Poster #3105

Epidemiologic Trends of HPV-Related Cancers in Minnesota

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Objectives of MCSS

- Monitor occurrence of cancer & describe risks of developing cancer
- Inform health professionals & educate public regarding specific cancer risks
- Answer questions & concerns about cancer
- Promote cancer research
- Guide decisions about how to target cancer control resources

Introduction

- Minnesota's smoking rate significantly declined from 1999 - 2010 from 22.1 + 1.7% to 16.1 + 1.2 %, a 6.0% change (CDC, State Highlights, Tobacco Data, 2010).
- Even while smoking rates are decreasing, oropharyngeal cancer incidence are increasing (1).
- Human papilloma virus (HPV) causes an epidemiologically & clinically distinct form or oropharyngeal squamous cell carcinoma (2).
- According to the Mayo clinic, > 90% of oral & oropharyngeal cancers are squamous cell carcinoma, meaning they begin in the flat, squamous cells in lining of the mouth & throat (3).
- Incidence rates, and trends over time, of other forms of non-cervical, HPV-related cancers in Minnesota, including relatively rare forms of cancers of the anus, penis, vulva, and vagina were analyzed using SEER*Stat software.

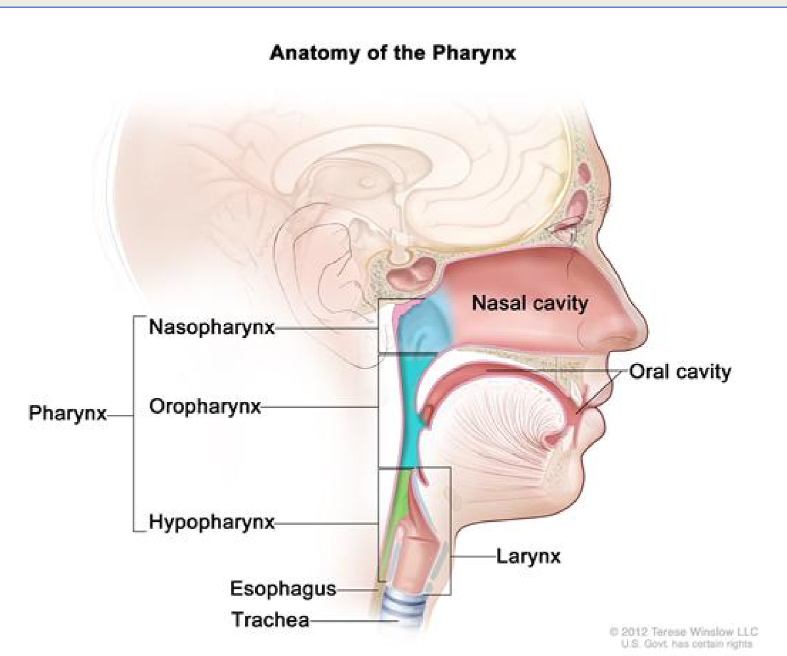


Figure 1: The oropharynx includes: the pharynx behind the mouth, back one-third of the tongue, soft palate, side and back walls of the throat, and tonsils.

Methods

The Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute (NCI) works to provide information on cancer statistics to reduce the burden of cancer in the U.S.. Cancer registries routinely collect data on patient demographics, tumor site, tumor morphology & stage at diagnosis, 1st course of treatment, & follow-up for vital status. SEER is the only comprehensive source of population-based information in the U. S. that includes stage of cancer at the time of diagnosis & patient survival data. **SEER*Stat** software version 8.1.5 was utilized to examine trends in HPV-related cancer trends over time among males & females from 1988-2009; results are presented here.

Citations

1. Tobacco Use in Minnesota:2010 Update. Minneapolis, MN: ClearWay Minnesota and Minnesota Department of Health; February 2011
2. American Cancer Society's publication, 2014, Cancer Facts and Figures.
3. Mayo Clinic , 2014, Diseases and Conditions. Tonsil Cancer. Mayo Foundation for Medical Education and Research. CON-20036669.
4. Chaturvedi AK, Engels EA, Pfeiffer RM, et al, 2011. Human papillomavirus and rising oropharyngeal cancer incidence in the United States. *J Clin Oncol,* Nov 10;29(32):4294-301.
5. Gayar, OH, Ruterbusch, JJ, Elshaikh, M, et al, 2013. Oropharyngeal Carcinoma in Young Adults: An Alarming National Trend. *Otolaryngol Head Neck Surg*. 2014 Apr;150(4):594-601

HPV–related Cancers

Cervical cancer

- Approximately 2/3 of cervical cancers are caused by HPV 16 and 18
- Cervical cancer in Minnesota is being prevented with routine screening tests which look for changes in cervical cells caused by HPV infection
- HPV tests look for the infections by finding genes (DNA) from HPV in cells

Vulvar cancer

- 50% of vulvar cancers & almost all vulvar pre-cancers are linked to infection with high-risk HPV types
- No standard screening available, other than routine physical exams
- More rarely occurring, often undetected cancer than cervical cancer

Vaginal cancer

- Up to 90% vaginal cancers and pre-cancers contain HPV
- Vaginal pre-cancers may be present for years before becoming invasive
- Vaginal cancer can sometimes be found with Pap test for cervical cancer/pre-cancer

Penile cancer

- HPV infection is found in 50% of penile cancers
- More common in men with HIV & among men who have sex with men (MSM)
- No approved screening test to detect early signs of penile cancer
- Nearly all penile cancers start under foreskin; often detected early in progression

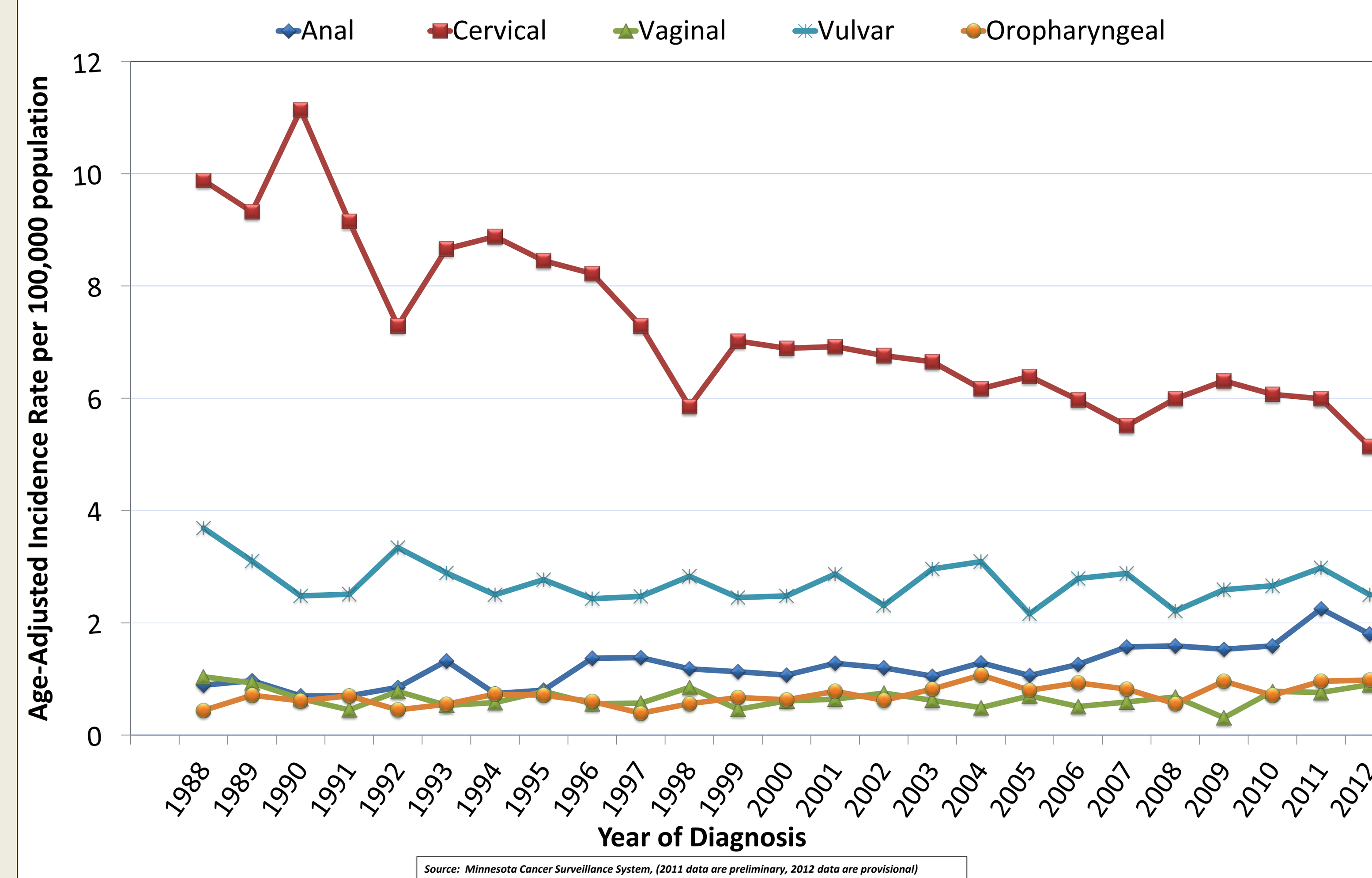
Anal cancer

- HPV causes cancer of the anus in men & women
- Among men, most common among those with HIV and MSM
- Anal cancer screening is not recommended, though some experts recommend anal cytology testing (*Anal Pap)* for at risk populations, such as MSM, women who've had cervical or vulvar cancer, HIV+, organ transplant+

Oropharyngeal cancer (including tonsil)

- HPV is now found in approximately 2/3 of oropharyngeal cancers in men & women
- No approved test to screen for oropharyngeal cancer
- Routine exams by a dentist, doctor, dental hygienist, or by self-exam are methods for early detection of oropharyngeal cancer is recommended

Figure 2: Human Papilloma Virus (HPV)-related Cancers – Females Minnesota, 1988-2012



Acknowledgements

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Conclusions & Recommendations

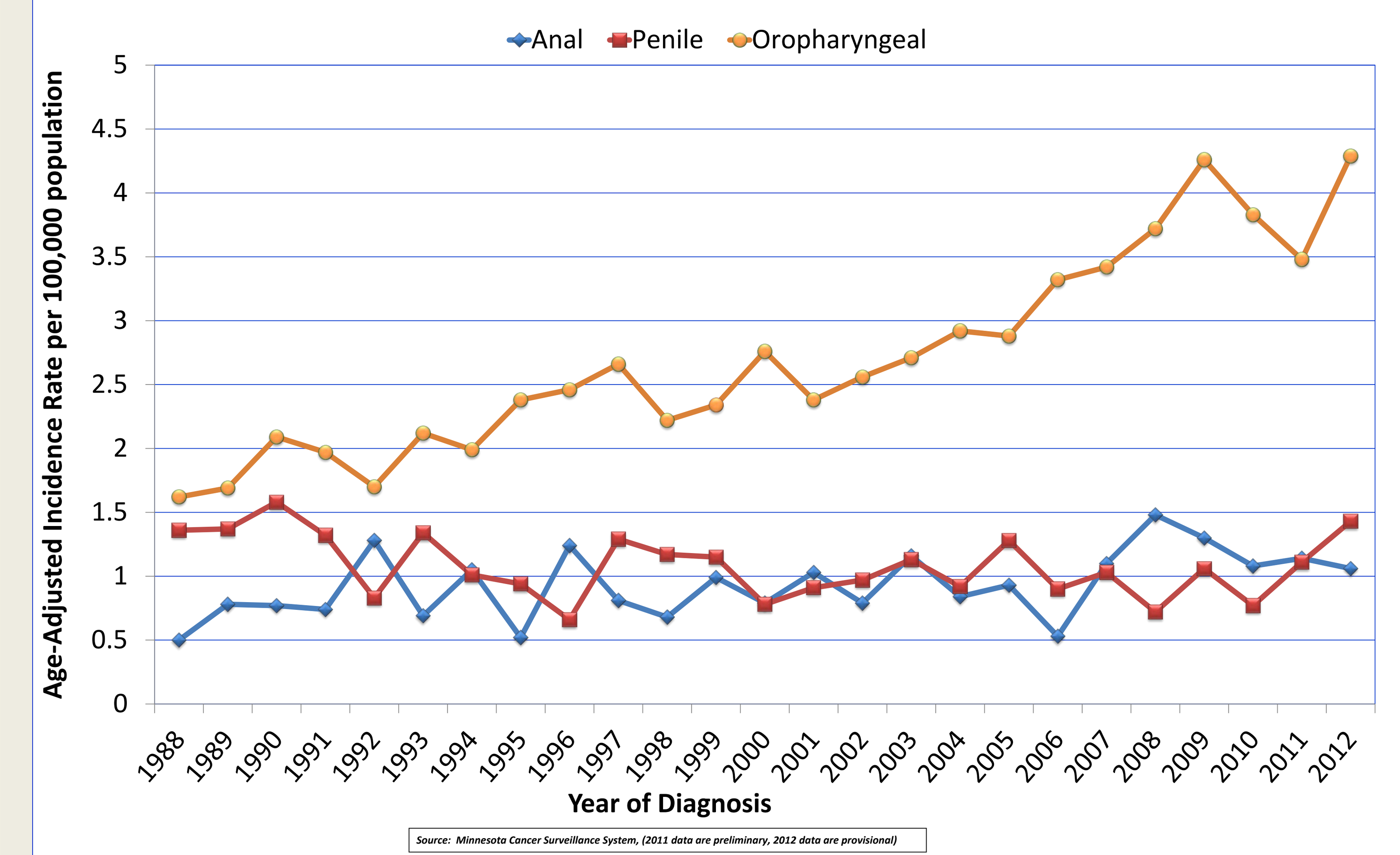
- No screening techniques currently exist for most HPV-related cancers (except cervical cancer in women)
- HPV-related cancers are vaccine - preventable cancers
- Prevention through behavior change (safer sex practices), vaccinations by primary care providers
- Treated with radiation therapy for HPV-related cancers is available, however, not everyone with HPV-associated cancers can be cured, depending on stage at diagnosis, co-morbidities
- Since the majority of the HPV-positive tumors contained HPV type 16 DNA, quadra-valent vaccination against this type prior to exposure should be widely implemented (4)
- Adolescent males & females, prior to sexual debut, should be vaccinated
- Current American Association of Pediatric (AAP) guidelines recommend that multi-dose vaccinations beginning in adolescence can be beneficial to both sexes (5)

Table 1 - Oropharyngeal (including tonsil) Cancer Incidence Rates for Males & Females - Minnesota

Year of Dx	Sex	Rate1	SE	Lower CI	Upper CI	Count	Pop	Rate Ratio	Ratio Lower CI	Ratio Upper CI	Ratio P-Value #
1990	Male & female	1.3	0.2	1	1.7	52	4,389,857				
1990	Male	# 2.1	0.3	1.5	2.9	38	2,153,089	1.6109	1.0276	2.5018	0.0373
1990	Female	# 0.6	0.2	0.3	1.0	14	2,236,768	0.4665	0.2364	0.862	0.0121
2000	Male & female	1.7	0.2	1.3	2.1	80	4,933,692				
2000	Male	# 2.8	0.3	2.1	3.5	64	2,443,070	1.6516	1.1687	2.3264	0.0042
2000	Female	# 0.6	0.2	0.4	1.0	16	2,490,622	0.3776	0.2055	0.6525	0.0002
2010	Male & female	2.2	0.2	1.9	2.7	139	5,310,658				
2010	Male	# 3.8	0.4	3.2	4.6	117	2,635,668	1.7054	1.3148	2.2096	0.0000
2010	Female	# 0.7	0.2	0.4	1.1	22	2,674,990	0.3172	0.1908	0.5057	0.0000

1Rates are per 100,000 and age-adjusted to the 2000 US Std Population (19 age groups – Census P25-1130) standard; Confidence intervals (Tiwari mod) are 95% for rates and ratios.
The rate ratio indicates that the rate is significantly different than the rate for 'Male and female' (p<0.05).
Warning: Use caution when interpreting ratios and related statistics as the ratio variable contains overlapping groupings.

Figure 3: Human Papilloma Virus (HPV)-related Cancers – Males Minnesota, 1988-2012



Further Information about Minnesota cancer trends can be obtained from the Cancer in Minnesota, 1988-2009 report which is accessible on and downloadable from the following website: http://www.health.state.mn.us/divs/hpcd/cdee/mcss/formation