A lifespan sexual health perspective on prevention of human papilloma virus infections and sequelae

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Disclosures

• No financial disclosures

• Relevant affiliations
  – American Sexual Health Association (ASHA)
  – American Sexually Transmitted Diseases Association
  – International Academy of Sex Research
  – Editorial boards

• Related research supported by NIH
Making connections of adolescent and adult sexual health
a professional lifespan recapitulation

• 1970’s – the ‘new morbidities’ of adolescence
  – Accidents, suicide, homicide
  – Pregnancy
  – Sexually transmitted infections

• 1980’s – adolescent sex as ‘risk’
  – Adolescent risk-taking theories
    • Risking the Future
  – Problem Behavior Theory

• 1990’s – the psychosocial contexts of STI
  – Neighborhood influences
  – Emotional and interactional content of relationships

• 2000’s – sexuality within adolescence
  – Developmental trajectories of sex and romantic/sexual relationships
  – Event-level analyses of sexual behaviors and partner interactions

• 2010’s – sexual health in adolescence and adulthood
Meanwhile...

- 1976 – Harald zur Hausen proposes HPV as a cause of cervical cancer

- 1980’s – Accumulation of clinical, laboratory and epidemiologic evidence linking HPV and cancers
  - 1983: HPV 16
  - 1984: HPV 18

- 1990’s – Natural history studies of acquisition of HPV in adolescence and young adulthood; evolving molecular understanding of HPV oncogenesis

- 2000’s – Clinical trials and licensing of HPV vaccines; epidemiologic and causal linkage of HPV to other cancers
  - 2008 Nobel Prize for zur Hausen

- 2010’s – Only a modest fraction of adolescents and young adults have received HPV vaccines
A sexualized definition of sexual health

- Sexual Desire
  - Self
  - Other
  - Sexual Cognitions

- Sexual Arousal
  - Awareness
  - Interpretation
  - Response

- Sexual Behaviors
  - Abstinence
  - Masturbation
  - Partnered Sex

- Sexual Function
  - Erection/Lubrication
  - Pain Free
  - Orgasm

- Sexual Rights
  - Sexual Knowledge
  - Sexual Choice
  - Sexual Pleasure

- Condom Use

STIGMA
What a sexual health perspective adds to risk-focused and vaccine-focused HPV prevention strategies

• The ubiquity of HPV infection

• Association of HPV with partnered sexual activities of adolescence

• HPV vaccination during adolescence

• HPV and population focused screening for cancer early detection among adults

• Substantial morbidity and mortality due to HPV-related cancer in older adults

• Complex interactions of sexual activities, prevention behaviors, sites of infection, and types of associated disease over the lifespan
HPV and squamous epithelia

Chow et al. APMIS 2010
Age-specific HPV prevalence (%) and Age-Specific Incidence Rate (ASIR) of Cervical Cancer /100,000
Modeled Oral HPV Prevalence, ages 14-69

*United States*

Adjusted for race, smoking, marital status and lifetime partners

Gillison et al, *JAMA*, 2012
### HPV Prevalence at First HPV Vaccine Dose

**13-20 year old adolescent women**

<table>
<thead>
<tr>
<th></th>
<th>No Previous Genital-Genital Contact N=69</th>
<th>Previous Genital-Genital Contact N=190</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall HPV, N (%)</td>
<td>8 (11.6)</td>
<td>133 (70)</td>
</tr>
<tr>
<td>N HPV types, mean [range]</td>
<td>0.2 [0-3]</td>
<td>2.3 [2-12]</td>
</tr>
<tr>
<td>At least 1 high risk type, n (%)</td>
<td>6 (8.7)</td>
<td>105 (55.3)</td>
</tr>
</tbody>
</table>

Adolescent women become young adult women

Sexual experiences, past year

Herbenick et al. J Sex Med 2010
<table>
<thead>
<tr>
<th>Source Site</th>
<th>Target Site</th>
<th>Transmission Rate / 100 Person-Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervix</td>
<td>Penis</td>
<td>5.0</td>
</tr>
<tr>
<td>Cervix</td>
<td>Scrotum</td>
<td>1.6</td>
</tr>
<tr>
<td>Cervix</td>
<td>Any genital</td>
<td>6.6</td>
</tr>
<tr>
<td>Anus</td>
<td>Scrotum</td>
<td>5.9</td>
</tr>
<tr>
<td>Any Hands</td>
<td>Any genital</td>
<td>28.2</td>
</tr>
</tbody>
</table>

Hernandez et al, *Emerging Infectious Diseases*, 2008
Shared HPV palm/genital sites

Hands-free sex

• 0/7 (0%) without genital HPV had palm HPV

• 12/18 (66%) with genital HPV also palm HPV +

Widdice et al, Journal of Adolescent Health, 2010
Kissing and oral sexual behaviors are associated with oral HPV infection

<table>
<thead>
<tr>
<th>Group</th>
<th>Sexual behavior</th>
<th>Odds ratio</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controls</td>
<td>&gt;10 oral sex partners</td>
<td>5.2</td>
<td>1.1-25</td>
<td>.007</td>
</tr>
<tr>
<td></td>
<td>&gt;25 vaginal sex partners</td>
<td>3.9</td>
<td>1.1-15</td>
<td>.003</td>
</tr>
<tr>
<td>Students</td>
<td>&gt;6 recent oral sex partners</td>
<td>7.9</td>
<td>1.05-59</td>
<td>.046</td>
</tr>
<tr>
<td></td>
<td>&gt;6 recent deep kissing partners</td>
<td>17.4</td>
<td>1.5-198</td>
<td>.023</td>
</tr>
</tbody>
</table>

D’Souza et al. J Infect Dis 2009
Younger women become older women

*Stigma: The importance of sociosexual concepts in HPV/STI prevention*

- Pretty
- Thin
- Virgin
  - “Women who reported themselves as virginal at enrollment were screened every 6 months after they reported becoming sexually active.” (*JID*, 2011)
- Whore
- Girlfriend
- Slut
Stigma, fear, and knowledge

Press coverage of HPV vaccination and “risky” sexual behavior

Partner Circumcision

Partner HPV Vaccination

Partner’s Partners

Partner HPV Infection

HPV Incidence

Infection at birth

Onset of partnered sexual activities

HPV Vaccination

Maternal Cancer Screening

Age

10 20 30 40 50 60 70
Partner Circumcision

Partner HPV Vaccination

Partner’s Partners

Partner HPV Infection

HPV Incidence

HPV Persistence

Onset of partnered sexual activities

HPV Vaccination

Maternal Cancer Screening

Age

10 20 30 40 50 60 70
How does the HPV of younger women become the cancer of older women

Evidence for low-level HPV persistence

Factors associated with HPV Persistence

Guanacaste Costa Rica

- Ex-smoker
- Never use OCP
- Parity > 5
- Lifetime partners < 4
- Multiple types

Castle et al, J Infect Dis 2011;203:814–822
Multiple simultaneous HPV infections are common

<table>
<thead>
<tr>
<th></th>
<th>Vaginal Samples</th>
<th>Cervical Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number HPV types/sample, mean (range)</td>
<td>0.99 (0-6)</td>
<td>0.79 (0-6)</td>
</tr>
<tr>
<td>Multiple HPV types/sample, %</td>
<td>55.7</td>
<td>56.9</td>
</tr>
<tr>
<td>4 or more types, %</td>
<td>15.8</td>
<td>10.3</td>
</tr>
</tbody>
</table>

Young adult women become older adult women

Sexual experiences, past year

Herbenick et al. J Sex Med 2010
Model for latency, microtrauma, and reactivation

A. Active infection
- Langerhans cell
- T cells
- E4 expression and virus assembly
- E4 expression and genome amplification
- Cells driven into cell cycle

B. Immune regression
- Stem cell
- Active T cells

C. Latency
- Latently infected stem cell

D. Wounding

E. Reactivation
## Side-effects of vibrator use, women ages 18-60 (N=1,059)

<table>
<thead>
<tr>
<th></th>
<th>Irritation %</th>
<th>Inflammation %</th>
<th>Tears or Cuts %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency, once or more</td>
<td>9.9</td>
<td>8</td>
<td>1.1</td>
</tr>
<tr>
<td>Duration, 1 hour or more</td>
<td>4.2</td>
<td>3.2</td>
<td>1</td>
</tr>
<tr>
<td>Severity, 1-10</td>
<td>3.9</td>
<td>4.0</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Herbenick et al. *J Sex Med* 2009
Lubricant use at most recent sexual event, Women ages 18 years and older

<table>
<thead>
<tr>
<th>Lubricant Application site</th>
<th>Penile-Vaginal % (N=6,048)</th>
<th>Penile-Anal % (N=62)</th>
<th>Solo Masturbation % (N=2,136)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant genitals</td>
<td>59</td>
<td>61</td>
<td>41</td>
</tr>
<tr>
<td>Partner genitals</td>
<td>54</td>
<td>81</td>
<td>-</td>
</tr>
<tr>
<td>On fingers</td>
<td>53</td>
<td>60</td>
<td>64</td>
</tr>
<tr>
<td>On sex toy</td>
<td>9</td>
<td>27</td>
<td>45</td>
</tr>
</tbody>
</table>

Herbenick et al J Sex Med 2011
Genital aesthetics

Pubic hair removal in past month, American women (N=2,451)

Herbenick et al J Sex Med 2010;7:3322–3330
The intersection of STI prevention and cancer prevention

*C. trachomatis* co-infection and HPV persistence

Shew et al, in preparation
Partner Circumcision

Partner HPV Vaccination

Partner's Partners

HPV Infection

HPV Incidence

Onset of partnered sexual activities

HPV Persistence

HPV Vaccination 10 20 30 40 50 60 70 Age

HPV Screening

Cervical cancer Screening

Maternal Cancer Screening
Age-specific HPV prevalence in women with normal cervical cytology

Gravitt  J Clin Invest 2011
Commercializing HPV screening

*HPV DNA Test Use in Primary Screening, before / after direct-to-consumer marketing campaigns*

<table>
<thead>
<tr>
<th>Age</th>
<th>Before Direct-to-Consumer Marketing</th>
<th>After Direct-to-Consumer Marketing</th>
<th>Change in predicted probability, % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 - 29</td>
<td>2.34</td>
<td>6.0</td>
<td>3.32 (2.69, 4.06)</td>
</tr>
<tr>
<td>30 and older</td>
<td>3.6</td>
<td>10.4</td>
<td>5.44 (5.07, 5.83)</td>
</tr>
</tbody>
</table>

Social and psychological responses to HPV screening

- Generalized distress
- HPV as a sexually transmitted infection
  - STI stigma
  - Guilt and blame
  - Disclosure to partners
  - Disclosure to family
  - Transmission to new partners

Kahn et al J Women’s Health, 2005; McCaffery et al. Sex Trans Infect, 2006
Partner Circumcision

Partner HPV Vaccination

Partner HPV Infection

Onset of partnered sexual activities

HPV Incidence

HPV Persistence

Age

Cervical Cancer

Oro-pharyngeal Cancer

Anal Cancer

Vulvar Cancer

Anal cancer screening

HPV Vaccination

Maternal Cancer Screening

HPV Screening
Older Adult Women Become Older Adult Women

Sexual experiences, past year

Herbenick et al. J Sex Med 2010
Sexuality Stigma

*Cancer as a sexually transmitted infection*

- Women as vectors
- Cancer as deserved consequence of improper sexual behavior
- Women’s responsibility for prevention
Sexual stigma, HPV, and Cervical Cancer

But in myself you know I do shy away from saying cervical cancer—I feel like it’s the preventable cancer, and the only thing I’ve ever heard about cervical cancer is the HPV commercials.

- Woman with cervical cancer

Sexual stigma, HPV, and Cervical Cancer

I think they think... that you’re promiscuous, which is a little unnerving... I feel like I’m admitting that I played around or something.

I don’t think anybody has said ‘Oh, were you just so sexually active that you caught this?’ specifically, but they probably think it.

Especially with this new vaccination, that can prevent it.

- 45 year old woman with cervical cancer

Dyer, Human Organization, 2010
The centrality of sexuality stigma in HPV public health

• Cultural regulation of sexuality
  – who is entitled to sexuality
  – under what circumstances
  – moral restrictions on sexual experiences

• Social and professional marking of the boundaries of normal and abnormal sexual experiences
  – The public health equivalent of abnormal is “risk”

• Social creation of ‘ingroups’ and ‘outgroups’

• Stigma as exertion of power by ingroups over outgroups
  – Distancing
  – Silencing
  – Exploitation
Women’s sexual health and stigma

“What does it say about the college coed, Susan Fluke, who goes before a congressional Committee and essentially says that she must be paid to have sex.

What does that make her?

It means you’re a slut, right?

It means you’re a prostitute. She wants to be paid to have sex. She’s having so much sex she can’t afford the contraception.”

- Rush Limbaugh 2/29/2012
Sexuality stigma and HPV public health over the lifespan

- HPV Incidence
- HPV Persistence
- HPV related cancers

- Onset of partnered sexual activities
- HPV vaccination
- HPV/STI prevention
- HPV cancer screening
- HPV cancer treatment

Stigma over the lifespan:
- Ages 10-20
- Ages 30-70

HPV cancer over the lifespan:
- Ages 30-70
A sexualized definition of sexual health

- Sexual Desire
- Sexual Arousal
- Sexual Behaviors
- Sexual Function

- Sexual Cognitions
- Awareness
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- Response

- Abstinence
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- Partnered Sex
- Condom Use
- Erection/Lubrication
- Pain Free
- Orgasm

- Sexual Rights
- Sexual Knowledge
- Sexual Pleasure

- STIGMA

Sexual Pleasure layered within Sexual Rights, surrounded by STIGMA, connected to Sexual Knowledge and Sexual Function.
Thank you!
Modeled Oral HPV Prevalence, ages 14-69

United States

Adjusted for race, smoking, marital status and lifetime partners

Gillison et al, JAMA, 2012