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HPV vaccination in male physicians: A survey of gynecologists and otolaryngology surgeons' attitudes towards vaccination in themselves and their patients

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ABSTRACT

Objective: Attitudes and barriers towards HPV vaccination were explored in a population of male surgeons in Gynecology and Otolaryngology in Ontario, Canada.

Materials/methods: An internet-based survey was distributed to male residents and physicians affiliated with the departments of Obstetrics and Gynecology, and Otolaryngology at six Ontario universities. The survey consisted of 16 questions (3 demographic, 3 workplace exposure, 6 regarding personal vaccination, and 3 regarding patient vaccination). Subgroup analyses examined differences between residents versus staff physicians and gynecologists versus otolaryngologists.

Results: Most respondents (51/63, 81.0%) had not been vaccinated against HPV, yet would consider vaccination in the future (41/51, 80.4%). Significantly more residents would consider vaccination compared to staff physicians ($p = .03$). Personal protection from benign HPV disease was the most common motivating factor (25/59, 42.4%) among participants. A notable barrier to vaccination was "age over recommendations" (9/44, 20.4%). Most participants would recommend the HPV vaccine to both male patients (49/62, 79.0%) and male partners of female patients (47/62, 75.8%).

Conclusions: This study demonstrates male gynecologists and otolaryngologists had largely favorable attitudes towards HPV vaccination though few had received vaccination. These findings may be used to increase HPV vaccine uptake among male health care professionals and their patients.

1. Introduction

Human papillomavirus (HPV) is the most commonly transmitted sexually transmitted infection (STI) in the world. It is estimated that approximately 75% of sexually active men and women in Canada will be infected with at least one strain of HPV in their lifetime and HPV infections account for 5.2% of the worldwide cancer burden [1–3]. There are cervical, anal, vaginal, vulvar, penile, oral cavity and oropharyngeal HPV related cancers [3]. According to the Canadian Cancer Society, approximately two-thirds of HPV associated cancers are non-cervical [3]. American cancer registries state that between 2006 and 2010, approximately 9300 annual cancers in men were directly attributable to HPV infections including 90% of anal cancers, and 63% of penile cancers [4]. During the same period, 7200 cases of oropharyngeal cancer were also found to be attributable to HPV infection in men [4].

It is well established that the HPV vaccine can protect against cervical cancer in HPV naïve females [5]. There is also strong evidence to support the vaccine's efficacy in males [2,6,7]. Specifically, studies have demonstrated the effectiveness of the quadrivalent vaccine in the prevention of ano-genital warts [6] and anal intraepithelial lesions [7] in men. Cost effectiveness data is more controversial. Most cost effectiveness studies are focused on whether vaccinating men is cost effective in decreasing cervix cancer in women. These studies show that vaccinating men is not cost effective, especially when female coverage is moderate-high [8]. Cost effectiveness data is more favorable for vaccination of men when considering all HPV related diseases and when female vaccination rates are below 40% [9]. A recent Australian study by Zhang et al. used a compartmental model to demonstrate that having a male HPV vaccination program with 84% coverage will result

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in a 90% reduction in HPV in men who have sex with men [10].

Countries such as Australia, Canada and the United States have adopted HPV vaccination programs for males. Specifically, in Canada, the National Advisory Committee on Immunization (NACI) issued an update in January 2012 on HPV vaccines, which included recommendations for males ages 9–26 and females aged 9–45 [11,12]. Currently, only the quadrivalent vaccine (Gardasil®, protecting against HPV 6/11/16/18) and the nonavalent vaccine (Gardisil®9, protecting against HPV 6/11/16/18/31/33/45/52/58) are recommended for men [12]. Publically funded school based HPV vaccination programs are available for both girls and boys in selected provinces and territories across Canada, including Ontario [13]. The desire to include men increased based on HPV vaccination rates failing to reach the levels necessary to establish herd immunity, gender equity issues, and a lack of protection for men having sex with men [14–16]. However, outside of school programs, HPV vaccination remains unsubsidized and it is excluded from many other worldwide national immunizations programs [8,9].

A large degree of HPV vaccine research has been done specifically targeting efficacy and benefits for women. Fewer studies have been conducted targeting awareness, attitudes and beliefs of males. The importance of such research has become increasingly apparent for several reasons. These include: the association of HPV with high rates of anal cancer in homosexual men, a high morbidity and cost associated with genital warts, and the risk of HPV related penile, anal, and head and neck cancers [17–19]. Furthermore, the burden of HPV-associated cancers is increasing in men [8]. A recent report by Habbous et al. found that from 2000 to 2012, there was a rise in the proportion of HPV attributable oropharyngeal cancers among patients being treated in Canadian surgical centers [20]. However, in 2010 Liddon et al. suggested that there was a preference to vaccinate females by both parents and health care providers [21]. A notable barrier to vaccination among adult males, parents, and providers is the belief that the HPV vaccine does not directly benefit them and that cervical cancer prevention for females is not sufficiently motivating [21]. Another study by Newman et al. identified lack of health care provider recommendation as a barrier to vaccination [22]. As HPV vaccination programs in males are still relatively new, much of the research done on the attitudes toward male vaccination was done prior to the establishment of routine vaccination programs and thus may not represent current opinions [21]. More recently, it has been shown that the majority of Canadian parents are not aware of the recommendations for male HPV vaccination [14]. As such, more research is needed to better understand attitudes toward male vaccination.

Studies suggest that men and parents of boys would benefit from the knowledge their health care providers communicate to them [17,23]. Our study aimed to address attitudes towards HPV vaccination in a population of male surgeons in Gynecology and Otolaryngology in Ontario, Canada as these are specialists who see and treat HPV related disease. Specifically, do these male surgeons feel they are at higher risk of HPV exposure due to occupation related exposure, have they been vaccinated, what are barriers to vaccination, and would they advocate for vaccination of male patients?

2. Materials and methods

An internet-based survey of 17 questions was created to address the attitudes towards male HPV vaccination in male Gynecologists and Otolaryngologists at academic institutions in Ontario, Canada. This study was approved by the Research Ethics Board at Women's College Hospital #**2014-0094-E.** The survey was created and hosted on an American web-based platform (Survey Monkey, www.surveymonkey.com) and was uniquely developed for this study. The survey was first piloted among a group of 5 resident physicians to ensure clarity, comprehension and time to complete the survey. To determine face validity, content validity, and comprehension, the survey was sent to a group of 5 experts who treat HPV as a major component of their practice.

The survey consisted of 3 demographic questions, 4 workplace exposure questions, 6 questions regarding personal vaccination, and 4 questions regarding patient vaccination. The questions were multiple choice with a mix of single answer and multiple answer options. A copy of the survey can be found in Appendix A.

The departments of Obstetrics and Gynecology and Otolaryngology at 6 Ontario medical schools were asked to distribute the survey among their male residents and staff physicians. The Obstetrics and Gynecology departments at the University of Toronto, McMaster University, University of Western Ontario, Queen's University and the University of Ottawa agreed to disseminate this survey. The survey was also distributed to the Otolaryngology departments at University of Western Ontario and Queen's University. The remaining 3 Otolaryngology departments did not participate. The survey was conducted in English, the most commonly spoken language in Ontario. The email invitation for the survey was sent out in January 2016 and remained open until May 2016. Reminders emails were sent out at 1 and 2 weeks after the initial email invitation.

Informed consent was obtained from all participants. Respondents who chose not to respond to a question were excluded from the analysis of the respective question. Subgroup analyses were preplanned to compare differences in treatment between gynecologists versus otolaryngologists and residents versus staff physicians. Chi-squared tests were run using SPSS Version 23 (Armonk, NY) to compare data between these subgroups. Fisher's exact test was used when expected counts were less than 5. A significance threshold of 0.05 was used for this study.

3. Results

A total of 91 surveys were sent via Survey Monkey. There were 63 male respondents recorded (63/91), with a 69% response rate.

As analysis was confined to male physicians and residents in obstetrics and gynecology and otolaryngology, all participants met the inclusion criteria. Obstetrics and gynecology was the most common specialty practiced among respondents (26/63, 41.2%), followed by general otolaryngology (19/63, 35.8%). Demographic information can be found in Table 1.

When asked to rate knowledge of HPV related diseases 34 (54.0%) of 63 participants rated their knowledge as above average. While 26 (41.3%) of 63 rated their knowledge as average, only one (1.6%) reported minimal knowledge and two (3.2%) expert knowledge. The majority (30/63, 47.6%) of respondents reported seeing between 0 and 25 cases of genital or head and neck condyloma, cervical precancerous or cancers, or HPV related head and neck cancers on an annual basis. A

Table 1
Baseline characteristics of respondents (n = 63).

Characteristics	Respondents n (%)
Sex	
Male	63 (100)
Specialty of medicine	
Obstetrics and Gynecology	26 (41.2)
Gynecology Oncology	3 (4.8)
General Otolaryngology	19 (35.8)
Head and Neck Oncology	7 (11.1)
Other Otolaryngologic Specialty	6 (9.5)
Other	2 (3.2)
Length of practice	
Current resident	38 (60.3)
1–5 years	5 (7.9)
6–10 years	4 (6.4)
11–20 years	10 (15.9)
More than 20 years	6 (9.5)

smaller proportion of physicians and residents reported seeing between 25–50 (17/63, 27.0%) and over 50 cases (16/63, 25.4%). Most participants (35/62, 56.4%) did not use laser for treatment of HPV related diseases. Moreover, when asked to describe perceived occupational risk of exposure to HPV, 46 of 63 (73.0%) responded that they believed they had a mild-moderate risk (mild; 25/63, 39.7%, moderate; 21/63, 33.3%). A smaller proportion noted no risk (9/63, 14.3%), high risk (6/63, 9.5%) or extremely high risk (2/63, 3.2%).

The majority (51/63, 81.0%) of participants in this study had not been vaccinated against HPV. There was no significant difference in vaccination rates when comparing gynecologists (7/29, 24.1%) to otolaryngologists (5/33, 15.2%) and residents (10/38, 26.3%) to staff physicians (2/25, 8.0%). The majority of those who had not been vaccinated (41/51, 80.4%) responded that they would consider vaccination in the future. This was not significantly different between obstetricians and gynecologists (17/22, 77.3%) versus otolaryngologists (23/28, 82.1%). In contrast, significantly more residents (26/28, 92.9%) than staff physicians (15/23, 65.2%) responded that they would consider vaccination in the future ($p = .03$). Of the 12 participants who had been vaccinated, 3 had received the nonavalent vaccine (25%), 8 received the quadrivalent vaccine (66.7%) and 1 had received the bivalent vaccine (8.3%).

When asked about their motivation to be vaccinated or to consider vaccination, the most common (25/59, 42.4%) motivating factor selected among participants was personal protection from benign HPV diseases. Potential partner protection from benign HPV disease was the least commonly chosen response (13/59, 22.0%) (Table 2). The most commonly chosen reason when asked to select reasons why one would not consider vaccination was “current age over recommendations” (9/44, 20.4%), followed by personal cost (5/44, 11.4%) (Table 3). Among those who selected “other” low perceived exposure risk was a common theme. Most participants (43/60, 71.7%) indicated that financial coverage of the HPV vaccine would make them more likely to seek the vaccination.

Most physicians and residents in this study indicated that they would recommend the HPV vaccine to both male patients (49/62, 79.0%) as well as male partners of female patients (47/62, 75.8%). Of those who would recommend the vaccine to male patients, most (32/49, 65.3%) answered there should be no age cut-off for vaccination (Table 4). Only a few participants would not recommend vaccination to male patients (1/62, 1.6%) or male partners of female patients (0%). Other answers included “not applicable” and “depends on the clinical circumstance”. Of the 4 participants who selected reasons for not recommending HPV vaccination to male patients, 2 chose personal cost, one (1) chose current age over recommendations and one (1) answered that it would depend on relative risk of exposure.

4. Discussion

The results of this study show that there is an overall favorable attitude among both staff and resident gynecologists and otolaryngologists towards HPV vaccination. Those surveyed felt that personal protection and partner protection is a high priority when seeking vaccination. Most practitioners in both disciplines felt that protection from malignant conditions was more important than benign HPV related disease (42% versus 33%). Overall 73% of providers felt that they had a significant risk of HPV exposure in their work, while only 14% felt that there was no occupational risk whatsoever. A respondent vaccination rate of only 19% suggests strongly that there is significant discrepancy between those who have received vaccination and those who believe they could benefit from HPV vaccination.

Among participants who were not vaccinated, several important themes were revealed in their responses. Firstly, vaccine safety was not noted to be a concern. This is in line with best available evidence and suggests that these frontline providers have sound knowledge of HPV vaccination. Another barrier to vaccination was the perceived lack of efficacy in men and paucity of data pertaining to the indirect benefits of male vaccination in women. Undoubtedly, there is a higher burden of HPV related disease in females although HPV related disease in men is rising. Efficacy of the quadrivalent vaccine has been well established in males in decreasing both ano-genital warts and in the prevention of anal intraepithelial pre-cancers in men [6,7,11]. Evidence on whether male vaccination may prevent cervical cancers is not yet available [11]. There is a small case series supporting the quadrivalent HPV vaccine in decreasing the number of surgeries in patients with recurrent respiratory papillomatosis [24]. Finally, cost effectiveness studies and vaccine acceptability studies in males are limited and recommending routine vaccination in all preadolescent males remains controversial [11,25]. A recent study in Norway did demonstrate that depending on cost, vaccination of boys may be cost effective strategy. However, the study did suggest that increasing coverage among women is even more effective and that increasing coverage should be a priority [26]. A Dutch study also showed that in mathematical modeling, vaccination in men reduced the burden of HPV related malignancy in men, but men still had more benefit when female vaccine uptake was increased [27]. It is biologically plausible that the HPV vaccine would decrease HPV related head and neck cancers in men but there are no studies yet supporting this. Studies have shown that men who receive the HPV vaccine show a decreased prevalence of HPV in the oral cavity compared to those who aren’t vaccinated [28]. A recent case series has shown the quadrivalent vaccine increased the negative conversion of HPV in laryngeal secretions in men with recurrent laryngeal

Table 2
If you have been vaccinated or are planning on being vaccinated what was your motivation? (Multiple responses allowed) (n = 59).

Answers choices	Respondents n (%)
Personal protection from benign HPV disease (warts)	25 (42.4)
Potential partner protection from benign HPV disease.	13 (22.0)
Personal protection from HPV related malignancies (oropharynx, penile, anal)	20 (33.9)
Potential partner protection from HPV related malignancies (cervical, vaginal, anal, penile, oropharynx)	18 (30.5)
All of the above	33 (55.9)
Not applicable	11 (18.6)
Other	1 (1.7)

Table 3
If you would NOT consider vaccination, why not? (Multiple responses allowed) (n = 44).

Answers choices	Respondents n (%)
Personal cost	5 (11.4)
Lack of demonstrated efficacy in men	2 (4.6)
Lack of data pertaining to indirect benefit to female partners	2 (4.6)
Concerns about vaccine safety	1 (2.3)
Previous exposures to HPV	3 (6.8)
Current age over recommendations	9 (20.4)
Time limitations	1 (2.3)
Limited access to provider	1 (2.3)
Other	7 (15.9)
Not applicable	26 (59.1)

Table 4
If you would recommend the vaccine to your male patients, what age would you use as the cut-off? (n = 49).

Answers choices	Respondents n (%)
21 years of age	5 (10.2)
26 years of age	8 (16.3)
No cut-off	32 (65.3)
Other	4 (8.2)

papillomatosis [29].

Other noted barriers to vaccination included personal cost as well as concerns about being over the recommended age. Currently, the cost of the vaccine is covered under the Ontario postgraduate medical resident drug coverage plan for both males and females, regardless of age. More knowledge about this coverage could alter the uptake among male resident physicians as 71% suggested that financial coverage would make them more likely to seek vaccination. In Canada, the National Advisory Committee on Immunization (NACI) does recommend routine vaccination of males from ages 9–26 and women aged 9–45 [12]. The vaccine has shown efficacy in women older than 26 and is likely to be the same in men if studied [30]. Many healthcare providers in this study are indeed over the current age recommendations for immunization, however, the data presented suggests that these individuals (73%) may consider themselves at risk for occupational exposure. The Canadian Immunization Guide does recommend vaccination in males 27 years and older who have ongoing risk of HPV exposure [31].

Data on occupational exposure to HPV is limited. The specific risk to health care workers, specifically those utilizing laser to treat HPV related disease is controversial. Some 500,000 health care workers are exposed to HPV on an annual basis [32]. Bovine Papilloma virus in laser plume was first demonstrated to be infective in 1995 [33]. Following this, multiple case reports emerged of surgeons developing respiratory papillomatosis following laser treatment of condylomata. Both the surgeon's lesions and the patient's lesions were HPV 6 and 11 positive [34]. Other larger studies have failed to establish an increase in HPV related disease in surgeons who routinely work with the virus [35]. A study of 110 laser surgeons failed to detect HPV on eyelids, ears, nasopharynx or post-filter apparatus when a smoke evacuator was used. However, 20% of pre-filter swabs did test positive for HPV [36]. A recent study of 287 surgeons treating genital warts or cervical lesions failed to detect HPV 6 or 11 in any oral or nasopharyngeal specimen [37]. While the rate of detectable transmission is low to health care providers, HPV is found frequently on gloves but not masks of surgeons treating HPV related disease [38]. Best practice recommendations at the current time suggest that evacuation of laser plume is an effective method of mitigating exposure to HPV [32]. While there is frequent exposure to HPV from both laser plume and contaminated equipment, there is no evidence of increased HPV infection in health care providers from occupational exposure [32].

This study may serve to increase awareness of the increasing role of HPV vaccination in males. Identification of barriers and attitudes towards vaccination can help identify ways to increase the overall uptake of important vaccination effort. This data includes a wide range of ages and experience; with younger practitioners feeling there is higher value for prevention of HPV related morbidity. Other strengths of the study include an excellent response rate within the province of Ontario's six major medical schools (69%). Opinions were expressed anonymously and providers had ample means to express personal attitudes towards vaccination in themselves and their patients.

This study has several limitations in that it included a small number of participants and attitudes may not be representative of other Canadian provinces and territories. Additionally, the lack of data on specific practices makes it difficult to quantify the overall levels of risk of each participant in both their professional and personal lives. There was also limited data on more experienced clinicians and the response rate among staff was lower than residents. The specific vaccines and doses received by vaccinated participants were not noted. We also did not collect data on the specific age and sexual orientation of participants, which are important risk factors for HPV exposure. Furthermore, a fictitious question was not utilized in the survey to ensure participants were paying attention and responding reliably. There is significant selection bias in these results. There may have been a response bias with those who felt HPV vaccination to be an important topic more likely to participate. Further, this cohort of physicians has more education and financial means than the general population and may not face a financial barrier to accessing the vaccine. There is also a possible response bias when only 2/5 Otolaryngology programs in Ontario participated and Toronto, the program that treats the most head and neck cancers/year, refused to participate. Western University in London did participate and they treat the second highest number of head and neck cancers in Ontario [39]. It is also unclear how many of the Otolaryngology participants subspecialize in laryngology. This group may see more HPV disease as they care for patients with recurrent laryngeal papillomas.

This study shows that attitudes among male Gynecologists and Otolaryngologists are largely favorable. The majority of this group perceives that there is some level of occupational risk (although this risk is likely low) and many would strongly consider seeking vaccination. The key barriers to vaccination were identified as personal cost, perceived lack of data on efficacy and concerns about being over the recommended age. Further research needs to be undertaken to establish the role of male vaccination in cervical cancer but there is good data establishing efficacy of vaccination in men. While there is considerable ongoing debate in public health policy towards universal vaccination, this paper identifies an unmet need in male health care providers. This information can potentially increase the uptake and awareness of HPV related morbidity and prevention in this population which may translate to an increase uptake in patients and merits further study.

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Conflict of interest

The authors have no conflict of interest to disclose.

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Appendix A. Survey questions: male physicians attitudes towards HPV vaccination

1. Are you male or female?
   Male
   Female
2. What specialty of medicine do you currently practice?
   Obstetrics and Gynecology
   Gynecology only
   Gynecology Oncology
   General Otolaryngology
   Head and Neck Oncology
   Other Gynaecologic Specialty: Please specify
   Other Otolaryngologic Specialty: Please specify

Other (please specify)

3. How long have you been in practice (i.e., since finishing residency)?
   I am a current resident
   1–5 years
   6–10 years
   11–20 years
   More than 20 years
4. How you rate your knowledge of HPV related disease?
   No knowledge
   Minimal knowledge
   Average knowledge
   Above average knowledge
   Expert in the field
5. In your clinical practice, approximately how many cases of genital or head and neck condyloma, cervical precancerous or caners, or HPV related head and neck cancers do you see on an annual basis?
   0–25
   25–50
   50–100
   100–200
   More than 200
6. In your clinical practice do you use a laser for treatment of HPV related disease?
   Yes
   No
7. In your clinical practice how would you describe your occupational risk of exposure to HPV?
   No risk of exposure
   Mild risk of exposure
   Moderate risk of exposure
   High risk of exposure
   Extremely high risk of exposure
8. Have you been vaccinated against HPV?
   Yes
   No
9. If you receive the HPV vaccine which one did you receive?
   Gardasil 9 (9-valent)
   Gardasil (quadrivalent)
   Cervarix (bivalent)
   Not sure
   Did not receive the HPV vaccine
10. If you have not been vaccinated as of yet would you consider the HPV vaccine in the future?
    Yes
    No
11. If you have been vaccinated or are planning on being vaccinated what was your motivation? Select as many as applicable.
    Personal protection from benign HPV disease (warts, papillomatosis)
    Potential partner protection from benign HPV disease.
    Personal protect from HPV related malignancies (oropharynx, penile, anal)
    Potential partner protection from HPV related malignancies (cervical, vaginal, anal, penile, oropharynx)
    All of the above
    Not applicable
    Other (please specify)
12. If you would NOT consider vaccination, why not? Choose as many as apply.
    Personal Cost
    Lack of demonstrated efficacy in men
    Lack of data pertaining to indirect benefit to female partners
    Concerns about vaccine safety
    Previous exposures to HPV
    Current age over recommendations
    Time limitations
    Limited access to provider
    Not applicable
    Other (please specify)
13. Would financial coverage of the HPV vaccine make you more likely to see the HPV vaccination?
    Yes
    No
14. Would you recommend the HPV vaccine to your male patients?
    Yes
    No

Not applicable

15. If you would recommend the vaccine to your male patients what age would you use as the cut-off?
    21 years of age
    26 years of age
    No cut-off
    Other (please specify)
16. Would you recommend the HPV vaccine to the male partners of your female patients?
    Yes
    No
    Depends on the clinical circumstance: please specify
    Not applicable
    Other (please specify)
17. If you would NOT consider vaccination for your male patients, why not? Choose as many that apply.
    Personal Cost
    Lack of demonstrated efficacy in men
    Lack of data pertaining to indirect benefit to female patients
    Concerns about vaccine safety
    Previous exposure to HPV
    Current age over recommendations
    Not applicable
    Other (please specify)

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