Summary Statement Title:
Condoms to prevent HPV infection, external genital warts, or cervical neoplasia: Evidence and implications for public health

Review Quality Rating: 5 (moderate)

Review on which this summary statement is based:

Review author contact information:
Lisa Manhart, Assistant Professor, Center for AIDS and STD, Harborview Medical Center, University of Washington, Seattle WA 98104-2499. lmanhart@u.washington.edu

This is a summary statement written to condense the work of the authors of this systematic review, referenced above. The intent of this summary is to provide an overview of the findings and implications of the full review. For more information on individual studies included in the review, please see the review itself.

Review content summary
This systematic review of 20 primary studies (cohort, case-control, and cross-sectional) aimed to determine the effectiveness of condom use in preventing human papillomavirus (HPV) infection and HPV-related conditions. Participants studied were: adult men, women, and couples. To be included, studies had to: clearly define the outcome being studied, employ an exclusive definition of condom use, and have a comparison group. In case-controlled studies the control subjects had to be from the same population as the cases, and there had to be more than 20 cases and/or controls. Interventions described in this review included: condom use. Outcomes measured include: 1) external genital warts, 2) HPV DNA detection in genital samples, 3) cervical warts and SIL or cervical intraepithelial neoplasia (CIN) (grade 1 or unspecified), 4) CIN II or III, and 5) ICC (squamous cell carcinoma and adenocarcinoma not differentiated). Authors report that although there is some evidence that suggests condoms may protect against genital warts, the review revealed that there is no consistent evidence that condoms reduce the risk of HPV infection, CIN II or III, and ICC.

Comments on this review’s methodology
This is a methodologically moderate systematic review. A focused clinical question was clearly identified. Appropriate inclusion criteria were used to guide the search. A comprehensive search was not employed as it was limited to one health database; reviewing reference lists of primary studies; and contacting key informants. The search was limited by language (English). Primary studies were not assessed for methodological quality. The methods were described in sufficient detail so as to allow replication. The results of this review were not transparent. Results were clearly presented in graphical form so as to allow for comparisons across studies. Heterogeneity was not assessed. Appropriate analytical methods (fixed effects, random effects) were not employed to enable the synthesis of study results. Because of the substantial heterogeneity, the results were not pooled through meta-analysis. Much of the data were too inconsistent to draw strong conclusions about the use of condoms against the different types of infections.

Why this issue is of interest to public health
Health Canada considers human papillomavirus (HPV) to be one of the most common sexually transmitted infections in Canada, with an estimate of 75% Canadians having at least one HPV infection over their lifetime1. The Society of Obstetricians and Gynaecologists of Canada estimates that 10% to 30% of the Canadian adult population is infected with HPV, and applied to current Canadian population statistics, this figure translates to an estimated three to nine million Canadians infected2. To add to the concern of the spread of this STI is the association between HPV infection and cervical cancer. Persistent HPV infection is the major cause of over 99% of cervical cancers and may also play a role in cancers of the anus, penis, and oropharynx (in the throat at the back of the mouth)3. In July 2006, a new HPV vaccine was approved for use in Canada4 with recommendations for use from the National Advisory Committee on Immunization to be released soon. Because of the widespread use of condoms to prevent unwanted pregnancies and the transmission of other STIs, evaluating the effectiveness of condom use in preventing HPV infection is an area of interest for public health. Because an HPV infection is spread through any sexual skin-to-skin contact5, it is possible to become infected with HPV from contact with any uncovered warts3.

Evidence and implications
Evidence points are in order of the strength of evidence
<table>
<thead>
<tr>
<th>What's the evidence?</th>
<th>Implications for practice and policy:</th>
</tr>
</thead>
</table>
| **1. Condom use and external genital warts (2 studies)**  
1.1. Results showed that the use of condoms statistically significantly reduced the likelihood of external genital warts in both men and women. The percentage reduction was 70% among males and 40% among females. | **1. Condom use and external genital warts**  
1.1. To reduce the transmission and incidence of genital warts, public health professionals should promote the use of condoms in both males and females. |
| **2. Condom use and cervical HPV DNA (6 studies)**  
2.1. Condom use and cervical HPV DNA (6 studies)  
2.1.1. The one study showing a statistically significant protective effect for condom use reported an 80% reduction in cervical HPV infection for those always using condoms compared to those who never used condoms. The true effect (95% confidence interval) ranged from a 90% to 40% reduction in cervical HPV infection.  
2.1.2. The one study reporting a statistically significant harmful effect of condom use reported a 1.5 times increased risk of cervical HPV infection for those always or mostly using condoms to those never using condoms. The true effect ranged from 1.1 to 2.0 times more likely to contract a cervical HPV infection.  
2.1.3. Methodological concerns. It is likely that some of these studies were underpowered and thus unable to detect a statistically significant impact. Measures of condom use varied and were not necessarily validated. Data on time intervals were lacking. All but one of these studies had a cross-sectional design. | **2. Condom use and cervical HPV DNA**  
2.1. It remains unclear as to whether or not condom use provides protection against cervical HPV DNA detection.  
2.2. High quality program evaluations and other research are required. (see implication #6) |
| **3. Condom use and cervical warts, squamous intraepithelial lesions (SIL), or cervical intraepithelial neoplasia (CIN) grade I or grade unspecified (4 studies)**  
3.1. Results were mixed regarding the effectiveness of condoms in preventing cervical warts or SIL or CIN I or CIN (grade unspecified).  
3.1.1. Three studies revealed no effect on any outcomes.  
3.1.2. The one study reporting a harmful effect of condom use reported a 1.8 times greater likelihood of cervical warts, SIL, or CIN grade 1 for those using condoms compared to those who didn’t. However, methodological concerns were noted with this study (the final effect size was not adjusted for potential confounding factors and significant differences were noted between intervention and control groups). | **3. Condom use and cervical warts, SIL, or CIN grade I or grade unspecified**  
3.1. It remains unclear as to whether or not condom use provides protection against cervical warts, SIL, or CIN I.  
3.2. High quality program evaluations and other research are required (see implication #6), |
| **4. Condom Use and CIN II or III (6 studies)**  
4.1. The results are mixed regarding the effectiveness of condom use as a protection against CIN II or III.  
4.1.1. Three studies found a significant protective effect for CIN III and two studies for both CIN II and III.  
4.1.2. Three studies found no protective effect  
4.1.3. For studies reporting positive effect reductions in CIN II or III ranged from 40-70%. | **4. Condom Use and CIN II or III**  
4.1. There is sufficient evidence to recommend condom use to prevent CIN II and III.  
4.2. However, given conflicting results high quality program evaluations and other research are required. (see implication #6) |
5. Condom Use and invasive cervical cancer (ICC) (5 studies)
5.1. The results of this review are mixed regarding the effectiveness of condom use to protect against ICC
5.1.1. One study found that condom use is statistically significantly protective against ICC, however methodological concerns were noted (e.g., subjects were monogamous females with condom use reported by husband).
5.1.2. Four studies found that condom use had no impact on ICC.

5. Condom Use and ICC
5.1. Generally the evidence does not suggest that condom use is protective against ICC.
5.2. High quality program evaluations and other research are required. (see implication #6)

6. Methodological Issues with the Primary Studies in the Review
6.1. All of the studies included in the review were not designed to measure condom use and did not include valid measures of frequency of use vs. frequency of sexual intercourse, correct type or coverage, precise measures of use (e.g., generally assessment involved always or never used), or participants experience with condom use.
6.2. It is possible that the power of many of the studies was not sufficient to determine statistical significance.
6.3. Lack of or inconsistencies in control for confounders made interpretation of the results of this review difficult.
6.4. All studies included in this review involved women but only two involved men.
6.5. The differing results and sub-populations of women represented in the studies may indicate that certain subpopulations are protected differently than others.

6. Implications for Future Research
6.1. High quality research studies should be funded and conducted that:
6.1.1. Use valid measures of condom use for contraception and protection against sexually transmitted infections, condom failure rates, and sexual behavior.
6.1.2. Assess the effectiveness of condom use on HPV transmission among both male and female populations.
6.1.3. Involve assessment of the impact of subgroups of populations according to risk status, frequency of intercourse, experience with condom use, age, and number of partners.
6.1.4. Involve partners as respondents.
6.1.5. Involve baseline measures and long term follow-up.
6.1.6. Are sufficiently powered to determine statistical significance.
6.1.7. Control for potential confounders.

7. Cost Benefit or Cost-effectiveness Information
7.1. No cost related information was included in the review.

7. Cost Benefit or Cost-effectiveness Information
7.1. Future research should assess cost benefit or cost-effectiveness of the interventions.
General Implications

- The results of this review were mixed regarding the protective effect of general condom use on the transmission of HPV, CIN II or III, IPP. However, for certain outcomes namely external genital warts and CIN II and III, there is some evidence to suggest condom use is protective. Until further research results are reported, it would be prudent to continue to advocate for the consistent use of condoms during sexual activity.

Legend: CI – Confidence Interval; OR – Odds Ratio; RR – Relative Risk

**please see the health-evidence.ca glossary of terms (found under ‘How to Use This Site’) for definitions

References used to outline issue


Other quality reviews on this topic


Related links

- Sexual Health and Promotion – Healthy Living, Health Canada: http://www.hc-sc.gc.ca/hl-vs/sex/index_e.html

Suggested citation


The opinion and ideas contained in this document are those of the summary statement author(s) and health-evidence.ca. They do not necessarily reflect or represent the views of the author’s employer or other contracting organizations. Links from this site to other sites are presented as a convenience to health-evidence.ca internet users. Health-evidence.ca does not endorse nor accept any responsibility for the content found at these sites.