



Region of Waterloo

PUBLIC HEALTH

## Building Healthy and Supportive Communities

# A Glance at HPV in Waterloo Region



This is one of a series of Public Health Perspective reports developed by Region of Waterloo Public Health. It focuses on HPV in Waterloo Region.

This report and others are available on the **Region of Waterloo Public Health** website:

[www.region.waterloo.on.ca/ph](http://www.region.waterloo.on.ca/ph)

(Go to **Resources** and select **Health Status and Research Studies**.)

### HPV Overview

Human Papillomavirus (HPV) is the most common sexually transmitted infection (STI) in Canada<sup>A</sup> and the primary cause of genital warts and virtually all cervical cancers. In addition to emotional and physical impacts of HPV, it is estimated that related disease results in an annual cost of more than \$300 million to the Canadian health care system<sup>1</sup>.

High prevalence rates and ease of transmission put most sexually active people at risk for an HPV infection. In fact, an estimated 75 per cent of the Canadian population will be infected with HPV at least once in their life and, at any one time, 10-30 per cent of adults are infected<sup>2</sup>. Because HPV is not a reportable infection, regional and provincial rates are not available, but are assumed to be consistent with National estimates.

### What is HPV?

Human Papillomaviruses are common, tissue-specific, DNA viruses<sup>3</sup>. There are more than 100 types of HPV and, based on their ability to cause certain forms of cancer, are commonly classified as either high or low risk<sup>4</sup>. At least 40 HPV types can infect the genital tract<sup>5</sup>.

### Transmission of HPV

Sexual transmission of HPV<sup>B</sup> may occur through skin to skin (or mucosa) contact involving the anogenital region (penis, scrotum, vagina, vulva, or anus) and the oral cavity<sup>2,4</sup>. HPV is often acquired around the time of sexual 'debut'<sup>2</sup> and new infection rates are highest among those under age 25<sup>5</sup>. Risk factors include early sexual debut; acquiring a new sexual partner; high number of sexual partners; male sexual partners with a high lifetime number of sexual partners; and sexual partners who carry the virus<sup>5,6</sup>. Other factors that increase the risk of an HPV infection include infection with chlamydia or herpes simplex virus-2; infection with human immunodeficiency virus (HIV); or immunosuppression<sup>5,6,7</sup>.

## FAST FACTS

- HPV (Human Papillomavirus) is the most common sexually transmitted infection in Canada.
- There are over 100 types of HPV. Forty of these types can infect the genital tract.
- Sexual activity is the primary risk factor for HPV.
- Most people who have HPV will not have symptoms and most infections are cleared by the immune system.
- Infection with HPV can result in genital warts and/or certain cancers.
- Safer sexual practices may reduce the risk of a new HPV infection and a healthy immune system is important to fighting off an existing infection.
- Regular Pap tests save lives. All sexually active females should have regular Pap tests, including those who have had the HPV vaccine.
- The HPV vaccine, Gardasil™, is recommended by the National Advisory Committee on Immunization for females age nine to 26 years old.
- The Ontario Ministry of Health and Long Term Care (MOHLTC) has established a publicly-funded HPV vaccination program for grade 8 girls. Public Health will provide this school-based immunization program commencing in the fall of 2007.

<sup>A</sup> Note: While HPV is estimated to be the most common STI in Canada (and around the world), Chlamydia is the most common *reportable* STI.

<sup>B</sup> Note: Some HPV types transfer cutaneously or from mother to child during the perinatal period. The transmission and related disease is not addressed here.

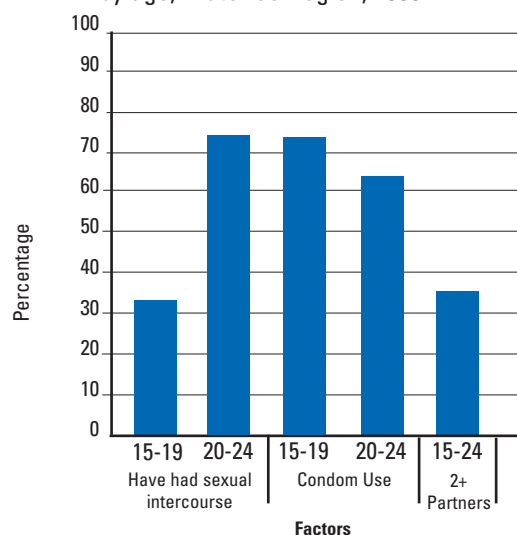
Lack of circumcision may also be an associated risk for men<sup>5</sup>. Condoms provide *limited* protection against HPV infection<sup>8</sup> but are also important for protection against the other STIs.

### Regional Data on factors that influence the risk of HPV<sup>9</sup>

Waterloo Region data on selected factors is provided below and in Figure 1. Data are similar to Ontario rates, unless otherwise indicated.

- Age at sexual initiation:** In Waterloo Region, 34.8 per cent (23.6-45.9) of teenagers (15-19) and 74.9 per cent (63.9-85.9) of young adults (20-24) have had sexual intercourse at least once. Trend data show a decrease in the overall proportion of those who reported intercourse experience since 2001. While local data are limited to intercourse, a National study from 2003 indicates that by Grade 11, 74-75 per cent of individuals have been involved in touching below the waist at least once and 52-53 per cent have had oral sex<sup>10</sup>.
- Number of partners:** Among sexually active 15-24 year olds, 40.8 per cent (22.9-58.6) of males and 31.8 per cent (17.1-46.5) of females reported two or more sexual (intercourse) partners in the last year.
- Condom use:** Three-quarters of respondents (74.8 per cent, 58.0-91.5) aged 15-19 reported using a condom the last time they had intercourse.
- Other STIs:** Interpretation of STI data is challenged by the nature of STI testing and reporting. First, changes in testing methods and sensitivity can impact the number of reported cases over time. Second, STI rates, are underestimates due to the fact that not everyone with the infection has symptoms and/or is tested<sup>11</sup>. Within these limitations, we know the following:
  - Chlamydia:** Local infection rates in 2004 (183.8 per 100,000 people) were similar to those in Ontario (185.3 per 100,000 people)<sup>12</sup>. Rates increased over the previous decade (in Waterloo Region by 121 per cent and in Ontario by 57 per cent). Explanations for the increase (found across Canada) include better detection methods, increases in risky sexual behaviour, lack of knowledge and action regarding safer sexual practices, and, possibly, treatment methods<sup>11</sup>. Reported rates of Chlamydia are highest among those under age 30<sup>11</sup>; in Waterloo Region, the rate for 15-24 year olds was 837 per 100,000 people in 2005<sup>13</sup>.
  - HIV:** Rates in Waterloo Region for the period from 1981 to 2005 were at 23.5 per 100,000 people (lower than the Ontario rate of 74.3 per 100,000)<sup>14</sup>.
  - Herpes Simplex 2 (HSV-2):** Rates are not available as HSV-2 is not a reportable infection.

**Figure 1:** Selected Factors that Influence the Risk of HPV, by age, Waterloo Region, 2006



### Signs, Symptoms, and Treatment of HPV

There is no routine testing for HPV and most infections do not cause signs or symptoms. Because the majority of HPV infections (70-91 per cent) are sub-clinical and will be cleared by the immune system within two years, most people never know they have, or ever had, HPV<sup>4,15</sup>. There is no treatment for an HPV infection alone, but when an infection leads to disease, treatment of the associated condition is available.

### Diseases associated with HPV

Although most HPV infections do not result in disease, clinical manifestations may occur if the virus achieves uncontrolled cell growth<sup>5</sup>. To achieve an infection, HPV must reach underlying basal cells in naturally thin areas called transformation zones found in the cervix and the anus or via microabrasions in the skin caused by sexual activity<sup>6</sup>. In addition to possible psychological impacts of an infection<sup>2</sup>, low-risk (non-cancer causing) HPV types (most often 6 and 11) can cause genital warts. High risk (cancer causing) HPV types (most commonly 16, 18) can lead to precancerous and cancerous cellular changes. Cancers linked to HPV include: cervical, anal, vaginal, vulvar, penile, oral and throat.

## Genital Warts (*condyloma acuminata*)

Genital warts appear as cauliflower-like growths on the vulva, vagina, cervix, penis, scrotum, perineum, anus, or male urethra. Depending on location, these benign warts may be associated with itching, burning, bleeding, vaginal discharge, or pain<sup>2,4,16</sup>.

While seldom<sup>c</sup> linked to increased cancer risk, genital warts can have emotional costs for the individual and economic costs for the health care system. Three main approaches to treatment are: chemical or physical destruction; immunologic therapy; or surgical excision. Therapies often require repeat application and have limited success; 30-70 per cent of warts return within the first six months following treatment<sup>16</sup>. Genital warts can also go away without treatment.

While statistics on prevalence are limited by a lack of Canadian population-based studies, data from countries with similar STI trends show highest rates of genital warts among adolescent females (703 per 100,000 population) and young adult males (783 per 100,000 population)<sup>5</sup>. In Public Health's STD clinic there were 554 wart treatments in 2005 and 786 in 2006, including repeat visits<sup>17</sup>.

## Cervical Cancer

In 2003, 18 women in the Region were diagnosed with Cervical Cancer, making it the 12th most common cancer among all females; a ranking similar to that for Ontario (10th)<sup>18</sup>. Analysis by age presents a different picture, though, as the cancer ranks 2nd among Ontario women under age 50<sup>19</sup>.

### Risk Factors for Cervical Cancer

Virtually all cervical cancers are linked to a **persistent, high-risk HPV infection**<sup>20</sup>. From 2 to 44 per cent of women may have this type of infection<sup>7</sup>, but not all develop cervical cancer. This is because a persistent HPV infection is a necessary cause of cervical cancer, not a sufficient cause<sup>19,21</sup>. Other factors associated with the progression of an HPV infection to cervical cancer include immune functioning (impacted by disease and behaviours such as tobacco use); poor diet; and a history of STIs<sup>4,7,15</sup>.

### Development and Treatment of Cervical Cancer

Most cervical cancers<sup>d</sup> spread slowly, taking up to ten years to develop<sup>5</sup>. Early stage cervical cancer is often without symptoms<sup>22</sup> and is most commonly discovered through a cytological assessment called a Pap test. Depending on the type, grade, and staging of the cancer, treatment may include: surgery; radiation therapy; and/ or chemotherapy<sup>23</sup>. The five year survival rate in Ontario is 73 per cent<sup>19</sup>.

<sup>c</sup> Note: Except for rare verrucous cancers

<sup>d</sup> Note: Most (70 per cent) are squamous cell carcinomas, 20 per cent are adenocarcinomas, and the remaining ten per cent include adenosquamous carcinomas and unspecified types.

<sup>e</sup> Note: Local and Provincial values are not corrected for hysterectomies.

<sup>f</sup> Note: ICD-9 Codes 154-2-154-3, 154-8 used in analysis.

## Incidence and Mortality of Cervical Cancer<sup>18, e</sup>

Data from 2003 show that in Waterloo Region women were diagnosed with cervical cancer at a rate of 3.5 per 100,000 people and experienced a mortality rate of 1.1 per 100,000. This incidence value was somewhat lower than that for Ontario (4.1 per 100,000). There has been no clear trend in the local incidence between 1994 and 2003 and Regional trends in mortality are complicated by a small sample. Provincial data, however, show a gradual decline in cervical cancer incidence and mortality between 1994 and 2003<sup>18</sup> (Figure 2) and a more than 60 per cent decrease over the last three decades; largely due to cervical screening programs<sup>7</sup>.

### Cervical Cancer by Age

In a decade of data (1994-2003), two thirds (66.3 per cent) of cervical cancer diagnoses in Waterloo Region were found among women under age 55. Ontario data show a similar pattern (Figure 3).

## Anal Cancer

Although less frequently discussed, other cancers linked to HPV include anal, vaginal, vulvar, penile, oral, and throat cancers<sup>4,5,24</sup>. Anal cancer is given specific attention due to a strong association with HPV and indications that incidence of this cancer is increasing, particularly among men<sup>25</sup>.

### Risk Factors for Anal Cancer

The anus shares histologic, embryologic and pathologic characteristics with the cervix<sup>26</sup> and, as with cervical cancer, most anal cancers are linked to infection with high-risk HPV types (primarily type 16). Additional risk factors include co-infection with HIV, tobacco use, lowered immune system functioning, and receptive anal intercourse<sup>6</sup>. On this last element, while anal intercourse increases risk, an HPV infection in the anus can be found in the absence of this practice<sup>6</sup>.

### Development and Treatment of Anal Cancer

Methods of detection of anal cancer can include anal cytology (similar to a Pap test), visual inspection of perianal skin, and digital or anoscopic examination. Anal cancer can become invasive. Treatment method depends on cancer stage and may include resection, radiation, or radiation combined with chemotherapy<sup>25</sup>. When caught early, anal cancer is often treatable. A general discussion of survival rates is limited by sex and race differences<sup>27</sup>.

## Incidence and Mortality of Anal Cancer<sup>18</sup>

Anal cancer<sup>f</sup> is rare within the general population. In 2003, seven individuals in the Region were diagnosed with this cancer and the incidence rate was 1.4 cases per 100,000 people; a rate statistically similar to that for Ontario (1.8 per 100,000 people). While local mortality rates are too small to report, Ontario had

a rate of 0.2 per 100,000 people in 2003. Notably, between 1995 and 2003, anal cancer incidence in Ontario increased by 38.5 per cent (Figure 2). Researchers have speculated on the cause of the increase (found across North America) suggesting factors including detection bias through increased screening among high risk populations as well as changes in risk factors such as rates of HIV infection and the average number of lifetime sexual partners<sup>27</sup>.

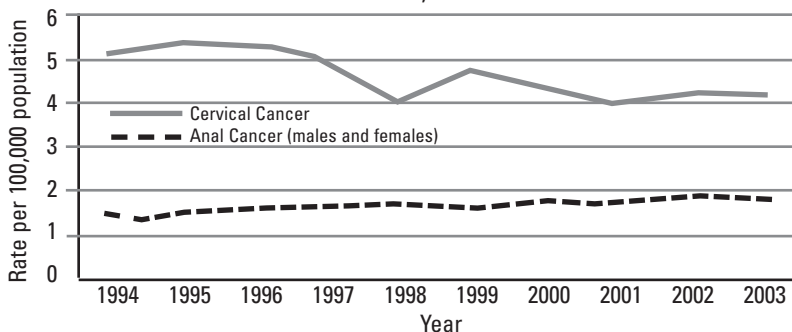
### Anal Cancer by Sex and Age

Although historically more common among women, surveillance studies in the United States show a higher rate of increase in anal cancer incidence among men since the 1970s<sup>27</sup>. This has led to a similar incidence rate for males and females over the last decade and a half<sup>27</sup>. Provincial data support this finding with comparable incidence rates among males and females between 1994 and 2003. Anal cancer is most common among older adults with two thirds of diagnoses (66 per cent) found in Ontarians aged 60 and older (Waterloo Region follows a similar trend, but sample size limits identification of percentages). See Figure 3.

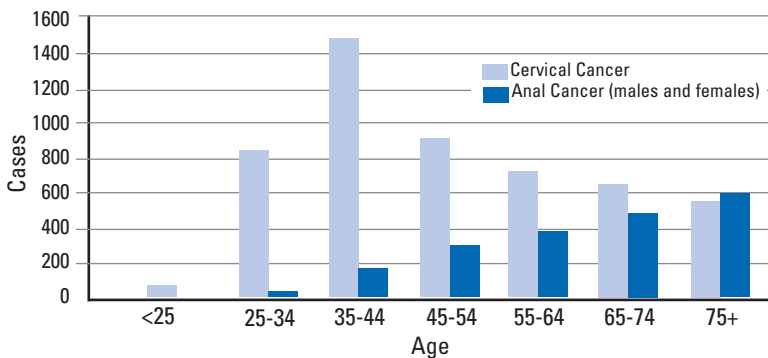
### Anal Cancer Within Unique Populations

Research indicates that among men who have sex with men (MSM) the risk of anal cancer is relatively higher at 35 cases per 100,000 people<sup>6</sup>. Among HIV infected MSM, the rate is even higher, at 75 cases per 100,000 people<sup>6</sup>.

**Figure 2:** Incidence of Cervical and Anal Cancer Ontario, 1994-2003



**Figure 3:** Incidence of Cervical and Anal Cancer, by Age Ontario, 1994-2003



Source: Cancer Care Ontario, Ontario Registry, Release 5 (Extracted June 6th, 2007).

## Reducing Risk of HPV Infection, Persistence, and Disease

### Safer Sexual Practices

As HPV is a highly prevalent STI, safer sexual practices are important. These include:

- Avoiding early initiation of sexual activity
- Limiting the number of sexual partners
- Consistently using barrier methods (condoms and dental dams) when sexually active

### Healthy lifestyle

Maintenance of a healthy immune system is important to the body's ability to fight off an HPV infection. Practices important to a healthy immune system include:

- Elimination of exposure to tobacco
- Eating for health (follow Canada's Food Guide)
- Participation in daily physical activity
- Sufficient rest
- Stress reduction

### HPV Immunization

A vaccine offers hope in preventing and thereby reducing HPV infection and related disease. The first preventive vaccine, Gardasil<sup>™</sup>, was approved by Health Canada in July of 2006 for use in females aged 9-26. In January of 2007, the National Advisory Committee on Immunization (NACI)<sup>6</sup> published a recommendation that all females aged 9-13 should receive Gardasil<sup>™</sup> and that those aged 14 to 26 would benefit from it<sup>5</sup>.

The HPV vaccine seeks to protect an individual from HPV types that can lead to disease by allowing the body to develop antibodies against the types. The increased effectiveness *before* initiation of sexual activity is part of the reason the immunization is targeted to young girls<sup>5</sup>.

Gardasil<sup>™</sup>, a quadrivalent vaccine, is effective against two high risk types (16 and 18) associated with approximately 70 per cent of cervical cancers and two low-risk types (six and 11) linked to 90 per cent of genital warts<sup>5</sup>. Cervarix<sup>™</sup>, a bivalent vaccine protecting against types 16 and 18, is presently under review by NACI. While the focus of these vaccines is cervical cancer prevention, the HPV types included in both are associated with a portion of the cancers found in the anus, vagina, vulva, penis and the throat<sup>28</sup>. Early data are promising for Gardasil's<sup>™</sup> reported ability to reduce anogenital disease among the studied female population<sup>29</sup>.

<sup>6</sup> Note: NACI provides medical, scientific, and public health advice on immunization to the Public Health Agency of Canada.

An equally important discussion is on what an HPV vaccine is not:

- An HPV vaccine does **not** protect against all types of HPV
- An HPV vaccine does **not** cure an existing HPV infection
- An HPV vaccine does **not** protect against other STIs
- An HPV vaccine does **not** replace regular Pap tests

### The Ontario School-based HPV Immunization Program for Grade 8 Girls

The Ministry of Health and Long Term Care (MOHLTC) announced in August, 2007 that the HPV vaccine would be publicly funded in Ontario for at least three years. This decision followed a Federal commitment of \$300 million toward immunization. The three dose vaccine is optional and will be offered to Grade Eight girls. Public Health is responsible for the administration of the vaccine in this school-based program commencing in the fall of 2007. Those outside the funded cohort can purchase Gardasil™. More information on the vaccine is offered through the Ministry of Health<sup>4</sup>, Cancer Care Ontario<sup>1</sup>, and the manufacturer of Gardasil™, J. Questions regarding the school-based program can be directed to Public Health.

### Routine Cervical Screening – Pap test

A Pap test can detect pre-cancerous cellular changes as well as pre-invasive and invasive cancerous cells<sup>30</sup>. Since the introduction of Pap tests in Canada approximately 50 years ago, morbidity and mortality associated with cervical cancer has been significantly reduced<sup>31</sup>.

Ontario guidelines<sup>32</sup> state that **all** women should start having Pap tests within three years of first vaginal sexual activity; including vaginal intercourse, vaginal/oral or vaginal/digital sexual activity. Screening should continue until at least age 70 and the recommended frequency of screening is every two to three years following three consecutive annual negative tests. Women (particularly those who are immunocompromised or have had a hysterectomy) should consult a physician or nurse practitioner (NP) for specific recommendations<sup>19</sup>. A Pap test can be done by a family doctor, NP, or at an urgent care centre. Public Health provides screening to Sexual Health Clinic clients aged 24 and younger. In the case of an abnormal result, health care providers will follow up.

### Local and Provincial Data on Cervical Screening Rates<sup>9</sup>

In 2005, 89.9 per cent (89.8-90.0) of Waterloo Region women aged 12 and older reported having had a Pap test at some time. Percentages were lowest among teens (46.8 per cent) and increased through young and middle adulthood to the highest level among those 30-39 (97.9 per cent). While local data are largely similar to self-reported rates in Ontario, Waterloo women aged 30-39 were more likely (92.4 per cent) to report a recent Pap test, compared to the self-reported provincial average.

Among women who reported having had the test at some time, a significant majority said it was within the last year (50.3 per cent) while fewer women said the test was 1-2 years ago (28.7 per cent) or three + years ago (21.1 per cent). A recent Pap test was most common among teens (95.2 per cent) and women in their 20s (72.8 per cent). Because data are based on self-reports, conclusions are limited.

Reasons for not having a Pap test within the past three years included: they did not feel the test was necessary (26.8 per cent); doctor did not think it was necessary (22.6 per cent); they had a hysterectomy (21.8 per cent), or they hadn't gotten around to it (18.4 per cent). Ontario percentages are similar.

### Selected Anal Screening

Discussion of anal cytology is relatively recent<sup>33</sup> and the test is not widely available. Recommendations for anal screening, particularly among high risk populations, continue to be explored<sup>26,34</sup>.

### Increasing Knowledge: HPV and Cervical Cancer

Data from 2005/06 indicate that women in Waterloo Region are not fully informed about HPV and its relationship to Cervical Cancer<sup>35</sup>. Only 63.1 per cent (57.4-68.8) had heard of this STI and less than a third (32.1 per cent; 26.1-37.1) correctly identified a relationship between HPV and Cervical Cancer. Knowledge levels were highest among younger women.

In addition to clinical services, Public Health is active in increasing knowledge on the impact of HPV and the importance of cervical screening through community presentations, displays, and printed information on HPV, the HPV vaccine, and cervical screening guidelines. Public Health is also a member of the Cancer Prevention and Early Detection Network of Waterloo Region and produced a Public Health Perspectives on Cancer including cervical cancer details. In 2006, Public Health began a research-driven, education campaign for girls in local high schools (see box below).

### "P.S.: Have you had yours".

This annual campaign, developed with teen girls and run in all Regional Public Secondary Schools, provides information on the "Who, Why, and How" of Pap tests, and outlines the relationship between HPV and cervical cancer. Materials are available through the Public Health Resource Centre.

## WHAT DOES THIS MEAN?

- HPV is an extremely common sexually transmitted infection that can lead to genital warts and certain forms of cancer, the most frequent being cervical cancer.
- An individual can reduce the risk of HPV transmission through safer sexual practices and can increase their ability to fight off an HPV infection by making lifestyle choices that support healthy immune system functioning.
- Virtually 100 per cent of cervical cancers are caused by HPV.
- Cervical cancer is the 2nd most common cancer among women aged 50 and younger. Within the last decade, two-thirds of women diagnosed with cervical cancer in the Waterloo Region were under the age of 55.
- The HPV vaccine, Gardasil™, has been shown to be highly effective against the HPV types that cause 70 per cent of cervical cancers and 90 per cent of genital warts.
- The HPV vaccine does not protect against all HPV types, cure an existing HPV infection, protect against other STIs, or replace regular Pap tests.
- Pap tests save lives. The impact of cervical cancer screening programs is demonstrated in data showing a decreasing trend in the number of cases and deaths from cervical cancer in Ontario over the last 30 years.
- The best protection against cervical cancer is Pap Testing plus HPV immunization.
- Quitting smoking or never starting can reduce an individual's risk for both cervical and anal cancer.
- Public Health offers HPV immunization to Grade 8 girls through Ontario's school-based publicly-funded program. The Public Health department also offers cervical screening for Sexual Health clients, treatment for genital warts in the STD clinic, and education on HPV and cervical screening to a variety of populations.

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<sup>a</sup>Note: Ontario Ministry of Health:

<http://www.cancercare.on.ca/documents/FactSheet-HPVvaccine.pdf>

<sup>b</sup>Note: Ontario Ministry of Health: <http://www.health.gov.on.ca/index.html>

<sup>c</sup>Note: CCO HPV Vaccine fact sheet:

<http://www.cancercare.on.ca/documents/FactSheet-HPVvaccine.pdf>

<sup>d</sup>Note: Merck fact sheets: <http://hpv.com/hpv-resources.html>