Capturing EMR Data for Cancer Research and Registry Enhancement: A Florida Case Study

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SYLVESTER COMPREHENSIVE CANCER CENTER
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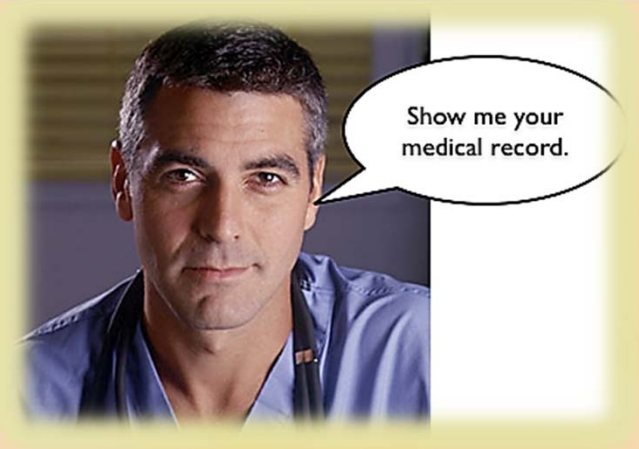
Background and Objectives

- AHRQ – The Agency for Healthcare Research and Quality Multiple Chronic Conditions Research Network
  - Capture EMRs to conduct complex patient analysis
  - Identify potential enhancements to cancer registry records
- Hospital EMRs can contain useful information for cancer outcomes research and registry enhancement
- Ca Registry – limited treatment info. Chemo fields have minimal information (yes/no, single/multi agent)
- Analysis of treatment efficacy, delays and quality of care, re-admissions due to Tx complications
- Research Team -- Florida Department of Health, the Florida Cancer Data System, U of Miami, Fl. A&M Uni.

Methods



- FCDS/DOH partnered with large ACoS hospital system (nine hospital facilities)
- ICD-9-CM Invasive Cancers Trigger Mechanism
- Admission years 2007-2010; medication records 2007-2011
- Selection of relevant EMR data elements using NAACCR items
- Patient linkage (deterministic and probabilistic)
- De-identification patient and provider
- Creation of study database for Ca of breast only

Data Item	FCDS	Hospital
	Type	Type
Admissions date	Date	Date
Primary Site	ICD-O-3	ICD-9 Diagnosis code 1-30
Laterality	Code	text
Grade	Code	text
Diagnostic Confirmation	Code	text
Histologic Type ICD-O-3	Code	text
Behavior Code ICD-O-3	Code	text
Regional Nodes Pos	Code	text
Regional Nodes Examined	Code	text
TNM Clin T (breast/rectum)	Code	text
TNM Clin N	Code	text
TNM Clin M	Code	text
TNM Clin Stage Group	Code	text
TNM Clin Descriptor	Code	text
Lymph-Vascular Invasion	Code	text
RX Date--Surgery	Date	ICD-9 Proc/CPT Date
RX Date--Radiation	Date	ICD-9 Proc/CPT Date
RX Date--Chemo	Date	ICD-9 Proc/CPT Date
RX Date--Hormone	Date	ICD-9 Proc/CPT Date
RX Date--BRM	Date	ICD-9 Proc/CPT Date
RX Date--Other	Date	ICD-9 Proc/CPT Date
Date of 1st Crs RX	Date	DERIVED - If done in hosp
RX Summ--Treatment Status	Code	ICD-9 Proc/CPT/REV
RX Summ--Surg Prim Site	Code	ICD-9 Proc/CPT/REV
RX Summ--Scope Reg LN Sur	Code	ICD 9 Proc
RX Summ--Surg Oth Reg/Dis	Code	ICD 9 Proc

Data Item	FCDS	Hospital
	Type	Type
RX Summ--Radiation	Code	ICD-9 Proc/CPT/REV
RX Summ--Surg/Rad Seq	Code	Using dates of procedures
RX Summ--Chemo	Code	ICD-9 Proc/CPT/REV
RX Summ--Hormone	Code	ICD-9 Proc/CPT
RX Summ--BRM	Code	ICD-9 Proc/CPT
RX Summ--Other	Code	ICD-9 Proc/CPT
Rad--Regional RX Modality	Code	REV/CPT/CHRG Description
Text--DX Proc--X-ray/Scan		TEXT
Text--DX Proc--Scopes		TEXT
Text--DX Proc--Lab Tests		TEXT
Text--DX Proc--Path		TEXT
Text--Primary Site Title		TEXT
Text--Histology Title		TEXT
CS Tumor Size	Number	TEXT
CS Extension	Code	TEXT
CS Tumor Size/Ext Eval	Code	TEXT
CS Lymph Nodes	Code	TEXT
CS Lymph Nodes Eval	Code	TEXT
CS Mets at DX	Code	TEXT
CS Mets Eval	Code	TEXT
CS Site-Specific Factor 1-24	Code	TEXT
Tobacco Use	Code; cigarette, other smoke, smokeless, NOS	Patient reported; none, current, within past year, greater than 1 year ago
height	Number	centimeters
weight	Number	kilograms
Age at DX	Number	Number

Data Item	FCDS	Hospital
comorbidities	NONE	ICD-9 CM/Health History
Family history of breast cancer	NONE	Health History
Medications AND chemo agents	NONE	Name, order date, stregth dose and unit, route of administration, drug form,
Medication order action dates	NONE	DATE
DX Date	Date	NONE
DX Stage	Code	NONE
Reason for No Surgery	Code	NONE
Reason for No Radiation	Code	NONE
RX Summ--Systemic/Sur Seq	Code	NONE
Text--DX Proc--Op		NONE
Text--Staging		NONE
RX Text--Surgery		NONE
RX Text--Radiation (Beam)		NONE
RX Text--Radiation Other		NONE
RX Text--Chemo		NONE
RX Text--Hormone		NONE
RX Text--BRM		NONE
RX Text--Other		NONE
Trnsplant_Endo		NONE
Trmsplant_Endo_Date	DATE	NONE

Treatment Data

Treatment	FCDS	Hospital
Chemotherapy	Single/multiple agent Date chemo initiated Text	**Medications:** Frequency, route of administration, strength dose/unit, drug form, order action date, order action type (complete, discontinue, cancel, resume, suspend), site of administration, infused volume/unit, dosage amount. **CPT/ICD-9 Procedure codes**
Hormone Therapy	Given/not given Date therapy initiated Reason not given Text	**Medications:** Frequency, route of administration, strength dose/unit, drug form, order action date, order action type (complete, discontinue, cancel, resume, suspend), site of administration, infused volume/unit, dosage amount. **CPT/ICD-9 Procedure codes**
BRM/Immunotherapy	Given/not given Date therapy initiated Reason not given Text	**Medications:** Frequency, route of administration, strength dose/unit, drug form, order action date, order action type (complete, discontinue, cancel, resume, suspend), site of administration, infused volume/unit, dosage amount.
Surgery	Type/dates – coded Reason not given Text Operative report text	ICD-9/CPT procedures and dates
Systemic surgery sequence	Sequence of systemic and surgical treatment	Derived from ICD-9/CPT procedure and dates
Radiation	Modality Date therapy began Reason not given Text	ICD-9/CPT procedures and dates
Transplantation	Type	ICD-9/CPT procedures and dates
Treatment Status	If treatment was given yes/no	ICD-9/CPT procedures and dates

Records and data transmitted to FCDS by Partner Hospital

- 253,570 patient *admissions* for years 2007-2011 all Invasive Ca
  - Includes in/out patient admissions
- Demographic, treatment and diagnostic procedures, health history, medical history, physical reports, discharge summary reports/instructions, medication list, pathology
- Chemo agents not available medications table
- 12,804 breast tumors
  - 11,504 unique patients linked with FCDS database
  - 1,584 Dx in 2010; 95% analytic

AHRQ Research Topics- Breast Ca

- **Investigate hospital readmissions** and **length of hospitalization**.
- Assess **reconstruction utilization patterns** among patients who undergo surgery
- Investigate subset of **'triple negative' patients'** treatment outcomes
- Assess **the role of BMI** as a predictor of overall outcomes
- **Can we enhance registry treatment data using hospital EMRs?**

Registry vs. EMR Treatment Comparison

Surgical Treatment Data

- 7 cases (0.4%) had missing surgical treatment information
- 230 cases (14.5%) had no surgery
- 8 cases had non-informative surgery info (surgery NOS)

Surgery Enhancement Process

For these ***245*** records (221 patients)

- Found 593 corresponding records in the hospital dataset
- Scanned for ICD-9 and CPT procedures related to surgery (literature: Du et al 1999 and expert's opinion)
- ICD-9 procedures: 85.41, 85.48, 85.23, 85.21, 85, 85.42, 85.43, 85.44 CPT procedures: 19180, 19220, 19240, 19160, 19162, 19120, 38740, 38745, 19307, 19304, 19303, 19302, 19301

Results

- 41 records were found with these codes
- Upon review we found surgery info for ***11*** unique patient records
- For some cases had additional info (excision of axillary lymph nodes, reconstruction etc.)

Registry vs. EMR Treatment Comparison

Radiation Treatment Data

- 8 cases (0.5%) had missing radiation info
- 1,068 (67.4%) had no radiation
- 7 cases (0.4%) recommended but unknown if administered

Radiation Enhancement Process

For these ***1,083*** records (855 patients)

- Found 2,618 corresponding records in the hospital dataset
- Scanned for ICD-9 and CPT procedures related to radiation ICD-9 procedures: 92.2 or 92.29
- CPT procedures: 77280-77370, 77401-77499 or 77750-77799, 19297

Results

- **33** patient records had procedures related to radiation treatment
- Low yield needs further investigation
- Have we received complete radiation from hospital?

Registry vs. EMR Treatment Comparison

Chemo Treatment Data

- 7 cases (0.4%) had missing chemo treatment information
- 1,040 cases (65.7%) had no chemo information
- 80 (5.1%) chemo was planned but not started at time of most recent FU

Chemo Enhancement Process

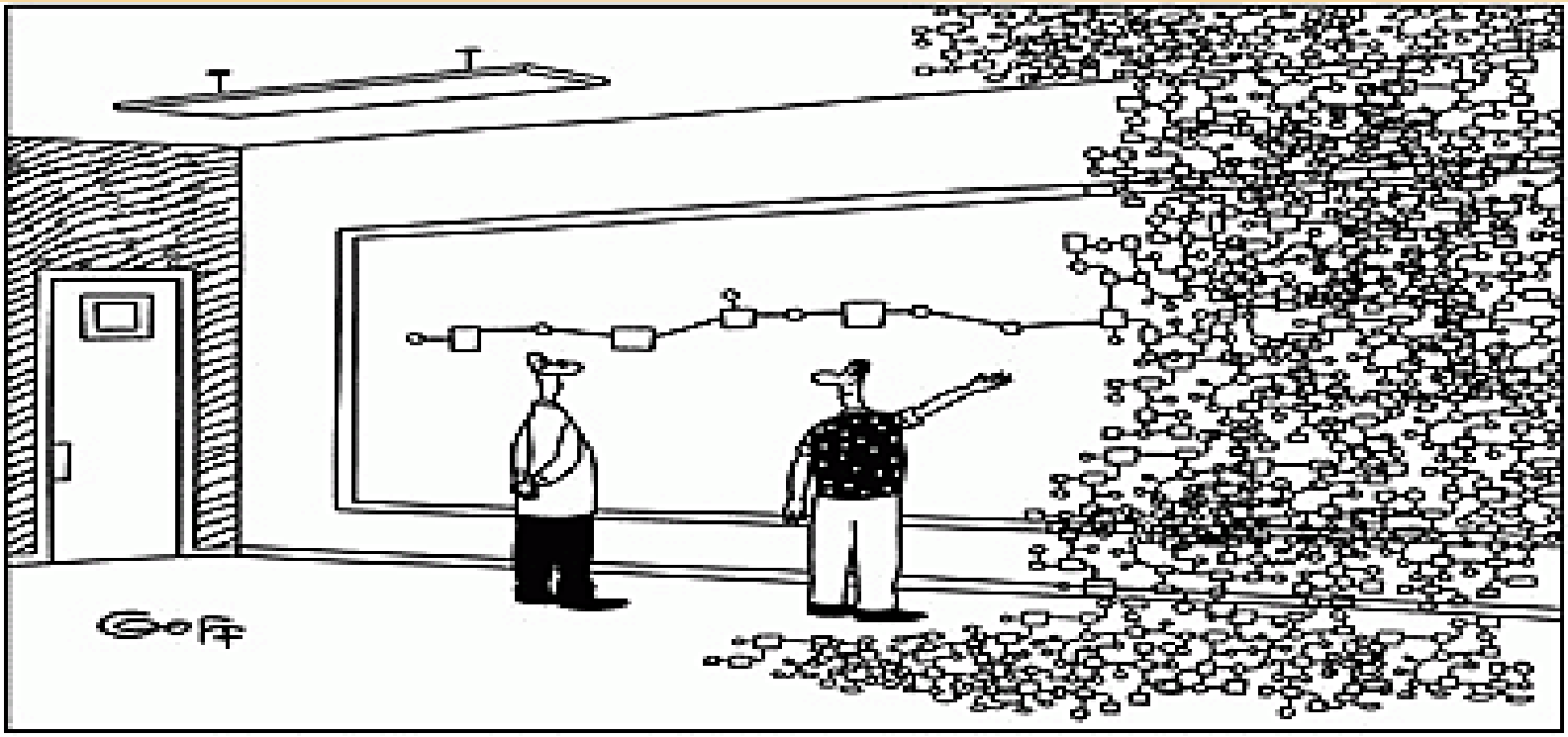
For these ***1,127*** records (891 patients)

- Found 2,894 corresponding records in the hospital dataset
- Scanned for
  - ICD-9 procedures: 92.25, 38.93, 86.05, 86.07
  - ICD-9 Diagnosis: V58.1, V58.11, V58.12, V66.2, V67.2
  - CPT procedures:96400-96549, J9000-J9999, Q0083- Q0085, 36598, 36590, 36571, 36569, 36561

Results

- **81** registry breast tumors potentially enhanced from hospital EMR.
- Cases need to be reviewed.

Challenges and Limitations



"This is where the idea for the new EHR starts getting a little complicated."

- Hospital EMR system is complex – what are we really getting?
- Incomplete chemotherapy medication list
- Formatting not standard – no HL7 or CCD/CDA capabilities
- Only looked at 2010 admissions data for treatment

Conclusion

- The registry records are quite accurate and the 'best tumor/patient' record works really well for research purposes
- Abstracts submitted by ACoS hospital may be more complete than for non-ACoS hospitals
- External reporting sources that have established reporting standards can be useful for supplementing the registry data (ex. Hospital discharge data)
- The EMR records can be used potentially for collection of detailed treatment information used in special studies
- Additional data elements that are scarcely collected by various reporting sources may be useful for specific case studies but need to be used with caution for epidemiologic studies as they may introduce bias.

Acknowledgement:

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- The AHRQ Multiple Chronic Conditions Research Network, made up of AHRQ funded researchers and a Technical Assistance Center, has been brought together to generate new knowledge about patients with multiple chronic conditions (MCC). The network works to advance the field of MCC research and to accelerate the speed of research-to-practice through collaboration among the investigators and the rapid dissemination of research findings, methods and datasets to the public.