cancers. By describing second primary cancers in the Ontario population, our aim is to improve the prediction of cancer patients that are most, or least, likely to develop a second primary cancer which can help prioritize the follow-up of those previously diagnosed with a first cancer. More specifically, we will compare the incidence of second primary breast, UCC, colorectal, and ovarian cancer in cancer patients with primary rates in the general population of Ontario females, determine the time period of highest risk of second breast, UCC, colorectal, and ovarian cancer for establishing the optimal duration of follow-up, and assess the excess risk of second primary cancer during follow up in women who have had chemotherapy as the main treatment compared to women had it before or after surgery, adjusting for prognostic factors.

NOTES:

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ESSENTIAL TNM- EVALUATION OF A TRAINING EXERCISE IN SUB-SAHARAN AFRICA

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Information on cancer stage at diagnosis is largely missing or poorly documented among population-based cancer registries (PBCRs) in Sub-Saharan Africa (SSA). In an early field trial of Essential TNM staging, it was observed that some training was needed to enable cancer registrars to abstract the correct TNM from case records. In November 2018, the Addis Ababa City Cancer Registry (AACCR) hosted a training course, attended by 17 participants from 16 cancer registry in SSA. The participants were asked to stage 16 cancer cases (anonymised photocopies of case records obtained from GICR) before and after the training. The discrepancy of the stages from before and after were scored and compared. Results show that there was a significant improvement in the participants' performance after the training. The application of the Essential TNM staging system, with training in its use, would allow cancer registrars in SSA to abstract cancer stage at diagnosis in a clinically recognised format, which is crucial information for cancer control and public healthcare policy making.

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COOPERATION AMONG COUNTRIES: SUPPORTING POPULATION-BASED CANCER REGISTRIES IN LATIN AMERICA

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Background: The commitment to provide cancer incidence by type of cancer implies important challenges in Latin America, a region where high quality PBCRs cover less than 10% of the population. The Pan American Health Organization is a key supportive partner of the Global Initiative for Cancer Registry Development; both partners look forward to join efforts benefiting from already existing cooperation mechanisms.

Purpose: The purpose of the project is to improve cancer registration and availability of mortality data in selected countries of the region through the implementation of a two year "Project for cooperation among countries for health development (CCHD)". This in turn aims to better inform cancer control.

Methods: Using a south to south cooperation model, and benefiting from the operational structure of the IARC Regional Hub for Latin America, the collaborative centres in of Argentina and Colombia will, together with IARC, provide support to five countries namely El Salvador, Guatemala, Panama, Paraguay and Peru.

The activities comprise site visits to assess the current situation for cancer registration providing on-site advice, followed by written recommendations for improvement directed to those in charge. Based on these observations and recommendations, targets will be formulated to advance implementation of PBCR and availability of high quality cancer incidence and mortality data. Technical advice will be provided and advances in countries/registries will be monitored closely. The project includes also the delivery of training courses.

Results: 5 training courses will be provided to cancer registry personnel and cancer surveillance professionals. Each country is expected to have one annual site visit; each registry a reviewed standard operating procedures manual. Reports on registration situation, on cancer incidence (if available), and on cancer mortality will be produced and disseminated via several channels.

Conclusions: Based on local expertise, skills, and resources the project follows the guiding principles of cooperation and supports some of the activities already initiated by the GICR in order to meet goals on cancer information for better cancer control.

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P-71**APPLICATIONS FOR MAKING RESPONSIBLE CANCER REGISTRY RESEARCH PRACTICE IN GERMANY A DEFAULT**Nina Schweiger¹; Alexander Katalinic²; Klaus Kraywinkel¹¹German Centre for Cancer Registry Data at the Robert Koch-Institute, Osnabrück, Germany²University of Lübeck, Institute for Social Medicine and Epidemiology

Background: In 2018, the German and the Dutch Society for Epidemiology updated and further developed recommendations for Good and Responsible Epidemiological Practice (GEP, RERP) (1, 2). They should help to prevent scientific fraud, to ensure value in research, and to promote trusting collaborations among scientists, study participants, and patients. Data providers are herewith encouraged to ensure that data are used properly and that the data receiver understands, and uses the data in a scientifically responsible way (2). Thus, cancer registries are to become “data stewards” for findable, accountable, transparent, and reproducible research practice.

Purpose: The application of GEP/RERP specifically tailored on cancer registry data are intended to pursue discussions of responsible scientific practice for routine cancer research data providers at the national level as well as internationally. It is not to restrain the freedom of scientific research in cancer epidemiology. Rather, data stewardship might take control over the professionalization process in making the principles of GEP/RERP a default in research with cancer registry data.

Methods: We identified best practice examples of data stewardship from an international selection of cancer registries to define primary fields of action for the German Centre for Cancer Registry Data.

Results: Best practice examples of cancer registry data stewardship that might foster responsible research are characterized by: conditional access & use regulations for scientific use files; analysis-software provision; scientific review of the applicant’s research proposal, or analysis-script for remote data-access; dissemination of procedures, validity and data comparability measures; providing supporting material and training on key elements of responsible cancer registry research practice.

Implications: We aim to expand already existing data stewardship-applications for users of the German Centre for cancer registry data by increasing findability of available data; by providing generic support for accountability and reproducibility in registry research via software tools; and by increasingly sharing procedures, syntax files, validity- and data comparability-measures. Rewarding systems are currently being developed in the biomedical science to increase responsible research practice, data-user involvement will be expanded to identify potential benefits in cancer registry research.

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P-72**AGE-STANDARDIZED EXPECTED YEARS OF LIFE LOST: QUANTIFICATION OF CANCER SEVERITY**RuRu Chun-Ju Chiang^{1,2}; Yueh Wang^{1,2}; Ying-Wei Wang³; Wen-Chung Lee^{1,2}

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Background: The critical implications of the expected years of life lost (EYLL) index of cancer for health policy assessments have been largely overlooked. In this study, we advocate to standardize life lost indices, named age-standardized EYLL.

Methods: We calculated the EYLL and the age-standardized EYLL to facilitate comparisons among 20 major cancer types including cancers of oral cavity, nasopharynx, esophagus, stomach, colon, rectum, liver, pancreas, bronchus and lung, female breast, cervix uteri, corpus uteri, ovary, prostate, kidney, bladder, brain, thyroid, leukemia, and non-Hodgkin lymphoma from the Taiwan Cancer Registry (TCR) database. The International Cancer Survival Standard was used for calculating age-standardized EYLL.

Results: A total of 797,314 patients aged more than 15 years between 2006 and 2015 were collected from the TCR database. The unstandardized EYLLs of three leading cancers for both genders were brain (22.5 years), esophagus (19.0 years), and pancreas (15.2 years). However, the age-standardized EYLLs of three leading cancers for both genders were pancreas (16.6 years), brain (15.7 years) and esophagus (14.6 years). Among 16 cancers in the men and 19 cancers in the women, pancreatic cancer was the most severe cancer in Taiwanese population, with the greatest age-standardized EYLL for men (15.6 years) and women (18.0 years). Negative correlations of moderate magnitudes were observed between the unstandardized EYLLs and the mean corresponding patient ages at the time of diagnosis among 20 cancers for both genders (correlation coefficient = -0.20). This indicated that a larger unstandardized EYLL for a cancer type may have been due to a younger mean age at diagnosis rather than greater severity. After adjusting the confounding effect of age, the age-standardized EYLL properly reflected the severity of the corresponding cancer type (correlation coefficient = 0.06).

Conclusion: The unstandardized EYLL represents an overall assessment of disease burden, whereas the age-standardized EYLL is a suitable measure of disease severity. These two measures may be incorporated into routine annual reports of cancer statistics.

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INNOVATION IN PROCESSES IN A NETWORK OF CANCER

Esther Palafox Parrilla; Raul Rangell¹; Patricia Parrilla¹; Diana Gaona¹

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Background: Mexico has a multifragmented public health system[1], and private sector institutions, this makes it difficult to control the information regarding cancer cases in the population, access to data from a registerable and reportable case of cancer is complex since there are no tools that allow the validity and certainty of traceability of the care of cancer patients.

Purpose of the study or project: Through the implementation of the National Network of Registries of Population-Based Cancer (RNRC-BP), it will allow a real vision of the cancer situation in Mexico[2], for the correct financing, infrastructure, analysis of access to treatment and its social impact.

Methods / Approach: The registry is operated through the collection of cases at the sources of information identified. In a mobile application hosted in the cloud, where 29 variables required by the IARC are structured, with the corresponding quality validations, the data are collected by doctors; it has a second central validation by epidemiologists and health professionals, in real time, for analysis and reporting to IARC.

Results: In 2016, the Chamber of Deputies Approved the creation of the RNRC-BP and was added to the General Health Law. In 2018, the Regulation of the RNRC-BP was published in the Official Gazette of the Federation[3], and there is a legal basis for the consolidation of an RNRC-BP. By 2018, the government budget for the operation of the RNRC-BP of 2019 was legislated and approved.

Conclusions: In Mexico there is the RNRC-BP, composed of 6 cities, it is considered an epidemiological surveillance system with national validity, active and continuous, to determine cancer incidence and survival rates in the Mexican population; it is the frame of reference for generating public policies and designs the National Cancer Plan and implements the strategies of the cancer prevention and control program in Mexico.

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CIRCUMFERENTIAL RESECTION MARGIN DATA QUALITY AUDIT IN SEER COLON AND RECTAL CANCER CASES

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Background: Circumferential Resection Margin (CRM) is an important prognostic factor in colon and rectal cancer. Specifically, a positive CRM (<1mm distance of tumor from the resected margin) has been associated with disease recurrence, distant metastasis, and worse survival. Since 2010, The SEER Program has measured both the Collaborative Stage Site-Specific Factor 6 (SSF 6) data item and Surgery Codes (SEER Program Coding and Staging Manual 2018) for colon and rectal cancers. Due to ambiguous guidance and a lack of understanding on the reporting and coding of these variables, a review of the data quality is warranted.

Objectives: The primary objective of this audit was to develop and complete an error analysis to understand how CRM cases are being coded and reported in colon and rectal cancer cases. With this knowledge, the SEER research team hopes to establish benchmarks for CRM and make recommendations for data quality improvement.

Methods: Using SEER*Stat, colon and rectal cancer cases diagnosed between 2010-2015 were identified; malignant and in situ were included in the analysis. A cross tabulation by SSF 6 codes and surgery codes was completed. SSF 6 codes and surgery codes were categorized according to CRM measurement and whether or not surgical resection was performed.

Results: The cross tabulation showed a total of five potential problem areas in the data. These problems could have resulted from miscoding of either the CRM code or the surgical code, or both. One specific issue is the proportion of unknown cases: 21.24% of all resection cases were coded to CRM unknown. Currently, there are seven volunteer registries reviewing a subset of 100 randomly selected cases to check for any of the five possible errors.

Implications/Next Steps: Registries have been instructed to correct any errors found in these cases and report back to the SEER research team. Feedback from registries is also being collected to further understand why a miscoding may have occurred. The SEER research team has identified three of the five problem areas to have the potential for an automatic fix in coding. Registries are expected to complete their review of cases by March 2019.

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P-75**COMPARISON OF A 10-YEAR CUMULATIVE AGE STANDARDIZED INCIDENCE RATE (ASR) OF LUNG CANCER AMONG METROPOLITAN CITIES IN SOUTH KOREA (2000-2009)****A Ram Kim**¹; Cheolin Yoo¹; Joo Hyun Sung²; Chang Sun Sim¹; Kyung Sook Jeong³; Minsu Ock⁴¹Department of Occupational and Environmental Medicine, Ulsan University Hospital, University of Ulsan College of Medicine, Bangeojinsunhwando-ro, Dong-gu, Ulsan, Republic of Korea, Ulsan, Republic of Korea²Department of Occupational and Environmental Medicine, Institute of Health Science, Gyeongsang National University Changwon hospital, Gyeongsang National University College of Medicine, Jinju, Republic of Korea³Department of Occupational and Environmental Medicine, Hallym University Sacred Heart Hospital, Gwanpyeong-ro 170beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, Republic of Korea⁴Department of Preventive Medicine, Ulsan University Hospital, University of Ulsan College of Medicine, Bangeojinsunhwando-ro, Dong-gu, Ulsan, Republic of Korea

According to the annual report of cancer statistics in South Korea in 2014, lung cancer is common in both males and females in Korea, and each metropolitan region shows different incidence rates. Smoking is known to be the most common cause of lung cancer making up about 80% of the cause. Others include genetic factors, history of respiratory infection, diet, occupational and environmental factors and so on. We hypothesized that regional difference of lung cancer incidence may come from the environmental and occupational difference of each region.

In order to compare the risk of the lung cancer in different regions, seven metropolitan cities were selected as target regions. Occupational and environmental hazards of each region were compared by reviewing the data of pollutant release and transfer register (PRTR) and annual report of ambient air quality in Korea. In addition, smoking rate was considered to get the adjusted standardized rate ratio (aSRR) which is ratio of 10-year cumulative age-standardized incidence rate (ASR) of lung cancer from 2000 to 2009 in each 7 region versus that of total South Korea (reference region). Then we compared the lung cancer risks in each region.

From the result, the total amount of carcinogenic substance emission was highest from 2001 to 2009 in Ulsan which means that the city with the highest environmental risk factors was Ulsan. Also, from 2000 to 2009, Ulsan showed the highest ASR of the lung cancer in all adults, males and females. Similarly, SRR and aSRR were significantly higher in both males and females in Ulsan.

By comparing the lung cancer risk, region with higher environmental risk factors, such as Ulsan, showed significantly elevated lung cancer risk. Based on the result of this study, it can be concluded that the environmental factor may have an impact on the lung cancer

development. Furthermore, in this study, 10 year cumulative incidence, age-standardization and smoking rate adjustment were all taken into account which made validity of this study higher than that of previous studies. Thus, it can be used as good reference data for the future study of cancer study in Korea.

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PATIENT VOLUME OF NON-MAJOR CANCER IN JAPAN: AN ANALYSIS OF HOSPITAL-BASED CANCER REGISTRY DATA IN 2016

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Background: The Japanese Ministry of Health, Labor and Welfare designates cancer hospitals to provide a high quality of cancer care entire Japan. Currently, 434 hospitals were designated (DCCHs). The Japanese 3rd Cancer Control Plan in 2018 pointed out that the DCCHs should review their patient volume and provided treatment through comparison with other hospitals in order to improve quality of health care. This study aims to examine patient volume of non-major cancer and whether differences may exist by investigating the distribution of patients' stage and age across DCCHs of varying patient volume across Japan for esophagus, pancreas, prostate, cervix, endometrial, and bladder cancers.

Methods: Using data from open national statistics of Hospital-Based Cancer Registry, we investigated patient volume of each DCCH and then the association between patient volume, cancer stage and patient age. Hospitals were classified into four groups according to their patient volume for each cancer.

Results: In total 130,610 patients were identified. For esophagus, cervix, endometrial and bladder cancer, the peak of patient volume in hospital was less than 10 cases. The proportion of patients with early clinical stage (0 or I) cancer was higher among high-volume hospitals for esophagus, pancreas, prostate, endometrial cancers, while for cervix cancer the proportion of patients with early clinical stage was higher among low-volume hospitals. The proportion of over 75 year older patients was larger among low-volume hospitals. The difference in the proportion of over 75 year older patients was greatest for endometrial (35.3%) and esophagus cancer (30.7%).

Discussion/conclusion: As a result of analysis, we found that certain DCCHs provided first-course treatment for only less than 10 patients with esophagus, cervix, endometrial and bladder cancer in 2016. The high-volume hospitals tend to provide treatment for more early-stage cancer patients and younger patients except cervix and bladder cancer patients. We should take into account these situation for developing sustainable health care system. It is important for us to continue to monitor these patient volume.

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DATA RESOURCE PROFILE: A NATIONAL EPIDEMIOLOGIC SURVEY FOR STOMACH, COLON, AND BREAST CANCER

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Background: The Korea Central Cancer Registry (KCCR) has covered all cases of cancer incidences since 1999. The information collected from KCCR is limited to generating statistics related to cancer; it does not fulfill clinical research needs. From the perspective of personal privacy protection, there are challenges associated with the use of cancer registry data. Using the national cancer database, the KCCR conducted an additional epidemiology survey for stomach, colorectal, and breast cancer, which are the most common types of cancer in Korea.

Purpose: The aim of this study is to collect specific information and investigate the changes in the epidemiological and clinical characteristics of these three types of cancer, and to disclose the outcome database to the public for research.

Methods: Data were collected from representative samples of cancer patients who were selected using a systematic random sampling method for incidence cases of stomach, colorectal and breast cancer from 2010 to 2014. A standardized protocol was used to collect collaborative stage (CS) information. The data were also linked to the cause of death database from Statistics Korea.

Results: A total of 15,665, 13,886, and 8,873 cases were included in the final study population for stomach, colorectal, and breast cancer, respectively, for 5 years. There was a very high level of completeness of essential CS items that were to be converted to other staging systems; however, a somewhat low level of completeness was observed in the CS items of site-specific factors. Agreement rate between originally collected summary stages (SS) and CS-derived SSs was highest for breast cancer, followed by stomach and colorectal cancer, with more than 87%.

Implications: Publishable studies using this data set can cover a diverse range of topics. Potential researchers can examine the changes in characteristics associated with stomach, colorectal, and breast cancer, by year and survival rates. The KCCR developed a website for using and releasing these survey data (available from: <http://kccrsurvey.cancer.go.kr/index.do>). Registration is required to access the website. After approval by the KCCR, users can download the required data.

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P-78**ESTIMATION OF CANCER INCIDENCE FROM MORTALITY DATA: A VALIDATION STUDY WITHIN A POPULATION-BASED CANCER REGISTRY****Miguel Rodríguez-Barranco**¹; Alberto Ameijide²; Pablo Fernández-Navarro³; Daniel Redondo-Sánchez¹; Dafina Petrova¹; Maria-José Sánchez¹¹Granada Cancer Registry, Andalusian School of Public Health, Biomedical Research Institute of Granada (ibs.Granada), University of Granada. CIBER of Epidemiology and Public Health (CIBERESP), Granada, Spain²Tarragona Cancer Registry, Fundation Society for Cancer Research and Prevention (FUNCA), Pere Virgili Health Research Institute (IISPV), Spanish Network of Cancer Registries (REDECAN), Reus, Spain.³Cancer and Environmental Epidemiology Unit, National Center for Epidemiology, Carlos III Institute of Health, Madrid.**Background:** Population-based cancer registries are required to calculate cancer incidence in a geographical area, and several methods have been developed to obtain estimations of cancer incidence in areas not covered by a cancer registry. However, an extended analysis of those methods in order to confirm their validity is still needed.**Objective:** To evaluate the predictive performance of one of the most commonly used methods to derive cancer incidence rates from mortality and incidence-mortality ratio (IMR).**Methods:** Using incident cases from all cancer sites (excluding non-melanoma skin cancer) during the period 1985-2008 from the Granada Cancer Registry, we compared incident cases estimated with the IMR method to observed cases diagnosed in 2004-2013 in Granada for total cancer and six cancer sites of interest for each sex. Using the previous 15-years mortality time series (1985-2010) and different functional forms of the IMR trend, we derived the expected yearly number of cancer cases for the period 2004-2013. We used GLMM including a polynomial function for calendar year of death and smoothing splines for age. To fit the models, we used a Bayesian framework based on MCMC. A goodness-of-fit indicator (GOF) was formulated to determine the best assumption of the IMR trend.**Results:** 53096 cancer incidence cases and 43884 deaths due to cancer were included. The average relative deviation along the time series between the observed and predicted number of cancer cases for all cancer sites was 6% in men and 4% in women. Of the 12 cancer sites studied, 6 had deviations lower than 5%, and 8 lower than 10%. The constant assumption for the IMR trend provided the best GOF for rectum, lung, bladder and stomach cancers in men, and colorectal and corpus uteri in women. The linear assumption was better for colon in men, and lung and ovary cancers in women. The adjustment for breast and prostate cancer was worse than for the other cancer sites.**Conclusions:** Overall, the IMR method showed good reliability for most cancer sites, except those with low lethality or sudden changes in incidence trends, in these situations, other methods are needed to get a suitable estimation.IACR
P-79**TRENDS OF CANCER SURVIVAL IN CHILDREN AND ADOLESCENTS IN THE PROVINCE OF GRANADA IN THE PERIOD 1985-2013**Maria-José Sánchez¹; **Daniel Redondo-Sánchez**¹; Miguel Angel Luque-Fernández¹; David López; Eloisa Bayo²¹Granada Cancer Registry, Andalusian School of Public Health, Spanish Network of Cancer Registries (REDECAN), CIBERESP, Granada, Spain²Radiation Oncology and Radiophysics Unit. University Hospital Virgen Macarena, Sevilla, Spain**Background:** Although cancer in children and adolescents is rare, it is a leading cause of death by disease in children in Spain with great social and emotional repercussion. Cancer survival in this population is generally high and it is expected to increase as treatments progress.**Objective:** To analyze the evolution of 5-year survival in children and adolescents in the province of Granada diagnosed for the first time with cancer in the period 1985-2013.**Methodology:** From the information of the Granada Cancer Registry, all incident cancer cases from 0 to 19 years diagnosed in the period 1985-2013 were studied. The date of follow-up was updated to December 31th 2016.

The observed 5-years survival was calculated using the Kaplan-Meier method along five-year periods of the year of incidence from 1985 to 2013. For each period and for each stratum, the probability of surviving 5 years from the diagnosis was estimated, together with its 95% confidence intervals (95% CI).

Results: In the period 1985-2013, 627 cases of childhood cancer and 330 cases of cancer in adolescents were diagnosed in Granada.

The 5-year survival among the children diagnosed with cancer had an increasing trend to reach 84.7% (95% CI: 75.9-90.5) in the most recent period (2010- 2013), almost 20 points more than in the period 1985-1989 (65.8%). The evolution was similar in boys and girls. By age groups, children 0-4 years old had a 5-year survival lower (80%) compared to the 5-9 years (88.9%) and 10-14 years (88.5%) in the period 2010-2013.

Among adolescents, the 5-year survival in 2010-2013 was 87.3% (95% CI: 72.1-87.3), 20 points higher than survival in 1985-1989. The boys from 15 to 19 years had a greater evolution (27 percentage points) than the girls (11 points).

Conclusions: Cancer survival in children and adolescents of the province of Granada has shown a remarkable improvement in the last decades, reaching values around 85% at 5 years from the diagnosis. These values are slightly higher than those estimated for Spain and other European countries, which are around 80%. In spite of the advances in the last decades, efforts must be remained to continue improving the life expectancy in this population.

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IS QUALITY OF REGISTRY TREATMENT DATA RELATED TO REGISTRAR EXPERIENCE AND WORKLOAD? A STUDY OF TAIWAN CANCER REGISTRY DATA

Chin Cheng

Background: Although cancer treatment information has been collected through the Cancer Registry system in Taiwan for more than 10 years, the accuracy of such data has never been evaluated. This study examined the accuracy rate between registrar experience and on-site chart review for the first course of cancer treatment.

Methods: In this retrospective chart review study, 392 randomly selected medical records from 14 hospitals were re-abstracted by experienced abstractors. The kappa coefficients of accuracy for the abstracting data were calculated against the gold standard. Correlations between registrar background and workload were then identified through regression analysis.

Results: Regarding surgery type, low accuracy rates were noted for gastric cancer (84.0%), oral cavity cancer (84.6%), and bladder cancer (88.9%). For chemotherapy, low accuracy rates were observed for hematopoietic diseases (81.3%) and esophageal cancer (88.0%). For radiotherapy, low accuracy rates were noted for esophageal cancer (80.0%), cervical cancer (81.8%), and lymphoma (85.7%). When stratifying by surgery type after adjustment for hospital caseload, a high accuracy rate was found for cancer registrars who had progressed from basic to advanced licenses within 5 years of graduating.

Conclusion: The accuracy rate for the first course of cancer treatment was affected by the cancer type and the experience of cancer registrars, but it was not affected by the workload of cancer registrars. We recommend that cancer registrars with basic licenses upgrade to advanced licenses as soon as possible. Medical record collaboration should establish documentation for checklist of radiotherapy and surgical operation records.

Keywords: data quality; peer review

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TOOL FOR SURVIVAL ANALYSIS ON CANCER REGISTRY

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Background: In survival analysis on cancer registry, the relative survival or net survival method is used due to the lack of the accurate cause of death information. For the actual calculation by using statistical software, Ederer I, II method (Ederer et al. 1961; Ederer et al. 1958) for the relative survival, and Pohar-Perme method (Perme et al. 2012) for the net survival method, are provided by “relsurv” package on R (R Core Team 2018) and “stns”, “strs”, “stnet” command on Stata (StataCorp 2015). However, these software requires complex programming operation with CUI (Character User Interface) environment, which is one of the most reasons that make a calculation of survival on cancer registry more difficult.

Purpose: The purpose of this study is to create a GUI (Graphical User Interface) based easily calculation tool for the survival rate on cancer registry.

Methods: The tool was created as a GUI-based web application tool using “shiny” package on R, which is a package to create web application tools. In order to guarantee the reproducibility of the calculation result between the GUI and CUI, we use the “relsurv” package for the calculation as the internal package in the tool.

Results: By using the tool, we can calculate the relative survival and net survival with “relsurv” package easily, by mouse operation on the computer screen such as “reading data, selecting variables, and pressing execution button”. As the validity test for the tool, we will report the result of the survival calculation for MCIJ (Monitoring Cancer Incidence in Japan) data.

Discussion: Since the “relsurv” package is used internally in the tool, the relative survival and the net survival method on R can be perfectly reproduced with this tool. We expect that this tool will contribute to the reduction of the practical burden for all people involved with the cancer registry.

IACR
P-82**SPATIAL ANALYSIS OF CANCERS INCIDENCE IN GUADELOUPE (F.W.I): LINK WITH PESTICIDES-AND OTHER ENVIRONMENTAL RISK FACTORS****Bernard Bhakkan-Mambir**¹; Jacqueline Deloumeaux¹; Daniele Luce²; Julien Dugas³¹Cancer Registry of Guadeloupe, University Hospital of Guadeloupe, Pointe-à-Pitre, Guadeloupe, GA, France²IRSET - INSERM U1085³Inserm

Background: Guadeloupe is a Caribbean archipelago of about 400.000 inhabitants. Soil and water contamination with chlordecone (kepone), an organochlorine pesticide used in banana plantations between 1973 and 1993, was suggested to be related to the high incidence of prostate cancer in this region. Possible associations with other cancer sites were later mentioned. An epidemiological surveillance of cancers incidence began in 2008 with the creation of the General Cancer Registry. Spatial analysis of cancer incidence in relation to chlordecone-contaminated areas or other environmental factors are needed to explore potential links.

Purpose: To identify geographical clusters with over-incidence of cancers and to explore the underlying risk factors that may be associated.

Methods: We analyzed data from the cancer registry for the period 2008-2015 which represented over 12000 cases¹. We used the I.R.I.S. of residence which is the smallest census unit assigned after geocoding the exact address of each patient. World-standardized incidences ratio were calculated. We used Bayesian disease mapping (BYM)² to identify geographical clusters.

Results: We found geographical clusters for four cancer sites. For prostate cancer, high incidence areas were located near a landfill and near two factories (sugar cane and bagasse and coal-fired power plant) but not within the chlordecone contaminated areas. For breast cancer, we found clusters near the same two factories but also in urban areas. Unexpectedly, we identified clusters for stomach cancer in areas with high chlordecone contamination and a common cluster for stomach and colon cancers for which we were not able yet to formulate any hypothesis.

Conclusion: We identified geographical clusters for four cancer sites and potential environmental risk factors that should be monitored. The clusters identified for stomach cancer in chlordecone-contaminated areas required specific studies.

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P-83**A GLOBAL TEN-YEAR EPIDEMIOLOGICAL FORECAST OF RENAL CELL CARCINOMA****Zoya Shamsi**¹; Ema Rodrigues¹; Nicole Zhang¹¹Decision Resources Group, London, United Kingdom

Background: Renal cell carcinoma (RCC) is the most common type of kidney cancer, accounting for approximately 90% of all malignant tumors of the kidney and renal pelvis. RCC incidence is increasing worldwide, and obesity and smoking are major modifiable risk factors impacting this growth.

Purpose: The aim of this study was to estimate and compare the global diagnosed incidence of RCC by region over the next ten years (2019-2029) using a forecast model that incorporates the changing risk of RCC due to population aging, as well as trends in obesity and smoking prevalence.

Methods/Approach: Defining RCC as ICD-10 code C64, including the ICD-O-3 histological subtypes 8260, 8310, 8312, 8316-8320, 8510, and 8959, we used a critically appraised set of country-specific cancer registries to estimate RCC incidence for 45 countries grouped into six distinct regions, representing approximately 90% of the world's population.

We reviewed the published epidemiological literature and identified smoking and obesity as the main risk factors for RCC; we incorporated them into our forecast model. For countries that are considered to be in the process of economic and epidemiological transition towards a developed world economy and disease risk profile, we applied an increasing trend based on the correlation between country-specific GDP per capita and age-standardized incidence.

Results: In 2019, we estimate the global incidence of renal cell carcinoma to be 350 thousand. We forecast that over the next ten years, this figure will increase by 35% to 472 thousand.

There is a substantial difference in the risk of renal cell carcinoma between high-income and lower-income countries, at 16 per 100,000 per year across the former and 4 per 100,000 per year across the latter. Over the forecast period, lower-income countries are projected to have higher growth rates (61%) than high-income countries (14%).

Conclusions/Implications: Global incidence of renal cell carcinoma varies greatly by geographic region, but there will be an increase across all countries over the period 2019 to 2029. Obesity and smoking in conjunction with changes in demographics (population growth and aging) will be the key drivers of this increase.

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EVALUATION OF REGIONAL PROGRAM RESULTS CONTROL AND PREVENTION OF BREAST CANCER IN THE SAMARA REGION (RF) (INTERNATIONAL COMPARATIVE STUDY ON CIS AND CONCORD 3)

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Breast cancer (BC) is one of the most common malignant tumors in the Russian population. According to Globocan, in 2012 in the Russian Federation the incidence of breast cancer was 45.6 per 100 thousand inhabitants, which is significantly lower than in Europe (69,2±3,2; =0,95,t=2). 17.2 per 100 thousand inhabitants, died from this disease, which is significantly higher than in the European Region (16,1±0,4; =0,95,t=2).

For the scientific substantiation of organizational measures to improve breast cancer control and prevention programs conducted in the Samara region, an assessment was made of the quality of medical care for this group of patients in the period 2008-2012.

The materials used were Cancer Incidence in Five Continents Vol. XI and Concord 3. The trends in morbidity, mortality and survival were studied using extensive and standardized indicators, the alignment of time series of which was carried out using a parabola of the first order.

In the Samara region, breast cancer ranks first in the structure of cancer incidence among women (24.6%). The standardized figure was significantly lower than the European average (70,1±3,7; =0,95,t=2) and amounted to 51.8 per 100 thousand inhabitants. However, over the past 5 years, the figure increased by 15.4% and in 2017 it was already 56.8 per 100 thousand inhabitants. The mortality rate from breast cancer was 16.9 per 100 thousand inhabitants, which corresponds to the European average values. Over the past 5 years, the figure dropped by 15.2% and in 2017 it became even lower - 15.3 per 100 thousand inhabitants. However, the 5-year relative survival of patients with breast cancer registered in 2010-2014 was only 71.0%, which was significantly lower than the average European level (81,3±1,2; =0,95,t=2). And, despite the emerging trend of its growth to 74.2%, continues to remain significantly lower than in the countries of the European Region.

An international comparison has shown that there is an alarming epidemiological situation in breast cancer in the Samara Region. This circumstance determines the need to accelerate the introduction of modern technologies for prevention, screening and early diagnosis of breast tumors.

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CHALLENGE IN TRANSLATING INFORMATION ABOUT CANCER SURVIVAL TO GENERAL PEOPLE: SHARING MESSAGES FOR CANCER SURVIVORS USING STATISTICS OF CONDITIONAL SURVIVAL

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Background: For cancer survivors and their family, it is essential to get information about their long journey during/after cancer treatment. Cancer survival is important statistics as an index for the prognosis of cancer, but simple statistics of five-year survival are sometimes pessimistic for survivors. Conditional survival is recently reported and considered as useful information for cancer survivors during their medical follow-up period. However, it is difficult to understand and interpret the original figures.

Purpose of the project: We aimed to develop infographics to translate the conditional survival for general population to understand easily. We also reported the process of the communication including their feedback and improved graphics and expression.

Approach: Researchers' side asked health communicators to create infographics based on the mutual discussion. Infographics were shared with members of cancer patients' group, and other researchers. Based on their feedback, researchers and health communicators changed infographics. The modified version will be uploaded in the website of our partnership project (Japan Cancer Information Partnership: J-CIP). Real feedback from patients and general people will be collected via interactive webtools.

Results: In total, members of patients' group felt positive feeling about the conditional survival. Especially for the cancer patients diagnosed as cancer with poor prognosis, the increasing five-year survival after some years encouraged their feeling during medical follow-up period. On the other hand, a member concerned that general people may overestimate the patients' health status after some years. The original version of infographics of conditional survival was stylish, but difficult to understand the meanings. Some patients and researchers said that increasing conditional survival curve resembled the climbing stairs or mountain. The modified version of infographics is image of climbing mountain with conditional five-year survival curves.

Implications: It is important not only to show useful statistics as simple figures, but also to express those figures' message to patients and general population. Interactive collaboration between researchers, health communicators and general people can help to develop good information using cancer registry data.

IACR
P-86**PULMONARY TUBERCULOSIS IS ASSOCIATED WITH ELEVATED RISK OF LUNG CANCER IN SOUTH KOREA: NATIONWIDE RETROSPECTIVE COHORT STUDY**Kyu-Won Jung¹; Seri Hong; Young-Joo Won¹National Cancer Center**Setting:** It remains unclear whether pulmonary tuberculosis is a risk factor for lung cancer.**Objective:** To examine the association between pulmonary tuberculosis and lung cancer risk in Korean.**Design:** The Korean National Health and Nutrition Examination Survey database was linked with the Korean National Cancer Incidence Database to examine the occurrence of pulmonary tuberculosis and lung cancer. The linked databases were also merged with a causes of death database of Statistics Korea. The Cox-proportional hazards model was used to estimate the hazard risk of lung cancer for Korean adults aged ≥ 40 years with pulmonary tuberculosis.**Results:** Of 20,252 total participants, 2,640 (13.0%) had old pulmonary tuberculosis (a medical history of pulmonary tuberculosis or radiologically inactive tuberculosis). After adjusting for all covariates, the hazard ratio of lung cancer among patients with old pulmonary tuberculosis was 3.24 (95% CI, 1.87-5.62) compared to the control group. According to smoking status, the hazard ratios of lung cancer for never smokers, ex-smokers, and current smokers among participants with old pulmonary tuberculosis were 3.52 (95% CI, 1.17-10.63), 2.16 (95% CI, 0.89-5.24), and 3.71 (95% CI, 1.49-9.22) compared to the control group, respectively.**Conclusion:** Korean adults with old pulmonary tuberculosis have a higher risk of lung cancer.IACR
P-87**CHALLENGES AND SOLUTIONS FOR BETTER OUTCOME IN SETTING UP RURAL CANCER REGISTRY IN DEVELOPING COUNTRIES**Ganesh Balasubramaniam¹; Rajaraman Swaminathan²; Sushama Saoba¹; Sandhya Cheulkar¹; Rajendra Badwe¹; Pramesh CS¹¹TATA Memorial Centre, Navi Mumbai, Maharashtra, India²Cancer Institute (W.I.A), Chennai, India**Background:** Cancer registries are an essential component of the national effort to initiate cancer control activities. The ultimate aim is to reduce morbidity and mortality due to cancer and this can be done by aggressive and widespread application of the state-of-art methods for prevention, early detection and treatment. It requires the use of cancer registries to focus programs and monitor progress. A network-of cancer registries like in India, has evolved over the years. Population and hospital registries continue to provide information.**Objective:** To elucidate the problems and challenges in setting up a rural cancer registry.**Material and Methods:** Tata Memorial Hospital Rural Cancer Registries data. However setting up a rural cancer registry in developing countries has many limitations and challenges mainly due to limited resources, infrastructure in health sector. The Tata Memorial Hospital (TMH) has recently set up 9 rural registries, mostly in the nuclear power plant areas, where access to information is a big challenge.**Results:** Preliminary data suggests that the incidence rate are between 30–60 per 100,000.**Discussion and Conclusion:** Results of these registries are presented along with the challenges faced during its operations and the efforts have given lessons and methods on how to overcome the problems faced in the rural areas of India. Results suggest that the compliance of medical facilities personnel, district authorities have improved and the outcomes are a proof of the cooperation given by the various authorities. In just a few years time, the registry data has given a lead on the cancer burden in the community.

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DESCRIPTIVE EPIDEMIOLOGICAL STUDY OF ELDERLY CANCER PATIENTS (65+YEARS) SEEN IN TATA MEMORIAL HOSPITAL, MUMBAI

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Background: It is well known that age is a known risk factor for cancer. Annually it is estimated that there are 0.3 million new Geriatric cancer (65+ years) diagnosed in India, contributing to about 30% of all cancer cases as per GLOBOCAN 2012. Tata Memorial Hospital (TMH), being a premier cancer institute in the country, registers substantial number of geriatric cancer cases. The present study profiles the geriatric cases seen in TMH over this period. To study the profile and trend of different types of Geriatric cancers registered in Tata Memorial Hospital (TMH) during 1999-2014.

Methods: Abstraction of information from case records of the patients registered in Tata Memorial Hospital, cases above 65 years at the time of diagnosis. These were classified and coded as per the ICD-O-3.

Results: TMH registered 55,175 Geriatric cancer (17%) out of a total of 335,889 cancer cases. 35,640 were males and 19,535 were females (M:F was 1.8 :1). Major cancer among males, the lung cancers (12.8%) was the leading site of cancer in the geriatric group followed by Prostate cancer (8.3%), Oesophagus (6.4%), pyriform fossa (5.6%) and buccal mucosa (5.0%) , thus contributing to 38.1% of all male cancer cases. Major cancer among females were breast cancer (20.9%), cervix (14.3%), oesophagus (5.8%) , lung cancer (5.1%), buccal mucosa (4.3%) and ovarian cancer (4.1%), thus contributing 54.5% of all female cancers.

Discussion and Conclusion: The most common cancers in geriatric group are similar to the trend seen among adults in terms of the leading cancers. Though the life-span in Indians are between 60-75 years, it is quite remarkable that about 15-20% of the cancers are seen in the geriatric group. This information will be useful to conduct a detailed study on the life-style factors in this elderly population.

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AN HOSPITAL BASED STUDY OF PEDIATRIC CANCER SEEN IN TATA MEMORIAL HOSPITAL, MUMBAI

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Background: The pediatric cancer incidence rate in India is 6.3 per 10⁵ while the global estimates are 8.8 per 10⁵. The types of cancers that occur in children vary greatly from those seen in adults. Despite its rarity and major advances in treatment and supportive care, cancer is still the leading cause of death from disease in children younger than 15 years old. To study different types of childhood cancers registered in Tata Memorial Hospital (TMH) during the years 1985-2013.

Methods: During this period, 23,727 cancer cases were registered. These cancer cases were coded by the International Classification Of Disease for Oncology (ICD-O-3). Since the classification of childhood cancer is based on tumor morphology and primary site with an emphasis on morphology rather than the emphasis on primary site for adults, all pediatric cancers were further classified according to the ICCC category (International Classification for Childhood Cancer) provided by the SEER Program.

Results: Of the 23,727 pediatric cancer cases seen (M:F ratio is 2:1), 40-42% cases were reported as Leukemia, in which Lymphoid Leukemia itself was contributing 27-28% of the total cancer cases, followed by Hodgkin's lymphoma which contributes 5-6% of total cancer cases, lymphomas and so on. In contrast with predominance of carcinomas seen among adults, pediatric tumors exhibit substantial histological and biological diversity, and most were not of epithelial origin.

Discussion and Conclusion: The most common cancers in pediatric group were Leukemias, lymphomas followed by Bone and soft tissue sarcomas, Malignant Bone Tumors, CNS-intracranial neoplasms, Retinoblastoma and other tumors like Renal tumors, Neuroblastoma, Hepatoblastoma, and germ cell tumors were also observed.

IACR
P-90**AN INTERIM REPORT ON FINDINGS OF A TOBACCO SURVEY BEING CONDUCTED IN SOUTHERN INDIA****Ganesh Balasubramaniam**¹; Umesh Mahantshetty¹; Chetana Nerurkar¹; Sushama Saoba¹; Rajendra Badwe¹¹TATA Memorial Centre, Navimumbai, Maharashtra, India

Background: Cancer Registries are an integral part of the cancer control activities at different levels of health care. It is well known that tobacco-use is a major factor for occurrence of cancer. Tobacco related cancers account for major share of all cancers. In India, tobacco consumption is responsible for half of all the cancers in men and a quarter of all cancers in women. India also has one of the highest rates of oral cancer in the world, partly attributed to high prevalence of tobacco chewing. Tobacco accounts for about 30 percent of all cancers in men and women in India. Mouth cancer is most common among men followed by lung cancer. Tobacco causes 1 death every 6 seconds yet India is the second leading consumer.

Objective: The results of an earlier study conducted in the partial block of the Uttara Kannada district showed a 40% prevalence of tobacco use. This has led to a house to house tobacco survey be conducted in four Talukas of Uttara Kannada district, Karnataka State in India. An interim report on findings of a tobacco survey being conducted in Southern India. A proforma to collect minimal information as demography, life-style, tobacco-use, past self and family history of cancer and oral screening. Analysis is done by using SPSS statistical software.

Interim Findings: In a target population of 400,000 consisting of 100,000 households will be surveyed. To date, 19,000 households consisting of 70,000 individuals are enumerated of which 60,000 are considered as 'Eligibles'; of these, 37,000 participated of which 173 prevalent cancers were reported. Of these, 5800 chewers and 1700 smokers were recorded. 24 head & neck, 21 breast, 18 cervical and 110 cancers were recorded. A detailed analysis of this survey will be presented.

Conclusion: The tobacco survey will provide opportunities for prevention by education at the grass root level. The outcome will help in undertaking and implementation of a larger workable district cancer control programme in these areas with effective intervention in terms of education.

IACR
P-91**THE WORLDWIDE LIFETIME RISK OF DEVELOPING CANCER****Rongshou Zheng**; Siwei Zhang; Kexin Sun¹; Hongmei Zeng²; Wenqiang Wei¹National Cancer Center/Cancer Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College²National Cancer Center of China

Background: The lifetime risk of developing cancer refers to the probability of a person has been diagnosed with cancer over his or her lifetime (from birth to death). These risk estimates, like incidence and mortality, can provide another measure of how widespread cancer is. The lifetime risk has not been estimated worldwide, and here, we estimate the lifetime risk using data from GLOBOCAN 2018.

Methods: We estimated the lifetime risk of cancer worldwide separately for men and women in 2018. The method used for estimating lifetime risk in this study by combining current incidence rates with current all-cause mortality ('current probability' method), and also corrects for the inclusion of multiple primary cancers in the incidence rates to estimate the probability of being alive without a previous cancer.

The age-specific new cases and deaths of all cancers (excluding non-melanoma skin cancer, NMSC) were obtained from GLOBOCAN 2018, the population and all-cause mortality data were obtained from the United Nations (World Population Prospects 2017).

Results: The lifetime risk of being diagnosed with cancer (excluding NMSC) is approximately 1 in 4.23 (23.65 %) in the worldwide, 1 in 4.03 (24.83 %) for men, and 1 in 4.45 (22.45%) for women. The lifetime risk of cancer for men ranked from 51.90% (1 in 1.93) in Singapore to 4.66% (1 in 21.44) in The Republic of the Gambia, for women it ranked from 4.32% in Gambia to 44.83% in Singapore. Lifetime risk of cancer at age 50 years was 20.9% (22.8% for male and 18.9% for female). At age 70 years, lifetime risk was 12.7% for male and 10.3% for female.

Conclusions: Lifetime risk is about one in four both for men and women worldwide, but nearly one fifth of people who are currently adults under the age of 50 years will be diagnosed with cancer at some point in their life span. Even at age 70 years it is one in eight for men and one in ten for women. This knowledge may promote efforts in education and treatment for prevention of cancer in younger patients.

IACR POSTERS

Parq Salon ABCD

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THYROID CANCER INCIDENCE TRENDS IN U.S. AND PUERTO RICO: 2001-2015

Carlos Torres-Cintrón¹; Guillermo Tortolero-Luna¹; Karen Ortiz-Ortiz¹; Mariela Alvarado Ortiz¹; Diego Zavala¹

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A rapid increase in the incidence of thyroid cancer (TC) in the last decades is well documented worldwide. This trend is partially attributed to overdiagnosis. Puerto Rico (PR) has the highest incidence rate of TC in the Americas and the third worldwide. We compared recent trends of TC among U.S. racial/ethnic groups and the PR population.

We used data from the PR Central Cancer Registry and the SEER-18 Registries databases for this analysis. Incidence rates were age-adjusted to the 2000 U.S. Standard Population and stratified by race/ethnicity, age-groups, sex, and histologic type. Joinpoint regressions were used to estimate the annual percent change in incidence trends.

During 2001-2015, age-adjusted incidence rates in PR and U.S. racial/ethnic groups showed an upward trend. We observed higher APCs in PR than in U.S. racial/ethnic groups. In PR, TC incidence increased 22.2% annually ($p_{2001-2007}=+26.9\%$ and $APC_{2007-2015}=+10.3\%$; whereas, NHW showed a significant upward trend from 2001-2013 and a significant decline since 2013 ($APC_{2001-2009}=+8.6\%$; $APC_{2009-2013}=+3.0\%$; and $APC_{2013-2015}=-3.0\%$). Independently of sex, age group, and histologic type, the PR population showed higher incidence APC than other racial/ethnic groups.

This is the first time we analyzed and compared TC incidence trends in U.S. and PR. TC incidence trends continue to increase throughout the study period across age-groups in PR population. However, a reversed trend occurred in NHW starting in 2013. Despite this, increases were higher in the PR population, in females, in ages 40-59 years, and for PTC. Further research is needed to better understand these disparities. In addition, there is a need to monitor and identify the causes for the reversed trend in PTC observed in NHW females aged 40-59 years, as well as the reduction in the upward trend of PTC observed in NHW males aged 40-59 and females aged 60+.

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AGE-PERIOD-COHORT EFFECT ON THE INCIDENCE OF COLORECTAL CANCER IN PUERTO RICO, 1987-2016

Mariela Alvarado Ortiz¹; Guillermo Tortolero-Luna¹; Carlos Torres-Cintrón¹; Karen Ortiz-Ortiz¹; Diego Zavala¹

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Since 2007, colorectal cancer (CRC) incidence rates in Puerto Rico (PR) are decreasing significantly at 1.3% per year. However, for the population aged less than 50 years, incidence rates are increasing. The aim of this study was to estimate the effect of age, period and cohort of birth on the incidence trends of CRC in PR.

Incidence trends for colon and rectum cancers from 1987-2016 in PR were analyzed by age-group and birth cohort using an age-period-cohort modeling. Joinpoint regression analyses were conducted for colon and rectum cancers and by two age-group (less than 50 and 50 years and older).

There were 42,411 CRC cases (71.6% colon and 28.4% rectum) diagnosed in PR during 1987-2016. Overall, age-adjusted incidence rates for colon cancer (CC) increased yearly since 1987 ($APC = 2.5\%$, $p < 0.05$) but began to decrease since 2006 ($APC = -1.0\%$, $p < 0.05$). For rectum cancer (RC), rates increased at a lower rate per year ($APC = 0.8\%$, $p < 0.05$). Among the population aged less than 50 years, CC rates increased consistently since 1987 ($APC = 2.4\%$, $p < 0.05$); while, RC rates increased since 1995 ($APC = 3.4\%$, $p < 0.05$). Conversely, among the population aged 50 years and older, CC rates increased from 1987-2006 ($APC = 2.5$, $p < 0.05$) decreasing thereafter ($APC = -1.5\%$, $p < 0.05$); whereas, RC increased at a lower rate ($APC = 0.6\%$, $p < 0.05$). The age-period-cohort modeling shows the age-specific relative risk increased for cohorts born circa 1952 for both CC and RC. For cohorts born after 1967, the relative risk doubled for those born before 1952. Incidence rates for both CC and RC, have been declining in age-groups older than 57 years.

To our knowledge, this is the first analysis on the effects of age-period-cohort for CRC incidence rates in PR. It is suggested that these trends among population aged 50 years and older might be due to an increase in CRC screening; while the trends observed in the younger population might be due to lifestyle changes and genetic factors. Future studies are needed to better understand and address these trends.

IACR
P-94**PROSTATE CANCER INCIDENCE TRENDS IN THE U.S. AND PUERTO RICO: 2001-2015**Guillermo Tortolero-Luna¹; Carlos Torres-Cintrón¹; Karen Ortiz-Ortiz¹; Mariela Alvarado Ortiz¹; Diego Zavala¹¹Puerto Rico Central Cancer Registry, San Juan, PR

Prostate cancer (PCa) is the most frequent cancer diagnosed in men in the U.S. and Puerto Rico (PR). Recent studies documented an increase in incidence of advanced PCa in U.S. men. However, none of these reports included U.S. Hispanic (USH) and PR men. This study expand on previous studies by including Hispanic men living in the U.S. and the island of PR.

We used data from the PR Central Cancer Registry and the SEER-18 Registries databases. Annual incidence rates were age-adjusted to the 2000 U.S. Standard Population and stratified by race, age-groups, and stage at diagnosis. Joinpoint regressions were used to estimate the annual percent change (APC) in incidence rates.

Overall, PCa age-adjusted incidence rates among U.S. men declined from 2001 to 2015 with a faster downward trend since 2009 (APC=-7.3%, $p<0.05$); while, among PR men, rates continued to increase until 2004 (APC=+10.7%, $p<0.05$) declining thereafter at a lower rate than in U.S. men (APC=-1.7%, $p<0.05$). In U.S., localized stage PCa decreased at a fast rate (APC=-8.8%, $p<0.05$) starting in 2009; whereas in PR it declined slowly between 2005 and 2012 (APC=-0.6%, $p>0.05$) and then at a non-significant (NS) faster rate (APC=-9.8%). In U.S., starting in 2010, we observed an increase in advanced stage PCa in non-Hispanic Whites (NHW) (APC=+5.4%, $p<0.05$). Whereas, in PR and USH men we observed a NS increase starting in 2011 (APC=+1.0%), and in 2007 (APC=+0.6%), respectively. Meanwhile, among non-Hispanic Blacks the downward trend decreased from an APC of -4.7% ($p<0.05$) in 2001-2007 to a NS APC of -0.03%, thereafter. The increase in advanced disease was observed among NHW aged 50-69 (APC=4.1%, $p<0.05$) and 70+ years (APC=+7.6%, $p<0.05$), and PR men aged 50-69 (APC=+6.0%, NS).

This is the first time we analyzed and compared PCa incidence trends in PR and U.S. Consistent with recent studies, we showed an upward trend in advanced stage PCa in NHW men aged 50+ years and PR men aged 50-69 years. The recent increase in advanced disease needs to be followed closely in order to better inform decision-makers and clinicians about these recent trends and review current guidelines accordingly.

IACR
P-95**INVESTIGATING CHARACTERISTICS OF WOMEN WITH BREAST CANCER RECURRENCE IN NORTHERN IRELAND (NI)**Victoria Cairnduff¹; Laura Dwyer²; Sinead Lardner²; Colm Burns³; Lesley Anderson¹; Anna Gavin²¹N.Ireland Cancer Registry, Belfast, United Kingdom²N.Ireland Cancer Registry, Centre for Public Health, Queen's University Belfast³Macmillan Cancer Support

Background: Little is known about the prevalence of recurrence within the NI breast cancer population as no standardised registration procedure exists for recording recurrence in cancer registries. This work describes the development of a procedure for recording breast cancer recurrence and reports characteristics of women developing recurrence.

Methods: A working procedure for recording recurrence was developed using the definition of a histologically confirmed return of cancer following the completion of curative treatment for breast cancer after a disease-free period (at least four months after diagnosis date). The disease and socio-demographic characteristics of women (n=1,109) diagnosed with Invasive Breast Cancer (ICD10 C50; excluding stage IV) in 2009 were extracted from the NICR database. Electronic healthcare databases were used to follow-up for disease recurrence to 2017.

Results: 145 (13.1%) of women diagnosed with Invasive Breast Cancer (excluding stage IV) had a recurrence with a mean time from diagnosis to recurrence of 3.4 years (95% CI: 3.1-3.7 years). For women with recurrence, 17.2% had a local/regional recurrence, two thirds (64.1%) had recurrence of distant site(s) and 18.6% had both local/regional and distant recurrence. A lower proportion of women of screening age (50-70 years; 9.9%) and over 80 years (10.4%) at diagnosis had a recurrence when compared with other age groups (20-49 years; 20.2% and 70-79 years; 16.5%). A third (34.2%; n=53) of women initially diagnosed with Stage III disease had a recurrence (Stage I; 6.0%, Stage II; 16.0% and Unknown Stage; 3.2%).

Conclusion: Recurrence was more commonly recorded in later stage disease and varied by age. Further investigation of the disease and socio-demographic characteristics (including deprivation quintile, screening status, hormone receptor status and treatment) is now essential to identify potential areas for improvement to inform future changes in breast cancer care in NI including the development of a specialist metastatic breast cancer service.

Acknowledgements

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IACR POSTERS

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USING THE PUERTO RICO CENTRAL CANCER REGISTRY-HEALTH INSURANCE LINKAGE DATABASE TO EXAMINE PATTERNS OF END-OF-LIFE CARE IN GASTROINTESTINAL CANCER

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Background: High-intensity care with undue suffering among cancer patients during the end-of-life is associated with poor quality of life and higher economic burden. Quality indicators to evaluate end-of-life cancer care using claims data have been identified.

Purpose: We examined, for the first time, the pattern and predictors of high-intensity care among gastrointestinal cancer patients in Puerto Rico (PR) using the PR Central Cancer Registry-Health Insurance Linkage Database (PRCCR-HILD).

Methods: The PRCCR-HILD includes 90.3% of the cancer population in PR diagnosed between 2008 and 2016. The study cohort consisted of patients aged ≥ 18 years with a primary invasive gastrointestinal cancer (ICD-O-3: C150-C249) diagnosed between 2009 and 2014, with a recorded date of death, who died from cancer, and who were enrolled in the month before death. We excluded patients with more than one cancer diagnosis, and who died within 30 days of diagnosis. Indicators of intensity of end-of-life cancer care included: use of chemotherapy, emergency room (ER) visits, hospitalizations, radiation, imaging use, intensive care unit (ICU) admissions, and place of death. We used logistic regression models to examine factors associated with end-of-life care.

Results: The study cohort included 4,332 cancer patients. We found that 10.1% of patients received chemotherapy within 14 days of death and 20.2% within 30 days of death. During the month before death 52.0% were hospitalized, 9.4% were admitted to ICU, 47.7% had ER visit, 9.8% underwent radiotherapy, and 40.4% died in a hospital. Female patients were less likely to have ER visits, be hospitalized, and to die in a hospital. Patients ≥ 65 years were less likely to receive chemotherapy, radiotherapy, imaging studies, and to die in a hospital.

Conclusion: To our knowledge this is the first time the patterns of care at the end-of-life is evaluated in PR. The study demonstrates the potential of the PRCCR-HILD to investigate further the quality of care at the end-of-life. Consistent with previous studies, we found similar patterns in the use of high intensive care. Further studies are warranted to improve the quality of care and to mitigate disparities at end-of-life care in PR.

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BURDEN OF GYNECOLOGIC CANCERS IN PUERTO RICO AND THE U.S.- 2009-2013

Diego Zavala¹; Carlos Torres-Cintrón¹; Mariela Alvarado Ortiz¹; Karen Ortiz-Ortiz¹; Guillermo Tortolero-Luna¹

¹Puerto Rico Central Cancer Registry, San Juan, PR

Gynecologic cancers are among the top ten cancers in women in Puerto Rico (PR) accounting for 13.9% of all female cancers diagnosed during the period 2009-2013. We compared the burden of selected gynecologic malignancies among women in PR and U.S. racial/ethnic groups.

Data for the period 2009-2013 were obtained from the Puerto Rico Central Cancer Registry (PRCCR) database, and from the SEER 18 Registries Research Data. For the purpose of the analysis gynecologic cancers include: ovarian, corpus and uterine NOS and cervical cancer. Data was analyzed by racial/ethnic groups (PR, non-Hispanic whites (NHW), non-Hispanic blacks (NHB), and U.S. Hispanics (USH) and by age groups. Crude and age-adjusted rates to the 2000 US Population standard were calculated. Racial/ethnic differences by sex and histologic types were assessed using the Incidence Rate Ratio (IRR) and 95% CI.

Women in PR had the highest age-adjusted incidence rate of cervical cancer (12.6/100,000) followed by USH (9.4), NHB (9.1), and NHW (7.0). Age-adjusted incidence rate of ovarian cancer were lowest among PR women (8.1/100,000); while the highest was among NHW (12.5) and intermediate among USH (10.6) and NHB (9.9). Age-adjusted rates of corpus and uterus NOS ranged from 21.4/100,000 in USH women to 26.6/100,000 in NHW. Women in PR an 80% higher risk of cervical cancer than NHW, 38% higher risk than NHB, and 35% higher risk than USH. By contrast, the risk ovarian cancer was 36% lower among PR women than in NHW, 34% lower than USH and 24% lower than NHB and 18% lower than HNB. The risk of PR women for cancer of the corpus and uterus, NOS was 13% lower than NHW and 7% lower than NHB, but it was 8% higher compared to USH.

Relative to U.S. women, women in PR had a 48% higher incidence rate of cervical cancer and lower risk for developing ovarian cancer. Since 2004 we have observed an increased risk of cervical cancer in PR women among women younger than 34 years of age and restricted to squamous cell carcinomas. These racial/ethnic differences and recent trends in cervical cancer need to be addressed.

IACR
P-98**TIME TRENDS IN COLORECTAL CANCER INCIDENCE AND MORTALITY IN THE REGIONAL HEALTH DISTRICT (RHD) OF BARRETOS, SÃO PAULO, BRAZIL****Allini Mafra**¹; Adeylson Guimarães Ribeiro¹; Denise Peixoto Guimarães¹; Elisabete Weiderpass²; José Humberto Tavares Guerreiro Fregnani¹¹Barretos Cancer Hospital, Barretos, São Paulo, Brazil²IARC**Background:** Colorectal cancer represent a significant cause of morbidity and mortality worldwide.**Objective:** The purpose of this study was to analyze the time trends colorectal cancer incidence and mortality in the Regional Health District (RHD) of Barretos, São Paulo, Brazil.**Methods:** From 2000 through 2015, we calculated the breast and cervical cancer incidence and mortality rates per 100,000 inhabitants who were age-standardized to the world population. We obtained the time trends using the Joinpoint Regression software.**Results:** The age-standardized rates (ASR) for the incidence of colorectal cancer increased annually, with an average annual percentage change (AAPC) of 4.1 (95% Confidence Interval (CI): 2.4 to 5.9). The mortality rates for invasive colorectal cancer stay stable AAPC of 0.0 (95% CI: -2.4 to 2.4).**Conclusions:** In Barretos region, northeast of São Paulo State in Brazil, was observed an increase for colorectal cancer incidence, however, no changes in colorectal cancer mortality were observed over the years. (FAPESP: 2017/03787-2)IACR
P-99**DISTRIBUTION OF OVERALL AND TOP FOUR CANCERS IN WASHINGTON D.C: A SPATIAL ANALYSIS USING 2015 INCIDENCE DATA****Betelihem Tobo**¹; Ian Quan¹; Munkhzul Otgonsuren¹; Alfreda Woods¹; John Davies-Cole²; Shalewa Noel-Thomas²; Nitin Shivappa¹; Lindsay Djinge¹; Anjali Talwalkar¹¹District of Columbia Cancer Registry (DCCR), Washington, DC, United States²District of Columbia Health Department**Background:** To better understand community-level determinants of health and to target cancer prevention efforts, geographic information about cancer among Washington DC (DC) residents is needed. We examined spatial variations in overall and top four cancer incidence in DC.**Methods:** The 2015 cancer incidence data from DC Cancer Registry were geocoded and used for this study. Primary exposure was Ward (land parcel decimation of eight, approximately equal population regions). Five cancer outcomes were assessed: overall and top four cancers per ICD-O-3 codes (breast, colorectal, lung, prostate). Age-adjusted incidence rates (AIR) (per 100,000 persons, 2000 US Standard Population using 19 age groups with 95% Confidence Intervals) were computed for each outcome by ward. Comparable, national cancer incidence data were from CDC.**Results:** In 2015, overall cancer incidence was higher in DC versus US (472 vs 438). Ward 5 had highest overall cancer incidence [AIR 67.8, 95%CI 61.4 - 74.2 VS lowest (46.8, 41.5 - 52.1) in Ward 2] and highest prostate cancer incidence [20.4, 15.3 - 25.6 VS lowest (8.1, 5.0 - 11.2) in Ward 1]. Ward 7 had highest lung cancer incidence [8.8, 6.5 - 11.1 VS lowest (2.7, 1.4 - 4.0) in Ward 3]. Ward 3 had highest breast cancer incidence [28.5, 22.5 - 34.4 VS lowest (13.4, 9.4 - 17.4) in Ward 2].**Conclusion:** We observed ward-level differences in overall, breast, lung, and prostate cancer incidence. Specifically, Wards 3, 5, and 7 experienced higher cancer burden. Future directions should aim to assess and address differences in risk and protective factors for cancer across Wards.

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Parq Salon ABCD

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ASSESSMENT OF TRENDS IN CERVICAL CANCER AND ITS PRECURSORS TO MONITOR SCREENING POLICIES IN DEVELOPING SETTINGS

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Background: Cervical cancer needs control in developing countries. Before assessing results of HPV vaccination, Pap smear continues a major screening tool. Brazilian screening recommendations elect women from 25 to 64; and thereafter stop after two normal smears in the time of five previous years. To better understand trends, we examined incidence and mortality rates of invasive and in situ lesions. The main objective was to calculate cancer incidence and mortality trends and incidence trends of its precancerous lesions in a mid-sized northeastern Brazilian city.

Methods: The 1996-2013 database from the Aracaju Cancer Registry and from the Brazilian Mortality Information System (SIM) were used to calculate age-standardized rates (ASR) for all invasive tumors, ICD-10: C53 and preinvasive lesions, ICD-10: D06. Rates were calculated for the age groups 0-24, 25-34, 35-44, 45-54, 55-64, and 65+. Trends were assessed by calculating the annual percent change (APC) using the Joinpoint Regression Program.

Results: 971 incident cancer cases, 1,737 incident in situ lesions, and 316 deaths were assessed, as distributed: 0-24: 1.5%, 11.7%, 0.6%; 25-34: 11.5%, 37.9%, 9.5%; 35-44: 20.6%, 29.1%, 14%; 45-54: 23.2%, 12.9%, 20.3%; 55-64: 17.4%, 5.1%, 26%; 65+: 25.7%, 3.2%, 29.5%. Mean cancer incidence and mortality ASR were 21.1 and 7.0/100,000; mortality to incidence ratio was 0.33, used as a proxy of 5-year survival, returns 67%. Mean in situ incidence ASR was 31.2/100,000. Trends showed decreased cancer incidence and mortality rates (APC -6.3, -3.7). Conversely, in situ trends increased (APC 12.0) until 2006, then downwards, (APC -7.9).

Conclusions: Trend analysis shows that Pap smears are effective in diminishing cancer incidence and mortality. However, decreasing trends of in situ lesions signal that health policies should be reassessed; otherwise, invasive tumors will recover high rates.

IACR
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ASSESSMENT OF TRENDS OF BREAST CANCER AND CARCINOMA IN SITU TO MONITOR SCREENING POLICIES IN DEVELOPING SETTINGS

Carlos Lima; Marcela Lima¹; Erika Brito¹; Hianga Siqueira¹; Marcell Santos²; José Lobo³; Marcia Lima¹; Angela da Silva¹; Hugo Brito¹; Rosana Cipolotti¹

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Background: Breast cancer standardized incidence rates in Brazil are estimated to vary in 2018/2019 from 24 to 59/100,000 in less to more developed regions respectively, with mean rate of 51/100,000 women. Rates are higher in the capital of the states. The role of screening is not well understood. Health policies advocate initiating screening at the age of 50. However, some controversies still exist about beginning screening at the age of 40, as some cancer societies state. We aim to calculate breast cancer incidence and mortality standardized rates (ASR) and ASR of carcinoma in situ in a mid-sized northeastern Brazilian city; and to calculate trends according to age groups 20-40, 40-49, 50-69, and 70+, to verify if screening policies should be modified.

Methods: The databases from the Aracaju Cancer Registry and from the Brazilian Mortality Information System (SIM) from 1998-2014 were used to calculate standardized rates, considering all invasive tumors, ICD-10: C50 and non-invasive lesions, D05. Trends were assessed by calculating the annual percent change (APC) using the Joinpoint Regression Program.

Results: For the period of study, 2,569 incident cancer cases, 154 in situ lesions, and 759 deaths were assessed. Cancer cases and deaths were distributed in percentage by age groups as following: 20-39: 11.1% e 9.0%, 40-49: 24.2% e 19.5%, 50-69: 44.0% e 41.8%, 70+: 20.5% e 29.8%, respectively. Carcinoma in situ occurred in 39.0% in women below 50 years and in 61% above 50 years of age. Mean cancer incidence ASR, carcinoma in situ incidence ASR and mortality ASR were 58.4, 2.7 and 16.7/100,000 women respectively; mortality to incidence ratio was 0.29, which if used as a proxy of 5-year survival would confer a figure of 71%. Trends showed stabilization both for incidence and mortality for all age groups.

Discussion and Conclusion: The population of study showed a middle incidence rate, and low rate of in situ lesions, characteristic of the Brazilian population. Considering stable mortality ASR and non-significant APC through the various age groups, we conclude that population screening policies beginning at 50, with two-year interval, should be appropriate and prioritized for the 50-69 age group.

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TRENDS IN INCIDENCE OF THYROID CANCER IN INCHEON PROVINCE, SOUTH KOREA FROM 2004 TO 2013: FOCUSING ON ASSOCIATION BETWEEN SCREENING AND THYROID CANCER INCIDENCE

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Purpose: Our study was aimed to confirm the trend in thyroid cancer incidence in Incheon province, South Korea from 2004 to 2013, and to identify the association between thyroid cancer screening and thyroid cancer incidence.

Methods: We collected information associated with annual incidence of thyroid cancer between 2004 and 2013 from Association of Cancer Registry, Incheon province, South Korea. We evaluated the annual changes of thyroid cancer incidence from 2004 to 2013, and its incidence according to the detection methods.

Results: The average incidence of thyroid cancer was recorded 3 per 100,000 individuals from 2004 to 2003. Over the time, the incidence of thyroid cancer has increased from 1 per 100,000 individuals in 2004 to 5 per 100,000 individuals in 2014 across Incheon province, South Korea. This incidence of thyroid cancer had been steadily increased from 2004 to 2013, showing the significant association between increased screening test and thyroid cancer detection ($p < 0.05$). In addition, of the increase, 54% were measured 10 mm or less tumors, and 85% of which were detected by screening.

Conclusions: The screening for thyroid cancer was attributed to the current increased incidence of thyroid cancer in Incheon province, South Korea.

IACR
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CANCER INCIDENCE IN 15 DISTRICTS OF NEPAL

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Background: First time in Nepal, population based cancer registry program was conducted to know the incidence, prevalence, morbidity and mortality of cancer. Since 2013, we have been conducting population based cancer registry program in 15 districts out of 77 districts.

Method: This was descriptive type of study and all new cancer cases were collected from District Hospitals, Medical colleges, Private Hospitals, Diagnosis labs, Office of vital events, Municipalities etc. The mortality data was also collected from Municipality and District development office. All collected cases were entered in computer for coding followed by ICD-O along with ICD-10 published by IARC. Total 2,950 new cases were analyzed for the purpose.

Results: The total population of study area was 6,889,887 which covered 25.88% of total population. (CBS, Nepal 2011). Among these cases, the mean age of the patients was 52.8 year. The common form of cancer for both sex was Bronchus and Lung (12.9%) followed by Cervix uteri (10.9%) and Breast (9.1%) respectively. Out of which only 57.8% took the full treatment, 1.9% cases didn't receive full treatment and 0.1% didn't want to receive the treatment.

Conclusion: This study elaborated that only 15 districts' cancer burden was fully recorded, so these coverage may not represent the whole country.

Key words: Nepal, Registry, Cancer burden, Cancer incidence, Population based data.

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STAGE INFORMATION AMONG POPULATION- BASED CANCER REGISTRIES IN LATIN AMERICA

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Background: Accurate information on the extent of disease at diagnosis is vital for managing cancer patient care, defining prognosis and evaluating cancer control policies. Nevertheless, the collection of comparable stage data by population-based cancer registries (PBCR) is notoriously challenging and only few PBCR are able to provide information on stage. Currently, the IARC Regional Hub for Latin America does not have information on the availability of stage information in the existing cancer registries in the region. Through the Global Initiative for Cancer Registry Development (GICR) the Hub has provided some training sessions on Essential TNM in two courses and one series of webinars.

Purpose: In order to plan future GICR activities to promote collection of stage data among PBCR in Latin America, information on current practices is required.

Methods: A short survey on staging practices for four main cancers (breast, cervix, colorectal and prostate) was sent via email to 82 PBCR in Latin America. The survey was designed on google forms, answers were centralized and tabulated by the Coordinating Centre of the Latin American Hub.

Results: The answer rate was 69.5%. After excluding 2 not-yet active PBCR, 56 PBCR were included for analysis. On a routine basis, 38 PBCR collect stage for breast cancer, 36 for cervix and 33 for colorectal and prostate cancer, respectively. 53.5% of the registries use TNM (either UICC or AJCC), 17.9% use condensed TNM, 16% use SEER and 12.5% use a modified system. FIGO is used by 7 PBCR. 9 registries use both TNM and SEER. There are variations within countries with more than one PBCR. 47 (84%) PBCRs have heard about Essential TNM, 61% received training and 25% are using it.

Conclusions: More than half of the respondent PBCR collect stage data for breast, cervix, colorectal and prostate cancers, with TNM being the most commonly used classification system. There is variation among and between countries in systems used. PBCRs already using TNM will profit in the short term of implementing Essential TNM. In the mid and long term, efforts should be directed to stimulate more use of TNM coupled with Essential TNM.

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CAUSES OF DEATH IN KOREAN CANCER PATIENTS IN THE ERA OF CANCER SURVIVORSHIP: HOW DO CANCER PATIENTS DIE?

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Background: Improved cancer survival is expected to increase non-cancer and secondary cancer-related deaths; however, cancer statistics reports rarely discuss details involving causes of death. Therefore, we identified causes of death and non-cancer mortality in Korean cancer patients using data from a nationwide population-based cancer registry linked to mortality statistics.

Methods: Leading causes of death in cancer patients diagnosed between 2000 and 2014 and followed up until 2015, and proportionate mortalities were characterized. Risks of non-cancer deaths relative to the general population were estimated using a standardized mortality ratio (SMR).

Results: Of the 43% of deaths that were identified, most deaths within 5 years following cancer diagnosis were attributed to the patient's primary cancer, and the proportion of non-cancer deaths among all deaths increased from 2000 to 2015. Proportionate mortality of non-cancer deaths in men diagnosed with stomach cancer varied from 9% within 5 years to 74% within 10 years following diagnosis. However, 80% of deaths in liver cancer patients and 70% in female breast cancer patients were attributable to their primary cancer, even 10 years following diagnosis, suggesting that continued follow ups are required. Cancer patients had higher mortality risks from suicide than the general population (SMR for suicide: 1.61 (95% CI: 1.53–1.68) in men, 1.46 (95% CI: 1.34–1.57) in women). In addition, the number of cardiovascular disease deaths among cancer patients rapidly increased more than 17 times from 2000 to 2015.

Conclusion: Until 2015, about 88.1% of total deaths among cancer patients were due to primary cancer. However, non-cancer death and related health issues are expected to become an important issue.

IACR
P-106**IS THERE COASTAL EFFECT ON THE ECOLOGICAL DIFFERENCES OF CANCER INCIDENCE?****Sun-Seog Kweon**¹; Mi-Ran Kang¹; Min-Gyeong Kim¹; Min-Ho Shin²¹Gwangju Cancer Registry, Hwasun-gun, Korea, Republic of²Chonnam National University Medical School

Spatial analysis commonly used to evaluate the association between cancer incidence and environmental exposure at the area level. We investigate the spatial association between cancer incidence and coastal proximity using geographical information system (GIS) tool. : Age standardized incidence rates (ASR) in 392 counties (1999-2013) were calculated using the database of the population-based cancer registries in Korea. The distance to the nearest coastline were computed using the ArcGIS function of "Near". Global ordinary least squares (OLS) and local geographically-weighted regression (GWR) were applied to evaluate the spatial association between coastal proximity and ASRs at the county level. The Moran's *I* index was statistically significant for all variables analyzed, including all ASRs and potential confounding variables included in the OLS and GWR model ($P < 0.05$). It indicates that there was spatial autocorrelation at the level of counties in study areas for these variables. We found the positive associations of the coastal proximity and total cancer, liver, and thyroid cancer. Colorectal cancer incidence was lower in the coastal areas and significant reverse spatial association with coastal proximity was found.

IACR
P-107**ASSESSMENT AND PROJECTION OF BURDEN OF CANCER DUE TO TOBACCO IN INDIA AND ITS STATES TILL 2025****Murali Dhar**; Jang Bahadur Prasad¹¹KLE University

Background: For effective planning and optimum allocation of resources, accurate assessment of burden due to tobacco and its projection is essential. There are number of reports in India during last 3-4 decades, reporting tobacco related cancers (TRC). However, there is no visible study in India attempting to assess cancers due to tobacco (CDT). Objectives: To assess CDT in India and States by sex and urban/rural and project the same till 2025.

Materials and Methods: The basic inputs required were 1) tobacco prevalence, 2) relative risk of cancer due to tobacco, 3) incidence rates of TRCs, and, 4) population. These were obtained respectively from 1) recent five rounds of NSSO, 2) our recently published study, 3) reports of PBCRs, and, 4) projections of Registrar General of India. Our recently published method was applied to assess the CDT and regression method for projection.

Results: The overall burden of CDT in India was estimated to be 169 thousand in 2015 and it was projected to around 236 thousand by 2025, an increase of nearly 39.6%. CDT accounted for nearly half of TRCs. The CDT as percentage of TRC was highest for Tripura followed by Meghalaya, Manipur, Mizoram and West Bengal. Detailed analysis indicated regional diversity in both CDT and TRCs.

Conclusions: Present study reports absolute burden of CDT as well as the same as a percentage of TRC for India and its States till 2025. This may help policy planners and administrators in prioritizing the resources and proactive decisions pertaining to anti-tobacco measures. Non-availability of enough PBCRs to capture regional diversity may also be addressed by competent authorities. Methodological applications may simulate more and more on cancer burden due to a particular exposure in the developing countries in general and India in particular.

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ENDOCRINE THERAPY AFTER BREAST CANCER DIAGNOSIS: A PROOF OF CONCEPT STUDY USING THE PRIMARY CARE PRESCRIPTION DATABASE

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Background & Introduction: Although endocrine therapy (ET) treatment for breast cancer patients is usually initiated within secondary care, the majority of repeat prescriptions are given in primary care. A partnership between NHS Business Services Authority and the National Cancer Registration and Analysis Service has linked cancer registration data with the Primary Care Prescription Database (PCPD). We used this linked data to identify the level of ET prescribing in women with breast cancer and assess the epidemiological research potential of the PCPD.

Materials & Methods: Cancer registrations for women diagnosed with breast cancer during 1995-2015 who survived to 1 April 2015 were anonymously linked to ET prescriptions issued during April-July 2015. Summary statistics were used to investigate ET prescribing.

Results: Among 369,277 survivors of breast cancer diagnosed during 1995-2015, 37% were prescribed ET during April-July 2015. ET prescribing was highest in oestrogen receptor positive (ER+ve) patients (81%) and lowest in ER-ve patients (6%) for those diagnosed five years prior to the prescription period. Prescribing varied by time: the proportion of ER+ patients prescribed ET was highest for those diagnosed during the year before (59%), the second (90%), third (88%), fourth (87%) and fifth (85%) years before the prescription period, and lowest for those diagnosed thirteen years before (7%). This was expected as ET treatment is usually recommended for five years. Younger women usually received tamoxifen and older women usually received aromatase inhibitors, in accordance with guidelines.

Conclusions: The linkage of PCPD to cancer registry data in England has allowed the investigation of ET prescriptions in women with breast cancer. Prescribing was as expected, in accordance with ER status, patient age and anticipated treatment duration. The PCPD, linked to cancer registry data, should bridge a substantial gap in the knowledge of therapies that are not delivered in hospital.

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HOSPITAL BASED CANCER REGISTRY IN NEPAL **Zeena Sharma**

Introduction: Among the cancer registry like Population Based (PBCR) and Hospital Based (HBCR) reports are published annually, recent report of 2015 has been published by National Cancer Registry Committee in collaboration with 12 major hospitals of Nepal. This presentation is prepared on HBCR 2015 report.

Objective: To analyze detail information of cancer cases in Nepal, to generate reliable data on the magnitude and patterns of cancer and to provide information for cancer care, services and prevention program.

Methods: The collected data were checked, edited and entered in computer using cancer registry software. In order to avoid multiple entries of the cases, the database were verified by name, age, sex, address, topography and morphology of cancer cases. Then the data were coded according to ICD-O-3, and ICD-10.

Result: Total of 9718 cases were registered in HBCR among which 4483(46.13%) were male and 5235(53.87%) were female peak age were 60-64 years group in both males and females. Highest incidence cases were Bronchus and Lungs (13.7%), Cervix Uteri (8.9%), Breast (8.8%), Stomach (5.3%) and Ovary (3.8%) in both males and females. While in males Bronchus and Lungs, Stomach, Larynx, Leukemia Lymphoma and Bladder were the commonest sites whereas in females Cervix, Uteri, Breast, Bronchus and lungs, Ovary and Gall Bladder were highest incidence observed. Detail report will be presented in the conference.

Conclusion: As PBCR has recently started in Nepal, HBCR data is useful in a resource limited country like Nepal to provide information for Cancer Care Services and prevention program in those hospitals, provincial and federal government in Nepal.

Keyword: HBCR, PBCR, Cancer Incidence, Nepal

IACR
P-110**EPIDEMIOLOGICAL AND CLINICAL PROFILE OF UTERINE CERVICAL CANCERS IN INDIA****Murali Dhar**; Kamalesh Kumar Patel¹¹Indian Institute for Health Management Research

The uterine cervical cancer is perhaps the leading cancer among Indian women. It accounts for up to one third of cancers in women, which is preventable to large extent and early diagnosable almost completely. The main objective of this paper was to relate the treatment pattern and clinical stage of uterine cervical cancer cases seen in referral hospitals and also to examine the down staging at diagnosis in India. Latest four reports of long standing HBCRs in India pertaining to data from 1999 to 2014 formed the source of data and descriptive analytical methods were applied to meet the objectives. Down staging was assessed by looking at percentage of localized, regional and distant cancers over a period of time. Chi square test was applied to test the significance of trends of the proportion of cancers in different clinical stage. Uterine cervical cancer in localized disease varied from 2.6 to 18.5 percent during 1999-2000 and 0.8 to 15.0 percent during 2007-11. Surgical treatment was more in Mumbai (32%) in localized cancers, while its contribution is lower in regional and still lower in distant spread cancers. Radiotherapy was highest and commonest in all stages and registries. Chemotherapy was highest for patients having distant spread. Ninety percent cervical cancers occurred among the women aged 35+ constituting less than half of the population. Evidence of down staging of uterine cervical cancer during 1999-2011 was observed in Bangalore and Dibrugarh. Nonetheless proportion of uterine cervical cancer is still high in regional stage in all registries. Proportion treated declined with progression of disease. More than three fourths untreated patients are in regional stages except in Mumbai. Proportion of palliative treatment was higher in Mumbai and Dibrugarh than other registries. In the absence of any mass screening programme, the down staging observed may be attributed to improvement in general awareness about cancer in major cities. There is need to enhance wide spread awareness about all the features of uterine cervical cancers among Indian women to increase the utilization of presently available screening facilities. Education and nonstop training is required for both target population as well as health care providers.

IACR
P-111**CLINICAL STADIUMS AND EPIDEMIOLOGICAL SURVEILLANCE - PROSTATE CANCER, LIMA-PERU REGISTRY (2010-2012)**
Enrique Zevallos Santillan

Introduction: The early detection of prostate cancer in Peru is very low, since patients usually arrive with a locally advanced or advanced disease, there are no prostate cancer screening campaigns that allow us to detect this disease in the initial stages.

Methodology: The National Institute of Neoplastic Diseases (INEN), between 2006 and 2010, found 21% in stage I-II, 42% in stage III and 37% stage IV. In addition, the estimated cost per patient, treated in INEN, with localized prostate cancer, a radical prostatectomy is S/. 5357, however, when the cancer is locally advanced, the average cost of treatment per year is S/. 10,300, and if the disease progressed, it would be between S/. 31,000 and S/. 34,000. These costs increase considerably if the patient has to receive chemotherapy or treatment for pain. The Cancer Registry of Metropolitan Lima and Callao, published for the years 2010-2012, 5935 cases of prostate cancer.

Results: The average cost of the association of the treatment by clinical stage would represent an indicator of valuation for an opportunistic screening. Taking into account these costs for each clinical stage, would have been spent on the treatment of prostate cancer during the period 2010-2012, only in Metropolitan Lima and Callao, just over 36 million dollars a year, of which 25 million will be for terminal cases.

Conclusion: If a percentage structure of clinical stages is achieved, such as that experienced in the Spanish study of Barceló Obrador. (I, II -74.56%, III -16.67% and IV -8.77%). It would save 18 million dollars a year, half of what was spent in that period and the association of the variables of the average cost of treatment per clinical stage will add value to the impact of opportunistic detection and will be a useful epidemiological surveillance tool.

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TRENDS IN PANCREATIC CANCER PROGNOSIS IN MURCIA - SPAIN

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Background: Pancreatic cancer incidence is increasing worldwide. Related to cancer prognosis, pancreatic cancer scores one of the worst, between 5% and 15% around the world. Pancreatic cancer survival in the Southeast of Spain has been analyzed with data from the Cancer Registry of the Region of Murcia (Spain).

Methods: All incident cases of pancreatic cancer between 1990 and 2010 has been extracted from the population based Cancer Registry of Murcia. The morphology and topography of the tumor are coded in ICD-O-3 and converted to ICD-10 for analysis. The code C25 (malignant neoplasm of pancreas) has been used to select cases. The base of diagnosis includes cases whose source of information is the Death Certificate Only (DCO). Information on vital status is obtained from the National Death Index, hospital discharges, medical records and health insurance database. Variables: date of incidence, age at diagnosis, sex, vital status and time of follow-up. Crude net survival and adjusted by age at 5 years of the diagnoses have been calculated. Survival was analyzed for two periods (1990-1999 and 2000-2010), by sex and age group. Net survival has been estimated using the Pohar-Perme method, with the cohort approach. The weights of the ICSS have been used to adjust for age. The software used was STATA-V14. All survival estimators are presented as percentages with their 95% confidence interval (95%CI).

Results: A total of 1924 patients with pancreatic cancer have been included after excluded 9% DCO (164 cases). Net survival at 5 years shows a value of 5.3% in 1990-1999 and 6.6% in 2000-2010. Net survival adjusted is higher in women than in men, 8.3% versus 6.7%. The highest net survival is observed in 15-44 years (21.1%) and the lowest in those over 74 (4%). The survival curve from diagnosis to 5 years shows a pronounced fall in the first year after diagnosis of 80% in absolute value.

Conclusion: Pancreatic cancer has a very unfavorable prognosis that has scarcely improved in the last two decades. It is essential to monitor the effects of new therapeutic strategies to check whether in long-term at population level improves survival.

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OE SOPHAGUS CANCER SURVIVAL FROM THE POPULATION BASED CANCER REGISTRIES OF SANGRUR AND MANSA DISTRICTS OF PUNJAB STATE, INDIA

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Background: Sangrur and Mansa cancer registries have been established by Tata Memorial Centre (TMC), Mumbai; PGIMER Chandigarh and Government of Punjab in a year 2013. The Sangrur registry covers 1.7 million population and Mansa registry covers 0.8 million population. More than 70% population of these registries is rural.

Method: The cancer registration method involves community interaction as well as a visit to the different places such as other cancer centers, medical colleges, pathology laboratories and private practitioners to collect the clinical details of the cancer patients. The cancer treatment facility was not available in the Sangrur district. Based on the information provided by the cancer registry, the Government of Punjab and TMC have established Homi Bhabha Cancer Hospital (HBCH), Sangrur. The hospital has started functioning since January 2015. In a year 2013-2014, 283 cases of oesophagus cancer have been registered from Sangrur (174) and Mansa (109) districts. Out of these 283 cases, 143 (50.5%) cases were male and 140 (49.5%) cases were female. The date of incidence is considered as the starting date and the last follow up date is considered 31/12/2018. Due to community interaction, we managed to follow up 276 cases (97.5%). Out of 276 cases, 27 cases are alive whereas 249 cases were dead at the follow up date. Out of 276 cases, 129 (45.6%) cases have completed the treatment and remaining 152 (53.7%) cases have not completed or left the treatment before completion. The data analysis was carried out in SPSS. The observed survival was calculated and in the detail presentation we will present the relative survival.

Results: The overall five years observed survival of esophagus cancer case was 11% (male 10% and females 12%). Those who completed the prescribed treatment have reported survival of 25%. The cases who could not complete the treatment or left the ongoing treatment reported 0% survival.

Conclusion: The completion of the treatment is the important prognostic factor in the survival of the oesophagus cancer. The early detection and easy access to treatment in the public hospital or through insurance scheme will improve the survival of oesophagus cancer.

IACR
P-114**PROSTATE CANCER SURVIVAL FROM THE POPULATION BASED CANCER REGISTRIES OF SANGRUR AND MANSA DISTRICTS OF PUNJAB STATE, INDIA****Shraddha Shinde**¹; Atul Budukh; Prithviraj Kadam¹; Sonali Bagal; Suchita Yadav¹; Rajesh Dikshit¹; JS Thakur; Rajendra Badwe²¹Centre for Cancer Epidemiology²TATA Memorial Centre, Navimumbai, Maharashtra, India

Background: Sangrur and Mansa cancer registries have been established in the year 2013 by Tata Memorial Centre (TMC), Mumbai, PGIMER Chandigarh and Government of Punjab. The Sangrur registry covers 1.7 million population and Mansa registry covers 0.8 million population. Both the registries have mainly rural population.

Method: The cancer registration method involves community interaction as well as a visit to the different places including cancer centers, medical colleges, pathology laboratories and private practitioners to collect the clinical details of the cancer patients. The cancer treatment facility was not available in the district. Based on the information provided by the rural cancer registry, the Government of Punjab and TMC have established Homi Bhabha Cancer Hospital (HBCH), Sangrur. The hospital has started functioning since January 2015.

In the year 2013-2014, we have registered 72 cases of prostate cancer from Sangrur (51 cases) Mansa districts (21 cases). The starting date was considered as an incidence date and last date of follow up was 31st December, 2018. Due to community interaction we could follow up all the 72 cases. Out of 72 cases, 15 cases are alive and 57 cases were dead at the follow-up date. Out of 72 cases, 39 (54%) cases have completed the treatment and remaining 33 (46%) cases have not completed or left the treatment in between. The data analysis was carried out in SPSS. The observed survival was calculated and in the detail presentation we will present relative survival.

Results: The five year observed survival of prostate case was 20%. The patients who could complete the prescribed treatment have reported survival of 34% and the cases where patients could not complete or left the treatment have reported 3% survival. The log rank test was used to compare the survival between these two groups and it was statistically ($p < 0.05$) significant.

Conclusion: The overall survival of prostate cancer is low. The completion of the treatment is an important prognostic factor in the survival. The early detection and easy access to treatment in the public hospital or through insurance scheme will improve the survival of prostate cancer.

IACR
P-115**USE OF POPULATION BASED CANCER REGISTRIES FOR CANCER CONTROL IN PUNJAB AND CHANDIGARH OF NORTHERN INDIA****JS Thakur**; Atul Budukh; Rakesh Kapoor¹; SPS Bhatia¹; Pankaj Malhotra¹; Kathirvel S¹; Pankaj Arora¹; Rajesh Dikshit²; Rajendra Badwe³¹Post Graduate Institute of Medical Education and Research, Chandigarh, India²Centre for Cancer Epidemiology³TATA Memorial Centre, Navimumbai, Maharashtra, India

Background: Population based cancer registries in Chandigarh and Punjab (PBCR) were set up in 2013 with a vision to establish baseline data to assess the burden and pattern of cancer covering almost 4.6 million population from UT Chandigarh and three districts in Punjab viz; SAS Nagar, Mansa and Sangrur.

Methodology: The registry staff have visited several hospitals and pathology laboratories, and also have interaction with village leaders for cancer cases registration and collect details on incident and cancer deaths cases along with Survival data. A customized version of CanReg3 software is used and results are presented 2013-14.

Results: In PBCR Chandigarh and SAS Nagar, the most frequently reported malignancies were lung and prostate in males and breast and cervix uteri in females. On the contrary, in PBCR Sangrur, Esophagus was the top leading cancer site followed by prostate in Males and Breast and cervix uteri in females. Similarly, in PBCR Mansa, Esophagus was the most common primary site followed by larynx in males and Cervix uteri in females with breast on the second. The Chandigarh PBCR incidence rate of Males and Females are higher than the national rate (Male 96.1, India 92.4, Female 104.6, India 97.4 per 100,000). SAS Nagar Female cancer incidence rate is slightly higher than the national rate (103.5 Vs 97.4 per 100,000); however male cancer incidence rates are lower than the national rate (80.4 Vs 92.4 per 100,000)

Cancer registries has contributed to cancer control activities, which includes, case control study on esophagus, cancer awareness and early detection campaign in Punjab. control study Sangrur and Mansa cancer registry

Conclusion: The cancer incidence rates for all the cancer sites are broadly stable in all the registries for the year 2013 as well as 2014. Cancer registries can be used effectively for cancer prevention and control activities.

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ALL-NATIONAL DISPANSERIZATION WORKS AS SCREENING ONLY IN BREAST CANCER: A REGISTRY-BASED STUDY FROM

ARKHANGELSK, NORTH-WESTERN Russia

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Background: A Dispanserization for several groups of adult population (DSGAP) is an all-national program implemented in Russia in 2013, which uses mammography, fecal occult blood test, cervix cytology and chest x-ray once in three years for the selected age risk groups. The objective of this analysis is to check whether DSGAP is effective in early cancer detection.

Material and methods: A data from Arkhangelsk regional cancer registry on all breast, colon, rectum, cervix, lung cancers were retrieved over a period 2000 to 2017. All cases were staged according to UICC TNM 7 version. Dynamic trends for the proportion of Stage I have been analyzed using joinpoint regression.

Results: Overall, 84 340 cases of selected cancers retrieved. Among screened in the frames of DSGAP malignancies, only breast cancer has shown a significant increase of the Stage 1 proportion from 16% in 2011 to 31% in 2017, joinpoint 2011, annual percentage change (APC) 9,3%. For cervix, colon and rectal cancers, a monotonous increase registered, from 26%, 7% and 12% in 2000 to 46% (APC 4.1%, p=0.005), 14% (APC 5.2%, p=0.11), 19% (APC 2.1%, p=0.13), in 2017, respectively. A proportion of Stage I lung cancer decreased from 15% in 2000 to 12% in 2017 (no joinpoints, APC -2.2%, p=0.56).

Conclusion: Mammography within DSGAP might be effective as a screening for breast cancer. Increase of the proportion in Stage I cervix cancer is more likely associated with improvements in opportunistic screening than with the implementation of DSGAP. The latter is not working as screening for colon, rectum and lung cancer. Despite evident progress of the early detection, the proportion of stage I among all selected cancers is still lower than in economically developed countries.

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CERVICAL CANCER SCREENING AMONG MARGINALIZED TEA WOMEN COMMUNITIES IN BANGLADESH

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Introduction: Tea plantation communities in Bangladesh form a highly marginalized and racially discriminated group who are subject to unhygienic living conditions. They lack access to health care services within and outside tea-plantation facilities. Low socioeconomic status coupled with systemic discrimination results in poor health status and poor prognosis for many treatable diseases, specifically for women. The status of sexual and reproductive health and rights (SRHR) is particularly poor. So far we do not have any insight on the burden of cervical neoplasia or cervical cancer in this population.

Purpose: The main objective of this implementation research was to investigate cervical intraepithelial neoplasia (CIN) prevalence among women in the tea garden community.

Methods: The research was implemented as a cross-sectional cervical cancer screening program using Visual Inspection by Acetic Acid (VIA) in ten tea plantations in Sylhet division. We coordinated with government health managers in Sylhet to send government nurses to tea plantations for conducting screenings. Women who were found to be VIA positive were taken to the district hospital for diagnosis and treatment.

Results: A total of 2993 married women within the ages of 25-65 were screened. 50.7% of the women were housewives, and the remaining were employed formally or informally within the tea estates. None of the women had any education beyond secondary school; the average monthly family income was 44 USD. 85.8% of these women had home deliveries for their last child, and 78.1% used clothes/rags during their periods. 73.3% of the women reported knowing about cervical cancer and 66% knew about breast cancer. 17.7% (522) of the women were VIA positive. Among VIA positive women, we were able to follow up with 468 (89.7%) women, out of whom 424 women agreed to undergo colposcopy. 66 (15.6%) of women who underwent colposcopy were diagnosed with CIN1 and 2 women were diagnosed with CIN2, who were provided with appropriate treatment.

Conclusion: This implementation research sheds light on the higher than national average (5-6%) of VIA positive rate tea plantation workers. It also provides an innovative and sustainable approach to provide SRHR services to these women using a development partner-government partnership.

IACR

✖ P-118

ARE POPULATION-BASED CANCER REGISTRIES UTILISED FOR EVALUATION OF CANCER CONTROL PROGRAMMES AS RECOMMENDED BY WORLD HEALTH ORGANIZATION? A 10-YEAR SYSTEMATIC REVIEW

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Background: Cancer is one of the most leading causes of death worldwide. The World Health Organization recommended the implementation of national cancer control programmes where population-based cancer registries (PBCRs) are a key element to monitor/evaluate the results of cancer control interventions.

Purpose: To examine whether PBCRs are being incorporated as a major element in cancer control programmes. Specific objectives included

- Assessing trends in utilisation of PBCR data.
- Establishing which elements of cancer control are being evaluated
- Examining which indicators (short-term or long-term) are being measured.

Methods: We reviewed studies that used PBCR as their main source of data in evaluating cancer control interventions in the period of January 2005 to May 2015. Literature was searched using the MEDLINE, EMBASE, CENTRAL and PSYCHINFO databases. Additional studies were identified from relevant websites, scanning references of included studies, hand searching contents pages of key cancer journals and citation searching. Selection of relevant articles, data extraction and data analysis was done by two independent reviewers. Disagreements were resolved by discussion and consensus.

Results: Sixteen articles were eligible for inclusion in the review. 69% (11 studies) were published between January 2011 and May 2015. Cancer screening interventions were the most evaluated elements of cancer control programmes accounting for 50%, followed by cancer treatment/care services at 44%. There were no studies that evaluated primary prevention or palliative care services. Nine studies (56%) used short-term measures, six studies (38%) used long term measures while one study used both short-term and long-term measures. Fifteen studies (94%) were from developed countries.

Conclusions: Although population-based cancer registries are still underutilised there is an increasing trend in the utilisation of PBCRs. The utilisation of PBCRs is skewed towards high-income countries. Cancer screening strategies are the most evaluated programmes and most studies use short-term outcomes to measure/evaluate the cancer control interventions.

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✖ P-119

INFLUENCE OF HORMONE RECEPTORS IN BREAST CANCER SURVIVAL WITH CORRELATION TO PLACE OF RESIDENCE

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Introduction: Breast cancer is commonly diagnosed cancer in women. Tumor receptors estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2) are well recognized prognostic factors for breast cancer. Breast cancer in India is an urban problem as higher incidence rates were seen in metropolitan places like Delhi, Chennai, Bangalore and Thiruvananthapuram District. According to CONCORD-3 study age-standardized 5-year net survival from breast cancer was 80% or higher in 34 countries around the world, however it is only 60% for India. A Global Burden of Disease (GBD) reported that of the northeastern states (with a population of 45 million people) have the highest burdens of cancer and low survival rates in India.

Materials & Method: Data from the Guwahati Cancer Registry for the 5-year period (2010 to 2014) is used for analysis for Kamrup district of Assam, India. Survival estimates were done using Kaplan Meir method.

Result: The overall 5-year survival is observed as 54.6%. There is a 10.6% improvement in survival was recorded among those who living in the urban areas (Urban 64.5% Vs Rural 53.9%). The risk of death was 40% higher for those who were resides in rural areas of than to those who were living in urban areas (p=0.070). There is a 6 fold variation in survival was observed according to their stage at presentation (Localized 76.0% Vs Distant 12.8%).

Hormone receptors found to be play an important role in survival outcome. Patients with ER/PR+ (positive) status have 13.6% higher survival rate than those who were with negative hormonal status (ER/PR-). The overall survival for ER/PR positive is 72.1% compared to 58.5% of ER/PR negative.

Conclusion: From the study it is evidently prove that breast cancer cases with positive hormone status had higher survival than patients with negative hormone status. The results of the study indicate the importance of receptor status in the prognosis of breast cancer and disparities in survival and with correlation to place of residence as the population residing in the urban areas have better extended survival probability compared to population residing in the rural areas.

IACR POSTERS

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✘ P-120

TREND OF CANCER INCIDENCE IN NEPAL FROM 2003 TO 2012

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Trends in cancer incidence is a key tool to identify the pattern of cancer of any country. This retrospective study was performed to present the trends of change in cancer incidence in Nepal. The total number of cancer cases in males was 26,064 while the total number of females cancer cases was 29,867 throughout the 10 years from 2003 to 2012. The cancer incidence per 100,000 in males was 12.8 in 2003 and 25.8 people in 2012. Similarly, in females, the crude incidence rate was 15.1 in 2003 and 26.7 per 100,000 in 2012. Cancer incidence was low at early age but it was increased with age in both sexes in Nepal. Lung cancer was the most common cancer in males throughout, while it was the third most common cancer in females. Cervix uteri was the most common site of cancer in females throughout the 10 years, with a clear trend for increase in breast cancer within this time.

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✘ P-121

DEVELOPING A CANCER SURVIVORSHIP PROGRAM AT TAWAM HOSPITAL, AL AIN UNITED ARAB EMIRATES

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INTRODUCTION: Majority of Cancer survivors at Tawam Hospital seem to be significantly less informed about their care process upon completion of their treatment. Tawam Hospital does not have a survivorship program for Cancer Patients. The main objectives were to identify and measure the components of the transition from oncology care to primary care by providing every patient and his or her primary care provider with a treatment summary and care plan and to deliver educational programs for both patient and primary care providers about a survivor's unique needs as well as developing a self-sustain program that can be replicated at other SEHA cancer service providers.

METHODS: Need Assessment Baseline Data was established with the survey comprised of basic questions to explore survivor's major concerns. Total 11 domains were assessed based on most prevalent concerns of survivors. Each domain was given a scoring as "1" providing 3 options as fully informed, partly informed or no information. The final results were: 13% of domains about which patient had full information 48% domains about which patients were partly informed 38% of domains about which patients had no information at all

INTERVENTION: • Creation of SCP template within the CERNER – • Identification of eligible patients through Cancer Registry – • Filling of information – shared responsibility of Cancer Registry and Breast care centre – • Assessment of level of patients' information about the care process through patient's feedback using survey –

RESULTS: Change data.

CONCLUSION/NEXT STEP: • Cancer patients at Tawam were found significantly less informed about the care process. • Problem was rectified by implementing the survivorship care program with the SCP focus. • SCP template was developed within the CERNER - accessed by both Cancer Registry and Survivorship clinic. • Need assessment survey was implemented and baseline data was collected to identify utmost needs/issues. • Eligible patients were identified and the part of SCP was filled by the Registry staff to be further filled by the Survivorship clinic staff. • Final SCPs were reviewed by the consultant to be signed and given to the patients. • Survivorship clinic will require: – Continuous

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✘ P-122

DISTRIBUTION OF CANCER BY SEX AND SITE IN NEPAL**Prakash Neupane**¹;¹B.P Koirala Memorial Cancer Hospital/ Bhaktapur Cancer Hospital, Bhaktapur, Nepal

Background: Cancer is one of the leading causes of death throughout the world. The indicators of cancer by site are significant to identify the problem of cancer. The purpose of this retrospective study is to perform the incidence of all cancers both in males and females over the ten years in Nepal.

Methods: The data collected from all the seven hospital based cancer registries of Nepal have taken for the study. This retrospective study has presented the number of cases, frequencies, and crude incidence of all cancers by sex and site.

Results: A total of 55,931 cancer cases with known age were registered throughout the hospital based seven cancer registries of Nepal from 2003 to 2012. Throughout the ten years, Lung (incl. trachea and bronchus) cancer (19.08%) was the major cancer in males followed by stomach cancer (7.86%) and Pharynx cancer (5.4%). Similarly, Cervix cancer (21.9%) was the most common cancer in females followed by breast (15.48%) and Lung (incl. trachea and bronchus) cancer (10.47%) over the ten years. This retrospective study presented the distribution of the cancer site over the ten years in Nepal.

Conclusion: This retrospective study showed that lung cancer is the major cancer in male while in female cervix uteri is the most common cancer ranging from 2003 to 2012.

Keywords: Cancer; sex; site; incidence

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✘ P-123

USING NATIONAL SYSTEMIC ANTI-CANCER THERAPY (SACT) DATA, COLLECTED IN ROUTINE CLINICAL PRACTICE IN ENGLAND, TO INFORM COMMISSIONING DECISIONS THROUGH THE CANCER DRUGS FUND (CDF)**Alice Turnbull**¹; Rebecca Smittenaar¹; Martine Bomb¹; Sarah Lawton¹; Bukky Juwa¹; Adam Brown¹¹National Cancer Registration and Analysis Service, Public Health England, London, United Kingdom

The systemic anti-cancer therapy (SACT) dataset is submitted by all National Health Service (NHS) England treatment providers every month, to the National Cancer Registration and Analysis Service (NCRAS) at Public Health England (PHE). It contains 43 data items, describing a patient's tumour, their clinician and treatment location, the drugs and regimens they received and treatment outcomes. The dataset includes cytotoxic chemotherapy, targeted drugs and immune modifying treatments. It was mandated in April 2014 and is the first nationally comprehensive SACT database, allowing us to understand treatment patterns and outcomes.

The National Institute of Health and Care Excellence (NICE) appraise all new cancer drugs in England, to determine whether they are clinically and cost-effective, and therefore appropriate for routine commissioning. When effectiveness is uncertain, the new Cancer Drugs Fund (CDF) provides patients who meet eligibility criteria with interim treatment access while additional data are collected. The NCRAS team use the SACT database to provide analyses on these patients, to support NICE decision making.

In approximately 25% of CDF decisions, SACT is the primary source of data. In other cases, SACT data supports the results of a randomised controlled trial. SACT data is mainly used to calculate overall survival and treatment duration but can also be linked to other NCRAS and NHS datasets to provide bespoke analyses, for example the proportion of treated who later receive a stem cell transplant or subsequent SACT.

A team of data liaison officers at NCRAS work with data providers to improve the quality and completeness of SACT submissions. Frequent reports are shared with NICE and the relevant pharmaceutical company which detail case ascertainment in comparison to applications for CDF funding and data completeness. Annual and final reports are prepared by NCRAS detailing the outcomes data required for NICE decision making.

To date, brentuximab vedotin for use in Hodgkin's Lymphoma and pembrolizumab for first line treatment on PDL1 positive non-small cell lung cancer (NSCLC) have been approved for routine commissioning following data collection in the CDF.

SACT data continues to provide real world insights into patient outcomes, and help determine whether a drug should enter routine commissioning.

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✘ P-124

SURVIVAL OF PATIENTS WITH EPITHELIAL OVARIAN CANCER, RESULTS OF THE HOSPITAL-BASED CANCER REGISTRY OF THE NATIONAL CANCER INSTITUTE (2005-2014)

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Aims: To provide demographical and clinical characteristics and estimations of 3-year overall survival (OS) of epithelial ovarian cancer (EOC) patients treated at the Colombian National Cancer Institute (INC) between 2005 and 2014.

Methods: All 783 patients first treated at INC for OC in the three periods: (2005-2008, 2009-2011, 2012-2014), without a prior cancer diagnosis, were included in this study. Follow-up was realized by cross-linkage with governmental databases using person identification numbers. Probability of surviving 36 months since the date of entry at INC was estimated using Kaplan–Meier methods, using the log-rank test to evaluate differences between groups.

Results: The overall survival probability at 36 months was 56.5% (95% CI: 53.0, 60.0), which was stable over time. Advanced age and clinical stage substantially affected 3-year overall survival, being 49.5% (95% CI: 43.4, 55.6) for age > 59, 21.9% (95% CI: 14.7, 29.2) for stage IV disease and 56.3% (95% CI: 37.5, 54.3) for serous tumors.

Conclusions: Survival of epithelial ovarian cancer was stable over time, with a wide variation according to histological subtype, clinical stage at time of diagnosis and age. Survival would improve with the opportunity, comprehensiveness and quality of the initial treatment.

Key words: Epithelial ovarian cancer; Histology; Survival; Hospital-based cancer registry; Colombia

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✘ P-125

THE NET SURVIVAL OF MAJOR CANCERS: A POPULATION BASED ANALYSIS IN ZHONGSHAN OF CHINA, 2003-2013

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Backgrounds and Purpose: Net survival of major cancers in China was only reported once before. So, for providing more precise information for cancer control and prevention in China, we explored the net survival of major cancers in Zhongshan of China in 2003-2013.

Methods: The survival data of major cancers (15 adult and 3 children cancers) of Zhongshan registered residents diagnosed in 2003-2013, which came from Zhongshan population based cancer registry, were collected and followed up to the end of 2014. The 5-year age standardized net survival rates (ASNSR) of different major cancers and their ASNSRs in different periods in Zhongshan were calculated and analyzed.

Results: 26 046 eligible major cancers cases in Zhongshan in 2003-2013 were included in this study. The 5-year ASNSRs of major cancers in Zhongshan in 2010-2013 varied greatly, between 11.7% -74.5%, with the highest for female breast cancers, lowest for esophageal cancer, higher than 50% for six cancers such as cervical, colon, rectum, and prostate cancers, lower than 30% for six cancers such as pancreas, lung, and stomach cancers. Among the 15 cancers whose 5 years ASNSRs could be compared in 2003-2013, only 6 cancers such as the cancers of colon, prostate, rectum, female breast, and adult brain with their 5 years ASNSRs increased, most for the cancers of adult brain (28.05%) and colon (22.17%), 9 cancers such as the cancers of pancreas, lung, ovary, and adult lymphoid leukemia with their 5 years ASNSRs decreased, the most for the cancers of esophagus (50%) and stomach (30.83%).

Conclusions: Except the 5 years ASNSRs of adult brain and pancreas cancers at high level, the 5 years ASNSRs of most major cancers in Zhongshan in 2010-2013 were at middle-low or low level in the registries participated in CONCORD 3 project worldwide. Moreover, the 5 years ASNSRs for most major cancers decreased in Zhongshan in 2003-2013. It indicated that the cancer control and prevention in Zhongshan should be enhanced.

Keywords: cancer; survival; trend; Zhongshan

IACR

✘ P-126

30 YEARS OF PROSTATE CANCER CARE AT THE SINGAPORE GENERAL HOSPITAL: CANCER TRENDS IN A MULTIRACIAL POPULATION

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Purpose: We hypothesize that the proportions of low, intermediate and high-risk prostate cancer groups (base on D'Amico classification) have changed significantly over the years and the treatment modality for each risk group has evolved as well. We aim to study the prostate cancer trends in a single institution.

Materials and Methods: Data from the institutional prostate cancer registry for 4041 patients diagnosed with prostate cancer from 1985 to 2014 were reviewed. Temporal trends were assessed for patient distribution and treatment modality among the different risk groups.

Results: From 1985 to 2014, the proportion of low-risk tumours doubled ($p < 0.05$). A five-fold increase was noted in the intermediate-risk group ($p < 0.05$). The proportion of high-risk tumours remained stable, whereas locally advanced/metastatic disease decreased significantly from 57.6% to 19.3% ($p < 0.05$). In the locally advanced/metastatic disease group, the proportion of Malay patients increased significantly ($p < 0.05$). The proportion of patients with Gleason score 7 increased steadily and most significantly, whereas the proportion of patients with Gleason score 6 increased from 1985 to 2004, followed by a decrease from 2005 to 2014. Patients with Gleason score >7 increased significantly from 2005 to 2014. There was no significant change on the proportion of clinical stage T1, T2 and $\geq T3$.

In the low-risk group, the proportion of patients with non-intervention increased significantly with a corresponding decrease in radical prostatectomy and radiation therapy as the treatment modality. In the intermediate-risk group, the proportion of patients with radical prostatectomy or radiation therapy significantly decreased from ($p < 0.05$). In the high-risk group, there was a significant decrease in the proportion of patients who underwent radical prostatectomy and a significant increase in the radiation therapy group.

The 10-year cancer specific survival rate has been increasing significantly. Malay patients have a significantly lower cancer specific survival rate compared to the other races after having accounted for various prognostic factors.

Conclusion: The proportion of low and intermediate-risk patients has increased over the past 30 years with a corresponding decrease in patients with high-risk and locally advanced / metastatic disease. Race may affect the prognosis of prostate cancer patients. Further study in this area is warranted.

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✘ P-127

LANDSCAPE CANCER SURVEILLANCE SYSTEM IN PARÁ/BRAZIL

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Hospital base cancer registries (HBCR) are systematic sources of information, installed in general or specialized hospitals, with the objective of collecting data regarding the diagnosis, treatment and evolution of cases of malignant neoplasm treated at the institution. In state of Pará/ Brazil, there are in operation four HBCR. The present study aimed to know and analyze the information landscape of the NBCR in Pará/Brazil. This is a cross-sectional study of cases registered between 2001 and 2016 in the Integrador database, which brings cancer cases at a hospital level in Brazil. The cases treated in the Pará state were included. Were established annual incidence, ten most common cancers, and intervals between consultation and diagnosis, and between diagnosis and treatment of patients.

There was an increase in the number of treated cases during the analyzed period and the time intervals are not yet in compliance with Brazilian legislation, which can be attributed to improvement of the effective of the Brazilian health surveillance system.

Key words: Hospital-based cancer records, cancer surveillance system

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✘ P-128

COLORECTAL CANCER MORTALITY IN GUAYAQUIL AND YEARS OF LOST LIFE

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Introduction: Cancer is a public health problem and responsible for 17% of deaths in the world, and approximately one third of these are due to five potentially modifiable risk factors, which indicates that cancer is largely preventable, requiring a deep analysis; in the city of Guayaquil, this has had an increase in the presentation of cases in recent years being an important cause of incidence and death, but its impact on this population is unknown. The objective was to determine the mortality and Years of Lost Life due to colorectal cancer in Guayaquil - Ecuador.

Methods: It is descriptive observational, using information from the population base registry of Guayaquil, diagnosed with colon - rectum cancer between 2005 and 2017. Describe mortality by years, sex, age group and years of lost life (YLL). The average life expectancy was 75 years. With this information a data matrix was constructed with the mentioned variables.

Results: There were 991 deaths where an increase was observed in a sustained manner, being in 2008 the Mortality rate per 100,000 inhabitants of 3.23, in 2012 it was 3.97 and in 2017 it was 4.49; where they were mostly women. In the year 2008 the rate of YLL per 1000 inhabitants was 0.55, in 2012 it was 0.64 and in 2017 0.70. The age group of 60-74 had higher deaths in men and women with 53.90% and 54.39% respectively; while the YLL were in the age group of 45 to 50 years with 40.81% in men and 45.81% in women.

Discussion and conclusions: According to sex, there was little difference in mortality between men and women, with the age groups most affected being 60-74 years, followed by 45-59 years of age. It should be noted that in men the tendency is to increase while in women it tends to stabilize in mortality; unlike in the YLL, both sexes the group of 45-59 years is the greater weight; However, a change is observed in young adults aged 15-44 years, which would require a detailed analysis of the factors that influence these premature deaths.

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✘ P-129

IMPACT OF MORTALITY AND YEARS OF LOST LIFE IN CHILDREN WITH LEUKEMIA IN GUAYAQUIL

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Introduction: Leukemia is the most frequent neoplasm in children, where acute lymphoblastic leukemia (ALL) occupies the first place of frequency, followed by myeloid leukemia (MLE) although it does not affect a large number of patients, the lethality is higher; in the city of Guayaquil they have had an irregular behavior in the presentation of cases in recent years and are one of the main causes of death but its impact on this population is unknown. The objective was to determine the mortality and years of lost life in children from 0 to 19 years of age with Leukemia of the city of Guayaquil.

Method: It is descriptive observational, using information from the registry of population base of those under 19, diagnosed with Acute and Myeloid Lymphoblastic Leukemia between 2005 and 2017. Describing by type of Leukemia, mortality, potentially lost life years (YLL), sex and age group. With this information a data matrix was constructed with the mentioned variables.

Results: 580 Leukemia deaths were recorded; 62.59% in men and 37.41% women. According to age, in ALL, 32.84% were between 5 and 9 years old, 26.41% between 10 and 14 years old, 23.26% between 15 to 19 years old and 17.49% less than 4 years old. In the LM 31.37% between 15 to 19 years, 24.80% between 10 and 14 years, 20.60% between 5 and 9 years and 21.24% less than 4 years. In LLA, 1310 years of life were lost in 2005, 2012.5 years in 2011, 2497.5 years in 2017, mostly in children; while in LM there were 525 in 2005, 490 in 2011, 745 in 2017, more in girls.

Discussions and conclusions: In this period, the YLL indicator shows the increase and impact of mortality from Leukemia in children. Likewise, we obtain differences in magnitude between the sexes and the different age intervals that allowed us to identify the fraction of the YLL attributable to this group of children. Being older in ALL in children, but in the LM more it is in girls and having an increase in recent years regarding the YLL rate.

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✘ P-130

CLINICAL-PATHOLOGICAL CHARACTERISTICS AND SURVIVAL IN COLORECTAL CANCER. SOLCA CUENCA-ECUADOR 2005-2013María Pérez Meza; Rocio Murillo¹; Carmen Ugalde¹¹SOLCA -CUENCA, Ecuador

Summary: Colon cancer is the most common neoplastic disease of the gastrointestinal tract, worldwide it is the third most common neoplasm in men and the second in women. Survival at 5 years varies greatly around the world. The overall rate in E.E.U.U. it is 65%, and ranges between 40 and 90% depending on the stage. The survival rates for Europe, Japan and Australia are similar and vary between 60% (Switzerland, Japan) and 40% (Poland). Overall, survival is somewhat lower in other countries, such as China, India, the Philippines and Thailand (30-42%).

Objective: To determine the clinical pathological characteristics of patients diagnosed with colorectal cancer that attended SOLCA-Cuenca and determine survival during the period 2005-2013.

Method: It is an observational study. We studied 59 patients with colorectal cancer, diagnosed in the Pathology Department of the Cancer Institute SOLCA-Cuenca and who had complete information in their clinical history.

Results: 29% corresponded to men and 71% to women. The average age was 60 years. 64% had localization in the colon and 36% in the rectum, corresponding to 58% in the right colon, 42% in the left colon. The great majority was adenocarcinoma (92%), moderately differentiated (80%) and poorly differentiated (20%). 85% were clinical stage II. A follow-up of 5 years was possible in 38 cases that ended the treatment (surgery, chemotherapy and radiotherapy) with the following data: EC I alive 77% dead 23%, EC II alive 85% dead 15%, EC III alive 64% dead 36% and EC IV alive 20% dead 80%.

Conclusions: Colorectal cancer is frequent in our environment. It is important to implement screening programs that allow diagnosis at early stages that improve the survival of our population.

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✘ P-131

CANCER INCIDENCE IN GUATEMALA CITY: RESULTS OF A PILOT REGISTRY PROJECTEduardo Gharzouzi; Marion Pineros¹; Graciela Abriata²; Christian Alvarez³; Joaquin Barnoya⁴¹International Agency for Research on Cancer²Instituto Nacional del Cáncer, Argentina³National Cancer Institute⁴INTEGRA Cancer Institute

Background: Guatemala lacks a population-based cancer registry, and must rely on sources such as Globocan to obtain incidence and mortality data.

Purpose of the Project: Answering the GICR's call to develop PBCRs, we obtained funds from NCI to start a pilot project involving five major oncological care referral hospitals in Guatemala City.

Methods: A Cancer Registry Committee was created, involving members from the Ministry of Health, The Pan American Health Organization (PAHO), the Guatemalan Pathology Association, and the 5 referral centers involved. A Procedure's Manual was elaborated outlining case definition, relevant variables and coding criteria in accordance with IARC standards. New cancer cases diagnosed between 2013 and 2015 among residents of Guatemala City (population: 993,815 in 2014) were collected in the following hospitals: 1. Guatemala Cancer Institute (INCAN), 2. HOPE Radiotherapy Center, 3. UNOP (Pediatric Oncology Unit), 4. Roosevelt Public Hospital, and 5. San Juan de Dios Public Hospital. Both active and passive search methods were used to collect data. Canreg5 was used to record and analyze data.

Results: Initiating data collection was facilitated by the creation of the committee, but nevertheless took substantial effort. 3,014 new cancer cases were documented, with 66.4% among females. Basis for diagnosis was mainly by histologic examination of primary tumor (90.8%). More than 35% were 50 years old, and 20.1% were 40 years old. Most common cancers among women were breast (24.5%), cervix (17.7%), non-melanoma skin (8.7%), lymphomas (4.1%) and colorectal (4.0%). Most common cancers among men were prostate (12.7%), non-melanoma skin (10.7%), lymphoma (8.8%), stomach (8.1%) and colorectal (6.5%). Surprisingly, male to female ratio for a number of tumors was almost 1:1 (colorectal, liver, stomach, lung, kidney, CNS, esophagus, bladder).

Conclusions: This is the first observed cancer incidence data recorded for Guatemala. We were able to bring together stakeholders from all levels (Ministry of Health, major public referral centers, PAHO, medical associations). Although this pilot project covered less than 50% of all potential information sources of the city, we were able to create a strong foundation for the development of a future population-based cancer registry for Guatemala City.

STUDENT POSTERS

Parq Salon Pre-Function

NAACCR

PS-1

BENZENE EXPOSURE, LEUKEMIA, AND NON-HODGKIN'S LYMPHOMA IN A SPATIAL CONTEXT

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Background: Chemical, petrol, rubber, and plastic manufacturing are industries with known links to certain cancers. The International Agency for Research (IARC) is part of the World Health Organization and looks to understand causes of cancer. Chemicals are placed into one of five groups by IARC, with Group 1 defined as "Carcinogenic to humans." Benzene is classified as a Group 1 carcinogen. It has been scientifically proven to be linked to leukemia. Exposure sources include pollution, gasoline, tobacco smoke, and designated industries. Studies of industry workers have been conducted resulting in Occupational Safety and Health Administration (OSHA) limits for benzene, but proving the magnitude of risk to workers is made difficult due to varying monitoring standards. There are very few studies evaluating certain cancers, air pollution, and road traffic exposure within a spatial context.

Purpose: Analyzing leukemia and Non-Hodgkin's lymphoma alongside chemical exposure sources will improve general contextual knowledge of exposure. This research will assess and visualize relationships between industrial exposure data and these cancers in the US.

Methods: Using geoinformatic tools we looked at industries, leukemia and Non-Hodgkin's lymphoma to analyze and extract patterns within a spatial context. Geospatial industrial and cancer elements were compiled in a Geospatial Health Context Big Table (GHCBT). The GHCBT includes broad socio-demographic and environmental elements as well as exposure data, such as smoking, plumes, chemical plants, and industry density. Cancer incidence from the Cancer Control P.L.A.N.E.T., that includes combined cancer registry data from the CDC's National Program of Cancer Registries (NPCR) and the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) Program were used.

Discussions: We evaluate, quantify, and display correlations between leukemia, Non-Hodgkin's lymphoma, compiled risk factors, and assess population exposure in the US. The resulting maps demonstrate the application and use in understanding industries and the potential role as a localized or regionalized carcinogen source and inform our understanding of chemical exposures.

Conclusions: Geospatially integrated risk and exposure data can reveal patterns and associations. Key components are discovering new correlations and relationships among integrated parameters.

IACR

PS-2

TRENDS IN CHILDHOOD CANCER MORTALITY IN THE MEXICAN SOCIAL SECURITY HEALTH INSTITUTE, 1990-2015.

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Introduction: The Mexican Institute of Social Security (MISS) covers the health service of 50% of the Mexico population, what makes it the largest social security institution of Latin America.

Type of Study: Ecological.

Aim: Analyze the childhood cancer mortality trends in children attend by the MISS during 1990-2015.

Material: Numerators (Mexican General Deaths Registry, 1990-2015), denominators (Population assigned to Family Doctor MISS, 1990-2015).

Analysis: Estimation of crude rates and standardized rates by direct method using the 2000-2025 WHO World Population. Trends were evaluated by estimating the annual percentage change (APC) and the average annual change (AAPC) fitting a joinpoint regression model.

Results: 15098 deaths were studied. The main causes of death were leukemia (53%), Central Nervous System (CNS) tumors (14.4%) and lymphomas (7.1%). The 99% of deaths caused by eye and orbital tumors occurred in children under 5 years old and 84% of them correspond to retinoblastomas.

For all cancers combined, during 2010-2015 the mortality was 50.6 per 1,000,000 population (men 55.7, women 45.7) and the group mortality were; leukemia (26.9), acute lymphoid leukemia (20.5), acute myeloid leukemia (4.6), CNS tumors (8.8), Hodgkin's lymphomas (0.4), non-Hodgkin lymphomas (2.5), bone and joint tumors (3.0), soft tissue tumors (1.5), kidney and renal pelvis tumors (1.3), liver tumors (1.1) and eye and orbital tumors (0.8). The mortality was higher in males in all the cancer groups except Hodgkin's lymphomas, bone tumors and kidney tumors.

An increasing trend was identified during 1990-1996 (PAC = 3.3) and one to decrease during 1996-2015 (PAC = -3.3). This pattern of tendency was concentrated in leukemia and 5-9 years old males.

Conclusions: The pattern of tendency identified is different from the increase tendency reported for the Mexico national childhood cancer mortality. Nevertheless, the mortality in the MISS is high, 2.5 times the USA rate (50.6 vs 21), which suggests the existence of deficiencies in the treatment that children receive. All the groups of neoplasms studied had high mortality rates. The groups that showed the greatest delay in reduction of their mortality are; leukemia, lymphomas and bones tumors. The tumors that have the least delay are; eye and orbit tumors and kidney and renal pelvis tumors.

IACR
PS-3

VALIDITY OF STATE CANCER REGISTRY TREATMENT INFORMATION FOR ADOLESCENT AND YOUNG ADULT WOMEN

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Population-based cancer registries collect information on first course of treatment that may be utilized in research on cancer care quality, yet few studies have investigated the validity of this information. We examined the accuracy and completeness of registry-based treatment information compared to insurance claims data in a cohort of adolescent and young adult (AYA) women. Women with a diagnosis of breast cancer, Hodgkin lymphoma, non-Hodgkin lymphoma, thyroid cancer, cervical/uterine cancer or ovarian cancer at ages 15-39 during 2003-2014 were identified using data from the North Carolina Central Cancer Registry (NCCCR) (N=2,342). NCCCR data were linked to Medicaid and private insurance claims data, and claims were reviewed for the 12 months following diagnosis to identify cancer treatments received. Using claims data as the gold standard, we calculated the sensitivity and positive predictive value (PPV) of NCCCR data for receipt of chemotherapy, radiation and hormone therapy. Overall, the sensitivity of the NCCCR data was high for chemotherapy (86%) and moderate for radiation (74%). PPVs were 82% and 83% for chemotherapy and radiation, respectively. Both the sensitivity (67%) and PPV (70%) were lower for hormone therapy for women with breast cancer. In this cohort of young women, population-based cancer registry data on chemotherapy receipt was highly accurate and complete in comparison with insurance claims. Radiation and hormone therapy information in the registry appeared to be less complete. Registry and claims data are collected for different purposes and use different criteria to ascertain the treatment information. Thus, investigators should select the treatment data source based on availability and their research questions.

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PS-4

CERVICAL CANCER INCIDENCE TRENDS AMONG NATIONALS OF THE GULF COOPERATION COUNCIL, 1998-2012

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Background: Cervical cancer is the 9th most common cancer in women of all ages among Gulf Cooperation Council (GCC) nationals, and the 5th most common in women aged 30-44 years. GCC states include the United Arab Emirates, Bahrain, Saudi Arabia, Oman, Qatar, and Kuwait; which share similar demographic, socioeconomic and cultural backgrounds.

Age-standardised annual incidence rates (ASIRs) of cervical cancer among GCC nationals have fallen slightly from 2.9/100,000 (1998-2002) to 2.4/100,000 (2008-2012), but the number of women diagnosed has risen from 719 to 852 during the same period, because of demographic change. ASIRs vary from 7/100,000 in Oman to 2/100,000 in Saudi Arabia.

GCC states have been undergoing rapid demographic and cultural changes as well as changes in their health services. These may affect cervical cancer incidence, age of occurrence and stage at diagnosis. Monitoring trends in cancer incidence is crucial for planning services, to meet future demands for diagnosis and treatment and to assess the priorities for prevention (vaccination and screening).

Aim: The aim of this study is to provide detailed trends in cervical cancer incidence among GCC nationals.

Method and results that will be presented: The Gulf Centre for Cancer Registration (GCCR) has maintained a database of cancer in the GCC states since 1998. It receives incident cases from national registries and verifies data quality.

Cervical cancer data for the 15 years 1998-2012 were obtained from the GCCR. Trends in absolute numbers of women diagnosed and in the age-standardised annual incidence rates in each country will be compared. Age-specific incidence rates and ASIR by stage at diagnosis will be presented for all countries combined.

Implications: Trends in the number of women diagnosed are important for public health planning, while age-specific and age-standardised incidence rates give an indication of changes in risk factors. Cancer incidence by stage at diagnosis is important to assess the availability and effectiveness of early diagnostic services, because stage is the major determinant of cervical cancer survival.

STUDENT POSTERS

Parq Salon Pre-Function

IACR
PS-5

RADIOTHERAPY IN PATIENTS AFFECTED BY GLIOBLASTOMA: DOES TIME TO TREATMENT IMPACT ON SURVIVAL? A POPULATION-BASED ANALYSIS USING DATA FROM CONCORD-3

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Background: Radiotherapy is the mainstay of treatment for patients with glioblastoma. The American Society for Radiation Oncology (ASTRO) recommends that radiotherapy should start as soon as possible. Patients enrolled in clinical trials usually start radiotherapy within six weeks of diagnosis, but for patients not enrolled in trials, the great majority, time to treatment may be longer if access to care is sub-optimal. The impact on survival of treatment delay is controversial; current evidence is restricted to small, retrospective, hospital-based studies.

Purpose of the study: To investigate whether survival from glioblastoma varies with time to radiotherapy in the US, using data contributed to the third cycle of the CONCORD programme.

Methods: We included adults (18-70 years) diagnosed with glioblastoma (ICD-O-3 morphology code 9440) during 2000-2014 and for whom the full date (day, month, year) of the first course of radiotherapy is available. Time to radiotherapy is categorised as: less than four weeks, four to six weeks, and more than six weeks ("delayed"). Net survival will be estimated with the non-parametric Pohar-Perme estimator. Estimates will be age-standardised using the International Cancer Survival Standard weights.

Results: Forty-five of 48 participating registries provided information on radiotherapy treatment. In 23 of these registries, full dates of treatment were available for at least 70% of glioblastoma patients undergoing radiotherapy. The final study population comprised 27,711 individuals. The median time to treatment was 31 days (IQR 22-42 days). The proportion of patients starting radiotherapy within four weeks of diagnosis ranged from 26% in Delaware to 56% in Idaho, while the proportion commencing treatment between four and six weeks ranged between 26% in Arkansas and 44% in Delaware. The proportion of patients with a delayed start of treatment varied between 15% in Montana and 30% in Greater California. For all 23 registries combined, and for each registry, we will estimate one-year and two-year net survival before and after stratifying by time to treatment.

Conclusions: If delay in radiotherapy for glioblastoma is associated with survival disparities, the results should prompt investigation of the obstacles to timely access to optimal treatment, including radiotherapy.

IACR
PS-6

DETERMINING RISK OF COLORECTAL CANCER AND THE EFFECT OF SCREENING COLONOSCOPY BASED ON GENETIC RISK SCORE

Feng Guo

Background & Aims: Previous studies have shown that the genetic risk score (GRS), computed based on colorectal cancer (CRC) related single nucleotide polymorphisms (SNPs), could be relevant for risk stratification. This study assessed the association of the GRS with CRC incidence controlled by screening colonoscopy and evaluated whether the effectiveness of screening colonoscopy in reducing CRC incidence differs by GRS.

Methods: We constructed the GRS based on 55 SNPs that are associated with CRC risk. We obtained genetic data from 6600 participants (age range at baseline: 50-75 years) in a population-based cohort study conducted in Saarland, Germany. During a median follow-up of 14 years, a total of 147 incident CRC cases were identified through record linkage with the statewide Saarland Cancer Registry. Cox proportional hazard models were used to examine the association between the GRS and CRC incidence. Time-varying Cox proportional hazard models were performed to evaluate whether screening colonoscopy effect differs with genetic risk.

Results: In the overall population, having a GRS in the medium and high tertile was associated with a 1.3- and 1.8-fold risk of CRC incidence, respectively. When restricted to the population without history of screening colonoscopy use, compared to participants in the low tertile of GRS, those in the medium (adjusted hazard ratio, aHR 1.87; 95% confidence interval, CI 1.09-3.20) and high tertile (aHR 2.59; 95% CI 1.51-4.43) had increasingly higher risk of CRC ($P_{\text{trend}} < 0.001$); however, such significant associations were not noted among colonoscopy-screened population. Compared with no screening colonoscopy, screening colonoscopy use was associated with a 62% and 67% reduction in CRC incidence among people with medium and high GRS, respectively, whereas no significant reduction was observed in the low GRS group.

Conclusion: In this population-based cohort study, we identified that the association between genetic predisposition and CRC risk was reduced among cohorts who had undergone screening colonoscopy. Our findings also indicate that the effects of screening colonoscopy on CRC prevention were not uniform across different genetic risk groups, benefiting those with greater genetic risk for CRC more.

**NAACCR
PS-7**

DIFFERENTIATED THYROID CARCINOMA: A 5-YEARS SURVIVAL STUDY AT A REFERRAL HOSPITAL IN RIO DE JANEIRO

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Background: Although the prognosis of differentiated thyroid carcinoma (DTC) therapy is considered excellent over time, a small number of cases have a poorer prognosis and evolve into death.

Aim: This study aimed to estimate the 5-year specific survival and to identify risk factors in a cohort of DTC adult subjects.

Methods: Survival probability was estimated by the non-parametric Kaplan-Meier method in a retrospective hospital-based cohort study. Comparisons were done by means of the log rank test. Risk factors were sought using Cox risk modeling and crude and adjusted Hazard Ratio measures were obtained.

Results: Specific 5-year survival in the cohort was 98.5% (95% CI: 94.2-97.5%). However, poorer survival was observed for those diagnosed at stage IVC (47.1%; 95% CI: 30.4-73.0%), with a distant metastasis (54.8%; 95% CI: 39.2-76.4%) and submitted to radiotherapy (70.5%; 95% CI: 54.3-91.6%). The main factors associated with risk of death stratified by gender were age \geq 45 years old (aHR 9.88; 95% CI: 1.67-58.33), distant metastasis (aHR 18.87; 95% CI: 7.38-48.29) and lymphadenectomy (aHR 6.36; 95% CI: 2.26-17.91). On the other hand, radioiodine therapy diminished the risk of death (aHR 0.16; 95% CI: 0.06-0.43).

Conclusions: This cohort had a very high survival over a 5-year period. The prognosis was negatively influenced by age \geq 45 years old, distant metastasis and lymphadenectomy, whereas radioiodine therapy was found to be protective.

**IACR
PS-8**

DIFFERENCES IN THE INFLUENCE OF EDUCATION LEVEL ON BREAST CANCER MORTALITY AMONG ASIAN AND NON-HISPANIC WHITE WOMEN

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Background: Breast cancer is the most common cancer among US women. Studies on the relationship between education level and postmenopausal breast cancer (PMBC) mortality in the US have been inconsistent. For US Asians, often seen as a "model" minority in terms of affluence and education, this relationship has never been studied.

Methods: PMBC deaths (ICD-10 code C50) from 2012-2017 in California were analyzed; population data came from the American Community Survey. Age- and education-adjusted mortality rate ratios were computed using negative binomial regression models for Asians in aggregate and for the two largest specific Asian groups, Filipino and Chinese, with non-Hispanic whites (NHW) as the reference group.

Results: In total 15,235 NHW women and 2,371 Asian women died of breast cancer during the study period. Educational attainment was positively associated with mortality from PMBC both in NHW and Asian women. Stratified by educational level, NHWs had higher risk of PMBC mortality than Asian women. However, for Asian women, those who attended college had a 2.6 times higher risk of death from PMBC (MRR: 2.62; 95% CI: 2.25-3.05) than women with less than a high school degree; Among NHW women, the risk was only 11% higher among college educated women (MRR: 1.11; 95% CI: 1.04-1.19). Within Asians, there was considerable heterogeneity in the effect of education on PMBC mortality: Compared to their counterparts with less than high school education, the risk for college educated Filipinos was 2.8 times higher; for Chinese women the risk was 1.9 times higher.

Conclusions: Given that breast cancer survival has been shown to be higher among women with higher education across all race/ethnicities, our mortality findings can only be explained by a true increased risk of PMBC among highly educated Asian women. Lower parity, older age at first birth, higher uptake of hormone replacement therapy and negative acculturation for Asians are possible causes. More studies are necessary to uncover potential avenues for intervention to reduce the future burden of PMBC among Asian women.

STUDENT POSTERS

Parq Salon Pre-Function

IACR
PS-9

PERFORMANCE INDICATORS FOR A HUMAN RIGHTS-BASED APPROACH TO CANCER CONTROL, USING CANCER REGISTRY DATA (CONCORD-3)

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Background: The first UN Special Rapporteur on the right to health (2002-2008) has argued that human rights-based approaches (HRBA) were not legally grounded in the right to health as written in international law.¹ For cancer, however, a HRBA with a formal legal basis might save more lives than expensive treatments for a small proportion of patients. Thus far, attempts to define a HRBA to health have shown only a limited understanding of the international human right to health. These attempts have mostly been made in the field of maternal, child and reproductive health.

Purpose: We aim to define a HRBA to cancer, and to construct indicators to measure its implementation worldwide. Using results from the CONCORD programme for global surveillance of cancer survival, we will explore the association between these indicators and population-based survival.

Methods: After examining 2,526 articles on HRBA and the right to health, we selected 30 studies for formal review. We also performed a normative analysis of international and regional legal instruments that mention the right to health. We made a final selection of indicators. We will correlate these indicators with population-based cancer survival estimates for countries that have participated in the CONCORD programme, by calendar period of diagnosis.²

Results: We will present preliminary results on the international correlation between indicators of a HRBA to cancer and population-based cancer survival.

Conclusion: This study will help experts define a HRBA to cancer. By exploring the international correlation between cancer survival and indicators of a HRBA to cancer, we will find which attributes from legal texts tend to be associated with the best health outcomes. The results may help policy-makers define more effective strategies to achieve universal health coverage for cancer.

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NAACCR
PS-10

CAUSE OF DEATH AMONG 688,474 CANCER PATIENTS: NANDE STUDY LINKING VITAL STATISTICS DATA AND POPULATION-BASED CANCER REGISTRY DATA

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Background: Survival information on Japanese cancer patients is limited to their survival status, and the cause of death is often unknown. Additional information such as time trends are lacking and the detailed causes of death among cancer patients are not clear.

Purpose: To estimate the rates of index cancer deaths, non-index cancer deaths, and non-cancer deaths in cancer patients, and to clarify the long-term cause of death other than cancer of cancer patients.

Methods: We analyzed vital statistics (VS) data between 1995 and 2016, along with population-based cancer registry data from Osaka Prefecture, Japan, (Osaka Cancer Registry, OCR) for patients diagnosed between 1985 and 2013. The survival, mortality, hazard and 95% confidence interval (CI) were estimated by using the competing risk analysis for three causes of death: index cancer death, non-index cancer death, and non-cancer death. These parameters were compared and examined for temporal trends. The present study was one of the derived studies conducted by the collaborative study group, NANDE (Neoplasms And other cause of Death).

Results: The final data set contained data for 688,474 cancer patients. A total of 394,146 deceased persons were included during the observation period (median: 4.90 years, mean: 5.35 years). The 10-year overall survival rate was 37.5% (37.48%–37.76%) for all cancers. Immediately after the onset of cancer, the hazard of index cancer death was high, and the hazard of the three causes showed no significant difference within 5–8 years. In mouth and pharynx cancer, the proportion of non-index cancer deaths was high. In breast and liver cancer with high rates of recurrence, the hazard of index cancer death was constant. In prostate, breast and laryngeal cancers with good prognosis, the hazard of non-index cancer and non-cancer deaths monotonically increased.

Conclusion: Through this study, the temporal trends in the hazard of three causes of death after the diagnosis of cancer were clarified and the features of each cancer site were revealed.

NAACCR
PS-11

REDUCING OVERUSE OF NONSPECIFIC TUMOR REGISTRY CODES THROUGH DATA VISUALIZATION

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Background statement: Tumor registry data quality is dependent on detailed cancer data variables and the use of accurate and specific codes. The overall quality of this data is often not visualized in real time. Therefore, Kaiser Permanente Mid-Atlantic States (KPMAS) has created data visualization dashboards that provided immediate quality feedback. They effortlessly detect overused values for non-specific tumor registry abstract variables including code categories: Unknown (99), Not Applicable (88) or Not Otherwise Specified (NOS).

Purpose of the Project: To improve completeness and accuracy of tumor registry data quality through data visualization

Methods: An initial assessment of tumor registry data quality was performed in 2016 and assessed for changes in missing/unknown and not otherwise specific codes (e.g. 99, 88, NOS) for: Date of Initial Diagnosis, Behavior, Morphology, Grade, Class of Case, Vital Status, Summary Stage 2000 and AJCC Group Stage. Use of non-specific primary site codes and unknown primary site (e.g. C50.9 or C80.9) was also monitored. Daily updated interactive Tableau® dashboards linked to the tumor registry database and visualized all cancer cases and quality was re-assessed in 2018.

Results: In 2016, there were 17,706 cases in the KPMAS tumor registry and post data visualization in 2018, 24,237 cases. Review of bi-monthly interactive Tableau® dashboards showed a steady decrease in missing/unknown as well as unspecified codes being used. Missing/unknown date of initial diagnosis reduced from 0.11 to 0.0%, Behavior 29.0 to 12.0%, Morphology 29.0 to 12.0%, Grade 47.1 to 40.6%, Class of case 29.1 to 12.3%, Vital status 4.7 to 0.04%, SEER Summary Stage 47.5 to 25.6%, AJCC Group Staging 73.0 to 34.2%. Not otherwise specified codes improved from 11.2 to 2.8% for primary site, 0.54 to 0.04% for unknown primary site, and 0.2 to 0.04% for histology.

Conclusions/Implications: KPMAS tumor registry was able to reduce the missing/unknown/not otherwise specified codes from the database by visualizing the status of data variable in real time. The visualization will be expanded to include treatment information variables and can be adapted by other tumor registries.

NAACCR
PS-12

FEATURES OF THE CAUSE OF DEATH BY AGE IN BREAST CANCER PATIENTS AND BY YEARS AFTER DIAGNOSIS: NANDE STUDY LINKING VITAL STATISTICS DATA AND POPULATION-BASED CANCER REGISTRY DATA

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Background: The cause of death in cancer patients with good prognosis is more difficult to identify than in those with poor prognosis. The number of people who die of primary cancer typically decreases at 5 years or more after their diagnosis. Conversely, the 5-year relative survival rate of breast cancer is 90% or more; however, the mortality rate over 5 years is constant.

Purpose: To clarify the cause of death of cancer patients with respect to diagnosis age and years after diagnosis.

Methods: We analyzed vital statistics (VS) data between 1995 and 2016, along with population-based cancer registry data of Osaka Prefecture, Japan (Osaka Cancer Registry, OCR) for patients diagnosed between 1985 and 2013. The mortality and hazard were estimated using the flexible survival analysis for three causes of death that were index cancer death, non-index cancer death and non-cancer death. These parameters were compared in age classes and were examined for temporal trends. The present study was one of the derived studies conducted by the collaborative study group, NANDE (Neoplasms And other cause of Death).

Results: More than half of breast cancer patient deaths under 75 years were index cancer deaths. Conversely, breast cancer death was less than half in patients 75 years and older. The rate of non-cancer death gradually increased: at 85 years or over, more than half were non-cancer deaths. The proportion of other cancer death was within 10% at the age of 64 years and 10%–16% at the age of 65 years and over. In people under 60 years of age, the hazard of breast cancer death decreased, and non-cancer death increased, as the years after diagnosis increased. Conversely, a similar tendency was not observed in people under 60 years of age.

Conclusions: This study clarified the characteristics of cause of death with respect to the diagnosed age of breast cancer patients and the years passed after the diagnosis. In younger people, the breast cancer death rate was high even 10 years after diagnosis.

STUDENT POSTERS

Parq Salon Pre-Function

NAACCR
PS-13

CANCERS ATTRIBUTABLE TO OVERWEIGHT AND OBESITY FROM 2012 TO 2014 IN NIGERIA: A CANCER REGISTRY STUDY

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Background: Overweight and obesity are known risk factors for chronic diseases including cancers. In this study, we evaluated the age standardized incidence rates (ASR) and proportion of cancers attributable to overweight and obesity in Nigeria.

Methods: We obtained incidence data from the databases of two population based cancer registries (PBCRs) in Nigeria (Abuja and Enugu cancer registries) on cancers site for which there is established evidence of an association with overweight or obesity based on the International Agency for Research on Cancer and the World Cancer Research Fund classification. We analyzed the data using proportion attributable fraction (PAF) for overweight or obesity associated cancers calculated using prevalence data and relative risk estimates in previous studies.

Results: The two PBCRs reported 4,336 new cancer cases (ASR 113.9 per 100,000) from 2012 to 2014. Some 21% of these cancers were associated with overweight and obesity. The ASR for overweight and obesity associated cancers was 24.5 per 100,000; 40.7 per 100,000 in women and 8.2 per 100,000 in men. Overall, only 1.4% of incident cancers were attributable to overweight and obesity. The ASR of cancers attributable to overweight and obesity was 2.0 per 100,000. Postmenopausal breast cancer was the most common cancer attributable to overweight and obesity (n=25; ASR 1.2 per 100,000).

Conclusion: Our results suggest that a small proportion of incident cancer cases in Nigeria are potentially preventable by maintaining normal body weight. The burden of cancer attributed to overweight and obesity is still relatively small in Nigeria, but it may increase in the future.

IACR
PS-14

CLINICAL AND SOCIODEMOGRAPHICS CHARACTERISTICS ASSOCIATED WITH THE BEGINNING OF BREAST CANCER TREATMENT BETWEEN WOMEN RESIDENT IN THE BRAZILIAN NORTHEAST REGION, 2006-2015

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Introduction: Increasing estimates of breast cancer incidence reinforces the need to plan public policies in order to improve care for cancer patients. In the last three decades in Brazil, breast cancer has become the leading cause of cancer death in the population feminine. Inequalities in access to health services are related with socioeconomic level and other factors that make it difficult to reach the beginning of treatment.

Aims: To analyze the time elapsed between breast cancer diagnosis and initiation of treatment in woman resident in Northeast region treated in the Brazilian public health system from 2006 until 2015 and to identify factors associated with delayed onset of treatment.

Methods: This cross-sectional study was performed using the data from the Hospital Registry of Cancer (RHC). Due to the large difference in the median time, the analysis were stratified by three categories of treatment surgery, radiotherapy and chemotherapy. Breast cancer treatment probability was estimated by the non-parametric Kaplan-Meier method in a retrospective hospital-based cohort study. Comparisons were done by log-rank test. Prognosis factors were sought using a semi-parametric Cox risk modeling and crude and adjusted Hazard Ratio measures were obtained.

Results: The median time between diagnosis and initiation of treatment was 48 days for the group of women who underwent surgery or chemotherapy. The overall probability of receiving treatment within 60 days was much higher, being 0.60 (95% CI: 0.59-0.61) and 0.63 (95% CI: 0.61-0.64), respectively. However, for women undergoing radiotherapy, median time was 91 days and the overall probability of receiving treatment within 60 days was 0.35 (95% CI: 0.32-0.39).

Conclusions: Sociodemographics differences were found among woman of study. More favorable social conditions was associated with a greater risk of being treated within 60 days. For women with more advanced stages the treatment were received within less time because they have a worse prognosis of the disease. It was clear that the delay to carry out radiotherapy was related with the scarce supply of this treatment in Brazilian northeast region.

IACR
PS-15

USING HEALTH MINISTRY MASS NOTIFICATION SYSTEMS TO IMPROVING DATA QUALITY IN CANCER REGISTRIES

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Background: In Colombia, cancer notification is compulsory since 2015. However, reliance solely on passive (electronic) registration practices does not seem to be an appropriate strategy to obtain complete accurate incidence data. Having good quality statistics on cancer burden is essential to make an accurate diagnostic of the cancer problem and to design, implement and monitor control measures. Notification systems on cancer implemented by the Latin American Health Ministries have certain limitations in terms of completeness, comparability and data validity [1].

Aims: Implement a system for using data from the Health Ministry mandatory notifications in the Cali Cancer Population-based Registry (RPCC), Universidad del Valle.

Methods: RPCC monthly received flat files with general mortality data from the Municipal Health Secretary and breast, cervix and childhood cancer data from the Public Health Surveillance System. A set of instructions to process structures during data extraction was defined and rules for naming tables, parameters and relations were specified. Data was debugged through text processing functions using regular expressions, control fluxes and nested loops [2]. Data was stored in a transactional and analytical model based on facts-dimensions relations [3].

Results: In 2018, the Cali Municipal Secretary of Health notified the RPCC of 3562 deaths from cancer in all sites and 3196 cases of breast, cervix and childhood cancer, of which 46% were new cases. Data from notification systems updated identity (9%) and residence (23%) of 3662 prevalent cases. Death certificate updated vital state and last-contact date of 97% of these.

Conclusions: It's a priority to implement schemes, structures and tag languages for standardizing processes and improving interoperability of cancer registry systems in Latin America. Notification systems contribute improving exhaustivity and quality of data in cancer registries.

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IACR
PS-16

DETECTING EFFECTS OF HOLIDAYS AND SEASONALITY ON FEMALE BREAST CANCER INCIDENCE USING CENTRAL CANCER REGISTRY DATA

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Background: Effects of holidays and seasonality have been widely studied in different fields. However, few efforts have been made to apply time series techniques to analyze cancer incidence data.

Purpose: To explore daily and monthly incidence of female breast cancer (FBC). For daily data, we sought to quantify holiday effects and detect cyclical patterns. For monthly data, we focused on detecting the effect of FBC awareness month (October) as well as quarterly or annual effects.

Methods: We used Missouri Cancer Registry data. It included complete date (YYYYMMDD) incidence cases of invasive FBC from 1996 to 2015 in Missouri (N=84,792 cases). For daily data (n=7,305 days), a generalized linear model (GLM) was used to quantify effects of holidays and weekends. "Holidays" included New Year's Day, Birthday of Martin Luther King Jr., Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Black Friday, Christmas Eve and Christmas Day. Based on spectrum analysis, a Bayesian structural time series (BSTS) model was employed to detect weekly/annual effects. For monthly data (n=240 months), seasonal decomposition of time series by LOESS (STL) was used to detect annual effects and the awareness month effect.

Results: For daily data, holidays and weekends were associated with lower incidence of FBC compared with other days. Among holidays, Christmas Day, Thanksgiving Day and Independence Day had the lowest incidences. For holidays that might happen either on a weekday or weekend, lower incidence was associated with weekends. A slight but significant positive linear trend was displayed. The incidence on each day was associated with the previous day, week, month and year before. For monthly data, a positive linear trend per year was detected. Annual seasonality appeared with lowest incidence in February and peaked in October. More results will be presented in June.

Conclusion: Both daily and monthly data indicated a slight upward linear trend for incidence of FBC per year. Daily data implied that holidays and weekends had lower incidence of FBC. Possible seasonality appeared and further analysis should be conducted. Monthly data showed that annually seasonality exists and FBC awareness month was associated with higher incidence.

STUDENT POSTERS

Parq Salon Pre-Function

IACR
PS-17

HOSPITAL SURGICAL VOLUME AND 3-YEAR SURVIVAL FOR PANCREATIC CANCER PATIENTS WHO RECEIVED A CURATIVE SURGERY WITH CHEMOTHERAPY

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Background: A number of studies have demonstrated that high-volume centers are associated with improved clinical short-term outcomes for pancreatic cancer in some developed countries. However, whether long-term outcomes are superior at high-volume centers is unknown.

Purpose: Objective of this study was to estimate long-term survival for pancreatic cancer patients who underwent operations and given chemotherapy according to hospital surgical volume in Japan.

Methods: 1294 cases who received a curative surgery at 88 institutions to remove primary carcinoma and also received chemotherapy for pancreatic cancer in 2006-2013 were identified in the Osaka Cancer Registry database. Hospital surgical volume was classified into tertile according to the number of operations for pancreatic cancer underwent per hospital (low/middle/high). Survival analysis was restricted to the reported cases who lived in Osaka Prefecture since follow-up data on vital status 3 years after the diagnosis were available. A cumulative survival was estimated using the Kaplan-Meier method. The hazard ratio (HR) with 95% confidence interval (CI) for hospital surgical volume were calculated using the Cox proportional hazards regression models for 3-year survival since pancreatic cancer diagnosis, adjusting for age, sex, living area, year of diagnosis (2006-2008, 2009-2011, 2012-2013), cancer stage (localized, regional, distant), and radiotherapy (done, not done).

Results: 3-year survival was higher with increased hospital surgical volume (low: 31.6%; middle: 41.2%; high: 50.3%). After adjustments for all confounding factors, significantly higher HRs for 3-year survival were observed in the middle and low volume groups compared with the high volume group: HR (95%CI) of middle volume group was 1.26 (1.03-1.53), and HR (95%CI) of low volume group was 1.71 (1.38-2.11).

Conclusion: The prognosis of pancreatic cancer patients is significantly better in high-volume centers after adjustments for several confounding factors. Our results suggested that centralization may improve outcomes in pancreatic cancer.

IACR
PS-18

SECOND MALIGNANT NEOPLASM (SMN) SURVIVAL DIFFERENCE AMONG CHILDHOOD CANCER PATIENTS

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It has previously been established that survivors of childhood cancer face an increased risk of developing second malignant neoplasms (SMNs) as a late effect of childhood illness. A review of literature indicates that between 1.2-5.3% of patients will have a second malignancy, with the average elapsed time between first and second cancer being 3.41 (range: 0.00-24.06) years. During a preliminary review of RI registry data focused on the SMN occurrence in pediatric patients, it appeared that those who were diagnosed with a second cancer more than five years after their first diagnosis were more likely to be alive than those who had a SMN within five years. To our best knowledge, differential prognosis of SMNs by elapsed time between the first and second tumors, has not, thus far, been demonstrated in published reports. We evaluated survival from second malignant neoplasms by elapsed time (interval between first and second diagnosis, SMN within 0-5 years after the first tumor diagnosis versus >5 years). Study dataset was constructed from the Rhode Island Cancer Registry (year of diagnosis: 1995-2016) and the Connecticut Cancer Registry (year of diagnosis: 1995-2015; source: the Surveillance, Epidemiology, and End Results (SEER) database). We created Kaplan-Meier plots using R, analyzing survival probabilities of SMNs for two study groups categorized by elapsed time of SMN development. Of 103 cases in total, we identified 45 SMN cases occurring within five years after the first tumor, with 53.30% of children surviving. In comparison, of 58 SMN cases more than five years after the first tumor diagnosis, 79.30% of children survived. Statistical evaluation of these findings will be presented upon the completion of this project. Through this preliminary study, we have found that though childhood cancer survivors have a higher risk of developing SMNs, there has been a significant success in the treatment of SMNs that occur as a secondary effect of childhood cancer. However, further research is needed to evaluate the validity of the survival rates found for late-effect SMNs based on time elapsed from first diagnosis, controlling patient demographics (sex/age), with more cancer-related factors (such as year of diagnosis, cancer type, behavior, staging, treatment outcomes and more).

**NAACCR
PS-19**

STUDY PROTOCOL - STUDY OF MODIFIABLE RISK FACTORS FOR INSTITUTING EVIDENCE BASED PREVENTIVE STRATEGY FOR CARCINOMA ESOPHAGUS IN PUNJAB

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Background: In Punjab, esophageal cancer is becoming leading cancer in rural population. Reason for increase in incidence of esophageal cancer in this region is unknown. The lifestyles of people in Punjab is different from those of other areas of India. Therefore, the risk factors contributing to esophageal cancer may also be different between Punjab and other areas of India. There are no previous studies on risk factors for increase in esophageal cancer in this region. Use of pesticides is much higher in Punjab state. Further use of fumigants i.e. Aluminum Phosphide in grain storage is also prevalent in Punjab. Also there is no evidence available for association of use of pesticides/fumigants in occurrence of esophageal carcinoma.

Purpose of the study: To identify the risk factors, especially the role of chemical toxicity (Pesticides/fumigants/heavy metals) associated with development esophageal carcinoma among inhabitants of Punjab.

Methods: A case-control design will be used to identify potential risk factors associated with development of carcinoma esophagus in Punjab. Cases will be recruited from Department of gastroenterology, PGIMER, Chandigarh, Population based cancer registry Mansa, Sangrur, SAS Nagar and Punjab Cancer control cell. For each esophageal cancer case 2 controls (Hospital based & community based) will be selected after matching for gender, Age (± 5 years) and area of residence.

A pre-designed questionnaire, which will include demographic characteristics (age, sex, religion, etc.), family cancer history, personal medical history, height, weight, life-style (habits such as smoking, chewing, alcohol drinking, etc.), dietary habits and dietary items, fumigants and pesticide usage and practices etc., will be used. To study HPV and for H. Pylori infections in relation to carcinoma esophagus, biopsy and blood samples will be taken from the study subjects. Urine & grain sample will be taken for analysis of pesticides. Heavy metals analysis will be done in water samples. Oral health will be examined for mucosal changes as well as for oral hygiene.

Discussion: This study will results in identification of risk factors for high occurrence of Carcinoma Esophagus in Punjab, so that measures for early detection, prevention and control of Carcinoma Esophagus could be initiated.

**IACR
PS-20**

DEVELOPING A QUALITY REGISTRY NETWORK ON COLORECTAL CANCER CARE (QRN-CRC) IN IRAN; REPORT OF THE PILOT PHASE

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Introduction: The clinical cancer registry program (CCRP) in Iran was first established in 2013. The aim of this Quality Registry Network was developing a robust model of colorectal cancer (CRC) care quality assessment based on the CCRP to determine the role of related health authorities, insurance organizations and scientific societies in the country.

Methods: We reviewed the medical records of all CRC patients who underwent surgery in one of the four major cancer centers in Iran from January 2013 to December 2015. All included patients or their families were called to assess the applicability of the model retrospectively. After analyzing the data and conducting feasibility study, main quality indicators and related clinical variables in CRC care were determined. Next, we developed an appropriate feasible model of quality of care assessment for CRC in which a combination of survival analysis and indicator assessment was deemed.

Results: The model was stratified for non-metastatic and synchronous metastatic CRC patients. For both non-metastatic and metastatic group the main steps of the proposed model included 1- Cause specific overall survival (specified for gender and age groups), 2- Comorbidity adjusted overall survival, and 3- In-hospital mortality rate. For non-metastatic group the model consisted of 1- Disease free (DFS) and relapse free survival (RFS) for stages I-III of colon and rectal cancers, 2- One and six months postoperative mortality rate, 3- Rate of emergent surgery, 4- Rate of Surgical margins involvement, 5- Rate of not receiving adequate neo-adjuvant and adjuvant treatment or inappropriate time interval to surgery, 6- Rate of inadequate lymph node harvesting and its effect on receiving adjuvant therapy. In synchronous metastatic group the model comprised 1- Overall survival rate for all sub-groups M1a, M1b and M1c, 2- Proportion of stage IV patients received the first line of systemic or targeted therapy, and 3- Proportion of patients with CRC and hepatic metastasis turned into resectable cancer.

Conclusion: This is the first effort aiming at customizing a model of quality of care assessment for common cancers in Iran. The robustness of the achieved model need to get evaluated further by policy-makers' and experts' opinions.

STUDENT POSTERS

Parq Salon Pre-Function

NAACCR

PS-21

DEVELOPMENT OF AN INNOVATIVE SECURE PLATFORM FOR CONDUCTING NEEDS ASSESSMENTS OF THE AVAILABILITY AND QUALITY OF CANCER CARE SERVICES IN CITIES

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Background: City Cancer Challenge (C/Can) empowers a global community of cities with the tools, processes and structures to improve cancer care locally. The City Needs Assessment Questionnaire was developed [1] to provide in-depth information on the state of cancer treatment and care services in a city. To facilitate systematic data collection and analysis an online platform was developed in partnership with the Cali Cancer Population-based Registry, Colombia.

Aim: Develop a secure web platform for building and managing online databases to systematically gather reliable data on the availability and quality of cancer care services.

Methods: The Questionnaire consists of four sections: 1) institutional overview, 2) management of cancer care services, 3) core cancer services and 4) community access and integrated care, with a total of 1471 questions. A model for assigning variables to each question was created following a logical hierarchy for each section. The Questionnaire was entered in the REDCap platform, a web-based electronic data collection application created by the Vanderbilt University [2]. Questions were assigned advanced functions including automatic validation, calculated fields, file upload and bifurcation logic. A multifunctional team then reviewed the Questionnaire for optimal usability and consistency.

Results: A web-based platform was created for data collection on the Questionnaire in participating cities. This platform includes interactive aids and mechanisms to improve traceability of variables from data collection to analysis. Streamlined external reporting modules also ensure consistent and robust data analysis. It is currently being piloted in two cities, Porto Alegre (Brazil) and Kigali (Rwanda).

Conclusions: This tool will facilitate consolidation of needs assessment data collected by C/Can, enabling clean, real-time and remote analysis of a city's cancer care situation for the first time.

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PROGRAM-AT-A-GLANCE



TIME	MONDAY, JUNE 10	TUESDAY, JUNE 11	WEDNESDAY, JUNE 12	THURSDAY, JUNE 13	TIME
6:30 am		BREAKFAST Parq Salon ABCD: 6:30am - 8:00am	BREAKFAST Parq Salon ABCD: 6:30am - 8:00am	BREAKFAST Parq Salon ABCD 6:30am - 8:00am	6:30 am
7:00				FREE FUN RUN / WALK Meet in Hotel Lobby 6:30am - 7:30am	7:00
7:30		WELCOME & OPENING CEREMONIES Parq Salon EF: 8:00am - 8:30am	CONCURRENT SESSION 3 Various Rooms: 8:00am - 9:30am	FLCSC LMS USER GROUP: 7:00am - 8:00am	7:30
8:00	COLLECTING MEANINGFUL QUALITATIVE DATA Fairview I: 8:00am - 12:00pm	DR. NADINE CARON & PLENARY SESSION 1 Parq Salon EF: 8:30am - 10:00am	BREAK/POSTERS/EXHIBITS: 9:30am - 10:00am	DR. ALEJANDRO MOHAR BETANCOURT & PLENARY SESSION 4 Parq Salon EF: 8:00am - 10:00am POSTER AWARDS 9:20am - 10:00am	8:00
8:30	ADVANCED SEER*STAT SOFTWARE TRAINING Fairview III: 8:30am - 5:30pm	BREAK/POSTERS/EXHIBITS: 10:00am - 10:30am	NAACCR YOUNG TALK #3: 9:35am-9:55am		8:30
9:00	IACR BOARD OF DIRECTORS MEETING Fairview IV: 9:00am - 5:30pm	NAACCR YOUNG TALK #1: 10:05am - 10:25am	DR. JAMES BRIERLEY & PLENARY SESSION 3 Parq Salon EF: 10:00am - 12:00pm	BREAK/POSTERS/EXHIBITS: 10:00am - 10:30am	9:00
9:30	TOOLS AND SOFTWARE TO AUTOMATE AND NORMALIZE THE CANCER DATA ABSTRACTION WORKFLOW Fairview II: 12:00pm - 4:00pm	CONCURRENT SESSION 1 Various Rooms: 10:30am - 12:00pm	LUNCH ON YOUR OWN/POSTERS/EXHIBITS Parq Salon ABCD & Kitsilano Salon D: 12:00pm - 1:30pm	NAACCR YOUNG TALK #4: 10:05am - 10:25am	10:00
10:00	PROFESSIONAL DEVELOPMENT STEERING COMMITTEE MEETING Kitsilano Salon C: 4:00pm - 5:30pm	CONCURRENT SESSION 1 Various Rooms: 10:30am - 12:00pm	NAACCR BUSINESS MEETING Parq Salon EF: 12:30pm - 1:30pm	CONCURRENT SESSION 4 Various Rooms: 10:30am - 12:00pm	10:30
10:30	RESEARCH & DATA USE STEERING COMMITTEE MEETING Fairview I: 4:00pm - 5:30pm	LUNCH ON YOUR OWN POSTERS/EXHIBITS: 12:00pm - 1:30pm	STATISTICAL SUMMIT GROUP MEETING <i>(Invitation Only Please)</i> Kitsilano Salon B: 2:00pm - 4:00pm	LUNCH ON YOUR OWN/POSTERS/EXHIBITS Parq Salon ABCD & Kitsilano Salon D: 12:00pm - 1:30pm	11:00
11:00	INTERNATIONAL FELLOWSHIP AWARDEE MEETING <i>(Invitation Only Please)</i> Burrard: 5:00pm - 6:30pm	CLEMESSEN LECTURE: DR. ELISABETE WEIDERPASS & PLENARY SESSION 2 Parq Salon EF: 1:30pm - 3:00pm	MEET at Hotel Lobby: 3:20pm - 6:30pm	CONCURRENT SESSION 5 Various Rooms: 1:30pm - 3:00pm	11:30
11:30	MEET & MINGLE Parq Salon ABCD & Parq Salon Pre-Function: 5:30pm - 7:00pm	BREAK/POSTERS/EXHIBITS: 3:00pm - 3:30pm	LEADERSHIP MEETING Kitsilano Salon C: 4:30pm - 6:00pm	BREAK/POSTERS/EXHIBITS: 3:00pm - 3:30pm	12:00 pm
12:00 pm		NAACCR YOUNG TALK #2: 3:05pm - 3:25pm	AWARD CEREMONIES: 4:40pm - 5:15pm	DR. ANIL CHATURVEDI & PLENARY SESSION 5 Parq Salon EF: 3:30pm - 4:40pm	12:30
12:30		CONCURRENT SESSION 2 Various Rooms: 3:30pm - 5:00pm	INVITATIONS FOR 2020: 5:15pm - 5:30pm		1:00
1:00		BIRDS OF A FEATHER: TAKING FLIGHT I Granville: 5:15pm - 6:15pm			1:30
1:30		2019 IACR/NAACCR COMBINED RECEPTION Parq Pre-Function & Parq Salon EF: 6:30pm - 9:30pm			2:00
2:00					2:30
2:30					3:00
3:00					3:30
3:30					4:00
4:00					4:30
4:30					5:00
5:00					5:30
5:30					6:00
6:00					6:30
6:30					7:00
7:00					7:30
7:30					7:30

Plenary Sessions

Concurrent Sessions

Other Meetings

Break/Lunch/Breakfast

Breaks: Parq Salon ABCD