Background

It is well known from a range of observational and epidemiological studies that the lifetime risk of acquiring HIV among males can be significantly reduced via circumcision by 30–60% and up to 70% in post-pubertal settings [1–4]. Numerous papers on the topic have been published over the past two decades to elevate HIV prevention awareness, especially in sub-Saharan countries.

Modeling, supported by the USAIID Health Policy Initiative and UNAIDS, performed in 2014, indicatedthat cost of VMMC ranged from US$35.00 to US$13.75 per VMMC performed, based on a cost-occupancy model that was aligned with the World Health Organisation’s (WHO) considerations of models for optimizing volume and efficiencies.

The same modeling suggests that scaling up adult VMMC to reach 80% coverage in the 15 countries by 2020 would entail performing 20.4 million circumcisions between 2011 and 2015 and an additional 4.2 million between 2016 and 2025. Such a scale-up would result in serving 25.6 million new HIV infections through 2025. In addition, while the model shows that this scale-up would cost a total of US$25 billion between 2011 and 2025, it would result in net savings (due to averted treatment and care costs) amounting to US$16.1 billion [5].

To date, there are over 38 million adolescent and adult males in Africa who could benefit from male circumcision for HIV prevention [6,7]. The challenge Africa faces is how to safely scale up a surgical procedure in resource limited settings.

In a clinical setting, evidence so far has shown that PrePex circumcision is faster and safer than surgical circumcision. In a study that was recently published by our team, we have presented the results of a single-site non-blinded randomized controlled trial (RCT) to compare the performance of non-surgical VMMC using the PrePex device versus an approved WHO method of surgical VMMC in adults. The study was conducted over a period of 9 weeks with a total of 917 men. The allocation ratio of 2:1 (for PrePex, 737 subjects for Surgical) was used. The study was carried out by the Nyerere District Hospital, Nyerere, a rural area in Kirundo Province in Burundi. This study was reviewed and approved by the National Ethics Committee of Burundi in 2011. The current work describes its methods, findings and conclusion regarding the cost of the two studied VMMC methods.

We have performed the cost analyses based on data gathering during the study course on the cost of tools and materials actually used as well as the required infrastructure, the clinical human resource, costs related to treating AEs of the surgery and the training.

The amount of equipment used in the VMMC procedures for each of the study procedures was documented at the end of each session to create a detailed clinical input form [6].

The cost of clinical human resources was based on the actual average time that the care providers spent on a VMMC procedure, as measured per procedure by a stopwatch and documented in a dedicated CR.

The cost of PrePex training was performed by the cost of the following teachers and trainees, training related administrative and human resources, cost of training materials and tools, and the costs of performing 120 hands-on procedures for 5 teams of 10 nurses. Since the staff that performed the surgical VMMC was already very experienced and did not pass through surgical training course in our study, we have analyzed the cost of surgical VMMC training by using data gathered from a surgical campaign at a comparable hospital nearby.

The cost of treating adverse events was based on the cost of a medical provider treats the event, the cost of the materials and tools that are required for treatment, based on the type of event, multiplied by the proportion of events incurred in each VMMC procedure in our study.

The following cost elements are assumed to be identical for both methods and therefore have not been included in the final cost difference comparison of the 2 VMMC methods: Sexualization / demand creation, mobilization (act of assembling volunteers), lifts (US$), HV etc. counselors, secretaries, supply chain managers, lab service personnel, warehouse manager and guards.

The total cost was calculated according to the following cost elements:

- Costs of tools and for the PrePex VMMC procedure was calculated when using reusable stainless steel tools setting up to $22.78US$.
- The cost of tools and materials for a Dental SS method surgical VMMC were published by Biragwato et al. in a paper from 2010 [6] and were calculated at $20.5US$ when using reusable stainless steel tools.
- Cost of clinical human resources for both PrePex and surgical VMMC methods, the preparation time and procedure time gathering method and the results were described in our previous published paper [3], it included a 37” step with a stopwatch/measuring time of each procedure.
- The calculation includes the personnel involved in the PrePex and surgical VMMC procedures, their salary per minute, the time they spent (average in minutes) on the VMMC procedure and the calculated salary per VMMC procedure (refer table 2 below).
- Cost of Infrastructure: The cost of infrastructure for surgical VMMC was calculated by Biragwato et al. and we based on the assumption that 150,000 men in 1 year will require new 97 small surgery rooms. We have used the same assumptions for comparison reasons that PrePexVMMC infrastructure should be calculated as $150,000 men in 1 year.
- Based on the efficiency results of the PrePex study we determined that circumcising 150,000 men in 1 year will require 25 standard rooms including 2 beds, 2 tables, 2 cupboards, 1 sink and standard lighting.

We see no reason to build new procedure rooms but rather use existing rooms in healthcare facilities across Rwanda, renovate a procedure room and equipment was determined at an average of 40US$ per procedures, resulting in a yearly net rental of 400US$ per room and 12000US$ for 25 rooms. This sum divided by 150,000 VMMC per year is 0.80US$ per VMMC.

Biragwato et al. [3] calculated that $77 of small surgical rooms using the same assumptions at 3.05US$ per VMMC.

Cost of Training: To our knowledge there is no training costs related to the PrePex procedure, but for the surgical VMMC training we have calculated that $0.20US$ per team of 10 nurses.

We have calculated that for performing 250,000 VMMC procedures in 1 year, in a very conservative, Perinatal Centre, PrePex will require 100 teams of nurses. Their 30 teams of PrePex VMMC was performed in 2011, therefore the total cost of 150,000/VMMC in 1 year the training cost is 0.25US$.

Cost of different training scenarios were calculated with the same assumptions (150,000, procedures in 1 year) a surgical VMMC training cost of 1.55US$ per VMMC.

Costs related to treating Adverse Events:

We calculated that in our study the additional cost due to AEs per VMMC surgical was $1.78US$.

The PrePex device incurred an additional cost for AEs.

Cost Analysis of the PrePex Surgical Procedure Compared to Standard Surgical Procedure

Our study analyzed the cost differential between surgical and non-surgical VMMC in a randomized, controlled setting. We focused our analysis on cost elements that do not overlap between the two procedures. This type of analysis was intended to give an absolute difference in cost. Our results may serve decision makers in evaluating the PrePex VMMC cost findings compared to surgical VMMC.

Our findings suggest that across all cost elements, the PrePex VMMC is less expensive for a simple VMMC procedure than surgery. A second important finding suggests that in an equal treatment setting at the time of this article, one can save up to 10.5% per VMMC cost, which represents reduction of VMMC procedure cost of 16%.

Given that the VMMC procedure is significantly safer than surgery, the absolute cost savings calculations may increase as higher volumes of VMMC procedures can be performed per VMMC center per day, rendering other cost elements, such as location and supply chain cost less expensive than for surgical VMMC.

One aspect that may increase the PrePex VMMC supply chain cost is the need to use 5 sizes, when the accurate number of each size per population is not absolutely known. The PrePex device consists of 5 different sizes (A to E) for all adult men. This problem may be solved by maintaining a constant buffer stock of each size of 5% of the total planned number of procedures. As the VMMC campaign increases, the PrePex VMMC campaign decreases, so the VMMC campaign needs calculations.

Our current study further adds to the literature the added value of PrePex in aspects of efficient procedure time, safety and the ability to conduct the VMMC in a non-surgical environment by a local cadre health provider. A study that was recently published also demonstrated the safety of administering PrePex February 13, 2013 in the current work describes its methods, findings and conclusion regarding the cost of the two studied VMMC methods.

We strongly believe that this new device will enable Rwanda and other sub-Saharan African countries to meet the goal of performing 20 million VMMC procedures in 5 years and subsequently achieving a significant reduction in new HIV infections during that time and thus enhancing the health of the population.

Literature Cited

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