

Condom use around the globe: how can we fulfil the prevention potential of male condoms?

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Approximately 340 million incident cases of sexually transmissible infections (STI), including 2.6 million cases of HIV infection,^{1,2} occur worldwide each year. These infections contribute towards making unsafe sexual intercourse the second leading risk factor for disease, disability or mortality in the poorest countries across the world.³ Given the general absence of available vaccines and microbicides for most STIs (particularly HIV), the use of condoms – a simple technology whose first use for disease prophylaxis (for syphilis) was described by Gabriello Fallopio in 1564^{4,5} – continues to receive attention for its prevention potential. There is general consensus that male condoms must play a central role in any STI/HIV prevention program,⁶ a stance endorsed by UNAIDS in a recent position statement,⁷ that deemed the male latex condom ‘... the single most efficient, available technology to reduce the sexual transmission of HIV and other sexually transmitted infections.’ Although there have been marked increases in the public sector distribution⁸ and use of condoms worldwide in recent years,⁹ the potential for condoms to significantly influence levels of infection has only been partially realised to date.

Condom effectiveness

When used consistently and correctly, condoms provide protection against a variety of STIs (and also are effective at preventing unintended pregnancy).¹⁰ By covering the penile glans and shaft, condoms prevent STIs transmitted primarily to or from the urethra (including gonorrhoea (*Neisseria gonorrhoeae*), chlamydia (*Chlamydia trachomatis*), trichomoniasis and HIV) and also STIs transmitted primarily through skin-to-skin contact or contact with mucosal surfaces (including genital herpes, human papillomavirus (HPV), syphilis and chancroid), to the extent that these areas are covered by the condom. *In vitro* laboratory studies further indicate that latex condoms provide an effective physical barrier to STI pathogens.^{11–14}

Nevertheless, a decade ago, questions surrounding the effectiveness of condoms for STI prevention raised concerns regarding public health recommendations for their promotion

and use.^{15–17} Effectiveness is difficult to quantify because of measurement challenges inherent to clinical studies of condom use, including the absence of randomised controlled trials (and ethical issues precluding inclusion of a non-condom arm to persons at risk), reliance on self-reported measures of condom use, inadequate measures of consistent and correct use, and potentially low study power from infrequent STI outcomes. Because of these limitations, clinical and epidemiologic studies generally tend to underestimate condom effectiveness.^{18–25} Nevertheless, a growing body of research from clinical studies, spurred by the release of a 2001 US Dept of Health and Human Services report,²⁶ has documented that properly used condoms reduce the risk of many STIs. The strongest evidence comes from cohort studies of heterosexual couples discordant for HIV infection (i.e. one partner is infected and the other is not), where consistent condom use reduces HIV risk by ~80%.²⁷ Additional reviews^{18,19,28–30} and clinical studies^{31–35} that have employed improved designs, measurements and analytic methodologies offer further evidence of the protection provided by regular condom use against other STIs, including gonorrhoea, chlamydia, genital herpes, syphilis and HPV. The continued use of improved study designs and condom use measures in future studies will undoubtedly lead over time to more precise estimates of the effectiveness of condoms against individual STIs.

Moving beyond effectiveness

Sufficient evidence now exists to redirect a substantial portion of public health efforts towards better measuring and addressing barriers to consistent and correct use.³⁶ Future studies, for example, could use biological markers of semen exposure detected in vaginal specimens after coitus³⁷ to confirm the specific steps in condom use (e.g. failure to use the condom for the entire act or to withdraw immediately after ejaculation) that are most likely to increase risk of infection transmission.³⁸ Knowledge of the steps that need to be emphasised could improve counselling on the mechanics of condom use, as

demonstrated in a recent intervention trial of men diagnosed with STI.³⁹ STI prevention strategies that include a condom component should reinforce and clearly communicate information about effectiveness to potential users, acknowledging that although condoms may not fully eliminate STI risk, their use certainly confers more protection for sexually active persons compared with non-use, and that proficient (consistent and correct) use further reduces the risk of transmission as compared with inconsistent or incorrect use. More accurate research on condom effectiveness is likely to result in improved educational messages and improved condom use and protection. The public perception of condom effectiveness and trust in condom use as a strategy for personal protection are also likely to improve, facilitating the cultural shift that is necessary to establish condom use as a normative behaviour.

Barriers to use

Consistent use

The challenges to fully realising the prevention potential for condoms to address the global STI and HIV epidemics extend far beyond measuring condom effectiveness, however. To better facilitate and promote use of condoms, public health officials should be realistic about both the advantages and drawbacks inherent to condom use. Almost 25 years ago, in one of the first memorable attempts of the U.S. Centers for Disease Control and Prevention (CDC) to place condom advertisements on network television as part of the America Responds to AIDS public information campaign,^{40,41} one public service announcement showed a man putting on a sock, with the accompanying tagline, 'Putting on a condom is just as simple'. Although prevention efforts have since progressed considerably, one question the public health community must honestly reflect upon is the extent to which it may oversimplify and downplay the difficulties associated with condoms to prospective users.

Were consistent and correct use simple to achieve, we would expect rates of condom use to be high (and problems with condom use low) across different settings and populations worldwide. Despite promising news suggesting condom use has increased substantially in recent years and remains highest among persons at greatest risk, current levels of use are likely insufficient for preventing the spread of STIs and considerable opportunity for improvement remains. Data from CDC's national Youth Risk Behaviour Surveys (YRBS), for example, indicate condom use at last intercourse by sexually active high school students in the USA increased markedly since the 1990s, but is still only around 60%;⁴² comparable figures from the National Survey of Sexual Health and Behaviour estimate 80% use at last intercourse among USA adolescents.⁴³ Condom use is markedly lower among sexually active USA adults, where ~20% overall^{44,45} – and less than 50% of adults with multiple partners⁴⁴ – report use at last intercourse. Similarly discouraging patterns of condom use have been reported from general population surveys in other countries for both adolescents⁴⁶ and adults.⁴⁷ Likewise, Demographic Health Surveys (DHS) conducted in five sub-Saharan countries, where the HIV burden is high, suggest that condom use at last intercourse increased dramatically among

men having higher-risk sex yet still remains only 40–70%.⁴⁸ There is increasing recognition that sustained condom use requires a level of commitment that may be difficult even for people who know that they are at risk for STIs because of the actual or perceived disadvantages of condom use. Thus, sustained condom use beyond the most recent act of intercourse (e.g. 3–6 months or 1 year) would probably be even lower. Even among studies of heterosexual couples discordant for HIV²⁷ – the same studies that demonstrated the effectiveness of consistent use – fewer than half of participants reported regular use of condoms despite having a known risk for infection and presumably a high motivation to use condoms. Less than optimal rates of male condom use also have been reported from several recent international HIV prevention trials of microbicides and diaphragms, in which participants at increased risk for HIV exposure received intensive condom counselling and an adequate supply of condoms.^{49–54}

Correct use

Similarly, even when condoms are used, problems can occur. These problems range from those that could directly compromise effectiveness within a particular act of intercourse (e.g. breakage, slippage and failure to use condoms throughout intercourse)^{18,20,24,55} to those that can directly impact the likelihood of condom use during future acts of intercourse (e.g. loss of erection, loss of sensation or inability to ejaculate).^{55–58} Two intentional user practices that have received increased attention of late – putting condoms on after starting intercourse or removing condoms before ejaculation^{20,55,59–63} – illustrate well the challenges of achieving effective use. And although the rate of any of single condom problem generally is low (less than 5–10% of coital acts),^{55,59} the fraction of users reporting one or more problems often exceeds 40–50% even over brief periods of time.^{55,62} These examples underscore the reality that condom use, despite features that give an appearance of simplicity (e.g. low technology, low cost and available without prescription), is a multi-faceted task. Even under the best of circumstances, factors such as inexperience,^{64–67} prior negative experiences with condoms,^{56,59} or gender or social inequalities in relationships⁹ make the task inherently more complex and difficult to carry out.

The ability of public health to achieve the full prevention potential for condoms depends on how successfully we acknowledge and address the difficulties associated with using condoms with innovative and practical solutions. In 2004, UNAIDS proposed a four-pronged strategy for maximising the prevention potential of condoms that included: (1) realising there are interactions between condom promotion – including condom social marketing and peer-based condom education – and other prevention strategies; (2) understanding and correctly communicating information on condom effectiveness; (3) convincing people to use condoms when they are needed, and to do so consistently and correctly; and (4) ensuring a sufficient and regular supply of condoms for those who require them.⁹

Potential solutions

Specific areas that have yielded promising results towards increasing use include developing better condoms to increase acceptability and uptake among current and prospective users, as well as improving the accessibility and marketing of condoms in settings worldwide. From a device standpoint, condoms can be improved to make them more acceptable to prospective users. Possible improvements to condoms could include making them easier to apply, less likely to slip off or break, capable of providing the same (or greater) level of sensitivity as unprotected intercourse, and better fitting and more comfortable for men regardless of their penis size.^{56,68} Such design innovations in condoms are being made in an effort to make use more acceptable to broad populations of prospective users for STI prevention.^{69–72} Though still representing a very small fraction (~0.2%) of the worldwide condom market,⁷³ condoms designed to be worn by women serve a specific need for female-controlled barriers, and are increasing in popularity and availability.⁷²

From a marketing standpoint, traditional condom marketing that focusses on the value of condoms in preventing STI (or unintended pregnancy) may need to be replaced by or supplemented with marketing that emphasises that sexual satisfaction is possible with the use of condoms for both men and women. Though, ideally, condom use would be the norm for the general population, condom use remains substantially higher in casual relationships.^{44,74} The promotion of consistent use of condoms within regular partnerships remains a major public health challenge: in some settings, for example, most new cases of HIV among women result from infection transmitted via their husband.⁷⁵ However, the use of condoms – or suggestion of their use – within a primary relationship may be interpreted as a lack of trust or fidelity,⁷⁶ or as incompatible with developing or maintaining an intimate, emotional relationship.^{77,78} Emphasising the positive outcomes from practicing condom-protected intercourse could facilitate their use.^{79–81}

Additionally, simply increasing the availability of or accessibility to condoms has been shown to be efficacious in increasing condom use behaviours.⁸² Effective aspects of innovative population-level condom social marketing strategies to increase the awareness of the benefits of condom use and to normalise their use (from countries such as India, Kenya⁸³ and Brazil⁸⁴) should be examined as potential models for widespread use. There also is encouraging evidence that condoms can be successfully incorporated into comprehensive STI prevention strategies that involve multiple prevention messages, as demonstrated by recent examples from Uganda,⁸⁵ Thailand⁹ and China.⁸⁶

Although the emphasis continues to be placed on developing biomedical interventions (e.g. vaccines, microbicides, circumcision), the male latex condom remains the most effective, most widely available and by far the least expensive prevention method. Increasing its use continues to be an important public health priority for comprehensive STI and HIV prevention efforts, which should focus on improving condom devices, increasing their access, and addressing the needs of specific subpopulations and social norms regarding condom use. Finally, addressing the global HIV/STI pandemic

will require explicit acknowledgement of the challenges of using condoms. Doing so is essential to fully realising the potential for condom use as a prevention tool.

Conflicts of interest

None declared.

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