

Outcomes of male circumcision performed by medical doctors and non-doctor health workers in central Uganda

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Research note

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Abstract

Objective: Task shifting for male circumcision is still a challenge. The aim of this study was to evaluate the outcomes of circumcision conducted by doctors compared to non-doctors in Kampala, Uganda

Results: In this prospective cohort study, we observed and followed 274 males at 3 health facilities in Kampala, Uganda. Each participant was observed during the circumcision procedure, monitored for 2 hours post-surgery and assessed at 24hours, 3 days and after one week for adverse events. The mean age of the circumcised men was 24.82 (6.36) years. Of the circumcisions, 19.3% (53/274) were carried out by doctors while 80.7% (221/274) by non-doctor health workers. About 5.47% (15/274) experienced adverse events and the proportions by cadre were similar; medical doctors (5.66% [3/53]) and non-doctor health workers (5.43% [12/221]), $p=0.99$. Seven patients had evidence of pus discharge (all had been operated by non-doctors), only 2 patients had bleeding at 2 hours (one by medical doctor and one by non-doctor), 4 patients had evidence of excessive skin removal (2 by medical doctor vs 2 by non-doctors). There was no reported urethral injury or glans amputation. These results indicate that non-doctor health workers can offer circumcision services safely with low adverse event rates.

Introduction

Male circumcision has been found to reduce HIV transmission by 60% [1-3]. Statistical models indicate that to avert 3.36 million new HIV infections by 2025, an 80% coverage of adult medical male circumcision (MMC) is required in 13 countries in eastern and southern Africa [4]. This means a total of 20.34 million MMCs should have been done between 2011 and 2015 with additional 8.42 million in the years 2016 to 2025 to maintain the 80% required coverage [4]. However, one of the key challenges to scaling up of MMC in sub-Saharan Africa is the lack of skilled health personnel to conduct the circumcisions [5]. Due to this critical need of increased access to a number of services in settings of shortage of human resources for health, the World Health Organisation (WHO) has recommended task shifting among health workers such that specific duties are moved from highly qualified health workers to trained and skilled health practitioners with shorter relevant training and fewer qualifications[6].

In the process of scaling up MMC coverage, a number of countries and HIV control programs in sub-Saharan Africa have implemented task shifting; with circumcisions being conducted by nurses and clinical officers (an equivalent of physician assistant in North America) due to the limited number of doctors in these low income settings [5]. A number of studies have evaluated clinical outcomes following MMC between doctors and other trained lower cadre health workers. The findings generally showed no difference in the incidence of adverse events such as post-surgical bleeding and infection [7, 8].

In Uganda, even though circumcisions have been carried out successfully by non-physician health workers [9], a number of health professionals and policy makers still express skepticism of this practice, raising issues such as reduction in the quality of care and weakening of the health system [10]. In addition, Uganda lacks a clearly stipulated policy and guideline on task shifting [11]. Our study thus

aimed to generate data on clinical outcomes of task shifting during MMC in different health facilities in Kampala, Uganda comparing MMC outcomes between of doctors and non-doctor health workers.

Methods

Study setting and participants

We carried out the study at two private not-for-profit hospitals (Mengo hospital and Kibuli hospital) and one government public health centre (Kisenyi Health center IV). These facilities are all located in Uganda's capital city, Kampala and routinely carry out MMC as part of their services. The circumcision services are offered as outpatient procedures on a walk-in basis. In this study, we included participants who were aged 13 years and above. We excluded those with co-morbidities including sickle cell anemia, diabetes mellitus, history of hypertrophic scars or keloids, those receiving chemotherapy, bleeding disorders and severe penile anomalies like hypospadias.

Study design

This was a prospective observational study carried out from September 2013 to February 2014. We prospectively observed and followed up 274 males who had circumcisions during the study period. Participants were monitored for 2 hours post-surgery and they were evaluated at 24 hours, at 3 days and after one week to assess for adverse events. Direct observation was employed in assessing the complications of circumcision. Males who came to the health facilities for circumcision during the study period were consecutively recruited. Circumcisions in the facilities were done by the cadres who routinely conduct these procedures in the facilities. And these included medical doctors, nurses, clinical officers and orthopedic officers. The complications which were assessed at follow up were bleeding and sepsis following the operation at 2 hours, 24 hours, 3 days, and 7 days (one week) intervals. Direct observation was employed to assess the outcome and phone calls if no complications occurred in the first 24 hours. Direct observation of the procedure was done by [HM] who was at the time a postgraduate student undertaking her master's degree in surgery. HM conducted the observation and follow up of the participants working together with research assistants. To evaluate time taken to conduct the surgical procedure, a stop clock was used. Timing using the stop clock was started from the time of applying the antiseptic solution to the surgical site and ended after the wound dressing was applied. The comparison was made between medical officers versus non doctor health workers. Outcome variables assessed were bleeding and sepsis following circumcision. All participants who required medical care were referred to their clinical care team at the respective hospitals for management.

Data analysis

Data was entered using Epi data version 3.1. Frequencies and percentages for categorical measures/variables were generated and stratified by circumcision cadre (Medical doctors and non-doctor health workers). Means (standard deviations) and Medians (interquartile ranges [IQR]) for continuous measures/variables were generated. Chi-square or Fisher's exact test was used to measure association

between categorical variables whereas the Student t-test and Kruskal Wallis test were used on continuous variables. The logistic regression model was used to measure factors associated with adverse events at univariate level. A patient/participant was regarded as having an adverse event if they experienced any of the following: post-surgical bleeding, evidence of glans amputation, evidence of excessive skin removal, evidence of urethral injury, fever post-surgery and evidence of pus discharge post circumcision. Statistical analysis was performed using SAS Enterprise Guide 7.1.

Results

Participant characteristics

The study enrolled 274 circumcised patients/participants with 80.66% (221/274) of the circumcisions carried by the non-doctor health workers and 19.34% (53/274) by medical doctors. The overall mean (SD) age obtained was 24.82 (6.36) years. Majority of the circumcisions were carried out at Kisenyi Health centre (57.30%, 157/274), mostly carried out by the non-doctor health workers (68.78% [152/221] vs. 9.43% [5/53], $p < .0001$) and the most used circumcision method by the non-doctor health workers was dorsal slit (99.08% [216/218] vs. 100.00% [50/50]) as compared to medical doctors. The median (IQR) time taken (in minutes) for circumcision by medical doctors was [30.00 (26.00 - 37.00) vs. 8.00 (7.00 - 22.00), $p < .0001$] longer as compared to non-doctor health workers. More of those circumcised by medical doctors had evidence of excessive skin removal (3.77% [2/53] vs. 0.90% [2/221], $p = 0.1696$). Of those circumcised by non-doctor health workers, 1.36% (3/221) had fever post-surgery and 3.17% (7/221) had evidence of pus discharge post circumcision. In overall, about 5.47% (15/274) of the patients/participants experienced adverse events; those circumcised by medical doctors (5.66% [3/53] vs. 5.43% [12/221], $p = 0.9999$) non-doctor health workers (Table 1).

Factors associated with adverse events (univariate)

The odds of participants' age and time taken for circumcision process were (OR: 1.0582, 95% CI: 0.9836 - 1.1385) and (OR: 1.0323, 95% CI: 1.0014 - 1.0641) times for those experiencing adverse events. The odd of number of circumcision were (OR: 0.3553, 95% CI: 0.1181 - 1.0689) times in Mengo/Kibuli hospital than Kisenyi Health centre. The odds of patients/participants experiencing any of the adverse events were (OR: 1.0450, 95% CI: 0.2842 - 3.8430) times for those circumcised by medical doctors as compared to those circumcised by non-doctor health workers (Table 2).

Table 1: Demographic and clinical characteristics by medical cadre

<u>Variable</u>	<u>Overall</u>	<u>Medical doctor</u>	<u>Non-doctor health workers</u>	<u>P-value</u>
Total circumcised (%)	274	53 (19.34)	221 (80.66)	
Age of patients (in years)				
Mean (SD)	24.82 (6.36)	23.34 (6.38)	25.18 (6.31)	0.0628
Median (IQR)	24.00 (20.00-28.00)	22.00 (19.00-27.00)	24.00 (20.00-28.00)	0.0320
Min - Max	13.00-49.00	15.00-49.00	13.00-45.00	
Number of circumcisions by health facility				
Mengo hospital (%)	113 (41.24)	45/53 (84.91)	68/221 (30.77)	<.0001
Kisenyi Health centre (%)	157 (57.30)	5/53 (9.43)	152/221 (68.78)	<.0001
Kibuli hospital (%)	4 (1.46)	3 /53 (5.66)	1/221 (0.45)	0.0045
Circumcision method†				
Dorsal slit (%)	266 (99.25)	50 (100.00)	216 (99.08)	-
Forceps guided (%)	2 (0.75)	0 (0.00)	2 (0.92)	
Time taken for circumcision (in minutes)				
Mean (SD)	18.81 (14.86)	32.72 (9.47)	15.45 (13.96)	<.0001
Median (IQR)	10.00 (7.00-30.00)	30.00 (26.00-37.00)	8.00 (7.00-22.00)	<.0001
Min - Max	5.00-62.00	16.00-62.00	5.00-60.00	
Post-surgical bleeding				
Bleeding after 2 hours (%)	2 (100.00)	1 (50.00)	1 (50.00)	-
Evidence of glans amputation				

<u>Variable</u>	<u>Overall</u>	<u>Medical doctor</u>	<u>Non-doctor health workers</u>	<u>P-value</u>
No (%)	274	53 (19.34)	221 (80.66)	-
Evidence of excessive skin removal				
Yes (%)	4 (1.46)	2 (3.77)	2 (0.90)	0.1696
No (%)	270 (98.54)	51 (96.23)	219 (99.10)	
Evidence of urethral injury				
No (%)	274 (100.00)	53 (19.34)	221 (80.66)	-
Fever post-surgery†				
Yes (%)	3 (1.10)	0 (0.00)	3 (1.36)	-
No (%)	270 (98.90)	52 (100.00)	218 (98.64)	
Evidence of pus discharge post circumcision†				
Yes (%)	7 (2.56)	0 (0.00)	7 (3.17)	-
No (%)	266 (97.44)	52 (100.00)	214 (96.83)	
Adverse events				
Yes (%)	15 (5.47)	3 (5.66)	12 (5.43)	0.9999
No (%)	259 (94.53)	50 (94.34)	209 (94.57)	

†missing data

Table 2: Univariate analysis of factors associated with adverse events

<u>Variable</u>	<u>OR (95% CI)</u>	<u>P-value</u>
Age of patients (in years)	1.0582 (0.9836-1.1385)	0.1294
Number of circumcisions by health facility		
Mengo/Kibuli hospital vs. Kisenyi Health centre	0.3553 (0.1181-1.0689)	0.0656
Time taken for circumcision (in minutes)	1.0323 (1.0014-1.0641)	0.0402
Circumcisions by cadre		
Medical doctors vs. Non-medical doctors	1.0450 (0.2842-3.8430)	0.9472

Discussion

Our prospective study was set out to evaluate the clinical outcomes of MMC by medical doctors compared to non-doctor health workers. In general there was no difference in incidence of adverse events between medical doctors and non-doctor health workers. Our study findings show that non-doctor health workers can safely perform circumcisions allowing for task shifting that allows doctors to focus on other essential services.

The total prevalence of adverse events from our study of 5.47% was slightly higher compared to other studies in Uganda which show a prevalence of 2.1% in Kampala [9] and 0.6% - 1.4% from a study in Rakai [12]. Our rates are lower compared to studies which were published in other African countries which recorded prevalence of adverse events ranging from 0-24% [13] and 0.70 to 37.36% with an overall pooled prevalence of 2.31% [7]. Our study thus indicates that the rate of occurrence of adverse events is relatively low in the context of task shifting.

The incidence of infections in our study was slightly higher (fever 1.35% and pus discharge 3.15%) as compared to what is described in other studies 0.30% to 1.85% [7]. In our study, all the participants with features of infections had been operated by non-doctor health workers. The difference could be due to the largest number of circumcisions which were done by non-doctors and thus the higher proportions observed in this group. However, this is an indicator for the need to emphasize infection control procedures when conducting circumcisions. And as task shifting is being implemented as per the

guidance by the WHO [6], we would recommend continuous training and evaluation on infection control for the circumcision programmes.

In our study, there was no reported serious adverse event such as urethral injury, glans amputation or death. This is also similar to other circumcision programs in Uganda [9, 12] and other sub-Saharan African countries [7]. This is re-assuring since it indicates that MMC can be conducted safely by both non-doctor health workers safely with limited incidence of serious adverse events.

Conclusion

From our study, it can be seen that non- doctors can provide comparably safe MMC as medical doctors, with no incidence of serious adverse events. In our study there was noted occurrence of infection among participants circumcised by non-doctors while none was reported among MMC conducted by doctors. This may indicate the need to improve training in infection control for non-medical workers conducting MMC. Our study adds to the existing evidence to guide health workers and policy makers on task shifting in the scaling up of male circumcision.

Declarations

Ethics approval and consent to participate

This study was approved by the Makerere University School of Medicine Research and Ethics Committee (SOMREC). Written informed consent was obtained from each participant and assent for all those below 18 years was obtained prior to their participation. A comprehensive explanation of the study and written consent explaining the nature, purpose, benefits and limitations of the study was given to the participants.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

HMK implemented and conceptualised the study. All authors (HKM, AB, KO, EL and SL) participated in data interpretation and writing of the manuscript. All authors read and approved the final manuscript.

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Not applicable

Limitations

A high number of circumcisions was conducted by non-doctor health workers because some health facilities had few doctors. The incidence of adverse events among circumcisions by non-doctor health workers compared to doctors may thus have been affected by the disproportionately higher number of non-doctor health workers who conducted the circumcisions.

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Abbreviations

MMC – Medical male circumcision, WHO – World Health Organisation