# Addressing HPV-Related Cancer Risk Among Men Who Have Sex With Men (MSM): A Guide for Health Care Providers

Sex Information and Education Council of Canada (SIECCAN)

SIECCAN
THE SEX INFORMATION & EDUCATION COUNCIL OF CANADA

# Addressing HPV-Related Cancer Risk Among Men Who Have Sex With Men (MSM): A Guide for Health Care Providers

This guide is for health care providers (HCP) with gay men and other men who have sex with men (MSM) clients in their practice. The purpose of this guide is to provide HCPs with information on: 1) HPV, HPV-related cancers among MSM and the need for HPV vaccination in this population; 2) Communicating with MSM about HPV and HPV-related cancer prevention; and 3) Conducting a sexual history/STI risk assessment with MSM clients.

## PART 1: THE NEED FOR HPV VACCINATION AMONG YOUNG MSM

Human papillomavirus (HPV) is the most common sexually transmitted infection (STI) in Canada (1) and around the world (2, 3). It is estimated that up to 75% of sexually active women and men will acquire at least one HPV infection in their lifetime (4). Most HPV infections are transient and asymptomatic; more than 90% of new HPV infections clear or become undetectable within two years (5). Prevalence of HPV is typically highest among young adults between the ages 20 and 24 years (6); however, prevalence among men remains high at all ages (7).

There are over 100 different types of HPV with more than 40 HPV types that infect the epithelial lining of the anogenital tract and other mucosal areas of the body (1). HPV infections are transmitted by direct sexual contact or skin-to-skin contact. Sexual transmission usually occurs via genital-genital and oral-genital contact, but can also occur through other close skin-to-skin touching during sex (2).

There are approximately 13 cancer causing or high-risk HPV types (Table 1) (3). Among men, HPV infection is associated with anal, penile, oropharyngeal, and oral cavity cancers; most of these HPV-related cancers in men are associated with HPV types 16 and 18. In women, persistent infection with HR HPV types is responsible for nearly all cervical cancers and is implicated in cancers of the anus, vulva, vagina, as well as head and neck cancers (8). HPV types 16 and 18 account for approximately 70% of cervical cancers. Non-carcinogenic HPV types 6 and 11 cause 90% of anogenital warts in men and women (8, 9).

**Table 1: HPV Types**

| Low-Risk HPV | High-Risk HPV |
|---|---|
| 6, 11 | 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68 |
| ***Adverse health outcomes:*** | ***Adverse health outcomes:*** |
| Anogenital warts | Cancer of the anus, oropharynx, mouth, penis, cervix, vulva, vagina |

*Source: Trottier, H., & Franco, E. L. The epidemiology of genital human papillomavirus infection. Vaccine 2006; 24, Suppl 1: S4-15.*

## HPV-Related Cancers Among Men

HPV-related cervical cancer in women is an important public health concern and has led to the development of school-based HPV vaccination programs for girls. However, HPV-related cancers among men are an important and growing concern as HPV infection rates among males, particularly among MSM, are high (10, 11). For example, in a study of 262 men attending a STI clinic in Vancouver, Canada, 70% were infected with HPV (12).

### Anal Cancer

- 90% of anal cancers are associated with HPV infection (9).
- HPV-related anal cancer rates in men have significantly increased in the past 30 years (9, 13).
- HPV types 16 and 18 are the most frequent HPV types associated with anal cancer (9).

### Oropharyngeal Cancer

- Over 70% of oropharyngeal cancers are associated with HPV infection (14, 15).
- The incidence of HPV-related oropharyngeal cancer has increased by 225% in the last 30 years and men are more commonly affected than women (14).
- HPV types 16, 18, and 33 are responsible for approximately two-thirds of HPV-related oropharyngeal cancers (16).

### Penile Cancer

- The vast majority of penile intraepithelial neoplasia cases are HPV-related, with estimates ranging from 60 to 100% (17, 18).
- In one review of 1,266 cases of squamous cell carcinoma from 30 studies, HPV was detected in 48% of penile cancers (19).

## High Rates of High-Risk HPV Infection in MSM

Although the prevalence of HPV infection in men varies across studies, numerous studies have established that MSM have very high rates of HPV infection (10, 11). The prevalence of anal HPV in MSM is higher than cervical HPV and dysplasia among women and does not decrease with age (10).

- In one study (Seattle, USA), 70% of MSM aged 16 to 30 had an anal HPV infection and 37% of participants were infected with HPV type 16 and/or 18 (20). Other studies have found similar or higher rates of high-risk anal HPV types among MSM (10, 11).
- High-risk oral HPV infections have been detected in approximately 15% of MSM (21).
- High-risk penile HPV infections have been detected in approximately 16% of MSM (22).

## Higher Rates of High-Risk HPV Infection in HIV-Positive MSM

- HIV-positive MSM have higher rates of high-risk HPV infection than HIV-negative MSM (11, 21, 22).
- In one study of HIV-positive MSM, 65% had high-risk anal HPV and 32% had high-risk penile HPV (22).
- HIV-positive individuals are up to 28 times more likely than HIV-negative individuals to develop anal cancer (23).

## The Potential of the HPV Vaccine to Reduce HPV-Related Cancer Among MSM

Vaccination against HPV is an important strategy for the prevention of HPV-related diseases and cancers among males and MSM (23, 24).

- In a placebo-controlled, double-blind study of 602 MSM, the HPV vaccine was effective in reducing the incidence of persistent anal infection with high-risk HPV types (25).

- In a placebo-controlled, double-blind study of 4065 boys and men aged 16 to 26, the HPV vaccine reduced incidence of both anogenital warts and penile, perianal, and perineal intraepithelial neoplasia (26).
- Of 150 men aged 27 to 45 who received the HPV vaccine, HPV antibodies were detected in the oral cavity - suggesting that the vaccine may protect against oral HPV infections (27).

### HPV Vaccination Programs for Girls Do Not Protect Young MSM From HPV-Related Cancers

In many jurisdictions, HPV school-based programs for girls have been offered. It was assumed that immunizing a large number of girls would provide herd immunity for boys. However, the concept of herd immunity only provides protection to boys who have sex with girls: herd immunity does not protect boys who have sex with other males. While some Canadian provinces have recently started programs to vaccinate boys (e.g., British Columbia, Alberta, Nova Scotia, Prince Edward Island, Manitoba, Quebec, Ontario), many unvaccinated males outside of publically funded programs remain vulnerable to HPV-related cancers (28). Additionally, most adult men who are currently at risk of HPV infection did not participate in vaccination programs because they were older than the age groups targeted by these programs.

- Widespread school-based vaccination programs targeted at girls were thought to offer protective benefits to boys via herd immunity. However, this protection does not extend to the MSM population (28).
- To date, analyses of vaccination programs have largely ignored non-cervical cancer outcomes and, thus, underestimate the benefits of male HPV vaccination (24).

## Recommendations for HPV Vaccination for MSM

Numerous public health authorities/organizations, such as Canada's National Advisory Committee on Immunization (NACI) (8) and the US Advisory Committee on Immunization Practices (2), have issued recommendations for HPV vaccination of males.

NACI recommendations:

- Routine HPV vaccination of males between the ages of 9 and 26 years (8).
- HPV vaccine may be used in males over 26 years of age who have not been previously vaccinated (8).

MSM older than 26 years of age are still viable candidates for the HPV vaccine for the following reasons:

- It is unlikely that one individual has been exposed to all 9 HPV types covered in the HPV9 vaccine (29).
- Individuals may be re-infected with HPV types to which they have been previously exposed (30). This suggests that individuals may benefit from the HPV vaccine at any age.

## MSM Lack Knowledge of HPV and Have Low Levels of Awareness of the HPV Vaccine

MSM exhibit low rates of awareness of HPV-related diseases and cancers.

- In one Canadian study of MSM attending a STI clinic (Ottawa, Canada), 75% were aware that the vaccine protects against HPV infection, but less that 50% were aware that HPV is the primary cause for anal cancer (31).

- In one review of 16 studies, knowledge regarding HPV-related cancers was poor to moderate among MSM. Additionally, MSM exhibited a lack of concern regarding HPV-related cancers (32).
- In a systematic review of HPV knowledge and attitudes towards the vaccine, MSM demonstrated insufficient knowledge regarding the availability of the HPV vaccine as a method of primary prevention (23).

## HPV Vaccination Rates Among MSM are Low

HPV vaccination rates among MSM are low.

- Of 277 MSM attending a STI clinic in Ottawa (age 18-69 years, mean age 37 years), only 15% had received the HPV vaccine (31).
- Of 1457 US MSM who completed an online survey (age 18-26 years, mean age 23 years), only 7% had received the HPV vaccine (33).
- Of 336 US MSM surveyed via a MSM smartphone dating app (age 18-26 years, mean age 23 years), only 21% had received a dose of the HPV vaccine (34).

## Most MSM are Receptive to Receiving the HPV Vaccine

Even though MSM exhibit low levels of awareness and knowledge regarding HPV, numerous studies have identified that MSM are open to receiving the HPV vaccine - especially when they are educated about the health benefits of the vaccine from their HCPs (20, 34, 35, 36).

- Of 1169 MSM recruited via community venues in Vancouver (age 19-83 years, median age 33 years), 67% were open to receiving the vaccine, especially if they had discussed their sexual history with their HCP (36).
- Of 336 US MSM surveyed via a MSM smartphone dating app (age 18-26 years, mean age 23 years), men were 40x more likely to have received the vaccine if a HCP had recommended the vaccine (34).

# PART 2: COMMUNICATING WITH MSM ABOUT HPV AND HPV-RELATED CANCER PREVENTION

All sexually active MSM are at risk for HPV infection and HPV-related cancers so it is important for health care providers (HCPs) to make MSM aware of these risks and discuss steps that MSM can take to lower their risks of HPV infection and the subsequent development of HPV-related cancers. The companion fact sheet to this guide (*HPV-Related Cancers Among Men Who Have Sex With Men: What You Need to Know to Reduce Your Risk*) provides basic information for MSM clients.

## HPV Vaccination

Health care providers should inform MSM clients that the HPV vaccine is the most effective way to prevent HPV and HPV-related cancers. The most current HPV vaccine (9-valent) protects against the main HPV strains that cause genital warts (types 6, 11) and other high-risk HPV strains that cause cancer (types 16, 18, 31, 33, 45, 52, 58) (2).

**Regardless of their age, MSM are at risk for HPV-related cancers. Health care providers should recommend the HPV vaccine accordingly.**

**Below are sample phrases that HCPs can use with MSM clients to discuss HPV vaccination:**

*HPV is the most common STI and it is very common among MSM. Have you heard about it? There is a vaccine that is effective for preventing most strains of HPV.*

*Both anal sex and oral sex are high-risk behaviours for transmitting an STI called HPV, which can cause cancer, so we should talk about ways to reduce your risk.*

*Consistently using condoms for anal sex and oral sex can reduce your risk for HPV infection. There is also a vaccine for HPV to prevent most of the strains of HPV that cause genital warts and that can cause anal and oral cancers.*

*We have talked about your risk for HPV and HPV-related cancers. Do you want more information on getting the HPV vaccine?*

**As part of a discussion of HPV vaccination with MSM clients, health care providers (HCPs) should make sure that they are aware of the following:**

## HPV Vaccine Facts for MSM

- All sexually active MSM are currently (and/or in the future will be) at risk for HPV infection and HPV-related cancers.
- Canada's National Advisory Committee on Immunization recommends HPV vaccination for all males age 9 to 26 years and indicates that the vaccine can be used in males over age 26.
- The HPV9 vaccine protects against 9 HPV strains that are responsible for the majority of genital warts and other high-risk strains that cause cancer.
- Even if someone has been exposed to HPV, they most likely have not been exposed to all 9 HPV strains in the HPV9 vaccine.
- The HPV vaccine can offer protection from reinfection with HPV.

## Condom Use

HCPs should provide the following information regarding condom use and HPV to their clients:

- Using condoms correctly and consistently can help reduce the transmission of HPV (37, 38).
- HPV can still be transmitted from skin-to-skin contact (from areas not covered by a condom) even if using condoms (39).
- HPV is commonly transmitted via oral sex and oral HPV infections can subsequently lead to oropharyngeal cancer (14, 15).

## HPV and HPV-related Cancer Screening

There is an HPV DNA test approved for use in Canada for women but not for men (39). Given the very high prevalence of HPV infection in MSM, and the transient nature of most infections, HPV DNA tests would be of little clinical value for MSM.

Anogenital warts can be diagnosed via a visual inspection of the penis, anus, and surrounding area and then treated (1).

Digital anal exams may detect advanced anal cancer but are unlikely to detect pre-cancerous changes resulting from HPV infection (40).

HCPs can conduct various screening practices to potentially identify early signs of HPV-related anal cancer precursors (e.g., anal dysplasia) in high-risk groups such as MSM (41). Anal cytologic examinations (anal Pap smear) can be used for this purpose but it should be noted that abnormal anal cytology is very common in MSM (41).

Confirmation of high-grade disease can be done through high-resolution anoscopy (HRA) (41).

Currently there is a lack of consensus about the use of anal Pap and HRA for screening people at increased risk of anal cancer such as MSM (1).

For primary care physicians, "One option is to use anal cytology and refer patients with abnormal cytology to an HRA clinic. At the very least, annual screening should be done by doing perianal visual inspection (for Bowne disease) and digital anal examination. This would help to identify presymptomatic, smaller anal cancers, which have an excellent outcome" (41).

## Addressing HPV-Related Cancer Risk as part of a General Sexual Health Risk Assessment with MSM

If an HCP has not previously discussed and assessed sexual health with a MSM client, it is appropriate to address HPV-related cancer risk within the context of a more general sexual health risk assessment. Some HCPs may be unsure about how to be proactive in creating a welcoming environment for MSM clients or have little experience in conducting a thorough sexual history. The next section of this guide provides information on conducting a sexual history and creating a welcoming office environment for MSM.

# PART 3: CONDUCTING A SEXUAL HISTORY/STI RISK ASSESSMENT WITH MSM

## Creating a Welcoming Environment for MSM

MSM (some of whom will openly identify as gay while others will not) have distinct health needs related to both biological (e.g., increased susceptibility to anal cancer, HIV infection) and social (e.g., internalization of stigma related to sexual orientation, gender non-conformity) factors (42).

In particular, young MSM may be susceptible to feeling stigmatized because of their sexual behaviour and/or sexual orientation (43). As a result, many MSM may not be forthcoming or proactive in discussing health risks related to their sexual behaviour.

In order to provide appropriate health care to MSM, it is essential for health care providers (HCPs) to obtain accurate and thorough medical histories, which require MSM to openly discuss their sexual practices. Thus, HCPs must create a welcoming culturally appropriate (i.e., "gay friendly") clinical environment where MSM feel safe and comfortable disclosing relevant information about their sexual practices (42, 44).

Because some MSM clients may not be comfortable discussing their sexual history, it is important for clients to understand that discussing their sexual behaviour and practices is a routine component of a medical examination (45).

- Communicate to clients that all information discussed remains confidential.
- Inform clients that questions regarding sexual behaviour and other related behaviours (e.g., substance use) are part of routine health care for all clients and that these conversations are necessary to provide optimal health care.

**While taking a sexual history, HCP can establish rapport with MSM clients by using the following types of phrasing:***

| Sample phrases/questions | |
|---|---|
| Open-ended questions | *What's your experience with using condoms been like?* |
| Nonjudgmental language | *My patients engage in a wide variety of sexual practices.* |
| | *What kind of sex do you have?* |
| Normalizing language | *Some of my patients have difficulty using a condom with every sex act.* |
| | *How is it for you?* |

**These techniques have been modified based on the US Centers for Disease Control and Prevention Treatment Guidelines, 2015 (47)*

### Do the Following to Create a Welcoming Office/Clinic Environment:

Display publications, posters, and social media that include sexual minorities and welcoming symbols (e.g., rainbow flags, pink triangles)

Ensure all office staff use respectful MSM terminology

Provide staff with opportunities for cultural competency/sensitivity training regarding service provision to provision to LGBTQ communities

Discuss the purpose of each medical appointment (e.g., "The purpose of today's appointment is…")

Use clear, understandable language (i.e., no medical jargon)

**Sample statements to share with clients:**

*I am going to ask you a few questions about your sexual health and sexual practices. I understand that these questions are very personal, but they are important for your overall health.*

*Just so you know, I ask these questions to all of my adult patients, regardless of age, gender, or relationship status. These questions are as important as the questions about other areas of your physical and mental health. Like the rest of our visits, this information is kept in strict confidence. Do you have any questions before we get started?*

*Source: US Centers for Disease Control. A guide to taking a sexual history (47)*

## Assessing Client Risk for HPV-Related Cancers and other STIs

By obtaining a comprehensive sexual history, HCPs can accurately assess MSM clients' risk for HPV-related cancer and tailor personalized health plans.

The Centers for Disease Control (47) suggest using the 4 "Ps" as a guide when taking a thorough sexual history. Additional questions may be required based on the client's responses and/or specific circumstances.

### 1. Partners

**Purpose:** Assess the number and gender of sex partners to determine the client's STI risk.

**Sample questions:**

*Are you currently sexually active? If not, have you ever been sexually active?*

*In recent months, how many sex partners have you had?*

*Are your sex partners women, men, both, transgender persons, or all of the above?*

### 2. Practices

**Purpose:** Identify which sexual practices the client engages in to determine anatomical sites for HPV and/or other STI screening.

**Sample questions:**

*Do you have oral sex? Are you the oral receptive or insertive partner?*

*Do you have anal sex? Are you the anal receptive or insertive partner?*

*Do you get tested for STIs including HIV? When tested for STIs, have you ever had a rectal or pharyngeal (oral) swab?*

*Do you share or have you ever shared any needles?*

### 3. Protection from STIs

**Purpose:** Identify the appropriate level of risk-reduction counselling needed based on the client's sexual practices.

**Sample questions:**

*Do you and your partners use any protection against STIs? If not, could you tell me the reason? If so, what kind of protection do you use?*

*How often do you use this protection? If "sometimes," in what situations or with whom do you use protection?*

### 4. Past history of STIs

**Purpose:** Assess the client's past history of STIs to determine their current risk levels.

**Sample questions:**

*Have you ever been diagnosed with an STI? When? How were you treated?*

*Have you had any recurring symptoms or diagnoses?*

*Have you ever been tested for HIV or other STIs? Would you like to be tested?*

*Has your current partner or any former partners ever been diagnosed or treated for an STI? Were you tested for the same STI(s)?*

*If yes, when were you tested? What was the diagnosis? How was it treated?*

After collecting a thorough sexual history, tailored risk reduction strategies can be identified and discussed with each client based on the client's sexual practices and behaviours.

## Screening

General STI screening is an important component of MSM's sexual health care. STI testing should be tailored to the client based on the clients' specific sexual practices and behaviours and/or specific anatomical sites that may be at risk.

## Prevention

Emphasizing STI prevention is important for all sexually active clients.

**Sample phrases to discuss STI prevention with clients**

*Given our discussion of your sexual practices, I'd like to discuss some strategies to help you minimize your risk for STIs.*

*Based on my assessment, I would like to suggest we do some STI screening and then discuss other prevention strategies.*

## References:


(1) Public Health Agency of Canada. Human papillomavirus (HPV) infections: Revised October 2014. *Canadian Guidelines for Sexually Transmitted Infections*. http://www.phac-aspc.gc.ca/std-mts/sti-its/cgsti-ldcits/section-5-5-eng.php#footnote27

(2) Centers for Disease Control and Prevention. Use of 9-valent human papillomavirus (HPV) vaccine: Updated HPV vaccination recommendations of the advisory committee on immunization practices. *Morbidity and Mortality Weekly Report* 2015; 64(11): 300-304.

(3) Trottier H, Franco EL. The epidemiology of genital human papillomavirus infection. Vaccine 2006; 24, Suppl 1: S4-15.

(4) Koutsky LA. Epidemiology of genital human papillomavirus infection. *American Journal of Medicine* 1997; 102(5A): 3-8.

(5) Hariri S, Dunne E, Saraiya M, Unger E, Mankowitz L. Chapter 5: *Human papillomavirus. VPD Surveillance Manual*, 5th Edition 2011. Centers for Disease Control and Prevention. http://www.cdc.gov/vaccines/pubs/surv-manual/chpt05-hpv.pdf

(6) Satterwhite CL, Torrone E, Meites E, et al. Sexually transmitted infections among US women and men: prevalence and incidence estimates, 2008. *Sexually Transmitted Diseases* 2013; 40: 187–93.

(7) Giuliano AR, Lee J, Fulp W, et al. Incidence and clearance of genital human papillomavirus infection in men (HIM): a cohort study. *Lancet* 2011; 377(9769):932-940.

(8) National Advisory Committee on Immunization (NACI). *Updated Recommendations on Human Papillomavirus (HPV) Vaccines: 9-valent HPV vaccine and clarification of minimum intervals between doses in the HPV immunization schedule*. 2016. Ottawa, ON: Public Health Agency of Canada.

(9) de Sanjose S, Bruni L, Alemany L. HPV in genital cancers (at the exception of cervical cancer) and anal cancers. *La Presse Médicale* 2014; 43(12): e423-e428.

(10) Machalek DA, Poynten M, Jin F, et al. Anal human papillomavirus infection and associated neoplastic lesions in men who have sex with men: a systematic review and meta-analysis. *Lancet Oncology* 2012; 13(5): 487-500.

(11) van Rijn VM, Mooij SH, Mollers M, Snijders PJ, Speksnijder AG, King AJ. Anal, penile, and oral high-risk HPV infections and HPV seropositivity in HIV-positive and HIV-negative men who have sex with men. *PLOS ONE* 2014; 9 (3): e92208.

(12) Ogilvie GS, Taylor DL, Achen M, Cook D, Krajden M. Self-collection of genital human papillomavirus specimens in heterosexual men. *Sexually Transmitted Infections* 2009; 85: 221-225.

(13) Shack L, Lau HY, Huang L, Doll C, Hao D. Trends in the incidence of human papillomavirus-related non-cervical and cervical cancers in Alberta, Canada: a population-based study. *CMAJ OPEN* 2014; 2 (3): e127-e132.

(14) Chaturvedi AK, Engels EA, Anderson WF, Gillison ML. Incidence trends for human papillomavirus-related and -unrelated oral squamous cell carcinomas in the United States. *Journal of Clinical Oncology* 2008; 26: 612-619.

(15) Ward G, Mehta V, Moore M. Morbidity, mortality and cost of HPV-related oropharyngeal cancer: impact of 2-, 4 – and 9-valent vaccines. *Human Vaccines & Immunotherapeutics* 2015: http://dx.doi.org/10.1080/21645515.2015.1095415

(16) Steinau M, Saraiya M, Goodman MT, et al. Human papillomavirus prevalence in oropharyngeal cancer before vaccine introduction, United States. *Emerging Infectious Diseases* 2014; 24(5): 822-828.

(17) Anic GM, Giuliano AR. Genital HPV infection and related lesions in men. *Preventative Medicine* 2011; 53(Suppl 1): S36-S41.

(18) Rubin M, Kleter B, Zhou M, et al. Detection and typing of human papillomavirus DNA in penile carcinoma: evidence for multiple independent pathways of penile carcinogenesis. *American Journal of Pathology* 2001; 159(4): 1211-1218.

(19) Backes, DM, Kurman RJ, Pimenta JM, Smith JS. Systematic review of human papillomavirus prevalence in invasive penile cancer. *Cancer Causes Control* 2009; 20: 449-457.

(20) Glick SN, Feng Q, Popov V, Koutsky LA, Golden MR. High rates of incident and prevalent anal human papillomavirus infection among young men who have sex with men. *Journal of Infectious Diseases* 2014; 209: 369-376.

(21) Mooij SF, Boot HJ, Speksnijder AG, et al. Oral human papillomavirus infection in HIV-negative and HIV-infected MSM. *AIDS* 2013; 27 (13): 2117-2128.

(22) van Aar F, Mooij SH, van der Sande MA, et al. Anal and penile high-risk human papillomavirus prevalence in HIV-negative and HIV-infected MSM. *AIDS* 2013; 27 (18): 2921-2931.

(23) Quinn GP, Sanchez JA, Sutton SK, Vandaparampil ST, Nguyen GT, Green BL. Cancer and lesbian, gay, bisexual, transgender/transsexual, and queer/questioning populations. *CA: A Cancer Journal for Clinicians* 2015; 65: 384-400.

(24) Kim JJ. Targeted human papillomavirus vaccination of men who have sex with men in the USA: a cost-effectiveness modeling analysis. *The Lancet Infectious Diseases* 2010; 10(12): 845-852.

(25) Palefsky JM, Giuliano AR, Goldstone S, et al. HPV vaccine against anal HPV infection and anal intraepithelial neoplasia. *New England Journal of Medicine* 2011; 365 (17):1576-1585.

(26) Giuliano AR, Palefsy JM, Goldstone S, et al. Efficacy of quadrivalent HPV vaccine against HPV infection and disease in males. *New England Journal of Medicine* 2011; 364(5): 401-411.

(27) Pinto L, Kemp T, Torres N, et al. The quadrivalent HPV vaccine induces HPV-specific antibodies at the oral cavity: results from the mid-adult male vaccine trial-the MAM trial. *HPV Vaccines: New Perspectives* YEAR; HPV15-0824.

(28) Newman PA, Lacombe-Duncan A. Human papillomavirus vaccination for men: advancing policy and practice. *Future Virology* 2014; 9(12): 1033-1047.

(29) Grennan T, Brunetta J, Burchell A, et al. Prevalence and distribution of oncogenic human papillomavirus (HPV) types in HIV-positive and HIV negative men who have sex with men (MSM) in Toronto, Canada: implications for anal cancer screening and vaccine coverage. *Canadian Journal of Infectious Diseases and Medical Microbiology* 2015, 26: 18B-19B.

(30) Mooij SH, Landen O, van der Klis FRM, et al. No evidence for a protective effect of naturally induced HPV antibodies on subsequent anogenital HPV infection in HIV-negative and HIV-infected MSM. *Journal of Infection* 2014, 69: 375-386.

(31) Moores A, Phillips JC, O'Bryne P, MacPherson P. Anal cancer screening knowledge, attitudes, and experiences among men who have sex with men in Ottawa, Ontario. *The Canadian Journal of Human Sexuality* 2015, 24(3): 228-236.

(32) Nadarzynski T, Smith H, Richardson D, Jones CJ, Llewellyn CD. Human papillomavirus and vaccine-related perceptions among men who have sex with men: a systematic review. *Sexually Transmitted Infections* 2014, 90(7): 515-523.

(33) Cummings T, Kasting ML, Rosenberger JG, Rosenthal SL, Zimet GD, Stupiansky NW. Catching up or missing out? Human papillomavirus vaccine acceptability among 18- to 26-year-old men who have sex with men in a US national sample. *Sexually Transmitted Diseases* 2015, 42(1): 601-606.

(34) Gerend MA, Madkins K, Phillips G, Mustanski B. Predictors of human papillomavirus vaccination among young men who have sex with men. *Sexually Transmitted Diseases* 2016, 43(3): 185-191.

(35) Gutierrez B, Leung A, Jones KT, et al. Acceptability of the human papillomavirus vaccine among urban adolescent males. *American Journal of Men's Health* 2013, 7(1), 27-36.

(36) Rank C, Gilbert M, Ogilvie G, et al. Acceptability of human papillomavirus vaccination and sexual experience prior to disclosure to health care providers among men who have sex with men in Vancouver, Canada: Implications for targeted vaccination programs. *Vaccine* 2012, 30(39): 5755-5760.

(37) Public Health Agency of Canada. Human papillomavirus (HPV) prevention and HPV vaccines: questions and answers. http://www.phac-aspc.gc.ca/std-mts/hpv-vph/hpv-vph-vaccine-eng.php

(38) Pierce Campbell CM, Lin HY, Fulp W, et al. Consistent condom use reduces the genital human papillomavirus burden among high-risk men: the HPV infection in men study. *Journal of Infectious Diseases* 2013; 208(3): 373-384.

(39) Public Health Agency of Canada. Human papillomavirus (HPV) and men: questions and answers. http://www.phac-aspc.gc.ca/std-mts/hpv-vph/hpv-vph-man-eng.php

(40) CATIE – Canada's Source for HIV and Hepatitis C Information. HPV, anal dysplasia and anal cancer. http://www.catie.ca/en/fact-sheets/cancers/hpv-anal-dysplasia-and-anal-cancer

(41) Salit IE. Screening for anal cancer. *Clinician's Corner* 2015, November, 2015.

(42) Mayer KH, Bekker L, Stall R, Grulich AE, Colfax G, Lama JR. Comprehensive clinical care for men who have sex with men: an integrated approach. *Lancet* 2012, 380: 378-387.

(43) Alemeida J, Johnson RM, Corliss HL, Molnar BE, Azrael D. Emotional distress among LGBT youth: the influence of perceived discrimination based on sexual orientation. *Journal of Youth Adolescence* 2009, 38(7): 1001-1014.

(44) Knight DA, Jarrett D. Preventive health care for men who have sex with men. *American Family Physician* 2015, 91(12): 844-851.

(45) Wilkin T. Primary care for men who have sex with men. *New England Journal of Medicine* 2015, 373: 854-862.

(46) Centers for Disease Control and Prevention. A guide to taking a sexual history. *US Department of Health and Human Services.* CDC Publication: 99-8445.

(47) Centers for Disease Control and Prevention. Sexually transmitted diseases treatment guidelines, 2015. *Morbidity and Mortality Weekly Report,* June 5, 2015, 64(3), 1-140.

SIECCAN
THE SEX INFORMATION & EDUCATION COUNCIL OF CANADA

This guide was produced by
The Sex Information and Education Council of Canada
www.sieccan.org

MERCK
*Be well*

This guide was made possible by the support of Merck Canada Inc. The opinions expressed in this guide are those of the authors and do not necessarily reflect the views of Merck Canada Inc.