Episode 116 – Children and Oral Health: Part Two

September 13, 2024

Introduction

Various oral diseases and conditions can affect the pediatric population (e.g., dental caries, periodontal disease,[1] head and neck cancers, orofacial trauma, orofacial clefts, noma). Oral diseases impact the oral health-related quality of life of more than half of children and adolescents globally. Poor oral health also hinders their speech and language development, and school attendance and performance. [1] [2] [3]

Head and neck cancers

Types of head and neck cancers that affect the pediatric population include rhabdomyosarcoma, salivary gland tumours, and oral cavity and oropharyngeal cancers.

Rhabdomyosarcoma

Rhabdomyosarcoma (RMS) is a type of sarcoma[2] that usually begins in skeletal muscles but may occur anywhere in the body. RMS is the most common type of soft tissue sarcoma in children and is slightly more common in boys than girls. RMS accounts for almost 3% of cancer cases among children ≤14 years of age and nearly 2% of youth aged 15-19 years. [4] [5] [6]

Although RMS can develop anywhere in the body, it is more likely to develop in:

- Head and neck region (e.g., near the eye, nasopharynx, throat, near the cervical spine and meninges of the brain)
- Genitourinary system (e.g., bladder, vulva, vagina, uterus, ovaries, prostate, around the testicles)
- Extremities (e.g., arms, legs, hands, feet) [6] [7]

Signs and symptoms of RMS depend on the location of the tumour. Symptoms of RMS in the head or neck region may include:

- Painless lump or swelling
- Headaches or earaches

[1] Refer to Episode 116 for part one of children and oral health for discussion on topics such as dental caries, pediatric periodontal disease based on the AAP classification, fluoride hesitancy, and communication strategies to improve topical fluoride acceptance

[2] Sarcoma is a type of cancer that develops in bone or soft tissues, including cartilage, fat, muscle, blood vessels, fibrous tissue, nerves, or other connective tissue. [73]

- Hearing loss
- Bleeding or discharge in the nose, throat, or ears
- Tearing, bulging, or swelling of the eyes, blurred vision
- Drooping or swollen eyelid, crossed eyes, redness or infection around the eye
- Facial swelling, asymmetry, pain, or paralysis (palsy)
- Stuffy nose or breathing problems [8] [9]

It is unclear what causes RMS. Most cases occur sporadically, with no recognized predisposing risk factors. Factors that may increase the risk of RMS include:
- Younger age as RMS most often occurs in children <10 years
- Certain genetic conditions (e.g., neurofibromatosis type 1, Noonan syndrome, Li-Fraumeni syndrome, Beckwith-Wiedemann syndrome, Costello syndrome) [4] [5] [9]

RMS diagnosis is through:
- Health history review, physical exam, complete blood count,
- Imaging tests (e.g., x-rays, CT, MRI, PET, and bone scans), and
- Biopsy (e.g., surgical, core needle, fine needle aspiration). [10] [11]

Treatment of RMS often includes surgery, radiation therapy, and chemotherapy. New types of treatment are being tested in clinical trials (e.g., immunotherapy and targeted therapy). [4] [10]

RMS is usually curable in children with localized disease who receive combined therapy. Children ages 1-9 years tend to have a better prognosis than children younger than one year and those ≥10 years. [6] [12]

Salivary gland tumours

Salivary gland tumours are rare and account for 0.5% of all malignancies in children and adolescents. After RMS, they are the most common tumour in the head and neck. Salivary gland tumours may occur after radiation therapy and chemotherapy given to treat primary leukemia or solid tumours. Often, the exact cause of these tumours is not known. [13] [14]

Most salivary gland tumours arise in the parotid gland, and about 15% in the submandibular or minor salivary glands under the tongue. These tumours are more frequently benign but may be malignant, especially in young children. There is a slight female predominance. [13]

Children may not have symptoms of a salivary gland tumour until the tumour has grown. Signs and symptoms of salivary gland tumours may include:
- Lump near the ear, cheek, jaw, lip, or inside the mouth that may be painless
- Trouble swallowing or opening the mouth widely
- Numbness or weakness in the face
- Fluid draining from the ear
- Pain in the face that does not resolve [14] [15]

Salivary gland tumour diagnosis is through:

- Health history review and oral exam,
- Imaging tests (e.g., ultrasound, MRI, CT scans), and
- Biopsy (e.g., fine-needle aspiration). [14]

Treatment options for childhood salivary gland tumours include:

- Surgery to remove the tumours is the most common treatment whenever possible, with care taken to avoid damage to the facial nerve if the parotid gland is removed during surgery.
- Radiation therapy after surgery for tumours with invasive characteristics. Radiation therapy may involve either external beam radiation therapy or internal radiation therapy. Internal radiation therapy, also called brachytherapy, uses a radioactive substance sealed in needles, seeds, wires, or catheters that are placed directly into or near the cancer.
- Targeted therapy using kinase inhibitors (e.g., entrectinib or larotrectinib) to block the action of the abnormal protein that signals cancer cells to multiply. These drugs help stop or slow the spread of cancer cells. [14] [16] [17]

The prognosis for salivary gland cancer in children is usually good. The 5-year overall survival rate for children with salivary gland tumours is approximately 95%. The prognosis can be affected by whether the cancer has metastasized to lymph nodes or other parts of the body at the time of diagnosis and whether the cancer can be completely removed by surgery. [13] [14]

Oral cavity and oropharyngeal cancer

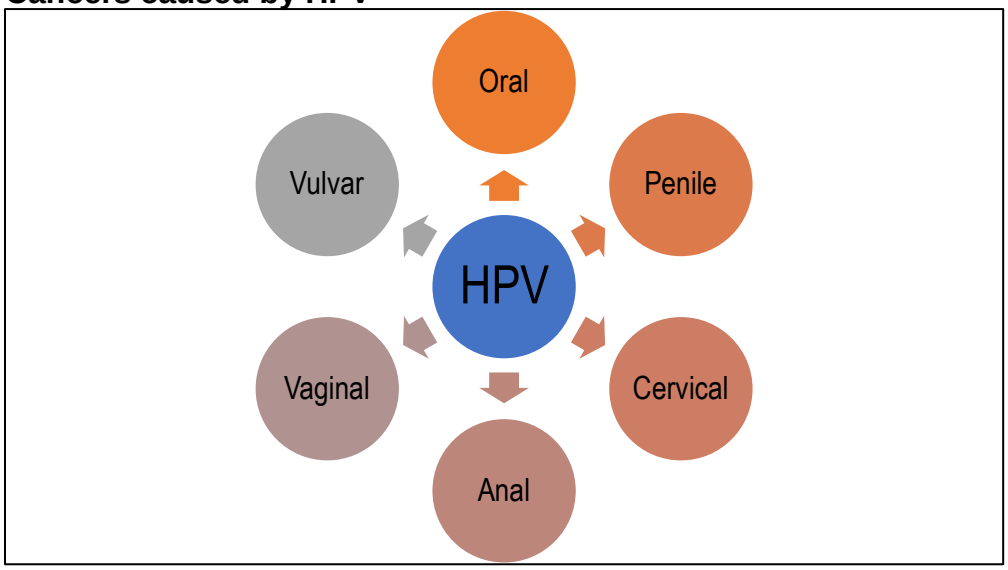
Oral cavity cancer is extremely rare in children and adolescents, as more than 90% of tumours and tumour-like lesions in the oral cavity are benign. When children do get oral cavity cancer, the most common types are lymphoma (i.e., cancer of the lymphatic system) and sarcoma. All types of tumours in the mouth can affect eating or speaking and need treatment. [18] [19]

Risk factors for oral cavity and head and neck squamous cell carcinoma in children and adolescents include:

- Certain genetic conditions, such as:
    - Fanconi anemia
    - Dyskeratosis congenita
    - Connexin gene mutations
    - Epidermolysis bullosa
    - Xeroderma pigmentosum
    - Chronic graft-versus-host disease
- Stem cell transplant
- Human papilloma virus (HPV) infection [18] [20]

Receiving the HPV vaccine can protect against HPV infection and lower the risk of head and neck cancers, in particular oropharyngeal cancer, and many other types of cancer, such as anal, cervical, penile, vaginal, and vulvar cancers. [18] [19] [21]

Cancers caused by HPV



Symptoms of oral cavity cancer may include:

- Sore in the mouth that does not heal within two weeks
- Lump or thickening in the mouth
- White (leukoplakia), red (erythroplakia), or white/red patch (erythroleukoplakia) on the gingiva, tongue, or oral mucosa
- Bleeding or pain in the mouth [19]

Symptoms of oropharyngeal cancer may include:

- Long-lasting sore throat
- Earaches, maybe unilateral
- Hoarseness
- Swollen lymph nodes
- Pain when swallowing, feeling something is caught in the throat
- Unexplained weight loss
- Some people have no symptoms[3] [22]

Tests to diagnose oral cavity and oropharyngeal cancer include:

- Health history and oral exam,
- Imaging tests (e.g., x-rays, MRI, CT scan, PET scan), and
- Biopsy (e.g., fine-needle aspiration, incisional). [19]

Treatment for oral cavity and oropharyngeal cancers may include:

- Surgery, which is the most common treatment for oral cavity cancer in children. For children with a benign oral cavity tumour, surgery is likely the only treatment required.
- Chemotherapy
- Radiation therapy [19]

[3] Refer to Episode 76 for addition signs and symptoms of oral and oropharyngeal cancers.

Human papilloma virus

- HPV infection is very common in Canada. Without vaccination, approximately 75% of people in Canada will acquire an HPV infection in their lifetime.
- Usually, the infection resolves on its own without causing any negative health effects. It is not known why HPV causes disease in some people but not others.
- Persistent infection with high-risk HPV types (e.g., 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59) can result in cervical, anal, vaginal, vulvar, penile, and oropharyngeal cancers.
- Low-risk HPV types (e.g., 6, 11) are generally non-oncogenic and cause conditions such as anogenital warts and recurrent respiratory papillomatosis.
- Some types of HPV are primarily sexually transmitted via skin-to-skin contact. Transmission can be reduced through safer sex practices, including the consistent and proper use of condoms and reducing the number of sexual partners.[4] Immunization before a person is sexually active is effective in protecting against HPV infections. [23] [24] [25] [26]

In Canada, about 25% to 35% of oral and oropharyngeal cancers are related to oral HPV infection. In 2020, the incidence rate of HPV-associated oropharyngeal cancer was approximately 4.5 times higher in males than females. The incidence of oropharyngeal cancer, especially in males, is increasing. [27] [28]

Unlike cervical cancer, there is no routine screening program for HPV-related oropharyngeal cancer. Therefore, the best approach to reduce the increase of HPV-related oropharyngeal cancer is through vaccination against HPV strains responsible for oropharyngeal cancer. [29]

HPV vaccination uptake in Canada is higher among females than males, likely because the initial focus of vaccination was cervical cancer prevention. The introduction in 2006 of a vaccine solely for females may have created a bias that led to the misconception that HPV is a female issue. All provinces and territories introduced HPV immunization programs for girls as part of routine immunization schedules. In September 2016, Ontario expanded the HPV vaccine program to include boys. However, it was not until 2017 that all Canadian provinces and territories offered free HPV school-based immunization programs to both girls and boys with varying eligibility criteria. [27] [30]

Nonetheless, uptake of HPV vaccination in publicly funded school-based programs across most of Canada remains suboptimal. Oral health professionals can help prevent HPV infection and HPV-related cancers and diseases by raising awareness, educating

[4] In August 2024, the World Health Organization released a new report showing condom use among adolescents has been declining in the past decade, increasing the risk for sexually transmitted infections, unintended pregnancies, and unsafe abortions. The data comes from a survey of more than 242,000 15-year-olds across 42 countries and regions in Europe, Central Asia, and Canada between 2014 and 2022. Findings showed 20% of 15-year-old boys and 15% of 15-year-old girls reported having had sexual intercourse in 2022, a relatively stable proportion since 2014. However, boys reported using condoms 61% of the time, down from 70% in 2014, while girls reported using them 57% of the time compared to 63%. The findings underscore the importance of providing comprehensive sexual health education and resources for young people. [74] [75]

their clients, and promoting evidence-based preventive interventions, including HPV vaccination. [27] [31]

Recurrent respiratory papillomatosis

Recurrent respiratory papillomatosis (RRP) is a rare, benign tumour of the respiratory tract caused by HPV. RRP is sometimes referred to as laryngeal papillomatosis, tracheal papillomatosis, or glottal papillomatosis. In the past it was often called juvenile laryngeal papillomatosis because it was thought to primarily affect only children.

RRP most often affects the larynx and vocal cords as laryngeal papillomas. Laryngeal papillomas can occur at any age but are most common at ages one to four years.

The disorder causes multiple, papillomas (wartlike growths) around the larynx. Less often, the disorder affects the oral cavity, trachea, and bronchi. In rare cases these growths spread to affect the lungs. The growths often recur after treatment. In extremely rare cases they can become malignant. Based on current research, RRP is not contagious, unlike oral HPV. [32] [33] [34] [35] [36]

RRP is generally divided into two subtypes:

- Juvenile-onset recurrent respiratory papillomatosis
- Adult-onset recurrent respiratory papillomatosis

Juvenile-onset recurrent respiratory papillomatosis (JORRP)

Juvenile cases develop before age 12 and are usually diagnosed before age five. HPV infection can be transmitted to the fetus before and during birth (i.e., as the infant passes through the birth canal of a person with an active genital HPV infection). As a result, newborns may develop JORRP. JORRP is associated with considerable morbidity and, in rare cases, can be fatal. [24]

Most children born to individuals with HPV do not develop RRP. In addition, many individuals with HPV in the tissues of the respiratory tract never develop papillomas, suggesting additional elements (e.g., immunologic or genetic factors) are necessary for RRP development in individuals with HPV. Other factors, such as timing, length, and volume of exposure to HPV, may play a role.

Juvenile cases are generally more aggressive and recurring. Children tend to need surgical treatment more often than adults. Some children experience remission of the disease when they begin puberty. [34] [37]

Adult-onset recurrent respiratory papillomatosis (AORRP)

AORRP can occur at any age, usually after age 14, and is less likely to recur. Although aggressive disease is more common in children, adults may develop an aggressive form. [25] [34]

In adults, the mode of transmission is less clear. Some cases may represent infection during infancy that remains latent until being triggered for unknown reasons in

adulthood. Some circumstantial evidence suggests RRP can develop after HPV transmission through oral sexual contact. [34]

AORRP may be exacerbated by tobacco exposure, gastroesophageal reflux, or radiation therapy. [34]

Risk factors
Risk factors for developing JORRP include:
- Being a firstborn child
- Having a vaginal delivery with a prolonged labour
- The mother is under 20 years of age
- If the mother has active genital warts, the risk of passing on HPV to the infant is approximately one in 250-400.[5] [34]

Incidence
JORRP is rare, with an annual incidence of 0.24 cases per 100,000 children aged ≤14. JORRP affects males and females equally. Although Canadian data is limited, evidence from other countries suggests the incidence of JORRP has declined since introducing routine HPV vaccination programs. For example, the United States lowered its incidence rate of JORRP from 2.0 cases per 100,000 to 0.5 per 100,000 since implementing the HPV vaccination program. [24] [34] [35] [38]

AORRP occurs most often in the third or fourth decade, with an increase recently noted around age 60. AORRP affects males slightly more often than females. Data on the incidence of AORRP in Canada are currently limited. [24] [34]

Symptoms
Symptoms of RRP in children can include weak crying, hoarseness, or other changes in the child's voice. Older children may have trouble speaking. Severe cases can cause life-threatening airway obstruction and respiratory complications. [32] [33] [34]

The most common symptoms of RRP include:
- Hoarse voice or loss of voice
- A noisy or high-pitched sound when breathing (stridor)
- Rapid or difficult breathing
- Chronic cough
- Difficulty swallowing [25]

Diagnosis
Laryngeal papillomas are detected using a laryngoscope. RRP may be solitary or multiple lesions. The tumours can be wart-like, often have a cauliflower-like appearance, and are either pedunculated (attached by a slim stalk), or sessile (closely adhering to mucosa). A biopsy confirms the diagnosis. [32] [33] [35]

[5] These risk factors do not apply to AORRP.

Differential diagnosis
A variety of conditions can produce signs and symptoms that are similar to those seen in RRP. These conditions include asthma, allergies, chronic bronchitis, croup, vocal nodules, gastroesophageal reflux, and foreign body aspiration. [34] [39]

Treatment
There is no cure for RRP. Treatment is by surgical removal. However, papillomas tend to grow back after removal. Many children require multiple surgeries and laryngoscopy and bronchoscopy surveillance as tumours may recur weeks or months later.

Removal of the papillomas may involve:
- Sharp surgical equipment to remove or debulk papillomas.
- Microdebrider, which uses suction to hold the tumour in place while a small internal rotary blade removes the growth.
- Pulsed-dye laser therapy to destroy the blood vessels that supply the papillomas.
- Carbon dioxide laser therapy to directly destroy papillomas. [34]

A tracheostomy may be needed in severe cases where tumour growth is aggressive to keep the breathing airways open. A tracheostomy is used only as a method of last resort because the procedure may allow for the spread of the disease further into the respiratory tract. [34]

Adjuvant therapy
In the past, some individuals received adjuvant therapy, which included certain medications or therapies designed to slow the regrowth of papillomas and increase the time between surgeries. Adjuvant therapies tried in severe cases include:
- Antivirals (e.g., cidofovir, acyclovir) to prevent the virus from replicating.
- Interferon, a synthetic form of certain proteins produced by the immune system.
- Indole 3-carbinol, an anticancer compound found in cruciferous vegetables (e.g. cabbage, cauliflower, broccoli)
- Bevacizumab, a recombinant humanized monoclonal antibody that targets the blood vessel growth of papilloma
- Photodynamic therapy, which uses a light-sensitizing agent selectively retained in the papilloma and is activated by a certain wavelength of light to help destroy the papilloma.
- Proton pump inhibitors to reduce chronic gastric acid exposure to help avoid metaplastic changes in the epithelium promoting papilloma spread. [32] [34] [37] [40]

Even though the HPV vaccine is primarily preventive, it has been studied as adjuvant therapy. A retrospective study by Yiu et al. 2018 of adult participants with existing laryngeal papilloma reported a significant decrease in surgical intervals, the number of procedures per year, and disease burden. A 2023 systematic review of 13 studies, with 243 participants, found the use of HPV vaccination as adjuvant therapy was associated with increased time between surgeries and a reduction in the number of surgical procedures required. The authors concluded HPV vaccination may be a beneficial adjuvant treatment for RRP. [32] [41] [42]

HPV vaccination

- HPV-associated diseases are a significant global public health problem.
- Nonavalent HPV vaccine (9VHPV) protects against HPV types 6, 11, 16, 18, 31, 33, 45, 52, and 58.
- HPV vaccination before HPV exposure is recommended to maximize its benefits.
- There are no data on HPV vaccine use in children less than nine years old. HPV vaccine may be considered in children under age nine who are at risk of HPV exposure or long-term immunosuppression.

While Canada has long-standing publicly funded HPV school-based immunization programs, HPV vaccination rates continue to fall short of the national goal of 90% coverage for two or more doses by age 17. To help improve HPV vaccination coverage and reduce HPV-associated disease in Canada, the National Advisory Committee on Immunization (NACI) updated its HPV vaccine recommendations on July 24, 2024. NACI now recommends a single dose of 9vHPV vaccine for individuals 9-20 years of age unless immunocompromised. The recommendations are based on current evidence and NACI expert opinion.

Over the last decade, several clinical trials and studies in females have shown that one dose provides comparable protection against HPV infection and disease among 9- to 20-year-olds. Reducing the number of doses for younger people may make it more convenient and encourage more to get the vaccine.

In 2022, the World Health Organization (WHO) updated its guidance, stating a single-dose schedule can provide a comparable efficacy and durability of protection to a two-dose regimen. Multiple other countries, including England, Ireland, Scotland, Wales and Australia, have already switched to a one-dose approach.

However, a 2-dose schedule of the 9vHPV vaccine may still be considered for individuals 9-20 years old with shared decision-making with their medical provider.

Additional NACI recommendations include:

- NACI still recommends two vaccine doses at least 24 weeks apart (6 months) for those 21 to 26 years old (unless immunocompromised).
- NACI still recommends a 3-dose schedule (months 0, 2, and 6) for individuals who are immunocompromised, as well as individuals living with HIV.
- Individuals 27 years and older may receive a 2-dose schedule of 9vHPV administered at least 24 weeks apart (6 months) unless immunocompromised.
- HPV vaccine is most effective when given at a younger age, before exposure to HPV. However, individuals 27 years and older can still benefit from vaccination.
- HPV vaccine can be offered in pregnancy. Pregnant individuals are at increased risk as HPV infection during pregnancy may lead to adverse outcomes for both the pregnant person and the fetus.
- Individuals who received a different HPV vaccine may consider an additional dose of the 9vHPV vaccine for added protection against additional HPV types after discussion with their medical provider.

- Although the 2vHPV vaccine is authorized in Canada, the 9vHPV vaccine should be used as it protects against more HPV types and associated diseases. [23] [24] [43]

NACI HPV vaccine recommendations July 2024 [23]

Age group	9vHPV vaccine schedule
9 to 20 years	One dose*
21 to 26 years	Two doses administered at least 24 weeks apart
27 years and older	Two doses administered at least 24 weeks apart
9 years and older who are immunocompromised or living with HIV	Three doses administered months 0, 2, and 6

* Two doses may be considered on an individual basis for those 9 to 20 years administered at least 24 weeks apart.

Parents still question HPV vaccine safety

Since 2006, HPV vaccines have been authorized in over 100 countries, including Canada. HPV vaccines have been monitored post-market for over 15 years, and evidence continues to show that HPV vaccines are safe and well tolerated. The most commonly reported adverse events following HPV vaccination are injection site pain, swelling, or redness. [24] [44]

Despite more than 15 years of consistent evidence that HPV vaccines are safe and effective, research has found more parents are citing concerns about the vaccines' safety in recent years.

Adolescent vaccination practices are primarily driven by their parent or guardian's decision-making. Thus, understanding the reasons for parental and guardian HPV vaccine hesitancy may inform interventions to improve overall vaccination uptake. [45]

Some parents have always cited concerns about safety for declining HPV vaccination for their children. However, Sonawane et al. (2021) showed the percentage of parents who declined HPV vaccination for their children due to safety concerns nearly doubled from 2015 to 2018. During the same time frame, reports of serious health issues after HPV vaccination were consistently rare. [46]

HPV vaccine hesitancy is one key factor contributing to low HPV vaccine uptake. The five most frequently cited reasons for HPV vaccine hesitancy among parents include:

- Safety concerns
- Lack of provider recommendation
- Lack of knowledge
- Their child not being sexually active
- The vaccine is not necessary [45] [46]

A systematic review by Loke et al. (2017) found adolescents and parents had insufficient knowledge of HPV infections. Possessing knowledge is known to influence HPV vaccine uptake, and many parents said they did not have enough information to make an informed choice. A better understanding of HPV infections and the importance

of vaccination may increase HPV vaccination acceptance in adolescents and parents, and thus its uptake by adolescents. [47]

Exposure to vaccine misinformation on the internet has created negative public perceptions of HPV vaccine safety. Fear tactics used by antivaccine campaigners often dissuade parents from vaccinating their children. There have been several myths propagated about vaccines causing adverse reactions, such as autism, multiple sclerosis, autoimmune diseases, ovarian failure, and even death. Despite scientific evidence debunking these myths, they continue to circulate. HPV vaccine safety doubts are exacerbated by misinformation spread through social media and other platforms. Exposure to or engagement with negative HPV vaccine content is associated with HPV vaccine hesitancy. There has been an increase in such content on social media and other platforms, contributing to the rise in safety concerns. These findings demonstrate the need to educate parents about the cancer prevention benefits of HPV vaccination and address their vaccine safety concerns. [45] [46]

COVID-19 pandemic

The COVID-19 pandemic significantly impacted routine vaccinations in Canada, particularly HPV vaccinations, due to the postponement of school vaccination programs resulting from the pandemic. In Ontario, school-based HPV vaccination rates dropped to as low as 5.2 % and 0.8 % for the 2019-2020 and 2020-2021 school years, respectively. Missed HPV vaccinations may result in more cases of HPV-related diseases and cancers that could have been prevented by vaccination. [29]

Discussing HPV with youth and parents

Oral health practitioners can increase youth and parent knowledge and understanding about the link between HPV and oral health and the role of HPV vaccination in preventing oropharyngeal cancers. [48]

Stull et al. (2020) found parents were comfortable discussing HPV and the vaccine in oral healthcare settings and most parents reported an expectation that oral health practitioners would talk to them or their children about HPV and cancer. The authors concluded oral health professionals can play a key role in increased uptake of the HPV vaccine through client communication. [49]

Dean et al. (2020) reported the majority of parents are receptive to discussing vaccines available to their children with both their child's dental hygienist and dentist. [50]

Barrientos et al. (2024) surveyed parents of youth aged 9-17 years and found the majority wanted to discuss diseases prevented by the HPV vaccine with their oral health practitioner. [51]

Naavaal et al. (2023) found most adults are comfortable discussing HPV and the HPV vaccine with their oral health practitioner. [48]

Daley et al. (2021) found adults are comfortable discussing HPV and oropharyngeal cancer with oral health practitioners, which may be key to OPC-HPV prevention. This

study verified client willingness to consider vaccine education and recommendations of oral health practitioners. Additionally, oral health practitioners, including dental and dental hygiene students, from diverse backgrounds, may offer an increased level of trust within minority communities. [52]

Oral disease prevention is within the scope of practice of dental hygienists and dentists. However, discussions related to HPV and vaccination are infrequent in oral healthcare settings. [53] [54]

Research shows that oral health practitioners are willing to participate in HPV vaccine promotion but revealed barriers that need to be addressed. Reported barriers to providing HPV information by oral health practitioners include time constraints during appointments, lack of knowledge, uncertainty of their role in vaccine promotion, personal beliefs, and low comfort levels. [53] [55] [56] [57] [58]

Studies have shown oral health providers who underwent training programs designed to increase HPV knowledge reported feeling more comfortable and prepared to discuss HPV and prevention with clients. Ultimately, through education, oral health practitioners can become leaders in preventing HPV-related cancers. [59]

Askelson et al. (2021) explored dental hygienists and dentists' willingness to promote routine HPV vaccination. Several dental hygienists believed parents would follow their vaccine recommendation, citing the good rapport and respect they have developed with clients' parents. Dentists felt vaccine promotion would require a collaborative effort or that dental hygienists might have a greater role to play. They noted dental hygienists often have more uninterrupted time with clients and stronger relationships with adolescents and their parents. The majority of dentists expressed confidence in dental hygienists' ability to deliver effective messages, emphasizing their crucial role in HPV education. [56]

Involving oral health practitioners in oral and oropharyngeal cancer prevention is not a new idea. However, risk factors for these cancers have changed, shifting from tobacco use to HPV infection. Given the strong evidence that provider recommendation results in higher HPV vaccination rates, involving oral health practitioners will continue to increase rates as parents receive needed HPV information from additional sources. [56]

Strategies to increase HPV conversations

Adolescent clients often visit their oral health practitioner twice yearly, which may be more often than they see their primary medical provider. During this window of opportunity, oral health practitioners can provide counselling to clients and their parents about HPV's link to oropharyngeal cancer and HPV vaccination. [60]

Strategies to encourage conversations about HPV and HPV vaccination with adolescent clients and their parents include:

- Framing the HPV vaccine as oral cancer prevention (i.e., focusing on a cancer-causing virus that can affect both females and males rather than a sexually transmitted infection)

- Adding a question about HPV vaccination on health history forms
- Beginning the HPV vaccination discussions while taking the client's comprehensive health history and performing routine oral cancer screenings. Emphasize that cancer prevention begins with the parent.
- Providing HPV informational materials in the waiting room
- Having HPV fact sheets available to hand to clients[6]
- Including HPV cancer prevention information on the clinic's website and social media pages. [29] [56] [60]

The quality of the provider's recommendation plays a role in the client's acceptance of the vaccine. Stronger provider recommendations for HPV vaccination are associated with greater uptake by parents and youth. Additionally, in the decision-making process, parents of adolescents report wanting more detailed communication regarding the logistics of the vaccine, namely the dosing schedule, number of doses, recommended age, and cost of the vaccination series.[7] [59]

Oral health practitioners should educate themselves about the connection between HPV and oropharyngeal cancer and be familiar with the recommended HPV vaccine schedule to speak confidently with young clients and their parents on this topic. Answer parents' questions succinctly, accurately, and empathetically, using understandable terms. Parents often accept explanations if presented with their children's best interests in mind. [59]

Common parent questions [61]

Question	Possible answer
Why does my child need HPV vaccination?	HPV vaccination is important because it prevents infections that can cause cancer, including mouth and throat cancer.
What diseases are caused by HPV?	Some HPV infections can cause cancer in the back of the throat or of the cervix, anus, or penis, but your child can be protected from getting these cancers in the future with HPV vaccination.
How do you know HPV vaccination works?	Studies continue to prove HPV vaccination works extremely well, decreasing the number of infections and HPV precancers in people who are vaccinated.
Is my child really at risk for HPV infection?	HPV is a common infection in teens and adults, both females and males. Nearly everyone will get HPV at some point in their lives. Getting the vaccine when your child is eligible will help protect them from the cancers and diseases caused by HPV later in their lives.
Why do they need HPV vaccination at such a young age?	Vaccines protect your child before they are exposed to an infection. That's why they receive the HPV vaccination earlier rather than later, to protect them long before they are ever exposed.
I'm worried my child will think that getting this vaccine makes it OK to have sex.	Studies tell us that getting vaccinated doesn't make children more likely to start having sex.

[6] HPV & Oral Care factsheet https://odha.on.ca/wp-content/uploads/2016/08/ODHA-Facts-HPV-copyright.pdf
[7] In Ontario, all students in grade 7 are eligible for a publicly funded vaccine until the end of their grade 12 year of high school. High school students who have missed HPV vaccination can reach out to their medical provider or local public health unit for information on where to receive the vaccination. Public health unit locator: https://www.phdapps.health.gov.on.ca/phulocator/

Question	Possible answer
Why do boys need HPV vaccination?	HPV vaccination can prevent future infections that can lead to cancers of the penis, anus, and back of the throat.
Is HPV vaccination safe?	Yes, HPV vaccination is very safe. Like any medication, vaccines can cause side effects, including pain, swelling, or redness where the vaccine was given. That's normal for the HPV vaccine as well and should disappear in a day or two. Sometimes, children faint after receiving vaccines, and could be injured if they fall. That's why people stay seated for a few minutes afterward to help protect them.

Parents may be ready to get their children vaccinated after speaking with oral health professionals about the HPV vaccine. Use this opportunity to make referrals to their primary medical provider or local public health unit for more information on HPV vaccination for their child. Follow up with clients and parents on their next visit. [60]

Complications of cancer therapy
It is important to educate youth on strategies to help prevent head and neck cancer to help avoid the sequelae of cancer therapy. It is just as important to screen pediatric clients for oral cancer during their appointments to provide early referrals to improve their prognosis if cancer therapy is necessary.

During the past five decades, progress has been made in developing curative therapies for pediatric cancer. These therapies have improved survival but can produce acute complications as well as adverse late effects. [62]

Acute oral complications of cancer therapy
Oral complications are common in individuals undergoing cancer therapy, especially those with head and neck cancer. Preventing and controlling oral complications can help individuals continue cancer treatment and have a better quality of life. [63]

The most common oral complications from cancer treatment include:
- Oral mucositis
- Infection
- Salivary gland problems
- Change in taste
- Pain

These complications can lead to other problems (e.g., dehydration, malnutrition)**.** [63]

Late effects of childhood cancer treatment
Survivors of childhood and adolescent cancer require close monitoring and regular follow-up care because side effects of cancer and its therapy may persist or develop months to years later. [6] [20]

Treatment for childhood cancer may affect the following:
- Organs, tissues, and body function
- Growth and development

- Mood, feelings, and actions
- Thinking, learning, and memory
- Social and psychological adjustment
- Risk of second cancers

Chemotherapy, radiation therapy, and surgery can result in cosmetic and functional abnormalities of the oral cavity and dentition.

Oral and dental complications reported in survivors of childhood cancer include:
- Tooth development disturbances (e.g., microdontia, enamel hypoplasia, root malformation, hypodontia, delayed eruption)
- Salivary gland dysfunction resulting in reduced saliva flow and xerostomia.
- Abnormalities of craniofacial development (e.g., malocclusion, temporomandibular joint dysfunction, trismus)
- Osteoradionecrosis
- Second cancers in the oral cavity [62]

Cancer treatments associated with dental maldevelopment include:
- Head and neck radiation therapy
- Any chemotherapy
- Hematopoietic stem cell transplant [62]

Children younger than five years are at the greatest risk of dental anomalies, including root agenesis, delayed eruption, enamel defects, and excessive dental caries related to disruption of ameloblast (enamel-producing) and odontoblast (dentin-producing) activity early in life. [62]

Complications of reduced salivary secretion include:
- Increased risk of dental caries and periodontal disease
- Susceptibility to oral infections
- Sleep disturbances.
- Difficulties with chewing, swallowing, and speaking
- Reduced quality of life [20] [62]

Quality of life for individuals who survive cancer may be improved by behaviours that promote health and well-being. These include a healthy diet, exercise, and regular medical and oral health checkups to screen for a second cancer. Regular oral health appointments are also important to receive preventive care (e.g., fluoride treatments, oral health education, scaling, etc.).[8] Healthy behaviours may make late effects less severe and lower the risk of other diseases. Avoiding behaviours that are damaging to health is also important. Tobacco use, excess alcohol use, nonregulated drug use, unprotected sun exposure, or physical inactivity may worsen organ damage related to treatment and may increase the risk of second cancers. [20]

[8] A second cancer is a different primary cancer that occurs at least two months after cancer treatment. A second cancer may occur months or years after treatment is completed. The type of second cancer that occurs depends on the original type of cancer and cancer treatment. [20]

Orofacial trauma

Orofacial trauma results from injury to the teeth and oral cavity. Approximately one billion people are affected globally, with a prevalence of around 20% for children up to 12 years of age. Orofacial trauma can be caused by oral factors such as lack of alignment of teeth and environmental factors (such as unsafe playgrounds, risk-taking behaviour, road accidents, sports injuries, violence, falls). Treatment is costly and lengthy and sometimes teeth can still be lost, resulting in complications for facial and psychological development and quality of life. [64] [65]

Children with traumatic dental injuries (TDIs) may simultaneously sustain a traumatic brain injury. A 2023 case-control study found for every tooth injured, the odds of concomitant traumatic brain injury increased by 45%. Emphasizing the importance of clinicians evaluating children with TDIs to rule out the possibility of a concomitant traumatic brain injury. [66]

A developing problem is the incidence of TDIs and soft tissue facial trauma in children from smartphones falling onto their faces while using them at rest time. This is related to the weight of smartphones and their excessive usage worldwide. Children are often given smartphones to watch animations, media or games at bedtime. Adolescents use them for selfies, social networking, and chatting before sleep. The common practice is lying down with the phone close to the face or held up for better viewing. This use can lead to the smartphone slipping and falling onto the face, causing traumatic dental and facial injuries. Reported injuries in children include lip contusions, luxation injuries, fractured teeth, and concussions.

These injuries may become more common in children with the increasing use of smartphones and other portable devices. However, these injuries can be prevented by using smart devices appropriately. Their use in young children should be minimized, and safety precautions must be taken when using them during rest or sleep time. [67]

Orofacial trauma can be reduced by encouraging protective equipment use (e.g., helmets, face shields, mouthguards) when participating in sports such as rugby, hockey, karate, bike riding, skiing, skateboarding, or any activity that involves potential trauma to the facial area. The type of protection will depend on the activity. [64]

A systematic review and meta-analysis by Tewari et al. (2023) evaluated global parental knowledge, attitude, and awareness regarding the prevention and emergency management of TDIs. Based on the data from eight studies, the authors reported that fewer than half of the parents were confident in identifying an injured tooth and performing replantation (if necessary). Less than a quarter of the parents knew the appropriate storage medium for an avulsed tooth. The majority were interested in obtaining information about dental trauma first aid. Inadequate knowledge about TDIs and their management exists among parents, underscoring the importance of educating parents on these topics.[9] [68]

[9] The International Association of Dental Traumatology (IADT) created the app ToothSOS to share information about orofacial trauma and management. The app provides the general public, clients, parents, educators, and professionals with information about traumatic dental injuries. The app is user-

Orofacial clefts
Orofacial clefts (i.e., cleft lip, cleft lip and palate, and isolated cleft palate) are the most common craniofacial congenital disorders and have a global prevalence of between one in 1000-1500 births. Genetic predisposition is a major cause. However, poor maternal nutrition (e.g., folic acid deficiency), tobacco consumption, alcohol use, and obesity during pregnancy also play a role.[10] [64] [69]

Noma
Noma is a noncommunicable, severe necrotizing disease of the mouth and face that starts as a gingival lesion. It then develops into acute necrotizing gingivitis that progresses rapidly, destroying the oral soft tissues and further spreading to involve the hard tissues and skin of the face. Noma is generally considered an opportunistic disease, mainly affecting children aged 2-6 years suffering from malnutrition, affected by infectious disease, living in extreme poverty with poor oral hygiene or with weakened immune systems.

The causative agent of noma is not known. It seems unlikely that a single infectious agent is responsible for the disease. Noma is the result of complex interactions in immunosuppressed children living in extreme poverty. In addition to known risk factors such as malnutrition, coinfections (e.g., measles, malaria) and poor oral hygiene, several factors such as poor living conditions (e.g., deficiencies in water, sanitation, and hygiene) and maternal malnutrition and closely spaced pregnancies that result in offspring with increasingly weakened immune systems, could be strongly related to disease onset.

Noma is mainly found in sub-Saharan Africa, although cases have been reported in Latin America and Asia. There are approximately 140,000 new cases of noma annually. Owing to the rapid progression of the disease and high mortality rate, many cases of noma remain undetected.

Without treatment, noma is fatal in 90% of affected children. Affected children die of sepsis or severe dehydration and malnutrition. Survivors experience severe facial disfigurement, have difficulty speaking and eating, endure social stigma, and require complex surgery and rehabilitation.

Early detection and treatment are crucial to stopping its progression and can help prevent suffering, disability, and death. Treatment includes basic oral hygiene, antibiotics, and improved nutrition (e.g., high protein). In the early stages, treatment can be provided at home. Regular oral examination of children at home or during medical visits is essential to identify gingival lesions that may develop into noma in at-risk children. [64] [70] [71] [72]

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friendly and can be downloaded on any Apple or Android mobile device at no charge. In the public section, there are instructions for how to handle dental injuries prior to visiting a dentist. The professional section contains IADT published guidelines for dental trauma. [76]
App Store https://apps.apple.com/us/app/toothsos/id1368359249
Google Play: https://play.google.com/store/apps/details?id=com.iadtapp.toothsos&hl=en_IN&gl=US

[10] Refer to Episode 108 and 109 for additional information on orofacial clefts.

Key messages

- It is essential for oral health practitioners to provide oral cancer screenings for all children and adolescents and provide information on risk factors to help prevent oral cancer.
- Raising public awareness about HPV and its link to oropharyngeal cancer is vital.
- Oral health practitioners have the opportunity to have potentially life-saving conversations with their clients by proactively discussing cancer risk and recommending HPV vaccination to help prevent oropharyngeal and other HPV-related cancers and diseases.
- Clients and parents are receptive to speaking with their oral health practitioners about HPV. HPV conversations provide them with another source of information to help increase proactive behaviour, including HPV vaccinations.
- Educating parents and youth on ways to prevent orofacial trauma, including the use of protective equipment, such as mouthguards and helmets.
- Oral health professionals can help raise awareness of noma by advocating for funding and research into the disease, which ultimately is a vital step in helping to eradicate it globally.

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Client resources

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https://www.cancer.gov/types/head-and-neck/patient/child/oral-cavity-treatment-pdq

Human Papillomavirus (HPV) & Oral Care, ODHA Factsheet
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Getting the HPV vaccine, Ontario Ministry of Health
https://www.ontario.ca/page/getting-hpv-vaccine

Public health unit locator
https://www.phdapps.health.gov.on.ca/phulocator/

HPV posters, factsheets and other resources, Immunize Canada
https://immunize.ca/human-papillomavirus-hpv

GARDASIL®9 for your Children, Merck
https://www.gardasil9.ca/your-children/

Oral Cancer Screening, ODHA Factsheet
https://odha.on.ca/wp-content/uploads/2016/08/Oral-Cancer-Screening.14.1-copyright.pdf

Sports Mouthguards, ODHA Factsheet
https://odha.on.ca/wp-content/uploads/2016/08/Mouthguards.14.1-copyright.pdf

ToothSOS app provides the general public, clients, parents, educators, and professionals with information about traumatic dental injuries. The app is user-friendly and can be downloaded on any Apple or Android mobile device at no charge.
https://iadt-dentaltrauma.org/patients-toothsos/

App Store https://apps.apple.com/us/app/toothsos/id1368359249
Google Play:
https://play.google.com/store/apps/details?id=com.iadtapp.toothsos&hl=en_IN&gl=US

Prevention and emergency dental trauma care for the public, International Association of Dental Traumatology https://iadt-dentaltrauma.org/prevention-and-emergency-care/

Additional Resources

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