



# Human papillomavirus and oral health

Office of the Chief Dental Officer of Canada<sup>1</sup>

## Abstract

Canada is among the world leaders in oral health. Despite this, there are growing concerns about the rising rates of HPV-related mouth and throat cancers. The link between human papillomavirus (HPV) and cervical cancer is well established; fortunately, thanks to detection and vaccination, Canada has one of the lowest incidence rates of cervical cancer in the world. The HPV-related mouth and throat cancers, however, present a different picture. In Canada, about 25% to 35% of mouth and throat cancers are related to oral HPV infection; and in 2012, the incidence rate of HPV-associated oropharyngeal cancer was more than 4.5 times higher in males than females. Furthermore, HPV vaccination uptake in Canada is higher among females than males. Physicians and nurses in public health and clinical settings have a role to play in the fight against HPV transmission, as do oral health professionals. Oral health professionals can play a key role in preventing HPV infection and HPV-related oropharyngeal cancers by raising awareness, educating and offering counselling to their clients, and promoting evidence-based preventive and diagnostic interventions.

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## Introduction

Canada is considered to be among the world leaders in oral health (1). Oral health is defined by the Canadian Dental Association as “a state of the oral and related tissues and structures that contribute positively to physical, mental and social well-being and the enjoyment of life’s possibilities, by allowing the individual to speak, eat and socialize unhindered by pain, discomfort or embarrassment” (2). It might come as a surprise to most Canadians that there are growing concerns about the rise in numbers of human papillomavirus (HPV)-related mouth and throat cancers (3). Sexually transmitted infections (STIs) are a significant public health concern in Canada (4). However, when one first thinks about STIs, their impact on oral health is often not top of mind. HPV infection is a good example of such an overlooked connection. HPV is both very common and very contagious; and different types of HPV are transmitted through sexual activities. More than 70% of sexually active Canadian men and women will have a sexually transmitted HPV infection at some point in their lives (5). While most people will contract this virus in their genital area, it can also be contracted in the mouth and throat (3). People are generally unaware of this fact, and of the potential consequences of an oral HPV infection (6). This overview will provide a synopsis of HPV, HPV-related oropharyngeal cancer (OPC), and how oral health professionals can contribute to reducing the burden of OPC on individuals and health care.

## Human papillomavirus epidemiology

There are over 100 types of HPV and the virus can infect different parts of the body (5). Low-risk strains cause minor ailments, such as warts, whereas high-risk strains can cause cancer (7). HPV is the most common STI in Canada and around the world, and most sexually active Canadians will eventually become infected with the virus (5). In many cases, the infection will disappear on its own, but in the small portion of cases, where the infection remains, it may lead to the development of cancers of the cervix, vagina, penis, anus, mouth or throat (8). It can take years before an infection by the high-risk persistent form of the virus can develop, in some cases, into cancer. Therefore, preventing transmission and immunizing pre-adolescents, teenagers, young adults and other potentially vulnerable groups is important (9).

The causal relation between HPV and cervical cancer is well established (10). HPV is the cause for nearly all cervical cancer (11). Indeed, according to a recent article, “cervical cancer continues to be a major public health problem affecting middle-aged women, particularly in less-resourced countries” (12). According to the World Health Organization, cervical cancer is the fourth most frequent cancer in women worldwide (13). In Canada however, we have seen a sharp decline in both incidence and mortality over time, with one of the lowest incidence rates of cervical cancer in the world (14). The combination of an early adoption of wide-spread screening tests and the introduction of the HPV vaccine played a key role in that decline (15).



While women have been seeing decreasing rates in cervical cancer, the incidence of other HPV-related infections and cancers, including OPC, specifically in males, is increasing (7). This is consistent with observations in the United States (US) and in some European countries (7). As presented in **Table 1**, OPC represents the highest number of HPV-related cancer cases in Canada (7). HPV-related OPC is mostly caused by the HPV-16 strain. The highest prevalence of HPV is found in adults of 20–24 years of age (16) with 10%–30% of active infections (17). In Canada in 2012, two-thirds of all HPV-associated cancers were diagnosed in females and one-third in males (7). **Table 2** below presents the incidence of OPC linked to HPV amongst men in Canada and the US (17,18). While comparable data for the same time frames are not available, one can see by these numbers that the incidence is rising.

**Table 1: Most common human papillomavirus-related cancers in Canada, 2012**

Type of HPV-related cancer	Total number of cases
Oropharyngeal	1,335
Cervical	1,300
Anal	475

Abbreviation: HPV, human papillomavirus

**Table 2: Incidence of oropharyngeal cancer linked to human papillomavirus in Canada amongst men**

Year	Number of cases per 100,000	
	Canada	United States
1997	4.1	N/A
2012	6.4	N/A
2013–2017	N/A	8.7
2017	N/A	8.9

Abbreviation: N/A, not applicable

Without vaccination, it is likely that most sexually active Canadians will have an HPV infection at some point in their lives. Unfortunately, good epidemiological data are lacking because HPV is not a nationally notifiable disease, is usually asymptomatic and diagnostics for HPV are not publicly available or funded (16,19). Transmission of oral HPV usually takes place through oral sex, but further research is still required to better understand if there are other potential modes of oral transmission; and to determine what are the mechanisms through which, in some cases, the virus will contribute to the development of mouth and throat cancers (20). In addition, a person infected by oral-HPV can be asymptomatic for many years, making it quite challenging to detect and to prevent further transmission (20). Oropharyngeal cancer affects the posterior third of the tongue, tonsils and medial wall of the pharynx and is commonly diagnosed at advanced stages (21).

## Human papillomavirus vaccination

While males can now receive the HPV vaccine, the focus that was initially put on the prevention of cervical cancer and the introduction of a vaccine solely for females appears to have created a gender bias that led to the misconception that HPV is a “women’s issue” (22). All provinces and territories have announced or introduced HPV immunization programs for girls as part of routine immunization schedules (23). However, it was not until 2017 that all Canadian provinces and territories offered free school-based immunization programs for HPV to both boys and girls with varying eligibility criteria (24–27). As a likely result, HPV vaccination uptake in Canada is higher among females than males (28). Unfortunately, detailed data on vaccination uptake in Canada are not consistent throughout the literature. Better research and surveillance is needed in this area (28).

Three American states, Illinois, Minnesota and Oregon, permit flu vaccinations in dental offices (29); however, only Oregon also allows HPV vaccinations in dental offices (29). Canadian dentists do not presently have the regulatory authority to administer HPV vaccinations, and the responsibility rests with physicians and nurses for the time being. HPV vaccinations in dental offices, however, might assist in increasing vaccination rates, particularly in males. Considerations around vaccinations in Canadian dental offices should be assessed and discussed with the appropriate regulatory bodies. Such discussions would include training, determination of whether dentists have sufficient patient medical histories, and estimation of associated costs (29). In the meantime, the administration of vaccinations in US dental offices should be monitored in order to inform any potential initiative of this kind in Canada.

## Moving forward

With the rise of HPV-associated OPC, there is a need for more action to reduce this trend. If not addressed, HPV-associated OPC may have a significant impact on the healthcare system and resources (7). The OPCs are a public health problem because they have a substantial impact at individual, societal and health care system levels (21). The participation of more boys in vaccination programs would contribute to ensuring that males are equitably protected from HPV-related diseases (22). Given the long latency between HPV infection and cancer, it may be years before the impact of vaccination can be assessed. Furthermore, there is strong evidence that female vaccination can help prevent infection in males through herd immunity (7). Vaccination of the population prior to them becoming sexually active is key in to reducing this burden (5). There is also a need to add and strengthen messaging around 1) sexual practices and behaviours, 2) the importance of oral health as part of overall health and 3) the role(s) played by oral health professionals in detecting early signs of anomalies in the mouth (6). Public health professionals need to continue monitoring changing and evolving patterns of HPV transmission and vaccination rates, and



ensure the application of a sex and gender-based lens to the observed trends considering that, for example, males are more likely to develop oropharyngeal cancers than females, while being less likely to get vaccinated (14,22).

Oral health professionals can play a key role in the fight against HPV transmission, particularly against oral HPV infection, and in preventing HPV-related oropharyngeal cancers—after all, HPV infection is preventable—by raising awareness, educating and offering counselling to their clients, and promoting evidence-based preventive and diagnostic interventions (6,13). Particular attention is needed in the area of the prevalence of oral HPV infection and its typical pathways of transmission in addition to vaccination trends. Its role in the development of HPV-related oral cancers should be closely monitored with increased surveillance and research, and there should also be continued research to explore poor oral health—including periodontal disease—and poor oral hygiene as independent risk factors for HPV infection and oral cancer (30). A small preliminary study in this area indicated that the capacity of Ontario dentists to detect and prevent oral cancers is limited due to inadequate training (21), while another small study in Florida showed that dentists were in the precontemplation and contemplation stages of readiness to discuss HPV vaccines with patients (31). In light of these studies, oral health professionals should be encouraged to do the following:

- Stay up-to-date on evidence related to HPV infection and oral cancers
- Conduct mouth cancer screening at regular check-ups
- Recognize and detect signs and symptoms at an early stage, and monitor any abnormal or suspicious lesion(s) in the mouth
- Explore the possibility of collecting samples at the dental office (e.g. oral rinses or swabs) for HPV detection
- Explain to clients the links between oral HPV and oral cancer
- Share clear and evidence-based information and discuss with their clients about known risk factors (such as tobacco use) and modes of transmission, including sexual practices and behaviours
- Continue to actively promote the importance of good oral hygiene and oral health as factors in prevention of HPV infection and HPV-related oral cancers
- Promote the HPV vaccine as a safe and effective way to prevent the infection
- Discuss with dentist regulatory bodies the possibility of administering the HPV vaccine in dental offices

## Conclusion

The link between HPV and OPC is evident; and with incidence rates rising, more action is required to curb this trend. There are numerous ways in which oral health professionals can contribute to reducing rates of oral HPV infection and in preventing HPV-related OPCs. Oral health professionals are key players in the

fight against HPV transmission and OPC prevention and should create and implement plans in support of this for the health and well-being of their patients.

## Authors' statement

None.

## Competing interests

None.

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