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Human Papillomavirus

Alexandra Irwin
Otterbein University, irwin1@otterbein.edu

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Alexandra Irwin, BSN, RN

Otterbein University, Westerville, Ohio

Introduction

The human papillomavirus(HPV) is the most common sexually transmitted infection. It can effect the genitals, oropharynx, and anus. HPV is passed by sexual intercourse, anal sex, and oral sex by an infected partner. Many people do not know they are infected.

There are many different classifications of the virus that differ in the risk of the cancer-causing ability. HPV16 is the most dangerous form of the human papillomavirus in that it is most likely to cause cancer of the cervix (Songock, Kim, & Bodily, 2017, p. 1).

HPV is becoming an epidemic, and it is predicted that by next year it will be one of the leading causes of head and neck cancers (Westricha, Warren, & Pyeona, 2017, p. 2).

"While the majority of the human population acquires HPV infections, only about 10% to 15% of infected individuals establish life-long persistent infection, and only a subset of which has the potential to progress to invasive cancer. This suggests that, for a majority of HPV-infected individuals, host defense mechanisms are largely effective at eliminating initial HPV infection", (Westricha, Warren, & Pyeona, 2017, p. 2).

Risk Factors

- Being sexually active
- Not receiving annual pap smears after the age of
- Unprotected sex increases the risk of contracting HPV
- Using condoms does not prevent the spread of HPV, but it can decrease the risk
- More than one sexual partner
- Not utilizing the HPV vaccination before becoming sexually active
- A pregnant mother can pass the virus to her infant during birth, although it does not happen frequently (Centers for Disease Control and Prevention, 2015).

Presentation of Process

Southern Ohio, where the author works, is an impoverished community that is less likely to utilize health prevention mechanisms.

- The prevalence of cancer of the cervix is much higher in areas of low socioeconomic status due to less access to resources, a decrease in screening measures, decreased immunization uptake, and less treatment plans (Hardin, & Munger, 2017, p. 1).
- There needs to be more education on the dangers and prevalence of HPV.
- There also needs to be more education provided to rural communities about the HPV vaccination, and that HPV can be prevented, but not treated, therefore taking the vaccination before a child is sexually active may save their life.
- Health care providers can change and save lives by being educated on HPV, and passing that education on to appropriate patients at visits while stressing the importance of preventing HPV with the vaccination and abstinence.

Signs and Symptoms

HPV does not always have symptoms, but a routine Papanicolaou smear (Pap Smear) can tell a provider if there are abnormal cells that need further testing.

- Asymptomatic
- Genital Warts
- Cancer of the vagina, penis, vulva, anus, throat, or mouth

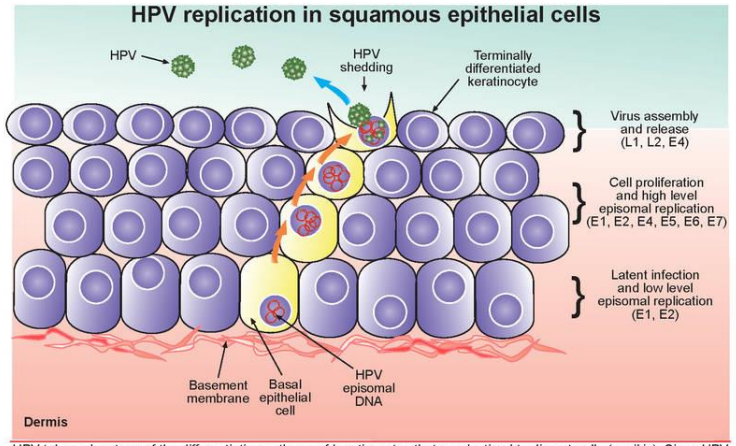
Most cervical cancer is caused by HPV, although having HPV does not always mean a person will develop cervical cancer. Cervical cancer is usually asymptomatic like HPV, until the cancer progresses. People should be aware of the signs and symptoms of cervical cancer:

- Blood from the vagina in unusual circumstances; after intercourse, after menstrual cycles have ceased, between menstrual cycles, and causing periods to last more days than usual with more bleeding than normal (American Cancer Society, 2016).
- Discharge that may or may not have blood from the female reproductive organ, it can be between menstrual cycles or after a woman has ceased menstrual cycles (American Cancer Society, 2016).
- Painful intercourse (American Cancer Society, 2016).

Underlying Pathophysiology

HPV is a virus that attacks DNA replication and can be cancerous or noncancerous, the virus causes disruption to the squamous epithelium of the cervix male and female reproductive organs, vulva, and the oropharynx (Songock, Kim, & Bodily, 2017, p. 1).

- *Papillomaviridae* infect squamous epithelium and mucous membranes cells in order to undergo cell division and remain in the hosts system (Hardin, & Munger, 2017, p. 4).
- The virus must penetrate through the basal layer of the epithelial stem cells, although the cells have multiple stratums for protection to make them difficult to access (Hardin, & Munger, 2017, p. 4).
- Micro-wounds have to be present revealing the bottom epithelial layer in order to be infected; the cervix and anus are vulnerable to micro-wounds causing them to be habitable for the virus to penetrate (Hardin, & Munger, 2017, p 4).
- The micro-wounds can be created from penetration during intercourse, or the virus may enter through high risk areas such as the squamocolumnar junction (Prati, Marangoni, & Boccardo, 2018, p. 1).
- The long control region of the HPV cell is what binds to the epithelium and allows for transcription and replication (Nowińska et al. 2017, p. 540).
- After the hosts cell is infected, the cell becomes self-directed and does not follow normal cell replication; this change causes the cell to initiate a cycle of binding virus DNA with the infected genome (Nowińska, Ciesielska, Podhorska-Okołów, & Dzięgiel, 2017, p. 540).
- When DNA is infected with a virus, the sequence of cell replication is effected; this causes an increased risk of cancer gene expression (Nowińska et al. 2017, p. 540).



HPV takes advantage of the differentiation pathway of keratinocytes that are destined to die naturally (anoikis). Since HPV is not cytolytic and does not cause viraemia, there is no inflammation and subsequent activation of the immune system. Infection of basal epithelial cells establishes a latent infection with low level replication of the viral episome and minimal viral protein expression. Following differentiation of the keratinocyte, early HPV genes are expressed and the viral episome is further amplified to higher copy numbers. Viral late protein expression and virus assembly occur during terminal differentiation of the keratinocyte and viruses are shed from the outermost layer of epithelial cells.

(Immunopaedia, 2014).

Significance of Underlying Pathophysiology

The significance of the pathophysiology is that the invasion of HPV can lead to uncomfortable manifestations such as genital warts. It can also lead to multiple cancers. Although the virus is usually asymptomatic, it can lay dormant for years causing symptoms later. Knowing how the cells become infected will help the provider understand the virus, what to look for, and how to treat it. HPV can lead to multiple cancers which is an important aspect when considering screening methods for patients at risk for HPV.

The provider should understand from the pathophysiology that HPV can change the DNA sequence and there is no cure for the virus once the basal layer of the cell is penetrated. People can come in contact with the infection, and the bodies immune system can fight it off; but if the basal layer is penetrated, the virus will not leave the body. This means that prevention is the key to best help patients.

It is also important for the provider to be educated on how the risk for cancer is increased. It is increased because the virus changes the sequence of cell replication and can express a cancer gene after laying dormant for an extended period of time. Therefore patients with abnormal cells on a pap smear should be investigated, and those with HPV should be screened for cancer. They should be screened for multiple cancers such as; cervical, vaginal, vulvar, penile, oropharynx, and anal.

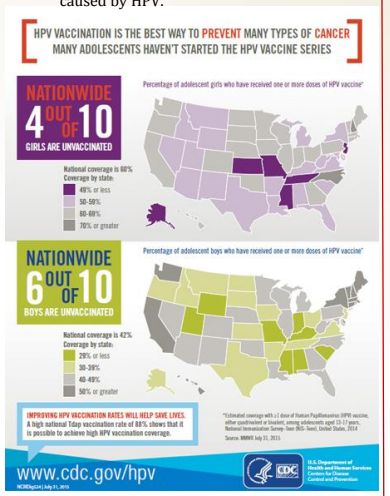
Implications for Nursing Care

The advanced practice nurse should be well educated and familiar with the Human Papillomavirus because it is prevalent in all communities, and education can save lives. The key factors that the nurse practitioner can implement into their practice:

- Emphasis on prevention because there is no cure to HPV.
- Educate families and strive to increase uptake of the HPV immunization for males and females during the recommended ages 11-12. The immunizations should be given before a person is sexually active because it cannot treat a person after they have already contracted the virus, but the immunization can prevent future contraction of the virus.
- It is also important to facilitate a comfortable and trustworthy environment with the patient and their families to promote honesty.

Implications for Nursing Care Continued

- When a patient feels comfortable and is honest with their health care provider, the provider is able to offer patient centered care that is unique to them.
- Performing pap smears on patients can help detect abnormal cells that may be caused by HPV.



(Centers for Disease Control and Prevention, 2015).

Conclusion

In conclusion, HPV is a common sexually transmitted infection that effects the lives of millions of people world wide. HPV penetrates the bottom layer of cells and can change the DNA of a cell which causes new cells to have the virus as well. This is important because changing the DNA of a cell can cause an increased risk for cancer gene expression. There is no cure for HPV, although there are preventative measures that a health care provider should be well educated on. Educating and advocating to parents and patients about the vaccines available for HPV prevention at the appropriate age is one of the best preventative measures against HPV. Health care providers should also inform their patients about the importance of routine health care such as the pap smear. The importance of sharing evidence-based knowledge and advocating for patients to uptake preventative measures against the Human Papillomavirus can save lives.

References

Centers for Disease Control and Prevention. (2015). 2015 sexually transmitted diseases treatment guidelines: human papillomavirus (HPV) infection. Retrieved fromhttps://www.cdc.gov/std/tg2015/hpv.htm

Harden, M. E., & Munger, K. (2017). Human papillomavirus molecular biology. Mutation research. Reviews in mutation research, 772, 3–12. doi:10.1016/j.mrrev.2016.07.002

Immunopaedia. (2014). HPV replication in squamous epithelial cells. Retrieved from https://www.immunopaedia.org.za/immunology/archive/immune-evasion/keratinocyte-immunity/carcinoma-development/human-papilloma-virus-hpv/

Nowińska, K., Ciesielska, U., Podhorska-Okołów, M., Dzięgiel, P. (2017). The role of human papillomavirus in oncogenic transformation and its contribution to the etiology of precancerous lesions and cancer of the larynx: a review. Advances in clinical and experimental medicine, 26(3), 539-547. doi: 10.17219/acem/67461

Prati, B., Marangoni, B., & Boccardo, E. (2018). Human papillomavirus and genome instability: from productive infection to cancer. Clinics (Sao Paulo, Brazil), 73(suppl 1). doi:10.6061/clinics/2018/e539s

Songock, W. K., Kim, S. M., & Bodily, J. M. (2017). The human papillomavirus E7 oncoprotein as a regulator of transcription. Virus research, 231, 56–75. doi:10.1016/j.virusres.2016.10.017

Westrich, J. A., Warren, C. J., & Pyeon, D. (2017). Evasion of host immune defenses by human papillomavirus. Virus research, 231, 21–33. doi:10.1016/j.virusres.2016.11.023

Centers for Disease Control and Prevention. (2015). Many adolescents still not getting HPV vaccine. Retrieved from https://www.cdc.gov/media/releases/2015/p0730-hpv.html

Additional Sources

The American College of Obstretricians and Gynecologists. (2018). Human papillomavirus (HPV): resource overview. Retrieved from https://www.acog.org/Womens-Health/Human-Papillomavirus-HPV

World Health Organization. (2019). Human papillomavirus (HPV) and cervical cancer. Retrieved from https://www.who.int/news-room/fact-sheets/detail/human-papillomavirus-(hpv)-and-cervical-cancer

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