Human Papillomavirus Prevalence and Behavioral Risk Factors among HIV-infected Men in Taiwan

Yuan-Ti Lee M.D.
School of Medicine, Chung Shan Medical University, Division of Infectious Diseases, Department of Internal Medicine, Chung Shan Medical University Hospital, Taichung, Taiwan.
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Sexually transmitted infections (STIs) a major public health issue.

They can facilitate the transmission of HIV and HPV.

HPV infection is primary cause of cervical cancer and HPV-related squamous cell cancers, especially among MSM.

More than 200 HPV types identified, >30 are sexually transmitted; of these 15 are considered oncogenic or high-risk HPV.
Prevalence of Anal, Oral, and External Genital HPV in HIV infected MSM

Objective

- Determine the prevalence of HPV infection in Taiwan
- Examine behavioral risk factors.
- Explore the initiation of HPV vaccination strategy, especially among HIV-infected subjects.
## Methods

### Study design

Prospective cohort study and a questionnaire

- An HIV Counseling and Testing Center of Chung Shan Medical University Hospital in Taiwan
- From 2013-2016

### Study population

Aged ≥20 years, HIV-infected and -uninfected men

### Demographic data

Age, Marital status, Education, Employment status, Sexual orientation

### Sexual behaviors

Receptive anal or oral sex, drug use in past 6 months, circumcised, one-night stand, number of sex partners, consistently condoms use
Study Procedures

**History of STIs**
Serum VDRL, *C. trachomatis*, *N. gonorrhoeae*, herpes simplex virus-2, oral, genital or anal warts, HIV

**HPV infection**
Samples: swabs from oral, genital, and anal sites

**Statistical analysis**
Subjects characteristics:
- Descriptive statistics
- Fisher’s exact test, Mann-Whitney U test
Multivariate analysis
- Predict factors related to high-risk HPV infection
HPV Genotyping Test

All samples were processed at the central laboratory using PCR.

The Roche Linear Array HPV genotyping test was performed on all specimens.

This assay can genotype 37 HPV types:
- 15 oncogenic or HR-HPV (16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68, 73, and 82)
- 3 probable HR (26, 53, and 66)
- 19 low-risk HPV (6, 11, 40, 42, 54, 55, 61, 62, 64, 67, 69, 70, 71, 72, 81, 83, 84, IS39, and CP6108).

Results

Demographic data

279 subjects, including 166 (59.5%) HIV-uninfected and 113 (40.5%) HIV-infected men

Median age: 26.0 (23.0-31.0) years

82.4% MSM
82.1% receptive anal sex
98.2% receptive oral sex
34.8% consistent condom use
HPV positive subjects had significantly higher rates in the following areas than HPV negative ones:

- Receptive anal sex (91.3% vs. 75.6%)
- Substance use (22.6% vs. 11%)
- History of sexually transmitted infections (75.7% vs. 38.4%)
- Anal, genital, or oral warts (39.1% vs. 6.72%)
- Syphilis (32.2% vs. 11.6%)
- HIV infection (69.6% vs. 20.1%)
Prevalence of Anal, Oral, and External Genital HPV in HIV infected MSM

China, Hu et al. (2013) n=212
Japan, Nagata et al. (2015) n=361
Canada, Coutlée et al. (1997) n=201
United Kingdom, King et al. (2016) n=1886

Taiwan, Lee et al. (2018) n=113
Italy, Ucciferri et al. (2017) n=45
USA, Steinau et al. (2017) n=110
China, Qian et al. (2017) n=212
Taiwan, Cheng et al. (2014) n=230
Japan, Nagata et al. (2015) n=212
China, Hu et al. (2013) n=212
Canada, Coutlée et al. (1997) n=201
United Kingdom, King et al. (2016) n=1886

Anal samples
External genital samples
Oral samples

Self-Collection of Rectal Swab

Step 1: Unopened Swab
Wash your hands thoroughly.

Step 2: Open the swab
Either squat down, or lift one leg on a toilet, ledge, or chair (as shown). Pull underwear down or off.

Step 3: DO NOT TOUCH THE TIP OF THE SWAB
Twist first to break seal.
Then pull the swab will stay attached to the cap.
Do NOT throw the plastic tube away! You will need to put your swab in it after you have collected the sample.

Step 4: With your dominant hand (right if you're right-handed, left if you're left-handed), grip the opened swab 1.5" away from the tip of the swab (just below the first notch). DO NOT TOUCH THE TIP OF THE SWAB.
Do NOT, at any point, use anything (soap, saliva, or any kind of lubricants) either on your body or on the swab.

Step 5: Insert the swab 1.5 inches into your rectum until you feel your fingers touch your anus.

Step 6: Once the swab is in, walk your fingers halfway down the swab (away from your body) and grip it there, for stability. (The swab should stay where it is—only your fingers should move.)

Step 7: Gently rub the swab in a circle, touching the walls of your rectum, to collect the specimen.

Step 8: When removing the swab from your rectum, slowly turn it in a circle while pulling it out.

Step 9: Place used swab back into the transport tube. Close tightly to prevent leakage.

Step 10: Place closed tube into the red plastic zip-lock bag. Seal the bag.

Step 11: Place sealed zip-lock bag into the return mailer (white envelope with a blue diamond-shaped sticker on the front). Seal the envelope and drop it in any mailbox.

https://www.iwantthekit.org/testing/rectal-testing/
Prevalence of HPV DNA Types of All Specimens among 279 Subjects

- **HIV(-) N=166**
- **HIV(+) N=113**

Counts:

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Results

HPV vaccine prevention rates by specimen type from 279 subjects

HPV, human papilloma virus; 2vHPV, bivalent vaccine (16/18); 4vHPV, quadrivalent vaccine HPV type (6/11/16/18); 9vHPV, 9valent vaccine HPV type (6/11/16/18/31/33/45/52/58)
# Factors Associated with Infection of High Risk HPV Types at Any Site

<table>
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<tr>
<th>Covariate</th>
<th>Univariate analysis</th>
<th>Multivariate analysis</th>
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<tr>
<td></td>
<td>OR (95% CI)</td>
<td>P-value</td>
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<tr>
<td>Age ≥31 years</td>
<td>0.33 (0.11-0.98)</td>
<td>&lt;0.05</td>
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<td>Employed</td>
<td>3.39 (1.48-7.80)</td>
<td>&lt;0.05</td>
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<td>Drug use</td>
<td>0.31 (0.11-0.88)</td>
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<tr>
<td>Receptive anal sex</td>
<td>0.92 (0.25-3.47)</td>
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<td>Circumcised</td>
<td>0.77 (0.28-2.09)</td>
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<tr>
<td>STIs</td>
<td>0.43 (0.18-1.03)</td>
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<tr>
<td>Anogenital or oral warts</td>
<td>0.71 (0.32-1.54)</td>
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<td>One-night stand</td>
<td>0.95 (0.44-2.03)</td>
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<tr>
<td>Number of sex partners&gt; 10</td>
<td>0.87 (0.36-2.11)</td>
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<tr>
<td>Consistent condom Use</td>
<td>2.09 (0.89-4.89)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>HIV positive</td>
<td>3.11 (1.37-7.08)</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

CI=confidence interval; HIV=human immunodeficiency virus; HPV=human papilloma virus; OR=odds ratio; STI=sexually transmitted infection
Limitations

The study subjects were exclusively from Taiwan.

Anal pap smears or cytology should be performed for HIV-infected MSM.
- We did not perform on any subjects.

Smoking increased risk of anal precancer in HR-HPV infected men.
- We did not include history of smoking as a risk factor.

Previous studies: nadir CD4 cell count <200 related to higher rates of HR-HPV in HIV infected subjects.
- We excluded the CD4-T cell count test results.

Conclusions

The following areas have higher rates in HIV-infected MSM with:
- HR-HPV
- oral and external genital HPV
- multiple type HPV

We cannot say if safe sex and consistent condom use would change rates.

Recommend routine HPV vaccination with 9vHPV (or at least 4vHPV) vaccines for MSM or HIV-infected subjects. It should be extended to all men.
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• **Conflict of interests:**
  – The authors declared no conflict of interests.
Thank You!