

Male circumcision as strategy for HIV prevention and sexually transmitted diseases. The potential role of traditional birth attendants in neonatal male circumcision

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Summary. In developing countries, it would be advisable to give priority to human immunodeficiency virus (HIV) prevention strategies, because of the high mortality caused by the rapid spread of the pandemic. Furthermore, HIV prevention could contribute to the mitigation of tuberculosis (TB) propagation, which is tightly correlated to acquired immune deficiency syndrome (AIDS). As demonstrated, male circumcision (MC) confers protection against HIV and sexually transmitted diseases (STD). The suggested strategy considers the neonatal MC advantageous, since it is safer, feasible, culturally more acceptable and less costly than adult MC. This approach is based on the assumption that, if newborn males are circumcised, within the next 15-20 years the sexually active population will be almost entirely circumcised and, consequently, the HIV transmission will be reduced. The employment of retrained traditional birth attendants is considered in order to implement the MC after the child birth and to facilitate its acceptance in those contexts where it is not traditionally performed.

Key words: HIV, acquired immunodeficiency syndrome, sexually transmitted diseases, male circumcision, tuberculosis, traditional birth attendants.

Riassunto (*La circoncisione maschile come strategia di prevenzione dell'HIV e delle malattie sessualmente trasmissibili. Il ruolo potenziale delle ostetriche tradizionali nella circoncisione maschile neonatale*). Nei paesi in via di sviluppo, sarebbe opportuno dare priorità alle strategie di prevenzione del virus dell'immunodeficienza umana (HIV), a causa dell'alta mortalità provocata dalla pandemia e della sua rapida diffusione. La prevenzione dell'HIV potrebbe inoltre contribuire a mitigare l'aumento della TB che è strettamente collegata all'HIV. È stato dimostrato che la circoncisione maschile (CM) protegge dall'HIV e dalle malattie sessualmente trasmissibili (MTS). La strategia proposta considera i vantaggi della CM neonatale, in quanto più attuabile, culturalmente accettabile e meno costosa della CM adulta. La strategia si basa sul presupposto che se i bambini vengono circoncisi alla nascita, in 15-20 anni la popolazione sessualmente attiva sarà quasi del tutto circoncisa e di conseguenza la trasmissione dell'HIV ridotta. L'utilizzo di ostetriche tradizionali riqualificate viene preso in considerazione per eseguire la CM subito dopo la nascita del bambino e facilitare la sua accettabilità nei contesti in cui non è eseguita tradizionalmente.

Parole chiave: HIV, sindrome da immunodeficienza acquisita, malattie sessualmente trasmissibili, circoncisione maschile, tubercolosi, ostetriche tradizionali.

INTRODUCTION

Human immunodeficiency virus (HIV) is a global health issue, being a threat to the health of the entire mankind, through population mobility and tuberculosis (TB) co-infection associated with the HIV pandemic.

The present paper is a review of the international debate about an HIV prevention approach, the male circumcision (MC). Epidemiological evidence, showing a significant association between the lack of MC and the HIV infection, has raised the consideration of MC intervention as a strategy to reduce HIV prevalence in affected areas. This paper is willing to contribute to the

discussion about the prevention methods of HIV, by identifying key actors for the implementation of the practice.

Investing in MC as a part of a comprehensive HIV prevention package is justified by the proliferation of the virus not only in Africa, Asia, and the Caribbean area, but also in Eastern Europe, in Mexico and more recently in Central America. MC could prevent millions of HIV new infections especially in sub-Saharan Africa and save on future treatment costs [1]. The practice is an opportunity to develop innovative programmes and to re-engage with policymakers and planners about the implementation of a prevention strategy.

Given the enormous mortality and morbidity caused by HIV/AIDS, prevention efforts should be greatly prioritized in the response to the pandemic. A global health task force could be created also in Italy – and the Istituto Superiore di Sanità may lead it – offering guidelines, according to the international research findings, for the implementation of MC by all cooperation relevant actors.

Male circumcision a practice thousands of years old

Performed especially among Jews and Muslims for reasons of religious duty, MC is also widespread among the Coptic Christians and in some parts of Oceania. The World Health Organization (WHO) and the Joint United Nation Programme on HIV/AIDS (UNAIDS) estimate that 664 500 000 males aged 15 are circumcised (30% global prevalence), with almost 70% of these being Muslims [2] and that in the US 56% of male are circumcised [3].

However, the population-based prevalence in the US is likely closer to 79%, as reported by the National Health and Nutrition Examination Surveys [4]. A study indicates that the recognition of the potential benefits of the neonatal MC may have been responsible for the observed increase in the US rate between 1988 and 2000 of newborn circumcision by 6.8% [5].

STUDIES, MEDICAL TRIALS AND RECOMMENDATIONS OF UNITED NATIONS

A number of observational studies point out that circumcised men have lower levels of sexually transmitted diseases (STD) such as HIV, penile carcinoma, urinary tract infections, and ulcerative STD [6, 7]. Similarly, a review of MC and ulcerative STD strongly indicates that circumcised men are at lower risk of chancroid and syphilis than uncircumcised men [8].

The reason lies in the fact that “the inner surface of the foreskin contains Langerhans’ cells with HIV receptors; these cells are likely to be the primary point of viral entry into the penis of an uncircumcised man” [9]. By removing the mucosal surface of the penis foreskin, the MC reduces the susceptibility to the virus.

A study published in 1999 pointed out that a decade had passed since the publication of Cameron and colleagues prospective study [10] that showed a greater than eight-fold increased risk of HIV-1 infection for uncircumcised men [11].

Trials and main medical studies

A trial conducted in 2005 by the French National Agency for Research on AIDS with the National Institute for Communicable Disease of Johannesburg in South Africa randomized 3274 uncircumcised men, aged 18-24 [12].

MC was offered to the intervention group immediately after randomization and to the control group at the end of the follow-up. Results showed that in the group of men that had been circumcised, the level of protection achieved against the infection was 60%. A study assesses that the trial provides the first experi-

mental evidence of the efficacy of MC in protecting men against HIV infection, as it was conducted in a general population and was the first randomized control trial testing the impact of MC. The demonstration in this study of a causal association between HIV infection and MC is consistent [13]. The study states that MC provides a degree of protection against acquiring HIV, equivalent to what a vaccine of high efficacy would have achieved. Consequently, the authors think that MC should be regarded as an important public health intervention and point out the importance of the MC at a time when no vaccine or microbicides are currently available. Auvert *et al.* make a reference to a previous study which suggested that the widespread use of antiretroviral will not substantially reduce the heterosexual spread of HIV in sub-Saharan Africa [14]. Moreover, counselling associated with MC, by advising about safe habits, could determine an increase of correct sexual behaviours.

A further analysis suggests that “MC could avert nearly six million new infections and save three million lives in sub-Saharan Africa over the next twenty years” [15].

In December 2006, two randomized trials carried out in Rakai District, Uganda [16] and Kisumu, Kenya [17], revealed at least a 51% and 53% reduction in the risk of acquiring HIV infection, respectively.

These two trials results support the findings published in 2005 from the South Africa Orange Farm Intervention Trial, sponsored by the French National Agency for Research on AIDS. “The three trials found that circumcision decreases HIV acquisition by 53% to 60%, herpes simplex virus type 2 acquisition by 28% to 34%, and human papilloma virus prevalence by 32% to 35% in men. Among female partners of circumcised men, bacterial vaginosis was reduced by 40%, and *Trichomonas vaginalis* infection by 48%. Genital ulcer disease was also reduced among males and their female partners. The findings are supported by observational studies conducted in the US” [18].

The analysis by Williams *et al.* provides evidence that, while the protective benefit to HIV-negative men will be immediate, the full impact of MC on HIV-related illness and death will be apparent in ten to twenty years.

In February 2006, a further medical study conducted on more than 300 Ugandan couples, suggested that MC also benefit women. The study estimated that circumcised men infected with HIV were about 30% less likely to transmit it to their female partners. 299 women acquired HIV from an uncircumcised male, compared to just 44 who acquired it from a circumcised partner [19]. A review summarises the evidence studies for a direct effect of MC on the risk of women becoming infected with HIV [20].

Recommendations of United Nations Organizations about male circumcision

In April 2006, The National Council in Zambia, with support from the UN Theme Group on HIV, launched the HIV Prevention Year 2006 [21]. The

frame reports the experiences of countries where United Nations Development Programme (UNDP) operates on MC and suggests the urgent need of expanding MC services, in order to respond to the increasing demand from people. Moreover, UNDP provides programmes for traditional healers (TH) [22].

In 2007, UNAIDS *Practical guidelines for intensifying HIV prevention. Towards universal access*, provided information about the MC and suggested the involvement of faith-based organizations (FBOs) and traditional healers for HIV prevention and promotion of MC [23].

In 2008, WHO led a consultation on MC in the African Region [24]. It was observed that the introduction of MC services could provide opportunities for capacity building in the health sector, such as training of personnel in minor surgical procedures and counselling.

In 2008, WHO published a “technical manual” on MC, in order to provide a practical guide on safe methods to perform MC, both on newborns and adults [25]. The manual points out that countries in sub-Saharan Africa where MC is common (> 80%) generally have an HIV prevalence well below those of countries where MC is less common (< 20%).

The manual includes the following benefits of circumcision:

- reduced risk of urinary tract infections in childhood;
- prevention of inflammation of the glans (balanitis) and the foreskin (posthitis), of the phimosis and paraphimosis;
- reduction of the risk of some STD, especially ulcerative diseases, such as chancroid and syphilis;
- reduction of the risk of becoming infected with HIV;
- reduction of the risk of penile cancer;
- reduction of the risk of cancer of the cervix in female sex partners.

In 2009, a toolkit was provided in order to hasten the MC implementation in endemic countries, showing the feasibility of MC performed by well trained providers belonging to the public health system or to the traditional healing services [26].

WHO is leading the UN agencies: UNAIDS, UNICEF and United Nations Population Fund (UNFPA) to support countries to develop MC policies, within the context of a comprehensive HIV prevention strategy.

According to the above agencies, HIV prevalence in the south and southeast Asian Countries where nearly all men are circumcised (Bangladesh, Indonesia, Pakistan, Philippines) remains particularly low, despite patterns of risk factors for HIV and other STDs similar to those found elsewhere in the region [27].

According to UNICEF, the education sector is a vital channel to inform young people and to prevent the HIV. In Lesotho, Namibia and Zambia it is making assessments of the effectiveness of this strategy [28].

HIV AND TUBERCULOSIS CO-EPIDEMIC: A SEVERE THREAT TO THE GLOBAL HEALTH

HIV prevention is also an important global health priority as the largely collision of HIV and TB epidemics, exploded in sub-Saharan Africa, has created a co-infection that is rapidly spreading.

The HIV/TB co-epidemic represents a setback to global control of TB, which would otherwise be in large-scale decline. These twin epidemics present a new health threat and raise the prospect of a global pandemic of extensively-drug-resistant TB, which will be extremely difficult to treat.

Why the HIV infection is driving the TB epidemic

HIV is one of the strongest risk factors for developing active TB, similarly TB sufferers are more vulnerable to HIV infection. In fact, the number of TB cases in Africa is expected to double over the next decade largely due to the HIV epidemic [29].

There is evidence that the stage of HIV infection is correlated with increased risk of TB infection. The immune system uses CD4 cells to defend the body against TB. A decline in CD4 cells, due to HIV, lessens the immune systems ability to prevent the growth and spread of TB. A weakened immune system allows for dissemination of bacteria to areas other than the lungs, which explains the increased chance of extrapulmonary TB among HIV-positive individuals. TB increases HIV replication and viral load, worsening the course of related immunodeficiency.

An example of the rapid rise of HIV co-infection in TB patients can be found in South Africa's gold mines. According to a study in the Free State Province, the TB prevalence rose from 15% in 1993 to 45% of all HIV patients in 1996 [30]. A retrospective cohort study of South African gold miners found that TB incidence doubled within the first year of HIV infection, thus supporting the need for widespread HIV testing as a preventive measure against TB [31].

The risk of developing active TB in an HIV-negative individual is 10% over the course of their lifetime. This risk increases 5-10 times to 7-8% per year in HIV-positive people [32]. Research also shows that HIV infection during infancy increases the risk of developing TB [33]. TB manifestations are more severe in HIV-positive children and progression to death is more rapid than in HIV-negative children [34].

A study, which followed adult patients attending the University of Cape Town's HIV clinics between 1986 and 1996, shows that the incidence of TB in AIDS patients is 500 times that of the general population and TB likely accounts for nearly 40% of AIDS deaths in the African region [35].

HIV and multi-drug resistant TB

Co-infection with HIV/TB presents serious medical and scientific challenges, among them difficulties in diagnosis, infection control, and managing co-toxicities between drugs previously used to independently treat the two diseases.

TB patients with HIV have been shown to be twice as likely to have MDR-TB as people who are not HIV-positive. There is also evidence that in resource-limited settings where TB is a major cause of mortality among HIV patients, a multi-drug resistant TB (MDR-TB) and an extensively drug resistant TB epidemic (XDR-TB) are emerging [36].

CHRISTIAN AND CATHOLIC VIEW ON MALE CIRCUMCISION

The Catholic Medical Mission Board (CMMB) has commissioned a study on FBOs and MC practices in Kenya. CMMB convened the Eastern and Southern Africa FBOs Male Circumcision Consultation Meeting in Kenya in 2007 [37]. The motivating factor for the meeting is the increased involvement of African FBOs in MC.

Catholic Medical Mission Board. Faith-based organizations and adolescent male circumcision

The lessons learnt from country experiences identified three key areas to be developed, if FBOs want to make a substantive contribution to providing MC, both for HIV prevention and as an entry point for adolescent sexual and reproductive health. Participants in the conference:

- recognised that FBOs have a significant role to play in scaling up MC for HIV prevention among adolescents, as they are trusted and respected in the communities and they already have infrastructure, capacity and networks that could be used to provide MC services;
- agreed on priority actions to improve the coverage and effectiveness of MC for adolescents: a national MC policy framework; mobilization of communities to increase the acceptability of MC; monitoring/evaluation of existing MC services; testing of different models of service delivery, both hospital and community-based, including adaptation of existing programmes and technical guidance available from WHO and UN partners;
- identified factors to consider when using adolescent MC as an entry point for adolescent sexual and reproductive health:
 - a) *in settings where MC is common (traditional)*, community mobilization and advocacy steps to expand their focus to HIV prevention and adolescent sexual and reproductive health (ASRH). Actions should include: stakeholder meetings and communication that target traditional circumcisers, church, traditional leaders and health providers; the use of IEC (information-education-communication) materials; community meetings and entertainment to support MC; resource mobilization to enhance the availability and accessibility of safe MC services, thus increasing the uptake of adolescent MC;

- b) *in communities where male circumcision is not common*, in addition to the above activities, the assessment of MC acceptability, addressing any myths and misconceptions associated with MC, and presenting the evidence of the protective effect of MC on HIV infection;
- c) *identification of a curriculum that provides information and develops skills* related to the benefits of MC, personal hygiene, post-surgery wound care, avoidance of high-risk behaviours and ASRH.

ACCEPTABILITY OF MALE CIRCUMCISION

One of the concerns around the potential of MC as an HIV prevention measure is that it may not be acceptable in communities which do not traditionally circumcise.

Surveys and qualitative studies among young as well as older men in six African countries have found that a considerable proportion expressed interest in MC, ranging from 45% in Harare, Zimbabwe, to over 80% in a large survey in Botswana. In the surveys, the men reported that their main interest in MC was related to hygiene, infection control and, for some, a belief that condom use is easier for men who are circumcised [38].

A recent comprehensive review addresses this issue by summarising 13 studies assessing the acceptability of offering MC services among traditionally non-circumcising groups in east and southern Africa. The median proportion of uncircumcised men willing to become circumcised was 65% [39]. Similarly, 69% of women favoured circumcision for their partners and 71% of men and 81% of women were willing to circumcise their sons. According to the study, the influence of women on the decision to circumcise is likely to be highly variable across cultures and across families within communities. However, in many settings, women, as mothers and as partners, are likely to have considerable influence, even if it is not explicit. The effort to promote MC will be more successful if it appeals to women as well as men.

The review underlines that the most salient barriers to the acceptability of MC were the concerns for safety, the cost of the procedure and the fear of pain. In areas where MC is uncommon, the clear preference was for a medical practitioner to be the provider, as this was perceived to be safer.

Cost as a primary consideration was shown by the pilot intervention in Siaya, Kenya, where men came in large numbers when the charges of MC were lowered to US\$ 1.45 [40].

The study identified that the main factors associated with willingness to be circumcised were improved hygiene and a reduced risk of STD. Penile hygiene was recognized as a major benefit of MC by both men and women. MC was widely perceived to protect against infections and to allow for easier identification of sores and ulcers, permitting earlier treatment.

Studies about the acceptability of male circumcision

A number of studies assess the acceptability of MC. A survey carried out in the Dominican Republic [41] found that rolling out circumcision services is feasible. An education and information programme about the benefits of MC aimed at sexually active young males and mothers is essential to increase the acceptance of the procedure. The objective of the study was to assess the opinions and attitudes about MC, the acceptability of the procedure, the circumcision status, sexual practices, and history of STD among men 18 to 50 years of age in the Altagracia Province. A survey was administered to 368 men in 5 municipalities across the province. The sample consisted of 238 (65%) Dominican men and 130 (35%) Haitian immigrants. Almost all the men were uncircumcised (95%) and about half (52%) were single. Overall, Haitian men were more likely to agree to a circumcision than Dominicans.

In western Kenya, among the Luo, a large, traditionally non-circumcising ethnic group, both men and women desired availability of MC clinical services in the Province's health facilities [42].

In Malawi, acceptability was lower in the North where the practice was little known, higher among younger participants and in central and southern districts where MC is practiced by a minority Muslim group (Yao) [43].

In Zimbabwe, despite the absence of specific educational or promotional efforts, and before knowing the results of current clinical trials of circumcision's efficacy in preventing HIV, nearly half of the men (data were collected from a sample of 200 men aged 31 years) expressed willingness to undergo the procedure [44].

In India a study found MC to be highly acceptable among a broad range of mothers in Mysore who appeared to be greatly motivated to learn more about MC. Although the majority of men in this population are currently uncircumcised, 88% of participants with uncircumcised children stated – after being informed of the risks and benefits of MC – that they would “definitely” or “probably” circumcise a male child if the procedure was offered free of charge in a hospital setting [45].

PROSPECTS AND CHALLENGES FOR MALE CIRCUMCISION

MC is among the most economically efficient HIV prevention strategies in sub-Saharan Africa. According to Auvert *et al.*, medical adult male circumcision (MAMC) may avert 2 to 8 million HIV infections over 20 years in sub-Saharan Africa and costs less than treating those who would have been infected [46]. The authors estimate the financial and human resources required to roll out MAMC and the net savings due to reduced infections. The model developed included costing, demography and HIV epidemiology. Fourteen countries in sub-Saharan Africa, where the prevalence of MC was lower than 80% and HIV prevalence among

adults was higher than 5% were investigated.

Recently, the evidence of the range of health benefits that MC provides and cost-effectiveness data in both Africa [47] and US [48, 49] offer further incentive for implementation.

Moreover, benefits are greater than estimated as MC confers protection on women in addition to the circumcised men and prevent infections among newborns, due to protective effect on adult women. Implementation of MC can lower public health system costs because of the resulting averted HIV care costs.

Male circumcision implementation in southern African countries

Despite the positive evaluation of the MC practice, progress in achieving coverage of adult target people is very slow [50, 51].

Potts *et al.* point out that waiting for further results of randomised trials for MC interventions can cost hundreds of lives, especially in poor countries with great need and potential to benefit. In their study of 2006, the authors underline the necessity of beginning the MC implementation immediately, as the demand for MC in Africa vastly exceeds the supply [52].

Countries all over Africa are at various stages of developing and implementing policies for mass MC, but only in Kenya MC has been rolled out on a large scale. In November 2008, the Ministry of Health (MoH) launched a voluntary MC plan, which aimed to have 1 million men circumcised by 2013. By the end of 2009, 90 000 men had been circumcised, especially in Nyanza Province, where the HIV prevalence is the highest in the country. In the Province 650 providers have been trained [53] and the support of traditional leaders has been pivotal [54].

In a number of African countries, the lack of policies and planning, the training of an insufficient number of providers, the missed involvement of nurses and traditional healers and the lack of financing have led to a poor implementation. Few examples are given below.

- *Namibia*: a study to understand attitudes, impact, and resource implications of implementation has been done and a MC action plan, submitted to the Parliament in 2009, included shifting of surgical tasks to nurses. The cost of the procedure (unit cost for adults is US \$88 and \$ 72 for newborns) was the main constraint to a large scale implementation.
- *Lesotho*: MC services are limited, with about 4000 men circumcised annually through government clinics and two NGOs. Even though advocacy has been done with traditional leaders and ways to involve traditional providers are being explored, a formal scale-up has not yet started.
- *Swaziland*: despite a number of relevant international partnerships for MC implementation in the adolescent and adult male population, the training of providers is taking time and the few trained are not properly utilized as the number of males circumcised by each provider is very low.

Male circumcision formal training

Johns Hopkins Program for International Education in Gynaecology and Obstetrics (Jhpiego) based in US, is the organization leading the training program for MC providers in sub-Saharan Africa. In 2008, Jhpiego developed in Zambia a “training model” that integrated clinical and counselling services around MC and tested the feasibility of providing MC, especially in private clinics. Jhpiego is also working in Swaziland where it is supporting the MoH to introduce international doctors, in order to assist with delivery of MC and build capacity of local medical staff to provide MC.

REASSESSING THE STRATEGY

Current WHO and UNAIDS guidelines emphasise MC as a clinical practice within health delivery settings. However, the strategy described above needs lots of providers to be trained in order to target adult males and lot of medical supervision. At the same time it requires health facilities and equipment.

The need to ensure sufficient qualified personnel available to do MAMC is critical. The implementation of MC in poor contexts and the consequent accessibility for the majority of adult people is very slow: already overwhelmed health systems run the risk of retarding the MC availability. The benefits may be confined only to those who have access to the health facilities and can afford the MC cost.

In the meantime the planning of services for newborns and pre-adolescents is not scheduled, although – especially for babies – the procedure is simpler and quicker.

The scale-up of children MC requires the use of local human resources available at community level such as local traditional practitioners [55, 56]. The development of plans including community human resources and FBOs should be prioritized. Research on the ethnic and cultural dynamics of scale-up should be encouraged [57].

Age for male circumcision

The age at which males become circumcised will have an effect on how rapidly MC interventions may impact the HIV epidemic in any given area. A programme for MC can be performed for all the necessary target groups: adults male who do not have HIV, those already HIV positive, newly born children and children before puberty. In hyper endemic countries significant achievement in the reduction of HIV pandemic can only be obtained if all males after puberty are circumcised. However, the implementation of services for MAMC is taking too much time as substantial human and financial resources are needed.

There appeared to be two leading directions:

- circumcise male babies, due to a simpler and low cost procedure, less fear, easier care and faster healing;
- circumcise children at ages 7-13 years, since the boy can understand the significance of the event, take

care of the wound himself, heal faster than if done post-pubertal, and has likely not begun sexual activity [58].

If local anaesthesia could be necessary for children, demanding specific training of providers and supplies, MC can be performed without anaesthesia and at the least physical risk on infants [59].

In low endemic countries, the strategy combining neonatal MC and pre-adolescent MC could allow total MC coverage for future generations, slowing down the advance of HIV infection.

Circumcision of boys and adolescents. In Swaziland, best practices to provide adolescents relevant information on MC are emerging through schools and communities [60]. The strategy to combat the pandemic could start by the central role of the school in the society. Besides the study curriculum, that can provide a comprehensive information about HIV prevention, circumcision of boys could be performed directly in schools by retrained TH or registered nurses, thus carrying out it before sexual maturity.

Circumcision of newborn male children. Newborn MC has existed for more than 6000 years. The results of the clinical trials present the opportunity to re-examine national and professional policies on infant circumcision.

WHO and UNAIDS recommend that neonatal circumcision should be a component of prevention campaigns, since “neonatal circumcision is a less complicated and risky procedure than circumcision performed in young boys, adolescents or adults [and] countries should consider how to promote neonatal circumcision in a safe, culturally acceptable and sustainable manner” [61].

In addition, a study by Schoen found out that postneonatal circumcision was 10 times as expensive as neonatal circumcision (\$ 1921 per infant vs \$ 165 per newborn) [62].

Rwanda: a cost-effectiveness study [63]. In Rwanda, where adult HIV prevalence is 3%, MC is not a traditional practice. Before the introduction of a country-wide MC program, in accordance with the Rwanda National AIDS Commission, researchers identified the most cost-effective way to increase MC rates. The scholars developed a simple cost-effectiveness model and applied it to three hypothetical groups of Rwandans: newborn, adolescent boys, and adult men. Analyses showed that MC is a cost-saving HIV prevention intervention, since both neonatal and adult MC could save Rwandan resources for each HIV infection averted.

The findings suggest that infant MC for the prevention of HIV infection later in life is highly cost-effective and likely to be cost-saving. The cost of neonatal MC is US\$ 15 while adolescent and adult MC are significantly more expensive (US\$ 59). The researchers estimated the cost of circumcision of infants employing the Mogen Clamp method.

That technique was selected because it is a simple procedure that requires only one reusable piece, does not need suturing and causes less pain and complications than other methods. The Mogen Clamp method appears suitable for national roll-out, even in remote areas.

Given the low cost and long term benefits, the study suggests that countries with moderate HIV epidemic should offer routine infant MC, integrated into existing health services and concludes that providing universal access to MC, especially neonatal MC, will reduce the overall cost of fighting severe HIV epidemics, driven by heterosexual transmission.

The research mentioned above points out that African governments and development partners should stop managing the HIV response as an emergency issue only and release themselves from a 1-year or even a 5-year planning perspective to focus on sustainable long term options for endemic countries. The study strongly indicates that from a development viewpoint, as infant MC is proven to be an effective means of HIV prevention, action cannot be deferred simply because gains will be achieved in the future.

PLANNING FOR NEONATAL MALE CIRCUMCISION

Neonatal circumcision has been proven to be considerably safer and significantly less expensive than adolescent or adult circumcisions.

Planning in regions more at risk of HIV infection

The exceptionally high prevalence of HIV in most southern African countries has raised questions about the factors that have contributed to the rapid spread of HIV in that region and about the eventual prevalence the epidemic might reach in regions showing the same pattern. The presence of such risks have been analysed in a number of researches.

It is important to start the scheduling of the MC procedure in those countries that present risk factors that could lead to high prevalence of the HIV infection in the next future.

Migration primarily influences HIV spread

A multi-centre study [64] analyses the socio-economic contexts that give rise to population mobility and their relationship to vulnerability to STD/HIV. It points out that in Central-America and Mexico, migrant women and sex workers are particularly exposed to HIV, due to transactional sex or sex for survival, becoming means for further contagion of male partners.

Moreover, in areas of increasing migration, factors such as separation from families and communities and hard working conditions contribute to an increased vulnerability of the migrant men to STD/HIV, as they engage habitually in high risk sexual behaviors.

A study by Lurie *et al.* provides evidence for the crucial role of migration in the spread of HIV in South Africa [65]. The research also emphasises the role of migration in the early stages of the epidemic.

An investigation by Coffee *et al.* considers that in South Africa the circular labour migration has possibly disseminated the disease widely, as the high-risk behaviour of migrants leads to increased HIV exposure of their partners in rural communities [66]. This aspect is more relevant when workers return frequently to their villages. A further research by Coffee *et al.* in South African rural areas indicates that high HIV prevalence may be influenced by migration. The mobility causes social disruption, increasing high-risk sexual behaviour, both among migrant workers and women who remain in rural communities, as they may engage with different partners. Therefore, the frequent return of migrants may only exacerbate the risk of HIV propagation [67].

It is worth taking into consideration a number of countries where the HIV prevalence is presently low, but where risk factors exist, such as migrations (seasonal and mid-term), risky behaviours, malnutrition, poverty, illiteracy, TB, malaria, limited access to health services and lack of knowledge about HIV aetiology. Emerging HIV epidemics have long latency periods, as the infection grows within concentrated risk groups and then extend to the general population [68].

Acceptability of infant male circumcision

Few studies underline the growing interest for infant MC. A small number of inquiries about acceptability of newborn circumcision have been carried out among mothers or expectant parents.

A survey investigated the acceptability of infant MC among mothers in south-eastern Botswana [69]. Women were given an illustrated pamphlet, a written description of MC techniques and a list of benefits and potential risks. The main benefits listed were the reduction of the risk of urinary tract infections in childhood and of acquiring STD later in life, including HIV. Sixty women (97%) completed the questionnaire. When asked if they would be interested in having her newborn son circumcised free of charge at that hospital by a trained doctor, 55 (91.7%) women said yes (95% CI 81.6 - 97.2%), 1 was unsure and 4 said no. When asked who would be the primary decision maker as to circumcise their son, 38 (63%) women identified themselves, 13 (22%) their partner, 6 (10%) their mother, 2 (3%) said their own father and 1 (2%) said the child himself if he was at least 16 years old. 51 women (85%) said their partner would definitely have to agree to the procedure before their male infant could be circumcised. 6 (10%) said they could be the only decision maker. 3 were unsure. Another example is Thailand. Although the country has a predominately non-circumcision culture, neonatal MC was found to be acceptable to expectant parents if they were informed about the benefits and risks of the procedure. Expectant parents were more willing to circumcise their newborn sons if they were in a lower income group or if the procedure was recommended by a physician or if it was free of charge [70].

Facilitators of acceptability. MC was only rolled out to neonates, it would take at least a generation before a population-level effect occurs. For this reason, it is important to start MC in settings with low HIV prevalence, where – on the other hand – there are risk factors that could rapidly increase the vulnerability to HIV. The acceptability of the practice could be increased by governments, throughout appropriate campaigns and the use of local traditional leaders.

Traditional health leaders and acceptability of the procedure. As the health system needs to be strengthened in order to increase access to safe MC services, the inclusion of retrained TH and TBA – as members already active in the community in respect of whom rural people have full confidence – should be given priority. The retrained TH together with local communicators are able to convey the most appropriate messages to raise awareness in communities and overcome barriers to acceptance of MC in areas where it is not practiced. In countries where MC is already performed it is worth working in concert with the local traditional authorities.

The potential role of TBA in expanding neonatal male circumcision services. One of the main challenges to HIV prevention is to provide vulnerable groups with evidence-based and cost-effective prevention strategies. Decentralization of HIV prevention services is a crucial priority and could be easily implemented through locally available human resources, according to the strategy of the Primary Health Care [71], that “relies, at local and referral levels, on health workers, including physicians, nurses, midwives, auxiliaries and community workers as applicable, as well as traditional practitioners as needed, suitably trained socially and technically to work as a health team and to respond to the expressed health needs of the community” [72].

MC offers the opportunity to reengage with ethnic or indigenous groups, if MC is considered a part of larger “reproductive health programme” aiming at diminishing the rates of maternal mortality, through refresher trainings for TBA (or midwives). In 2006, UNFPA and WHO launched an intensive country support initiative, recognizing the pivotal role of midwives in providing quality women-centred maternity care [73].

Although MC implementation could be critical in regions where it has no cultural value, the community health resources can offer a significant link between modern and traditional health services. TBA could be the human resources required to expand safe neonatal MC services, as they share the language and the cultural background and play a relevant role in the community, attending mothers and babies. Therefore informational campaigns may be more effective if targeted to the particular culture of indigenous populations, utilising the TBA, as they know local customs, traditions and values.

Therefore TBA can act as a link between public health policies and the community.

To rely on TBA is also a very cost-effective measure since, when attending deliveries, they are awarded by families in kind or with small amount of money, on a volunteer basis. This fact makes the model sustainable by the community itself. Therefore, the strategy could be easily replicated.

Finally, TBA could deal with those social determinants that elevate the HIV infection risk between adolescent males.

TBA training

The public-health system and the international agencies are working to increase the availability of trained TBA in communities with high rates of maternal mortality [74].

The same approach could be used in providing TBA with all necessary knowledge and skills about HIV prevention. They can easily be trained in order to carry out MC on babies in the rural and suburban areas, at the same time as they are retrained for a proper assistance to pregnant women. Neonatal MC could be included in a broader “reproductive health programme”. The teaching should focus on safety and hygiene in both practices: delivery and neonatal MC.

Therefore, during the refresher training, TBA should learn technical skills related to:

- a) the informational campaigns, in order to create awareness of the population about the spread of STD/HIV and to facilitate the acceptability of neonatal MC;
- b) the assistance before, during and after delivery, performing the skills learned during the refresher training, supported by the proper equipment (fetal stethoscope, gloves, etc.);
- c) the implementation of neonatal MC, supported by the essential equipment;
- d) the education of mothers concerning the youth sexual risky conduct, thus promoting consciousness about safe behaviours in adolescents, therefore offsetting cultural factors that encourage unsafe habits.

Health ministries involvement

Training should start without delay in nursing and midwife schools in resource-poor settings. This should be a priority for governments, non governmental organizations (NGOs) and multilateral organisations. Regional centres of excellence should be established for training practitioners, monitoring quality and assessing outcomes [75]. The study suggests that country specific tool kits for health ministries should be developed, including manuals and modules for the training of trainers.

Governments and development agencies should move towards a planning perspective for sustainable national programmes. In preparation for scale-up, widespread public information campaigns that describe benefits and place neonatal MC into the larger prevention context should be undertaken.

CONCLUSION

Countries currently characterized by low prevalence of HIV should be carefully monitored if risk factors, such as mobile population, are highly present. Such issues could cause, in 5-15 years, the same patterns of prevalence noticed in sub-Saharan Africa. In fact, migrant populations are particularly vulnerable to HIV, due to their risky sexual behavior. In Central-American countries and Mexico, migrations are widely present and could lead to the fast spreading of HIV pandemic in the region.

As it is stated in many studies, MC could be considered an effective method of preventing HIV in heterosexual intercourses. Significant achievements in the reduction of the pandemic could be obtained if the majority of males were circumcised.

The implementation of programmes that perform MC in adults and children (before or after puberty), is taking too long, because important human and financial resources are needed. However, MC can be implemented in newborn children with minimum risk and cost. Given its long-term effectiveness, the measure

is appropriate in countries where HIV has low prevalence, but where the presence of risk factors could lead to an hyper-endemic situation in the next years.

In order to increase the acceptability of this practice, it would be crucial to involve TBA as performers of MC. They are in charge of attending women delivery and can be retrained in both maternal reproductive health and in neonatal MC. Moreover, they are recognized members of the communities and can play a key role as educational resources, explaining the benefits of the procedure to the population, thus facilitating the acceptance of the practice.

The ideas expressed in this paper do not necessarily reflect any official view of the Italian Ministry of Foreign Affairs.

Conflict of interest statement

There are no potential conflicts of interest or any financial or personal relationships with other people or organizations that could inappropriately bias conduct and findings of this study.

Received on 24 May 2010.

Accepted on 2 September 2010.

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