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Human Papillomavirus (HPV) Related Cancers and Vaccination Coverage in Wisconsin

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BACKGROUND

Human papillomavirus (HPV) infection is very common, especially among young adults.[1,2,3] Approximately 6 million new HPV infections occur each year in the United States.[4] The U.S. Centers for Disease Control and Prevention (CDC) estimates that 79 million Americans are currently infected with HPV, with 14 million newly infected each year.[5] While most HPV infections clear within 1 to 2 years, persistent infections can progress to pre-cancer or cancer.[4,6] Almost all cervical and anal cancers and the majority of oropharynx cancers are caused by persistent infection with high risk HPV types 16 and 18.[6,7,8]

In 2006, the first HPV vaccine was introduced to reduce the number of HPV infections and subsequent HPV-related cancers. An objective of Healthy People 2020 is to increase HPV vaccine series completion for females aged 13-15 to 80% by the year 2020.[9,10] and Wisconsin's Comprehensive Cancer Control Plan 2010-2015 made increasing HPV vaccine utilization and surveillance in Wisconsin a priority.[10] However, since the licensure of the first HPV vaccine in 2006, utilization has remained low compared to other adolescent vaccines in the United States and in Wisconsin. In order to meet the goal of increased HPV vaccine uptake, multiple barriers will need to be addressed.

Summary

Background – Human papillomavirus (HPV) infection is common. While most HPV infections clear, some can progress to cancer. In 2006, the HPV vaccine was introduced.

Methods – National cancer data were obtained from the SEER Program and Wisconsin cancer data were obtained from the Wisconsin Cancer Reporting System. Wisconsin vaccine data were received from the Wisconsin Immunization Registry.

HPV-Related Cancers – Almost all cervical and anal cancers and the majority of oropharynx, vaginal, vulva and penile cancers are caused by HPV infection.

HPV Vaccine Coverage in WI – In 2013, only 34% of females and 11% of males aged 13-17 had completed the 3 dose HPV vaccine series. An estimated 55% of females and 29% of males had initiated the vaccine series but were not yet fully vaccinated.

Policy Implications – Barriers to HPV vaccine initiation and completion need to be addressed to improve vaccine coverage in Wisconsin. Barriers include lack of knowledge, lack of strong physician recommendation, and missed clinical opportunities.

METHODS

National cancer incidence data come from the United States Cancer Statistics: 1999 - 2010 Incidence, WONDER Online Database (U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute). National cancer mortality data are from SEER*Stat public-use database with mortality data provided by NCHS (Available at www.seer.cancer.gov/nchs).

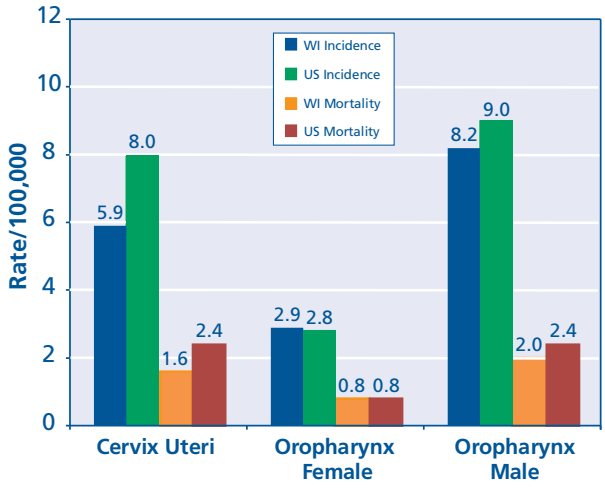
Cancer incidence data for Wisconsin are from the Wisconsin Cancer Reporting System (WCRS), Office of Health Informatics, Division of Public Health, Department of Health Services. Cancer mortality data are from the National Center for Health Statistics (NCHS) and are based on the underlying cause of death. WCRS staff prepared data for cancer incidence and mortality per 100,000 population, age-adjusted to the 2000 U.S. standard population.

Wisconsin vaccine coverage data are from the Wisconsin Immunization Registry (WIR), a statewide, population-based immunization information system used to record and track immunization histories for Wisconsin residents of all ages. In 2013, 93% of all children born on or after 1990 had at least 1 immunization recorded in the WIR. Currently, there are over 1,609 health care provider organizations with over 4,667 sites that are participating in the WIR. Denominators used to calculate the vaccination rates are from the 2009-2012 WI age- and gender-specific population estimates obtained from the Office of Health Informatics, Division of Public Health, Wisconsin Department of Health Services.

HPV-RELATED CANCERS

Persistent HPV infection can progress to pre-cancer or cancer. According to the CDC, in the U.S. 91% of cervical and anal cancers, 75% of vaginal, 72% of oropharynx, 69% of vulva and 63% of penile cancers are attributed to HPV infection.[7] From 2006-2010, in Wisconsin, 775 newly diagnosed cases of cervical cancer and 341 cases of oropharynx cancer in women, as well as 912 cases of oropharynx cancer in men, could be attributed to HPV infection. During this same time period, an estimated 226 cervical and 102 oropharynx cancer deaths in Wisconsin women, as well as 206 oropharynx cancer deaths in Wisconsin men, could be attributed to HPV infection.

FIGURE 1. Age-adjusted Incidence and Mortality Rates for Major HPV-Associated Cancers by Gender. Wisconsin and US – 2006-2010.



Sources: National incidence rates from United States Cancer Statistics: 1999 - 2010 Incidence, WONDER Online Database, U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. Other rates from Wisconsin Cancer Reporting System, Office of Health Information, Division of Public Health, Department of Health Services and National Center for Health Statistics, accessed in SEER*Stat public-use mortality file. Data accessed May 2014.

Note: Oropharynx cancer has been defined as including tongue, tonsil, oropharynx and other oral cavity and pharynx sites (inclusive of all cell types).

From 2006-2010, the HPV-related incidence and mortality rates for cervical cancer in Wisconsin were lower than the national rates, while the incidence and mortality rates for oropharynx cancer in Wisconsin were similar to national rates. In Wisconsin, the incidence rate of cervical cancer was 5.9 compared to the national rate of 8.0. The mortality rate for cervical cancer during this time was 1.6 for Wisconsin and 2.4 for the U.S. The incidence rates for oropharynx cancer were similar for the U.S. and Wisconsin, with greater rates diagnosed in men than women (8.2 and 9.0 for WI and U.S. men, respectively; 2.9 and 2.8 for WI and U.S. women, respectively). The mortality rate for oropharynx cancer was similar among WI and U.S. men (2.0 and 2.4, respectively) and it was the same among WI and U.S. women (0.8). (See Figure 1).

HPV VACCINE

Currently, there are two vaccines available to prevent HPV type 16 and 18 infections. Gardasil®, a quadrivalent vaccine, was approved for use in females in 2006 and for use in males in 2009. This vaccine protects against HPV types 6, 11, 16 & 18. Ceravix®, a bivalent vaccine, was approved in 2009 for use in females only and offers protection against HPV types 16 and 18. To be fully vaccinated against HPV infection, patients need to complete all three doses of the HPV vaccine, ideally over a 6 month period.[4,14] HPV vaccines offer the best protection to girls and boys who receive all three vaccine doses and have time to develop an immune response before becoming sexually active.[14,15,16]

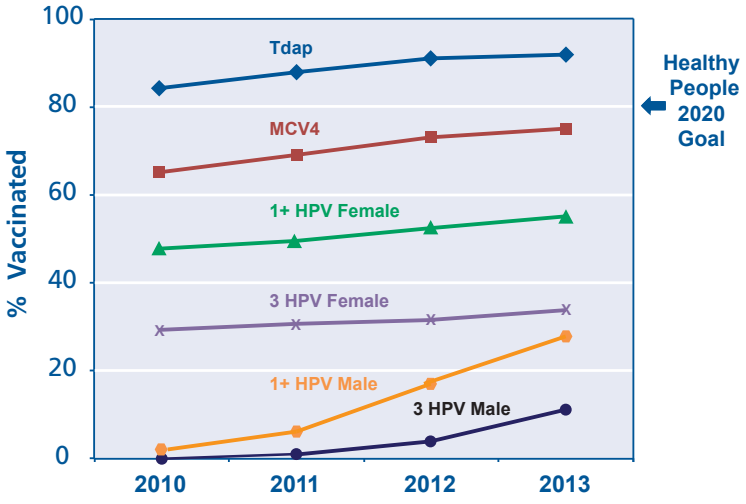
The HPV vaccine has been demonstrated to be effective at reducing the HPV infection burden in females aged 14-19 even with low vaccine uptake.[17] HPV prevalence data collected by the National Health and Nutrition Examination Surveys (NHANES) from the vaccine era (2007-2010) and the pre-vaccine era (2003-2006) showed that HPV infection decreased by more than half following the introduction of the vaccine.[17]

In addition to being effective, national vaccine safety monitoring data indicates the quadrivalent HPV vaccine (HPV4) is also safe.[15] The Vaccine Adverse Event Reporting System (VAERS), a national vaccine safety surveillance program, collects serious and non-serious adverse event data on vaccines after they are licensed for use in the United States. Of the approximately 57 million doses of HPV vaccine administered since June 2006, as of December 2013, only 26,000 adverse reports have been filed in VAERS; 92% were considered non-serious.[18]

HPV VACCINATION COVERAGE IN WI

Initiation of HPV vaccination is recommended for girls and boys starting at 11 - 12 years of age. It is also recommended for girls ages 13 - 26 and for boys ages 13 - 21 who have not yet been vaccinated.[14,15,16] Based on WIR data, male and female HPV vaccine coverage in Wisconsin is far less than that for other vaccines administered to adolescents. In December 2013, only 34% of WI

FIGURE 2. Estimated Trends in Vaccination Coverage Among Adolescents Aged 13-17 in Wisconsin.



Source: Wisconsin vaccine coverage data was received from the Wisconsin Department of Health Services (DHS), Wisconsin Immunization Registry (WIR). Denominators used to calculate these rates were obtained from, DHS Office of Health Informatics. Denominators are from the annual WI age- and gender-specific population estimates. Data received March 19, 2014.

Note: MCV4 = meningococcal conjugate vaccine; Tdap = tetanus, diphtheria and pertussis

females and 11% of WI males were completely vaccinated against HPV infections by completing the 3 dose vaccine series, compared to 92% who had received the school required Tdap vaccine and 75% who had received the meningococcal conjugate vaccine. An estimated 55% of WI females and 29% of WI males aged 13-17 had initiated the vaccine series by having received at least one dose of HPV vaccine but were not yet fully vaccinated (see Figure 2).

According to WIR, in 2009, vaccination initiation rates for the HPV vaccine reached 45% among Wisconsin girls aged 13-17. HPV vaccine completion among Wisconsin adolescent females increased from 26% in 2009 to 29% in 2010 and 34% in 2013. For this same population, the vaccination initiation rates for HPV rose modestly to 48% in 2010 and 55% in 2013. Following the 2011 recommendation to routinely vaccinate males with the HPV vaccine, there has been a dramatic increase in vaccination rates for HPV series initiation (6% in 2011 to 29% in 2013) and completion (1% in 2011 to 11% in 2013) among Wisconsin males aged 13-17. See Figure 2 for trends and comparisons of vaccination rates.

BARRIERS TO HPV VACCINATION

Multiple barriers to HPV vaccination initiation and series completion among U.S. adolescents exist.[3] Health care professionals report parental attitudes, financial concerns, inadequate insurance coverage and reimbursement, and knowledge gaps as reasons they did not vaccinate their adolescent patients.[3]

Many health professionals feel the decision to vaccinate their adolescent patients is beyond their control, reporting parental attitudes and concerns as significant barriers.[3] In the U.S., one quarter of parents of girls aged 11-12 refused HPV vaccination.[19] In addition, the cost to purchase and stock the vaccine[3] and inadequate insurance coverage and reimbursement, especially for males, also deters health professionals from vaccinating patients.[3,19,20] Some health professionals are not aware of the relationship between HPV and non-cervical cancers[3]; many emphasized cervical cancer prevention as the primary reason for vaccination.[19]

Lack of knowledge about the HPV vaccine[3,21] and concern with its safety[22] are common issues that prevent parents from vaccinating their children. Some parents feel their 11 and 12 year old children are too young to be vaccinated for a sexually transmitted disease, stating they are not yet sexually active. This highlights a parental lack of knowledge about the future protection the vaccine offers against HPV-related disease and the need to immunize prior to sexual debut, at an age when maximum immune response will be achieved.[22] In addition, parental concern over the safety of the vaccine has grown each year creating another barrier to vaccination.[22]

POLICY IMPLICATIONS

Continued efforts are needed to ensure that health care professionals and parents understand the importance of vaccinating adolescents before they become sexually active.[23]

Providers need to be fully aware of the importance of vaccinating both male and female adolescents, and they need to increase their efforts to routinely recommend the HPV vaccine for all adolescent patients. Parents who receive strong physician recommendations are more likely to vaccinate their children.[3,21] Providers need to help parents recognize the importance of vaccinating their child, before sexual debut and while their immune system is most responsive, to provide the best protection against potential HPV-related cancers. Since parents are more likely to vaccinate their daughters than sons[3], providers also need to educate parents on

the risk of HPV-related cancers for men and recommend vaccination of young males as well as females. Providers need to be prepared to address parental concerns and fears about the dangers of vaccination, emphasizing the safety of the HPV vaccine and addressing sources of misinformation.[24]

Since adolescent visits to healthcare providers are infrequent, proactive strategies are needed to initiate HPV vaccination and encourage series completion each time an adolescent interfaces with the health care system. Reducing missed clinical opportunities for HPV vaccination and improving reminder systems will lead to increased vaccine coverage. As many adolescents are visiting health care professionals for other vaccinations needed to attend school, there appears to be a significant missed opportunity for administering the HPV vaccine. In the 2012 NIS-Teen Survey, 84% of HPV unvaccinated girls had a health-care encounter where another vaccine was administered revealing a missed opportunity.[15] If the HPV vaccine had been administered during healthcare visits when another vaccine was given, HPV vaccination initiation rates could have reached 92.6%, a coverage rate similar to the one seen for adolescent Tdap in Wisconsin.[15]

HPV vaccination can protect youth from future HPV-related cancers. Although the vaccine has proven to be safe and effective, Wisconsin's HPV vaccine series completion rate is far below the Healthy People 2020 goal of 80%, with only 34% of females and 11% of males completing the HPV vaccine series in 2013. While establishing a reminder system is needed to facilitate vaccine series completion, parent education and strong physician recommendation at each teen health encounter is essential to improve HPV vaccine coverage for males and females living in Wisconsin.

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