



# Male circumcision and HIV

### Key Points

- Male circumcision is one of the oldest and most common surgical procedures worldwide, but it is relatively uncommon in the parts of sub-Saharan Africa with the highest rates of HIV infection.
- Three randomized controlled trials show that it reduces the risk of HIV acquisition in males by 50–60%.
- The World Health Organization recommends male circumcision as an important additional HIV prevention strategy.
- Services for safe male circumcision are being expanded in settings with high HIV prevalence. This brings with it a number of challenges.

### Background

There is an urgent need to intensify and expand HIV prevention strategies, with an estimated 33.4 million people living with HIV in 2008 and an estimated 2.7 million newly infected. New infections continue to outstrip advances made in numbers treated – for every 2 people put on antiretroviral therapy, another 5 become infected.

Current strategies to reduce sexual transmission of HIV include behaviour change (delaying sexual debut, reducing the number of partners, consistent condom use) and biomedical approaches (vaginal microbicides, treatment of other STIs, pre-exposure prophylaxis, male circumcision). Sexual behaviour is influenced by many factors, making it difficult to achieve substantial, sustained changes. Of the biomedical approaches, only male circumcision has reduced the risk of HIV infection in multiple randomized controlled trials.

Approximately 1 in 3 adult men are circumcised, with religion the main reason. Around 70% of circumcised men are Muslim. It is also practiced for non-religious reasons either neonatally (e.g. in the USA) or as a rite-of-passage to manhood (e.g. west Africa, parts of central and eastern Africa).

### Evidence on HIV protection

Several biological factors may explain the higher risk of HIV and other STIs in uncircumcised men: lack of keratinisation and a high density of HIV target cells in the inner foreskin; microtears and lesions of the inner foreskin; and longer survival of pathogens in the warm, moist sub-preputial space.

The hypothesis that male circumcision might protect against HIV infection in men was suggested first in 1986 [1, 2], and has since been supported by a number of observational studies [3,4,5].

### Evidence from randomized controlled trials

Three randomized controlled trials (RCTs) of circumcision among men in Uganda, Kenya and South Africa were begun in 2002-03. A total of 11,050 uncircumcised, HIV-negative

men were randomized to intervention or control arms, and followed for up to 2 years. Interim analyses found a highly significant reduced risk of HIV acquisition among the men randomized to circumcision [6,7,8], leading each trial to be halted early. Data showed a protective effect of 58%, which is identical to that found in the observational studies [3].

Several countries are planning to introduce or expand safe male circumcision programmes, including Kenya, Swaziland, Zambia and Rwanda. International funding agencies are also backing this strategy. However, the expansion of male circumcision services for HIV prevention raises some concerns, detailed below, into which the trials provide an insight. Further research is needed to evaluate them in the 'real world'.

### Public health relevance of the trial results

#### Complications of male circumcision

Adolescent or adult circumcision requires suturing and is more complex than neonatal or infant circumcision. RCT evidence indicates that 2–4% of men will have complications, such as bleeding, swelling and infection. All adverse events in the trials were successfully resolved. Such data indicate that adult male circumcision can be done safely where resources are limited when performed in a clinical setting by experienced, well-trained providers. However, in non-sterile conditions, with inexperienced providers and inadequate equipment, or poor after-care, serious complications or even death can result.

♦ Care is needed to ensure that circumcision is conducted as safely as possible. WHO/UNAIDS/JPIEGO have produced a manual for performing adult male circumcision under local anaesthesia [9]. National policies are needed to maximise the safety, efficiency and availability of circumcision services.

#### Behaviour change after male circumcision

Adoption of, or increase in, unsafe sex practices following circumcision could offset its protective effect. The trials showed little evidence of increases in risk behaviour. However, they

provided high standards of preventive care, with men given intensive counselling and being unaware that circumcision reduced their HIV risk. A study outside a trial setting also found that circumcised men were no more likely to report risky sexual behaviour post-circumcision than uncircumcised men [10].

- ◆ Adult circumcision services must be conducted with full counselling to convey the message that protection is only partial and safe sex behaviour is still necessary. Service expansion within over-stretched health systems may mean counselling provision is inadequate. Follow-up studies of circumcised men are needed as services are expanded and community perceptions evolve. Further work evaluating strategies to optimise counselling in resource-poor settings is vital.

### Cultural acceptability

In studies from 9 sub-Saharan countries, 29-81% (median 62%) of uncircumcised men were willing to be circumcised, 50-79% of women favoured circumcision for their partners, and 50-90% of men and women were willing to circumcise their sons [11]. Acceptability was lowest (29%) among uncircumcised men in Uganda in 1997, before male circumcision was widely perceived as being associated with HIV protection. Otherwise, over half of uncircumcised men were willing to be circumcised.

- ◆ The main barriers to acceptability were cost, fear of pain, and safety. Improved hygiene, perceived lower risk of STIs and other health benefits were the main facilitators [11]. This suggests that culture and ethnicity are not major barriers to acceptability of male circumcision in most of sub-Saharan Africa.

### Socio-cultural issues in the expansion of services

As a practice with strong socio-cultural resonance, the expansion of male circumcision services evokes challenges, including human rights, ethical and legal issues. The protection of human rights is integral to HIV prevention and care.

- ◆ Male circumcision must always be carried out safely, with informed consent and without discrimination. Further research is needed to better understand attitudes about circumcision among different groups, and to develop appropriate education and counselling messages.

### Cost-effectiveness for HIV prevention

Male circumcision is a one-time procedure costing around \$60 [12,13]. According to the South African trial data, the estimated cost per HIV infection averted was \$181, with net savings of \$2.4 million over 20 years (\$2411 per circumcision) [12]. In Rakai, Uganda, where HIV incidence is lower, 39 circumcisions would be needed to prevent one HIV infection over 10 years, at a cost of \$2631 per HIV infection averted over 10 years [13].

- ◆ As the benefits of circumcision are likely to be lifelong, and economies of scale should decrease costs, male circumcision is very likely to be cost-effective, at least comparable to nevirapine to prevent mother-to-child transmission.

### Relevance for female partners

There is no evidence that circumcision will directly reduce the risk of male-female transmission of HIV, but women will benefit from lower prevalence in men. Further, data show that women

of circumcised partners have lower risks of some cervical and vaginal infections. However, if male circumcision services are expanded without appropriate individual counselling, women may find it harder to negotiate safer sex behaviour if their partners believe themselves to be protected from infection.

- ◆ Whenever possible, female partners should be included in the education and counselling of men being circumcised to help ensure adherence to post-operative care instructions and minimize the risk of transmission due to premature resumption of sexual intercourse.

### Potential population-level impact

Modelling indicates that expanded services can have a marked population-level effect on HIV incidence in a very cost-effective manner. Population-level impact could be greater than individual efficacy if a large proportion of men become circumcised. With full coverage, male circumcision could avert about 2 million new HIV infections over the next 10 years in sub-Saharan Africa.

### Conclusions

Male circumcision provides around 60% protection against heterosexual acquisition of HIV in men. As protection is only partial, services must be accompanied by individual counselling and community campaigns conveying the message that the procedure will reduce, but not eliminate, HIV risk. Programmes to expand male circumcision services will need to be closely monitored and evaluated to ensure that effective counselling and follow-up takes place, and that service expansion brings benefits to other health programmes. For reasons of safety, cost and feasibility, countries may decide to also promote neonatal circumcision as a long-term strategy.

### References

1. Alcena V. Aids in third world countries. *NY State J Med* 1986; 86: 446.
2. Fink AJ. A possible explanation for heterosexual male infection with AIDS. *N Engl J Med* 1986; 315: 1167.
3. Weiss HA et al. Male circumcision and risk of HIV infection in sub-Saharan Africa: a systematic review and meta-analysis. *AIDS* 2000; 14: 2361-70.
4. Siegfried N et al. HIV and male circumcision - a systematic review with assessment of the quality of studies. *Lancet Infect Dis* 2005; 5: 165-73.
5. Drain PK et al. Male circumcision, religion and infectious diseases: an ecologic analysis of 118 developing countries. *BioMedCentral* 2006; 6: 172.
6. Auvert B et al. Randomized, controlled intervention trial of male circumcision for reduction of HIV infection risk: the ANRS 1265 Trial. *PLoS Med* 2005; 2: e298.
7. Bailey RC et al. Male circumcision for HIV prevention in young men in Kisumu, Kenya: a randomised controlled trial. *Lancet* 2007; 369: 643-56.
8. Gray RH et al. Male circumcision for HIV prevention in men in Rakai, Uganda: a randomised trial. *Lancet* 2007; 369: 657-66.
9. WHO/UNAIDS/JHPIEGO. *Manual for male circumcision under local anaesthesia*. World Health Organization, Geneva, 2006.
10. Agot KE et al. Male circumcision in Siaya and Bondo districts, Kenya: prospective cohort study to assess behavioral disinhibition following circumcision. *J Acquir Immune Defic Synr* 2007; 44: 66-70.
11. Westercamp N, Bailey RC. Acceptability of male circumcision for prevention of HIV/AIDS in sub-Saharan Africa: a review. *AIDS Behav* 2007; 11: 341-55.
12. Kahn JG et al. Cost-effectiveness of male circumcision for HIV prevention in a South African setting. *PLoS Med* 2006; 3: e517.
13. Gray RH et al. The impact of male circumcision on HIV incidence and cost per infection prevented: a stochastic simulation model from Rakai, Uganda. *AIDS* 2007; 21: 845-50.

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