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Parents, adolescents, children and the human papillomavirus vaccine: a review

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Abstract

Background: Human papillomavirus (HPV) is a sexually transmitted infection (STI). HPV is the most common sexually transmitted infection worldwide. It is also the most common STI in adolescents. This highlights a great clinical and public health concern that must be addressed. Parents are typically involved in the clinical decision-making process of vaccine administration to children and adolescents. Therefore, understanding the acceptability of the HPV vaccination as a method to prevent STIs and certain cancers is critical.

Purpose: To present the three primary themes that emerged from the literature: parental attitudes, parental beliefs and parental barrier towards vaccinating children and adolescents with the HPV vaccine.

Method: A literature search using Scopus to determine parents' attitudes and beliefs towards vaccinating children and adolescents with the HPV vaccine. The initial search included the key search terms of 'children' and 'HPV vaccine'. The publication year was limited from 2006 to present.

Findings: The three themes greatly influence parents' decisions to vaccinate their children. In the future, more attention needs to be paid to specific subgroups. Future research should include groups that are currently under-represented: fathers, urban populations, low socio-economic status and ethnic minorities.

Conclusion: Since nurses worldwide are often sought as healthcare resources by parents in the clinical decision-making process, their understanding of the attitude, beliefs and barriers parents have towards the HPV vaccine is paramount.

Keywords

Adolescents; Children; Human Papillomavirus; Literature Review; Parents' Attitudes and Beliefs; Vaccination Barriers

Background introduction

Human papillomavirus (HPV) is the most common sexually transmitted infection worldwide (Zhang et al. 2010). At least 75% of individuals will be infected, diagnosed or experience

one of the many HPV strains in their sexual lifetime (Centers for Disease Control and Prevention 2010). The disease burden of STIs falls disproportionately on adolescents compared with older adults (Weinstock et al. 2004). Estimates suggest that even though young people aged 15–24 years old represent only 25% of the sexually experienced population, they acquire nearly half of all new sexually transmitted infections (STIs; Centers for Disease Control and Prevention 2009). Sexually active adolescents aged 15–19 years old are at a higher risk of acquiring STIs resulting from a combination of behavioural, biological and cultural influences (Kaiser Family Foundation 2011). The higher prevalence of STIs among adolescents may reflect multiple barriers to accessing quality STI prevention services, including perception of susceptibility and risk, parental acceptance of STI vaccinations, and concerns about confidentiality.

The US Food and Drug administration (FDA) approved a quadrivalent HPV vaccine against types 6, 11, 16 and 18 for the use in females aged 9–26 years old in 2006 (Merck and Co., Inc. 2009). With the potential to prevent the majority of genital wart exacerbations and invasive cervical, penile, anal, oral-throat cancers, the new HPV vaccine represents a remarkable public health achievement (Parkins & Bray 2006). Recently, the FDA approved the quadrivalent HPV vaccine for use in males aged 9–26 years old. The oncogenic HPV types (mainly 16 and 18) are responsible for cervical cancer in women and almost all anal cancers in men and women, HPV 16 and 18 also account for 40% of penile cancers in men as well as 25–35% of oral and neck cancers in men and women (Parkins & Bray 2006). Non-oncogenic HPV types 6 and 11 cause genital warts. It is necessary for the HPV vaccination to be administered prior to HPV exposure for it to offer full protection against HPV infections and its sequela. The ideal population to target for HPV vaccination is adolescents before their sexual debut.

Review of the literature

Literature search strategy

The search engine Scopus was used to search the literature to determine the attitudes and beliefs of parents towards vaccinating adolescents with the HPV vaccine. The initial search included the key search terms of ‘children’ and ‘HPV vaccine’. The publication year was limited from 2006 to present. A span of 5 years was selected because of the recent licensure of the HPV vaccination by the FDA.

Upon examining the literature in the last several years, it is evident that there is a shift from hypothetical intentions to vaccinate adolescents with the HPV vaccine to post-licensure studies aimed at understanding the variables to increase vaccine uptake. Three primary themes emerged from the literature: parental attitudes towards acceptance, parental beliefs about the vaccine and barriers to vaccine administration.

Introduction to the themes

The first theme to be discussed is parental attitudes towards HPV vaccine acceptance. Understanding parental attitudes towards HPV vaccine acceptance is a key to increasing vaccine administration in the adolescent population. The theme parental attitudes will be

addressed by investigating the sub-themes of parents' knowledge, role of the physician, child gender and perceived risk. The sub-themes are instrumental in influencing the development of parental attitudes towards the HPV vaccine.

The second theme is parental beliefs towards HPV infections. Parental beliefs influence the administration of the HPV vaccine in numerous ways. The sub-themes of religion, ethnicity, and normative beliefs all contribute to development of social mores, which affect the development of beliefs.

The third theme is parental barriers towards HPV vaccination. While it is important to address attitudes and beliefs, understanding the barriers to the HPV vaccine administration can help inform intervention development to increase vaccine uptake. The barriers to increasing HPV vaccination rates are multifaceted. The sub-themes of age of administration, vaccines in general, specific issues to males, and cost are all obstacles that need to be overcome to increase HPV vaccination in adolescents.

Parental attitudes towards acceptance

Knowledge—Some studies report up to 60% of parents have no prior knowledge of the HPV vaccine (Brabin et al. 2006; Brewer & Fazekas 2007). As reported by the Centers for Disease Control (CDC), only 11% of 13–17-year-old adolescent received all three doses of the HPV vaccine in 2010 (Hitt 2010). This is in sharp comparison to 93% of children receiving all three doses of the hepatitis B vaccine in 2009 (Child Trends Databank 2011). Surprisingly, increasing parental knowledge of HPV infection and its sequela has not always shown to also increase vaccine acceptance.

Studies show mixed results for the relationship of HPV knowledge to vaccine acceptability. One educational intervention sampled 840 self-identified parents of primary caregivers of children 8–12 years old. A random sample was chosen from the Group Health Cooperative Center for Health Studies. The control group had 411 participants and the interventions group had 429 participants. The control group was mailed a survey about HPV infection and HPV vaccine. The intervention group was mailed the same survey plus a HPV information sheet. The parents in the intervention group did show an overall increase in HPV knowledge but that did not translate into higher vaccine acceptance rates (Dempsey et al. 2006). An explanation for this difference is because changes in knowledge were not reported by the study. Therefore, study findings cannot be tied to increased knowledge with any certainty. Notwithstanding, in another educational study with a pre-test/post-test design, parents were provided a one-page fact sheet about HPV. The post-test indicated 75% of parents reported an increased knowledge of HPV as well an increased acceptance of vaccine administration for their adolescents (Davis et al. 2004). A similar result was seen when 18–45-year-old men were given a HPV information sheet and then asked to complete a 29-item questionnaire. Results showed that 33% of the men wanted to receive the HPV vaccine after the educational intervention (Ferris et al. 2008). Educational interventions have shown to increase knowledge of HPV and the HPV vaccine acceptability in parents. Reinforcement of the educational interventions needs to be supported by public health advocates and healthcare practitioners to increase vaccine uptake.

Role of the physician—Research indicates that attitudes of physicians and nurses towards HPV and the HPV vaccine influence vaccination uptake. In general, physician recommendation weighed heavily on parental acceptance of the HPV vaccine (Dempsey et al. 2006; Olshen et al. 2005). Sixty-three per cent of physicians show a high willingness to recommend the HPV vaccine to males age 11–12 years old (Weiss et al. 2010). This is encouraging because in October 2011, the Advisory Committee on Immunization Practices upgraded the HPV vaccine in boys from permissive to recommended. Support of the HPV vaccine by physicians and nurses will help increase vaccination rates. An interesting finding that came out of this theme was 58% of physicians strongly agreed that the HPV vaccine would increase the opportunity to discuss sexual health with adolescent patients and parents (Weiss et al. 2010). This finding supports the concept that mothers who are willing to discuss related sexual health topics with their daughters at an earlier age are also more likely to accept the HPV vaccine (Marlow et al. 2007).

Gender—Gender-based knowledge also effects parents' acceptance of the HPV vaccine. Parents who understand that HPV 16 and 18 can cause cervical cancer in their daughter were more accepting of the HPV vaccination (Mortensen 2010; de Visser & McDonnell 2008). Parents who did not understand the HPV risk in males were less likely to accept HPV vaccination in boys (Marlow et al. 2007; de Visser & McDonnell 2008). Forster et al. (2010) looked at female adolescents ages 16–18 years old using a cross-sectional survey to assess acceptance rates of the HPV vaccine. Results showed that 72% of female adolescents intended to receive the HPV vaccine because of its health benefits. This is an interesting finding since adolescents have the ability to participate in their health care and potentially influence the clinical decision-making process of their parents.

Gender differences impacted the primary reason parents sought to vaccinate their adolescents. The primary factor for acceptance of the HPV vaccine in males by parents was the importance of protecting their son's future female partner from HPV-related disease (Reiter et al. 2010). This finding suggests that parents do not fully understand the complications of HPV infection in males. This is in contrast to parent's primary reason for vaccinating females which was to protect their daughters against cervical cancer (Dempsey et al. 2006; Ferris et al. 2010; de Visser & McDonnell 2008). These findings support the need for additional educational interventions to help increase paternal knowledge of HPV and acceptability of the HPV vaccine. Particularly, because males have a lower immune response to the HPV vaccine and have a higher prevalence of HPV infections (Giuliano et al. 2011) merely vaccinating them for the potential benefit to their future partners does not acknowledge the inherent risk they can incur because they are males.

Perceived risk—Parents' notion of perceived risk of their adolescent acquiring a disease influenced their decisions to vaccinate their children. Parents who had experience with chronic illness, either in themselves or in a family member were more likely to be accepting of the HPV vaccine. For instance, HPV vaccine acceptance rates were higher in adolescents whose mothers had experienced cancer themselves (Marlow et al. 2007; Olshen et al. 2005; Reiter et al. 2010). Ferris et al. found an increase in maternal acceptance related to women having a greater appreciation for the perceived risk of HPV infection because they undergo

routine Papanicolaou (pap) tests (2008). The comparable exam in males would be routine anal cytology, which at this time is not recommended for healthy men. Perceived risk of infection and parental beliefs towards HPV infections are directly related. The impact of parents perceived risk of infection and acceptance of the HPV vaccine is connected to parental beliefs towards HPV infection and its sequela.

Parental beliefs towards HPV infections

Religion—One such way is seen by parents' religious values. Parents who identified themselves as Christians were highly likely to vaccinate their children (Brabin et al. 2006; Shelton et al. 2011). This suggests that religious affiliation influences vaccination acceptance rates. However, several studies found religious values did not affect parents' beliefs regarding vaccination (Davis et al. 2004; Reiter et al. 2010; Zimet et al. 2005a). As these studies summarized, parental beliefs were directly influenced by practitioner recommendation and personal knowledge of the HPV vaccine.

Ethnicity—Studies found an ethnic group's prior experience with public health interventions affected beliefs. African American parents in general were more suspicious of the HPV vaccine than their non-African American counterparts. This could be a reflection of the well-documented finding that many African Americans are suspicious of public health intervention as it relates to STIs (Zimet et al. 2000). One study examined Hispanic parental beliefs. They found Latina mothers were significantly more willing to vaccinate sons than non-Latina mothers (Liddon et al. 2010; Lopez et al. 2010). This difference in acceptance rates between ethnic groups could reflect cultural beliefs towards the susceptibility of males and their affinity to infection. There is limited research regarding ethnic beliefs and HPV vaccination. This represents an area requiring additional research.

Normative beliefs—The belief that the HPV vaccine would offer future protection to sons and daughters has been shown to increase HPV vaccine uptake (Olshen et al. 2005). However, parental belief about the sexual transmissibility of HPV infection was not a significant indicator of intent to vaccinate their child (Zimet et al. 2005b). This finding highlights the importance of increasing parental knowledge of the sequela of HPV infections and prophylactic benefit of the HPV vaccine.

The belief the HPV vaccine would protect against more than one type of infection influenced HPV vaccine beliefs. Parents were more inclined to accept a vaccine that prevented chronic incurable diseases as opposed to diseases that could be prevented with a change in behaviour (Zimet et al. 2005a). Likewise, parents would be more accepting of a vaccine that offered protection against genital warts and cervical cancer than just cervical cancer alone (Dempsey et al. 2006). These could have interesting implications for public health campaigns to increase HPV vaccination uptake. A shift from promoting the HPV vaccine as a method to prevent individuals from getting a STI to the promotion of HPV in preventing cancer could increase parents' beliefs about the usefulness of the HPV vaccine.

The theory of planned behaviour (TPB) was a common theoretical framework used to explore parental beliefs about the HPV vaccine (Ogilvie et al. 2008). The TPB confirmed parents' belief about consequences of the HPV vaccination influenced their behaviour

towards HPV vaccine acceptance. The concept is based on the subjective probability that the behaviour will produce a given outcome. For example, parents whose normative beliefs about the safety and efficacy of vaccines in general contributed greatly to their belief in the safety and efficacy of the HPV vaccine. Parents who believed the vaccine was safe were more willing to vaccinate their children (Dahlstrom et al. 2010; Marlow et al. 2007; Mortensen 2010; Olshen et al. 2005; Zimet et al. 2005b).

The parents' perception of social normative pressures or relevant others' beliefs that they should or should not perform such behaviour, also influenced their belief towards vaccinating their adolescent with the HPV vaccine. For example, parents who believed the HPV vaccination would be supported in peer groups was a strong predictor of intentions to vaccinate (Dempsey et al. 2006; Marlow et al. 2007). Likewise, normative beliefs in mandatory vaccination programmes increased acceptance in the vaccination decision process. Additionally, parents were more likely to believe in the usefulness of the HPV vaccine if it was part of a school-based mandatory vaccination programme (Brabin et al. 2006; Ferris et al. 2010; Ogilvie et al. 2010).

An interesting finding in the application of TPB to examine parental normative beliefs towards HPV vaccination was the effect gender of the child had on the decisions to vaccinate. In some instances, the gender of the child affected the normative beliefs of the parents. A random nationwide population-based survey, which included 13 946 parents (11 187 parents of girls and 2759 parents of boys) investigated potential differences in the attitudes of parents regarding the gender of their adolescent and intentions to administer the HPV vaccine. Results of this study found 70% of parents of boys thought it was necessary to vaccinate girls, whereas only 54% of parents of girls believed it was necessary to vaccinate boys (Dahlstrom et al. 2010). This may be an indication of parental readiness to perform the HPV vaccination behaviour is influenced by the peer groups of the parents and by the gender of the adolescent.

Parental barriers towards HPV vaccination

Age of administration—A major barrier that emerged from the literature was the age at which the HPV vaccine should be administered. In general, parents disagreed on the age of administration. Parents thought giving the vaccine before the age of 12 would increase risky behaviour and early onset of sexual activity (Davis et al. 2004; Marlow et al. 2007; Olshen et al. 2005). Dahlstrom et al. (2010) found 53% of parents considered 15–17 years old be to the preferable age for their adolescent to receive the HPV vaccine. This age range preference for vaccination by parents is undermined by some studies finding 7% of school-age children engaging in sexual intercourse before the age of 13.5 years olds (Olshen et al. 2005). This suggests an earlier age for administration of the HPV vaccine needs to be supported to provide maximum protection from HPV infection and its sequela. Interestingly, pediatricians and family practitioners were more likely to recommend the HPV vaccine to 9- to 10-year-old boys than girls (Weiss et al. 2010). This acknowledges an understanding by practitioners that males have an earlier sexual debut vs. females. A greater effort to disseminate study findings needs to happen because some parents are still resistant to vaccinating their children prior sexual debut (Dahlstrom et al. 2010).

The notion that the HPV vaccine will increase early onset of sexual activity continues to be a strong barrier to vaccine acceptance. In Davis et al. (2004), 575 participants received an educational intervention and were asked to complete a 30-question survey regarding HPV and the HPV vaccine. Before administering the education intervention about the HPV vaccine, 55% of the subjects wanted the vaccine for their children. After reading the one-page intervention, a significantly greater number of parents were opposed to the vaccine because they believed it would increase early onset of sexual activity in their adolescent ($P=0.003$). (This presents a robust barrier, which combines lack of perceived risk, knowledge of HPV infections and underestimation of adolescent sexual behaviour by parents. The barrier is further complicated by parents showing an increased acceptance of the HPV vaccine as the proposed age of vaccination increases (Dempsey et al. 2006), which may make a significant proportion of adolescents ineligible for the prophylactic protection of the HPV vaccine because of engagement in sexual activity. This belief by parents undermines administration of the HPV vaccine prior to sexual debut. Clearly, the moral risk associated with the HPV vaccination may be perceived to outweigh its benefits (Brabin et al. 2006).

Vaccines in general—Parental barriers to the HPV vaccine were influenced by administration of vaccines in general. Parents who believed their adolescent already received too many childhood vaccines were less likely to embrace the addition of the HPV vaccine (Marlow et al. 2007). Similarly, parents who themselves did not receive all their vaccinations were less likely to vaccinate their children against HPV (Davis et al. 2004). For example, if parents did not acquire a preventable childhood illness such as the measles because they never received the measles, mumps and rubella (MMR) vaccine, they were less likely to perceive the risk of HPV infection. They were less likely to connect the susceptibility of acquiring the infection and its relationship to not being vaccinated. There were also less likely to think vaccinations were beneficial overall.

The HPV vaccine is a series of three separate injections given several months apart. This acted as barrier to administration. Parents who feared side effects of the vaccine, such as pain at the insertion site and fatal complication were less likely to vaccinate their adolescent child(ren) (Davis et al. 2004; Dempsey et al. 2006; Marlow et al. 2007, Mortensen 2010). Current studies are comparing the efficacy of a two-dose HPV vaccine vs. a three-dose regimen (Giuliano et al. 2011). Pending the results of such research, the number of injections required for the vaccine may eliminate this as one of the barriers to HPV vaccination.

Susceptibility to infection—It is evident that parents who believe their adolescents are at a greater risk for acquiring an infection were more likely to vaccinate their child with the HPV vaccine. In most cases, these parents thought their adolescents were more likely to engage in risky behaviours such as sexual intercourse without a condom and illicit substance use (Brewer & Fazekas 2007). Parents who believed their child would eventually be exposed to HPV were more likely to vaccinate (Olshen et al. 2005). These parents also demonstrated a high knowledge level of HPV and the relationship between sexual encounters and the increased risk of infection (Davis et al. 2004). However, parents who thought their adolescent was not at risk for HPV were less likely to believe the HPV vaccine was

necessary (Olshen et al. 2005). These parents displayed an overall low knowledge of HPV infection (Davis et al. 2004).

Specific barriers to males—Some studies focused on the HPV vaccine barriers in males. These findings were interesting because fathers in general were under-represented in all the studies that sampled parents. One such convenience sample study sampled 571 men ages 18 to 45 and provided them with a one-page information sheet about HPV and HPV infections. It then asked them to complete a 29-item survey. Results found the men sampled had specific barriers towards not wanting to receive the vaccine. These barriers included feeling they were outside the recommended vaccination age range of 9 to 26 years old, identified themselves as black and were lower educated (Ferris et al. 2009). The perceived barriers of men in this age are significant to understand because their personal barriers could influence the decision to vaccinate their current or future children.

Cost—Cost was a barrier commonly stated by parents for their adolescent receiving the HPV vaccine (Zimet et al. 2000). Dahlstrom et al. (2010) found 76% of parents were willing to vaccinate both male and female adolescents if the HPV vaccine were free, whereas, parents of girls were more willing than parents of boys to vaccinate their child even if the vaccine was not free. This finding was met with some contradiction. Mothers were more willing to vaccinate their sons if the HPV vaccine was free or cost less than \$400 out of pocket (Reiter et al. 2010). In this study results, mothers tended to be white, Caucasian and have a higher knowledge of HPV than participants sampled in other studies. Additionally, 45% of parents would be willing to pay for the HPV vaccine in both girls and boys (Mortensen 2010). This suggests that parents understand the risk of infection in both males and females and the prophylactic protection offered by the HPV vaccine.

Study design—An interesting barrier that emerged from the literature was derived from the recruitment techniques used in the studies. The majority of the studies reviewed used cross-sectional surveys (Brabin et al. 2006; Dahlstrom et al. 2010; Davis et al. 2004; Ferris et al. 2008, 2009, 2010; Foster et al. 2010; Marlow et al. 2007; Mortensen 2010; Ogilvie et al. 2008; Reiter et al. 2010; de Visser & McDonnell 2008; Weiss et al. 2010). Surveys were either mailed to the home or participants were recruited from doctors' offices. This recruitment technique oversampled mothers. In some cases, the response rate from mothers was as high as 91% (Davis et al. 2004). Additionally, the mothers tended to be white Caucasian with some college education (Dempsey et al. 2006; Ferris et al. 2010; Mortensen 2010; Ogilvie et al. 2008; de Visser & McDonnell 2008; Reiter et al. one intervention 2010). In a study with a sample size of 325 parents, 19 of the participants were fathers (Ferris et al. 2010). In contrast to the over representation of mothers, some studies had a paternal response rate of only 27% (Mortensen 2010). Very few studies have investigated the attitudes, beliefs and barriers of urban, low socio-economic status (SES), low education, fathers and ethnic differences towards the HPV vaccine. This represents a major barrier towards understanding how to increase vaccination uptake rates.

Implications for practice

Several gaps have been identified in the literature, which have great implications for practice. Perhaps the more influential is to understand the role the father plays in the parent clinical decision-making process. The current literature supports the mother as the gatekeeper in the parent clinical decision-making process. However the attitudes, beliefs and barriers of the father are under-represented or not addressed. It is necessary to understanding the relationship between the under utilization of father's role in the clinical decision-making process and vaccine uptake rates in adolescents, specifically in male adolescents. Understanding the father's role could have a secondary benefit of understanding how male children develop health-seeking behaviours as adults. Studies show a father's engagement with the male child is associated with positive cognitive, social and emotional outcomes for children from infancy to adolescents (Cowan et al. 2009) Likewise, disengagement from the parent clinical decision-making process towards the male child and HPV vaccine could have serious health risks for the male child's well-being and future health-seeking behaviour. Epidemiological studies have consistently demonstrated that men are less likely than women to utilize healthcare services as adults (Kalmuss & Austrian 2010).

Despite the impact of the HPV vaccine's ability to reduce genital warts and risk of invasive cancers, men's overall knowledge of HPV risk and interest in prophylactic vaccination are low (Lopez et al. 2010). This highlights why it is important to assess fathers' attitudes, beliefs and barriers to HPV vaccination and not solely mothers.

Little is known about the attitudes, beliefs and barriers regarding the fathers' involvement in the parent clinical decision-making process towards prevention of STIs. Research that explores gender-based differences as a way to better understand the clinical decision-making process and what support fathers require may not only amplify HPV vaccination compliance and STI prevention, but also enhance future adolescent male healthcare-seeking behaviour. This could lead to a direct reduction of the prevalence of HPV infections and its sequela. It is important to address the susceptibility of HPV infection and its sequela in both females and males because efforts to improve the sexual health of individuals and communities cannot succeed by focusing only on females (Kalmuss & Austrian 2010). Addressing HPV infection in male adolescents is particularly relevant because males play a key role in the transmission dynamics to both male and female sexual partners (Lopez et al. 2010).

Conclusion

HPV infection and its sequela continue to be a major public health and global health problem. The adolescent population is disproportionately affected. While much of the research has focused of assessing parental attitudes, beliefs and barriers to HPV vaccine administration, the results have been over-represented by mothers and homogeneous samples. This paper has concentrated on the attitudes, beliefs and barriers of parents; however, 'parents' is a generalized term and more attention needs to be paid to specific subgroups. Ideally, future research will include fathers, urban populations, low SES and ethnic diversity. The HPV vaccine is currently available for international distribution. Understanding the attitudes, beliefs and barriers of these critical components in the parent

decision-making process towards HPV vaccination will only increase uptake of this prophylactic prevention to reduce STIs in adolescents worldwide.

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