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Reduce infections of HPV types prevented by the 9-valent vaccine in young adults – IID-07
OHSU School of Medicine
Community Outreach Course
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Human papillomavirus (HPV) is an extremely prevalent infectious disease, especially among young adults, which can have detrimental effects. The CDC predicts that everyone who is sexually active will get HPV at some point in their lifetime unless they are vaccinated.¹ The HPV vaccine is an effective but widely underused intervention to limit the number of HPV infections. Healthy People 2030 states that between 2013-2016 more than 15% of the population ages 20 to 34 years old tested positive for a form of HPV which would have been prevented by the vaccine.² Data shows that the vaccine is effective in preventing up to 70% of cervical cancer related to HPV but interestingly only 53% percent of women and 27% percent of men in the United States are vaccinated against the virus.^{3,4} When coupled with the fact that an estimated 99% percent of cervical cancers are due to HPV, this is a large area for improvement.⁵ Therefore, it is important to educate individuals about HPV and ways to prevent it, the most effective being with the vaccine. Healthy people 2030 have a goal of decreasing the percent of all young adults who test positive for any strain of HPV that could be prevented with the vaccine, from 15.1% to 8.7%.² The first step in making this happen is educating the population on the dangers of HPV and making sure they understand the risk versus benefit of the vaccine. While there are risks to getting a vaccine, all eligible individuals should be vaccinated against HPV and obtain regular screenings to limit the spread of the virus among the population and to protect themselves from HPV related manifestations including genital warts and cancer. I plan to implement this intervention to adults in Portland who are eligible for the vaccines, ages 9 to 45. I will focus my efforts to young adults in the community, particularly students of a Portland Community College health course. I will do this by educating them about the vaccine using the techniques I learned from my research to increase the rate of vaccination.

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HPV is the most common sexually transmitted infection, with an estimated rate of infection of at least once is 50% of the population worldwide.⁶ When individuals think about HPV they often think of cervical cancer or genital warts. While that is correct, the virus is also responsible for penile, anal, vaginal, vulvar, and oropharyngeal cancers.⁶ While there are hundreds of different strands of the HPV virus that all present infection differently, the majority of them are often cleared by the immune system while few are more destructive to a person's health.⁶ HPV 6 and 11 are known for causing the majority of genital warts in the population. There are many strands that are considered high risk for the development of carcinogenesis the most prominent being 16 and 18.^{7,8} Women are primarily impacted by this virus due to the strong association with cervical cancer. The virus progression begins with an exposure to the virus and leads to an HPV infected cervix. If the disease progresses it moves to precancerous and ultimately cancer. However, in some cases the body has the ability to halt the progression and clear the virus at any stage prior to cancer.⁹

While women tend to be the topic of discussion for this virus, men are also at risk. While both genders have equal risk for genital warts, men are also at risk for anogenital cancers including penile and anal cancer. Up to 90% of anal cancer can be attributed to HPV strands 16 and 18.⁸ This virus is spread by skin to skin or mucosa to mucosa contact and can enter the body via micro-trauma to the area impacting both heterosexual and same sex practices.^{6,7} While the spread of this virus is often associated with sexual activity and the number of partners due to increased risk of exposure, other risk factors to be aware of include age, age at first intercourse, males who are uncircumcised, and use of barrier contraception.⁹ The most effective way to prevent this virus and the complications that are associated with it, is with vaccination.

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The vaccine was introduced to the United States in 2006.¹⁰ Prior to vaccination about 360,000 individuals were impacted by HPV associated genital warts yearly.¹ The vaccine has been proven to prevent 90% of genital warts and 70% of cancers.⁴ There are three approved vaccines in the United States, Gardasil, Gardasil 9, and Cervarix.¹¹ Gardasil 9 being the most protective. This vaccine targets the highest risk strands for cancer and genital warts, including 6, 11, 16, 18, 31, 33, 45, 52, and 58.⁴ In women, the vaccine is approved for the ages 9 through 45, with the optimal recommended age being 11-12, it is often not advised after the age of 26 and is often not covered by insurance due to greater risk of previous exposures with increased age.⁴ The recommendations are different for men, while it is still FDA approved from the age of 9 through 45, the vaccine is not standard practice after the age of 21, it is reviewed on a patient to patient basis and often will not be covered by insurance due to its “permissive use” recommendation.⁴ Regardless of biological sex, the dosing schedule changes based on age. For individuals under the age of 15 it is recommended to get 2 doses spaced 6 to 12 months apart. After the age of 15 a three dose vaccination is recommended which takes place at 0, 1-2, and 6 months apart.⁴

While HPV is the most common sexually transmitted infection, the HPV vaccine is not the most common vaccination among the population. In fact, the vaccination rate is significantly lower than those of other adolescent vaccines. As of 2018, across the United States for ages 13 through 17, the CDC shows vaccination statistics of 91.9% of the population up to date with the MMR vaccination, 92.1% with Hepatitis B, 89.6% with Varicella, 88.9% with Tdap, and 86.6% with meningococcal conjugate vaccine.^{10,12} All of which are significant percentages especially when keeping in mind that herd immunity requires the strong majority of the population to be vaccinated.¹³ However, when looking at the same year and age range the HPV vaccine showed a

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percentage of completion of 49%.¹² Within Multnomah County specifically, the rates from 2020 show that only 63% of adolescents aged thirteen to seventeen completed their HPV series and only 37% of adolescents aged thirteen completed the series within the recommended timeline.¹⁴

So why isn't more of the population getting vaccinated? With a generational movement of vaccine hesitancy there are many myths that surround the HPV vaccine that need to be cleared. One being that the vaccine is not safe.¹⁰ It is important to note that the process of any vaccine development is very long and thorough, the HPV vaccine specifically prior to its approval in 2006 was tested on over 20,000 individuals and included in several clinical trials.¹⁵ While there are side effects to be aware of as a patient, the most prominent are injection site erythema and tenderness.^{10,15} While rare, there is a risk of anaphylaxis, suggesting that individuals with severe allergies to ingredients contained in the vaccine should not receive it, however the reported prevalence is 3 cases per 1 million doses.¹⁶ The data from the clinical studies show that while there were reports of blood clots, Guillain-Barre syndrome, ovarian failure, autoimmune diseases, and death none of these outcomes were able to be connected to the vaccine and were due to other independent factors and consistent with regular rates within the population.^{10,15} 93% of the reported adverse reactions were of no concern and included headache, fever, fainting, and pain at injection site.¹⁵ The possible long term impacts of the vaccine have been followed thoroughly and have shown that there are no reported adverse events following the injection of this vaccine. Over 160 studies have been conducted examining the safety profile on this vaccine, the repeated research continue to support that it safe and efficient for protecting the population from this virus.¹⁶

Aside from the safety profile, the HPV vaccine is often referred to as a "sex" vaccine which is why many parents are hesitant giving it to their young adolescents, in thoughts that they

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don't need it because they are not sexually active or because they don't want to encourage sexual behavior.¹⁰ Studies have shown time and time again, that receiving the HPV vaccine is not correlated with increased sexual activity.¹⁰ What may be surprising to parents is that while sexual activity is the most common way for the virus to spread it is not limited to penetrative or oral sexual transmission. Since the virus can be transmitted by skin to skin contact, studies have showed that while not as common, it can be spread via shared clothing, digital-genital contact, or even instruments such as ultrasound wands or sex toys.¹⁰ In regards to the timeline, researchers determined the recommended age range of 11 to 12 with a goal of reaching individuals before they are sexually active, but also because younger individuals who are vaccinated display a stronger immune response to the virus which is why only two doses of the vaccine are needed before the age of 15.¹⁰ Given the recommended age for vaccination of 11 to 12 years old, most parents may not think their child is sexually active yet. It is important to be aware that by age 15, 16% of males and 11% of females have been sexually active and up to 5% before the age of 13.¹⁰ Regardless of the percentages, the goal is to vaccinate individuals before they are sexually active to give them the best chance of avoiding the virus.

When considering interventions to implement to reduce the number HPV infections in the United States, we should look at the model that Australia has implemented which has all but eradicated the disease. Prior to the introduction of the vaccine the prevalence of the two highest risk strands of HPV, 16/18, was 26.2%, following in the next 5 years that percentage dropped to 5.4%. Australia has funded a National HPV Vaccination Program primarily implemented through the school districts, in which the government pays for all childhood vaccines of individuals within the approved age range. The program sends reminders and gives financial incentives to parents and PCPs. While the vaccine is not legally mandatory to attend school,

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parents do have to supply an immunization record. The population appears to have endorsed this program and they have increased their vaccination rates to 80% in women and 76% in males.¹⁷ One of the main factors which could be influencing vaccination rates is the overall mindset of parents towards vaccines. One thought is that in the United States we get a large volume of information through the media which often has misinformation while Australian's have a large variety of locations to get their information and media often focus on positive endorsements of the vaccine.^{17,18} While the United States has not endorsed a national program, they do have abundant access to the vaccine and some states have taken it into their own hands. Some states and territories such as Hawaii, Puerto Rico, Rhode Island, Virginia, and Washington D.C. have taken the extra step to involve legislation and require the vaccine before entering the 7th grade. While other states have addressed the issue of access by making the vaccine free for certain ages and allowing pharmacists to give the vaccine.¹⁸

While we may not be able to implement a country wide initiative to encourage vaccination for HPV, we as providers can do our best to educate individuals about the virus, clear up misconceptions, encourage vaccinations, safe sex practices, and regular screenings. Pediatricians and family practice providers have incredible access to the vaccine eligible population and a strong influence over the administration of vaccinations. Along with the HPV vaccine, Tdap and MCV4 vaccine are also recommended at the 11-12 age range.¹⁰ The data shows that children are seeing their providers for those vaccines but there is a lack of consistency with the HPV vaccine.¹⁰ This is an area where providers are able to focus on increasing administration of the HPV vaccine.¹⁰ Studies have found that a provider's recommendation is one of the strongest predictors of HPV vaccination.¹⁹ The acceptance of the HPV vaccine is correlated with an individual's attitude toward the vaccine, which studies have found that these

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attitudes are influenced on provider recommendation.¹⁷ This means the way our providers supply this information to our patients is crucial and will impact an individual's perspective toward the vaccine and ultimately, vaccination rates. One study surveyed pediatricians and family practice providers in 2014 and found that more than one third of females and one half of males were not educated or given any recommendation for the HPV vaccine.¹⁹ A significant half of providers who were interviewed were categorized as giving low quality recommendations.¹⁹ We can improve these numbers by giving strong recommendations, encouraging males and females equally to vaccinate, and pushing for same day vaccination when appropriate.¹⁹ Improving the communication of providers to be consistent, avoid falling behind schedule, and increase urgency can greatly impact the perspective of our patients and ultimately increase the percentage of vaccination rates.¹⁹ The rate of vaccination is higher among providers who take charge and state that the child is due for the HPV vaccine as they would with all other vaccines, rather than just giving information or asking questions.¹⁹ In addition to increasing the vaccination rate, education about safe sex practices and regular screening for cervical cancer are crucial to limiting disease progression and spread of the disease. Cervical cancer screenings are recommended starting at the age of 21 to age 65.²⁰ Studies have determined that women were 2.5 times more likely to get screenings when exposed to cervical cancer education. In addition screening rates improved with medical office follow up and reminders, plus the option for home self-testing increased rates by two-fold.²⁰ Proper education and debunking common myths to patients and parents is crucial to increasing vaccination rates. I plan to use these techniques to educate my community, the students of a health course, to improve the understanding of this virus and properly educate them to improve vaccination rates.

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Human Papilloma virus is an incredibly prevalent virus that is impacting our population. We have the tools necessary to be able to limit the spread of this disease, but it is widely underused. The HPV vaccine is extremely effective and despite the belief of some, it is safe and appropriate to use on our adolescents to protect their future. In combination with our country's access to regular screenings and safe sex practices, we have the tools to limit HPV infections and prevent the cancers they cause. Education is a key factor in how we move forward as a country and community. Society and providers have the power to increase vaccination rates and ultimately decrease risk and spread of cancers. Education is a powerful tool that is often underestimated and can be misused by media and providers. If we can use our platforms to teach the public about the risks of HPV and ways to prevent the disease and spread, we as a population can have the power to positively impact our community and ultimately work toward the Healthy People 2030 goal of reducing the prevalence of this far too common disease.

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