



Instructing nurses about human papillomavirus (HPV) related cancers and the importance of HPV vaccination

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Abstract

This study sought to assess nurses' and midwives' knowledge of, attitudes towards, and acceptance of human papillomavirus (HPV) vaccination in relation to their background characteristics. Though the knowledge was there but several gaps were noticed regarding HPV vaccination, the major concerns being safety, efficacy and availability of the vaccine. Conclusions: HPV is a vaccine preventable cancer and for accepting the vaccination the health professionals can play a pivotal role in raising awareness and controlling the disease. Those who knew risk factors of HPV infection and that this could be prevented by the HPV vaccine, and those who knew that cervical cancer could be prevented by the HPV vaccine expressed this positive attitude about willingness to recommend the HPV vaccine. These results highlight the need to supplement nursing students' specific education, to improve their knowledge and awareness of HPV vaccination. To encourage higher HPV vaccine uptake, the general population requires accurate information about the utility of the vaccine in HPV infection prevention. Indeed, the achievement of vaccinations is related to the awareness of health professionals on this topic. Therefore, health care workers play an important role in health promotion via the provision of correct, complete and comprehensible information. Furthermore, in addition to physicians, other health care workers such as midwives and nurses must be adequately trained in order to offer, depending on their role, appropriate information consistent with maximizing adherence to vaccination and, they are an important population to study their level of knowledge, attitudes and behavior regarding HPV infection and related vaccination.

Keywords: HPV, vaccination, awareness, community health

Introduction

Awareness and knowledge of HPV has increased since the introduction of an HPV vaccine. However, the public often receives this knowledge through exposure to health-related media, which can often leave out important information (Kelly *et al.*, 2009) [17]. Public health awareness about the signs and risk factors for HNC have been shown to be poor (Warnakulasuriya *et al.*, 1999). Additionally, the relationship between HPV and HNC is not well-known across most populations (Dodd *et al.*, 2016) [7]. It is important to assess knowledge of HPV associated HNC, to identify gaps in knowledge and inform educational strategies. School nurses are an invaluable resource for children, including adolescents. They foster a unique role in bridging the gap between community and medical care, especially in low socioeconomic areas (Kaul *et al.*, 2019; McCullough *et al.*, 2020) [16, 22]. The role of the school nurse is broad, and includes providing preventative and screening services, health education, immunization, interventions for acute and chronic illnesses, mental health, discussing and sexually transmitted infection (COUNCIL ON SCHOOL HEALTH, 2016). One study found that 46% of adolescents do not see their primary care physician (PCP) annually, with only 35% of visits being for preventative care (Rand & Goldstein, 2018). The low vaccination rate may be associated with the fear of potential side effects, the stigma of a sexually transmitted disease, misinformation, or a lack of awareness of the downstream effects of HPV infection

(Berger *et al.*, 2018) [2]. Capogrosso *et al.* 2015 [4] found that only 51% of patients seen in an outpatient clinic reported knowing about HPV infections, 36.5% were not aware of an existing vaccine, and 79.7% did not know it is a risk factor for oropharyngeal cancer (Capogrosso *et al.*, 2015) [4]. This lack of awareness of the association between HPV and OPSCC extends to those in the healthcare profession. Single institution studies have demonstrated that half of medical students may graduate without knowing the HNC risk associated with HPV. A systematic review article found that 26–91% of medical and dental students were aware of HPV being a risk factor for HNC. In the general population the knowledge of this association ranged from 1–44% of people (Dodd *et al.*, 2016) [7]. Additionally, less than half of pediatricians report discussing this association with their patients (Gnagi *et al.*, 2016; Laitman *et al.*, 2018) [11, 19]. In the United States, it is estimated that there are 53,000 new cases of oral cavity and pharynx cancers each year (Siegel *et al.*, 2019). The leading risk factors for head and neck cancers (HNC) are tobacco and alcohol use (Hashibe *et al.*, 2007; Wyss *et al.*, 2013) [13]. However, in more recent years, there has been a rise in oropharyngeal squamous cell carcinoma (OPSCC) with up to 70% of these cases due to the high-risk types (16 and 18) of human papillomavirus (HPV) (Chaturvedi *et al.*, 2011) [5]. The incidence of HPV-related OPSCC now exceeds that of HPV-related cervical cancer (Siegel *et al.*, 2015). HPV associated HNC is shifting the patient population affected with OPSCC. Patients with

HPV associated HNC are typically younger than those with non-HPV disease, and tend to be white, educated, employed, and married (Gillison *et al.*, 2008) [10].

Today, HPV has been implicated as a cause of laryngeal, oral, lung, and anogenital cancer. Subtypes 6 and 11 are low risk and usually present with the formation of condylomata and low-grade precancerous lesions. HPV subtypes 16 and 18 are high risk and are responsible for high-grade intraepithelial lesions that progress to malignancies. It is important to understand that HPV alone does not cause cancer but requires triggers like smoking, folate deficiency, UV light exposure, immunosuppression, and pregnancy.

Diagnosis and cause

The main symptoms are anxiety, loss of self-esteem, pain and discomfort, poor choice of a sexual partner, growth of lesions, at risk for spreading an infection, at risk for cancer. HPV is a non-enveloped, double-stranded, circular DNA virus of the Papillomaviridae family. The virus enters the epithelium through disruption to the skin/mucosa and infects basal stem cells. Its genome contains seven early (*E*) and two late (*L*) phase genes required for viral propagation. The viral DNA may remain as an independent episome for a period before integrating into the host's genome. HPV preferentially integrates at fragile sites in the human DNA where the strand is prone to breakages.

Risk

HPV subtypes show a predilection for body sites they most commonly infect, and disease manifestations that result from infection may vary. Over 180 subtypes of HPV have been identified. Cutaneous warts of the hands and feet, such as verruca vulgaris or verruca plantaris, are most commonly caused by HPV subtypes 1, 2, 4, 27, or 57. Most anogenital warts, such as condyloma acuminatum, are caused by HPV subtypes 6 or 11 and termed low-risk HPV; these subtypes also are responsible for juvenile and adult recurrent respiratory papillomatosis. Pre-cancerous and cancerous lesions of the cervix, male and female anogenital areas, and oropharyngeal area are most commonly caused by HPV subtypes 16 and 18. However, subtypes 31, 33, 35, 45, 52, and 58 also fall in the high-risk HPV group as they are associated with cervical cancer development. The HPV subtypes which cause cutaneous verrucae are spread by contact between skin with microscopic or macroscopic epidermal damage and a fomite-harboring HPV. The prototypical location for contracting warts of the feet is a locker room.

Both low-risk and high-risk HPV (sometimes referred to as alpha-papillomaviruses) are considered to be sexually transmitted but may be spread by other forms of intimate contact. According to the Center for Disease Control and Prevention (CDC), the most recent studies show the prevalence of genital HPV for adults aged 18 to 59 to be approximately 45.2% in men and 39.9% in women.

Physical treatment

Cutaneous warts (verruca vulgaris, verruca plantaris): Examine hands and feet thoroughly, including between digits and the underside of the toes. Anogenital warts (condyloma acuminatum): Examine the anogenital region. Patients may additionally require a speculum examination of

the vaginal walls and/or anus. Men may require an examination of the urethra, depending on signs and symptoms. Depending on the history of sexual practices, an oropharyngeal examination may be prudent. Cervical dysplasia (squamous and glandular): Perform a speculum examination of the cervix. Depending on the patient's age and Pap smear history, an initial or repeat Pap smear may be warranted.

Diagnosis

Patients with cutaneous, anogenital, and/or oropharyngeal warts may have them excised and submitted for histopathological examination if there is any question about the diagnosis or concern for dysplasia.

Screening for cervical dysplasia/malignancy is typically accomplished through speculum examination and Pap smear with concurrent or reflex HPV testing, an assay test performed on cervical cells to evaluate the most common HPV subtypes associated with dysplasia. Treatment protocols stratify patients by age, HPV status, and Pap smear results. Depending on treatment stratification, patients with results concerning intraepithelial squamous or glandular lesions may proceed to colposcopy (a procedure in which the cervix is coated with acetic acid, acetowhite areas are evaluated with a colposcope, and concerning areas are biopsied to examine for histopathologic evidence of dysplasia or malignancy).

Modern treatment

Individuals with cutaneous warts have numerous treatment options available, including surgical removal, cryotherapy (freezing the infected tissue), irritant or immunomodulating medications, and laser removal. Many of these treatments' overarching purpose is to manually or chemically irritate the area, thereby invoking a host immune response to assist in clearing the infected tissue. To prevent lower anogenital tract HPV infection by the most common high-risk and low-risk subtypes, the CDC recommends that boys and girls be vaccinated for HPV starting at ages 11 to 12. It is further recommended that women get vaccinated through the age of 26 and men through the age of 21. Anogenital and oropharyngeal warts may be treated similarly to cutaneous warts as long as the patient is immunocompetent. Development of HPV-related carcinoma at these sites may require resection, chemotherapy, and/or radiation. Cervical HPV-driven lesions may regress without any intervention. Young immunocompetent women with dysplasia are usually monitored at shortened intervals through Pap smears, HPV testing, and colposcopic examination. Persistent cervical dysplasia at any age, or high-grade dysplasia in older women, is treated with cryotherapy, loop electrosurgical excision procedure (LEEP), or cold knife cone (CKC) excision. Both surgical procedures (LEEP, CKC) involve resection of the cervical os and transformation zone. If the patient progresses to malignancy (e.g., squamous cell carcinoma, endocervical adenocarcinoma), further resection, chemotherapy, and/or radiation may be required.

Pearls

Boys and girls aged 11-12 should receive the HPV vaccine. To be effective, the vaccination should be completed by age 13. Studies show that the vaccine is effective after 2 doses in younger children.

Discussion

In the United States, vaccinations are delivered in primary care offices and medical centers. However, other countries have implemented vaccination programs in schools. In Sweden, a web-based questionnaire was used to assess the attitudes of school nurses toward implementing HPV vaccination programs. This survey found that nurses with increased HPV education were more likely to have a positive attitude toward HPV vaccination than nurses who were not as educated about the topic. Furthermore, this study found that many parents turned to the school nurses with their questions and concerns about the vaccinations and adverse effects (Grandahl *et al.*, 2014) ^[12]. Increased education for school nurses can prepare them with the knowledge and confidence to answer these questions intelligently and to discuss the vaccine with adolescents and caregivers. In addition to pediatricians, school nurses can be an important source for adolescent and parental education about vaccinations. Community outreach events and continuing education events focused on school nurses may increase their confidence and provide them with additional information on updated recommendations and practices. In fact, when evaluating the overall continuing education program in this study, 80% of respondents indicated they gained new skills/strategies/information which they could apply to their practice, and 57.6% indicated they would implement these skills in their practice. In audience feedback and answers to free response questions, it was apparent that there were concerns about the side effects of the vaccine and how to discuss these issues with parents. In educating our school nurses, it is important to address these fears related to the vaccine. While the HPV vaccine is generally regarded as safe, there have been adverse effects which include syncope, seizure, anaphylaxis, and autoimmune disease. However, the overall incidence of these side effects is less than 1% as shown by a multitude of studies including retrospective cohort studies, clinical-trials, and several review articles (Phillips *et al.*, 2018). While this current study showed a positive impact of educating school nurses on HPV and the vaccine, there were some limitations to this study. First, there was a large discrepancy in the number of participants between the audience response questions and the post-education survey. This is in part due to the voluntary and interactive nature of the questions. Although the responses were anonymous, many people may be hesitant to participate in large group settings when faced with knowledge-based assessment type questions. Also, the heterogeneity of the cohort which consisted of participants with various educational backgrounds, ages, technological skills and comfort, likely corresponded to the discrepancy in responses associated with interactive live audience response questions (Porter & Whitcomb, 2005). There may also have been inherent survey bias in the way the questions were worded which may have unwittingly led participants to answer a certain way. Lastly, the intervention assessed knowledge of the association between HPV and HNC, but did not address how to improve HPV vaccination rates. However, data has shown that educating health professionals improves vaccination rates – interventions focused on improving provider knowledge of HPV vaccination via educational interventions including vaccine alerts, showed increased provider comfort with conducting

vaccine discussion which in turn has been successful in improving vaccination rates (Leung *et al.*, 2019) ^[21]. Based on initial results from this current study, further educational interventions to address school nurse comfort with conducting vaccine education to improve vaccination rates is warranted.

Conclusion

This study demonstrated gaps in knowledge of cervical cancer risk factors and attitudes towards HPV vaccination, which requires targeted measures to improve knowledge and attitudes. Despite the low rates of acceptance of HPV vaccination among the sample studied, perceived threats of cervical cancer and recommendation of HPV vaccination by colleague nurses and midwives motivated some of the participants to receive the HPV vaccination. Moreover, the study identified critical barriers that hindered participants from seeking HPV vaccination, including fear of adverse effects of HPV vaccination, fear of experiencing pain during injections and cost of the vaccine. The provision of a comprehensive training programme on HPV vaccination and safety net intervention to cover the cost of the vaccine could reduce barriers and increase uptake. This study also highlighted the need for stakeholders to consider important sociodemographic factors in efforts to increase the acceptability of HPV vaccination.

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