

High prevalence of sexually transmitted infections among asymptomatic women opting for the intrauterine contraceptive device use in Mwanza, Tanzania: An urgent call for control interventions

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Emmanuel S Masatu¹, Alphaxard Kajura¹, Fridolin Mujuni¹,
Elieza Chibwe¹, Helmut A Nyawale² , Peter Rambau³,
Mtebe Majigo⁴, Stephen E. Mshana² and Mariam M Mirambo² 

Abstract

Objective: Placement of intrauterine contraceptive device (IUCD) in asymptomatic woman infected with sexually transmitted infection (STIs) can lead to pelvic inflammatory diseases (PID) and infertility if not well treated. The current study investigated the magnitude of sexually transmitted infections among women opting for IUCD use in the city of Mwanza, Tanzania.

Methods: A cross-sectional study involving 150 asymptomatic women was conducted from August to December 2017. Detection of *Chlamydia trachomatis* antigen from endocervical swabs was done using immunochromatographic rapid tests while sera were used for detection of *Treponema pallidum*, human immunodeficiency virus (HIV) and herpes simplex virus Type 2 (HSV-2) antibodies.

Results: The overall prevalence of STIs was 45/150 (30%, 95% CI: 22–37) while that of individual STIs were 27.3%, 5.3%, and 2.6% for *C trachomatis*, *T pallidum*, and HSV-2, respectively. History of dysuria (aOR 6.6; 95% CI 2.3–18.8; $p < 0.001$) and history of STIs (aOR 4.6; 95% CI 1.0–20.8; $p = 0.049$) independently predicted presence of STIs.

Conclusions: Prevalence of STIs among women opted for IUCD use in the city of Mwanza, Tanzania is alarmingly high and is predicted by past history of dysuria and history of partner's STIs, calling for the need of screening of the STIs among high-risk women in low- and middle-income countries (LMICs) opting for IUCD use.

Keywords

IUCD, women, Mwanza, Chlamydia, intrauterine contraceptive devices, sexually transmitted Infections

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Introduction

Sexually transmitted infections (STIs) remain a global public health problem. The World Health Organization (WHO) estimates that about 500 million new STIs occur annually among people aged between 15 and 49 years.¹ In sub-Saharan Africa, the incidence of STIs among population aged between 15 and 49 years is about 240/1000 which is the highest record in the world.¹ It is estimated that about 8.3, 21.1 and 59.7 million new cases of *Chlamydia trachomatis*, *Neisseria gonorrhoea* and *Trichomonas vaginalis* infections, respectively, occur in sub-Saharan Africa annually. *N. gonorrhoea*, *C. trachomatis* and *T. vaginalis* have been found to increase human immunodeficiency virus (HIV)

¹Department of Obstetrics and Gynaecology, Weill Bugando School of Medicine, Catholic University of Health and Allied sciences, Mwanza, Tanzania

²Department of Microbiology and Immunology, Weill Bugando School of Medicine, Catholic University of Health and Allied Sciences, Mwanza, Tanzania

³Department of Pathology, Weill Bugando School of Medicine, Catholic University of Health and Allied Sciences, Mwanza, Tanzania

⁴Department of Microbiology and Immunology, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania

Corresponding author:

Mariam M Mirambo, Department of Microbiology and Immunology, Weill Bugando School of Medicine, Catholic University of Health and Allied sciences, P.O. Box 1464, Mwanza, Tanzania.

Email: mmmirambo@gmail.com



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acquisition and transmission.² In Mwanza Tanzania, the prevalence of *N. gonorrhoea* among adult patients attending care and treatment clinics (CTC) using polymerase chain reaction (PCR) was reported to be 2%.³ Moreover, a study which was done in 10 different antenatal clinics in Mwanza, Tanzania among adolescent pregnant women showed that 199 (49.4%) had at least one STI.⁴ The prevalence of STIs among HIV women opting for intrauterine contraceptive device (IUCD) in Uganda was reported to be 5.9%.⁵

Approximately, 160 million women worldwide use IUCD making it the most popular contraceptive method after sterilization.⁶ The use of IUCD in the city of Mwanza with an estimated population of 1.2million people has been found to increase in the past 3 years. It was noted that in 2014, 2015 and 2016, a total of 11,170, 12,292 and 14,807 women opted IUCD use, respectively.⁷⁻⁹ In an asymptomatic woman, the placement of IUCD can result in the transmission of pathogens responsible for STIs into the uterine cavity leading to development of pelvic inflammatory disease (PID), chronic pelvic pain and infertility.¹⁰ PID-associated intrauterine contraception is the commonest in the first 20 days of intrauterine contraception initiation.^{11,12} The United States Center for Disease Control and Prevention (CDC) and WHO recommend women at high risk of STIs to undergo STIs screening before the placement of IUCD.^{13,14} However, in low- and middle-income countries (LMICs) such services are not readily available. Syndromic approach has been used to screen women before IUCD insertion, however, the approach has low sensitivity.¹⁵ Tanzania, like many other LMICs, the syndromic management for STIs is being implemented.¹⁴ Evidence shows that 30%–80% of the women with *N. gonorrhoea*, 85% with *C. trachomatis* and 80% with *T. vaginalis* are asymptomatic.¹⁵ This indicates that a large number of women might be living with asymptomatic STIs.

STIs symptoms have low sensitivity and specificity in detecting STIs signifying the importance of STIs screening to detect STIs before IUCD insertion.¹⁶ Despite the fact that the prevalence of these infections is high in LMICs, there are limited number of studies that focused on women opting for IUCD use. In a view of this, this study investigated the presence of common STIs among women undergoing syndromic screening for STI prior to placement of IUCD. These findings are crucial in revising current protocol in LMICs in order to reduce IUCD associated morbidities.

Methods

Study design, duration, target population and study area

A cross-sectional health facility-based study was conducted between August and December 2017 in the city of Mwanza. Enrolment was done at Makongoro and Uzazi na Malezi bora Tanzania (UMATI) clinics. The total population served by these clinics is about 56,442 with approximately 500

IUCD insertions in a year. The study included family planning clinic attendees aged 18 years and above who opted for IUCD use.

Sample size estimation and sampling technique

The sample size was obtained by Kish Leslie formula using the prevalence of 5.9%.⁵ The minimum sample size was 85 women, however, a total of 150 women were enrolled. The study participants were enrolled conveniently until the sample size was reached.

Selection criteria

The study included women who were asymptomatic for STIs and seeking for IUCD placement service. Women who presented with signs and symptoms of STIs after physical examination (e.g. abnormal vaginal discharge purulent with yellow or brownish colour with foul-smelling, genital sores or blisters, painful intercourse, genital itching, lower abdominal pain, painful urination, pregnant women, those having gynaecological conditions such as cancer of the cervix, gestation trophoblastic disease, endometrial and ovarian cancer) as per national guidelines for management of sexually transmitted and reproductive tract infections were excluded. All women who tested positive were managed as per the Tanzania Standard Treatment Guidelines.¹⁷

Data/sample collection and sample processing

Pre-tested structured questionnaire was used to collect socio-demographic and other relevant information such as education level, age, religion, marital status, participant's alcohol use, disclosure of HIV status to partner, use of ARV, condom use, CD4 count, parity and number of sexual partners per year. About 4–5 mL of venous blood sample was collected aseptically from each consented participant and placed in plain vacutainer tubes (Becton Dickson and Company, Kenya). Sera were separated and stored at -80°C until processing.

Sera were used for detection of HSV-2 using immunochromatographic rapid tests as per manufacturer instructions (INVBIO Biomaterials Solutions, Beijing, China). Detection of HIV 1 and 2 was done as per Tanzania protocol for HIV screening.¹⁸ For *T. pallidum* (Syphilis) detection, a forward algorithm was used whereby a non-Treponemal test, *T. pallidum* antibodies (ARKRAY Healthcare Pvt. Ltd., Surat, India) followed by a treponemal test and *T. pallidum* hemagglutination test (TPHA) (Human Biochemical and Diagnostic, Wiesbaden, Germany) confirmation.

Endocervical swabs were collected and used to detect *C. trachomatis* infections as detailed in the manufacturer's instructions (INVIBIO Biotech Co Ltd, Beijing, China), with sensitivity detection of 10⁵ bacteria/ml and specificity of 97.5% to detect chlamydia antigen.

The Papanicolaou (PAP) smear was stained as previously described¹⁹ and examined under light microscope in low- and high-power objectives to observe pathological findings such as necrosis and presence of different inflammatory cells such as neutrophils, lymphocytes etc.

Data analysis

Data were collected and entered into computer Microsoft Excel 2007 and later analysed using STATA version 12. Continuous variables (age, gravidity etc.) were summarized using median with interquartile range (IQR) and categorical variables (residence, occupation marital status, etc.) were summarized as proportions. Test for association was done using chi-square test. Univariate and multivariate logistic regression model was used to determine independent predictors for STIs. A p-value of less than 0.05 at 95% confidence interval was considered statistically significant.

Results

Sociodemographic characteristics of asymptomatic women opted for IUCD use

A total of 150 asymptomatic women opted for IUCD placement were enrolled with the median age of 26 [IQR 23–32] years. The majority 129 (86.0%) aged between 18 and 35 years and most of them 144 (96.0%) were from urban areas. Three quarters 113 (75.3%) were Christians and more than three quarters 126 (84%) were married (Table 1).

History of symptoms of STIs and sexual behaviours among women opted for IUCD use

Lower abdominal pain 35/150 (23.3%), vaginal discharges 31/150 (20.7%) and dysuria 23/150 (15.3%) were reported as history (at least 3 months before seeking placement) of STIs symptoms. The most commonly reported high risk sexual behaviours were multiple sexual partners 28/150 (18.7%) (Table 2).

Prevalence of specific STIs among asymptomatic women opted for IUCD use in Mwanza City

Out of 150 enrolled asymptomatic women opted for IUCD use, the prevalence of *HSV2* (HSV-2, IgM), *T. pallidum* and *C. trachomatis* were 3/115 (2.6%, 95% confidence interval (CI): 0.3–5.6), 8/150 (5.3%, 95% CI:1.7–9.0) and 34/150 (22.7%, 95% CI: 15.9–29.4), respectively. The overall prevalence of STIs was 45/150 (30.0%, 95% CI: 22.6–37.4). In addition, the sero-prevalence of specific HSV-2 IgG antibodies were found to be 34/150 (22.6%, 95% CI: 15.9–29.3). Among the participants, only (4%) were known to be HIV positive and were on antiretroviral therapy (ART).

Table 1. Distribution of sociodemographic data among 150 asymptomatic women opted for IUCD use in Mwanza city.

Client particulars	Number (n)	Percent (%)
Age group		
18–35 years	129	86.0
> 35 years	21	14.0
Residency		
Rural	6	4.0
Urban	144	96.0
Religion		
Christian	113	75.3
Muslim	36	24.0
Others	1	0.7
Marital status		
Married	126	84
Not Married	24	16
Occupation		
Gov. Employee	8	5.3
Not Employed	55	36.7
Business	66	44.0
Self Employed	21	14.0
Education level		
Primary	90	60.0
Sec/Collage	53	35.3
Illiterate	7	4.7
Parity		
Primipara	53	35.3
Multipara	76	50.7
Grand Multipara	19	12.7
Nulliparous	2	1.3
Health facility		
Butimba	66	44.0
Makongoro	68	43.3
Umati	16	10.7
Sex frequency		
Once or not at all/week	25	16.7
Twice or more/week	125	83.3

Cytological changes observed among women opted for IUCD use in Mwanza city

Among cytological changes observed, the most common features were the presence of chronic inflammation indicated by the presence of lymphocytes which was observed in 56 (37.3%) women and acute inflammation as indicated by the presence of predominantly neutrophils which was observed in 14 (9.3%) women (Figure 1). However, none of the observed histopathological changes were found to be associated with any of studied STIs.

Factors associated with active STIs among asymptomatic women opted for IUCD use in

On univariate logistic regression analysis, history of vaginal discharge (odds ratio (OR) 2.8; 95% CI 1.2–6.3; p=0.014),

history of lower abdominal pain (OR 2.9; 95%CI 1.3–6.5; $p=0.007$), history of per vaginal bleeding (OR 10.1; 95%CI 1.1–93.3; $p=0.041$) were significantly associated with STIs

Table 2. History of symptoms of STIs and sexual behaviours among women opted for IUCD use in Mwanza city.

Past symptoms	Number	Percent (%)
History of vaginal discharge		
Yes	31	20.7
No	119	79.3
History of dysuria		
Yes	23	15.3
No	127	84.7
History of lower abdominal pain		
Yes	35	23.3
No	115	76.7
History of dyspareunia		
Yes	17	11.3
No	133	88.7
History of vaginal bleeding		
Yes	5	3.3
No	145	96.7
History of discharge to partner		
Yes	1	0.7
No	149	99.3
History of multiple sex partner		
Yes	28	18.7
No	122	81.3
History of past STI infection		
Yes	11	7.3
No	139	92.7
History of blisters		
Yes	18	12.0
No	132	88.0

among asymptomatic women opted for IUCD use. By multivariate logistic regression analysis, the odds of having history of dysuria (OR 6.6; 95% CI 2.3–18.8; $p < 0.001$) and the odds of having a partner with history of STIs (OR 4.6; 95%CI 1.0–20.8; $p=0.049$) independently predicted the presence of active STIs among women opted for IUCD use in the city of Mwanza (Table 3).

Discussion

This study has reported the burden of STIs among women opted for IUCD use in Mwanza, Tanzania, the overall prevalence of active STIs was 30.0% which is higher than two previous studies^{5,6} from East Africa. In the present study, *C. trachomatis* was the leading pathogen detected followed by *T. pallidum*. Regarding *T. pallidum*, the prevalence was comparable to a previous study among adolescent pregnant women in rural areas of Mwanza²⁰ despite population differences implying the same magnitude of *T. pallidum* across different women population in the City of Mwanza. In comparison to a previous study in the northern region of Tanzania among pregnant women, the reported prevalence in the current study is significantly high.²¹ Variations in geographical distribution and risk factors among the study populations may explain observed differences.

Concerning HSV-2 acute infection, seroprevalence reported in the current study is almost similar to the recently published report among pregnant women in the rural areas of Mwanza.²² In comparison to IgG seroprevalence, the findings are comparable to studies in northern part of Tanzania and rural areas of Mwanza region.^{4,21} This could be explained by the fact that, the risk factors in the study areas could be the same. In the contrary, the IgG seroprevalence reported in this study is low compared to 87% reported in Mbeya.²³ The

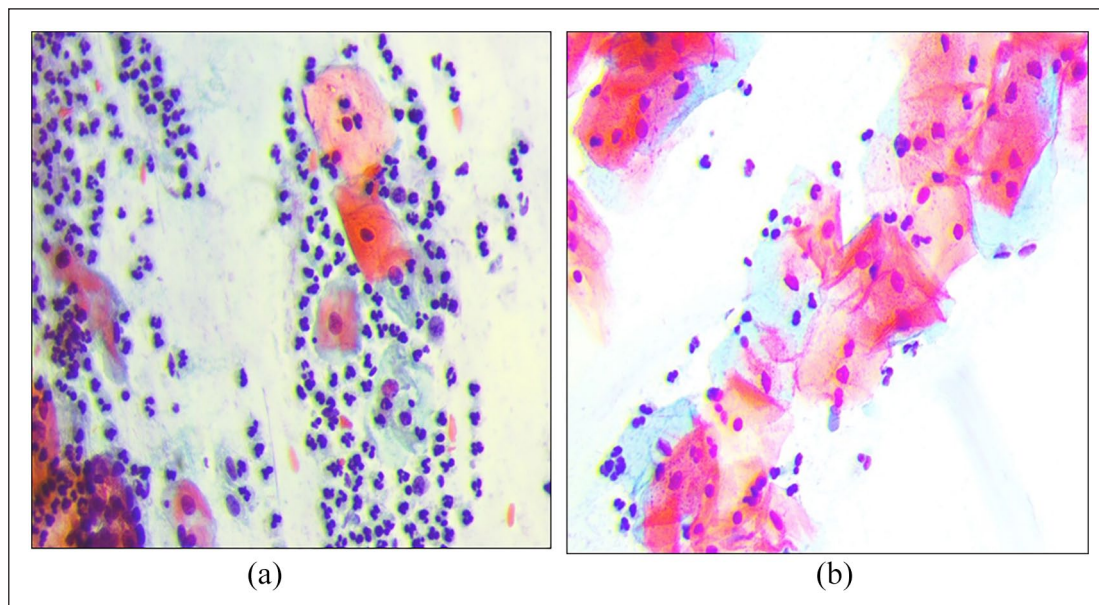


Figure 1. (a): Neutrophils and superficial cells (b): Lymphocytes.

Table 3. Factors associated with active STIs among asymptomatic women opted for IUCD use in Mwanza city.

Client characteristics	STI		Univariate		Multivariate	
	Yes	No	OR [95% CI]	p-value	OR [95% CI]	p-value
	n (%)	n (%)				
Age in years						
18–35	39 (30.2)	90 (69.8)	1.0			
>35	6 (28.6)	15 (71.4)	0.9 [0.3–2.6]	0.878		
Residence						
Urban	42 (29.2)	102 (70.8)	1.0			
Rural	3 (50.0)	3 (50.0)	0.4 [0.1–2.1]	0.289		
Religion						
Christian	37 (32.7)	53 (46.9)	1.0			
Muslim	8 (22.2)	28 (77.8)	1.7 [0.7–4.1]	0.234		
Others	0 (0.0)	1 (100.0)				
Marital status						
Not married	7 (29.2)	17 (70.8)	1.0			
Married	38 (30.2)	88 (69.8)	0.9 [0.4–2.5]	0.923		
Occupation						
Employed	1 (12.5)	7 (87.5)	1.0			
Self employed	3 (14.3)	18 (85.7)	1.2 [0.1–13.2]	0.901	1.1 [0.1–15.7]	0.936
Business	20 (30.3)	46 (69.7)	3.0 [0.4–26.4]	0.313	4.0 [0.4–40.9]	0.241
Not employed	21 (38.2)	34 (61.8)	4.3 [0.5–37.7]	0.185	5.7 [0.5–58.7]	0.145
Education level						
Sec/collage	14 (26.4)	39 (73.6)	1.0			
Illiterate/Primary	31 (32.0)	66 (68.0)	1.3 [0.6–2.8]	0.479		
Parity						
Null/Prime para	18 (32.7)	37 (67.3)	1.0			
Multi/Grand para	27 (28.4)	68 (71.6)	0.8 [0.4–1.7]	0.579		
Health facility						
Butimba	17 (25.8)	49 (74.2)	1.0			
Makongoro	23 (33.8)	45 (66.2)	1.3 [0.7–3.1]	0.309		
UMATI	5 (31.2)	11 (68.8)	1.3 [0.4–4.3]	0.657		
Sex frequency						
Once or not at all	8 (22.0)	17 (78.0)	1.0			
Twice or more/week	37 (29.6)	88 (70.4)	0.9 [0.4–2.3]	0.811		
H/vaginal discharge						
No	30 (25.2)	89 (74.8)	1.0			
Yes	15 (48.4)	16 (51.6)	2.8 [1.2–6.3]	0.014		
History of dysuria						
No	30 (23.6)	97 (76.4)	1.0			
Yes	15 (65.2)	8 (34.8)	6.1 [2.3–15.7]	<0.001	6.6 [2.3–18.8]	<0.001
H/lower abdominal pain						
No	28 (24.3)	87 (75.7)	1.0			
Yes	17 (48.6)	18 (51.4)	2.9 [1.3–6.5]	0.007		
History of dyspareunia						
No	38 (28.6)	95 (71.4)	1.0			
Yes	17 (41.2)	10 (58.8)	1.8 [0.6–4.9]	0.290	–	–
H/vaginal bleeding						
No	41 (28.3)	14 (71.7)	1.0			
Yes	4 (80.0)	1 (20.0)	10 [1.1–93.5]	0.041	5.5 [0.5–62.6]	0.170
Discharge (sexual partner)						
No	45 (30.2)	104 (69.8)	1.0			
Yes	0 (0.0)	1 (100.0)	Omitted	–		

(Continued)

Table 3. (Continued)

Client characteristics	STI		Univariate		Multivariate	
	Yes	No	OR [95% CI]	p-value	OR [95% CI]	p-value
	n (%)	n (%)				
Multiple sexual partner						
No	35 (28.7)	87 (71.3)	1.0			
Yes	10 (35.7)	18 (64.3)	1.4 [0.6-3.3]	0.466		
Partners STI infection						
No	38 (27.3)	101 (72.7)	1.0			
Yes	7 (63.6)	4 (36.4)	4.7 [1.3-16.8]	0.019	4.6 [1.0-20.8]	0.049
History of blisters						
No	40 (30.3)	92 (69.7)	1.0			
Yes	5 (27.8)	13 (72.2)	0.9 [0.3-2.6]	0.826		
HIV status						
No	42 (29.6)	100 (70.4)	1.0			
Yes	3 (37.5)	5 (62.5)	1.4 [0.3-6.3]	0.636		

OR: odds ratio; CI: confidence interval.

possible explanation could be differences in study population whereby the previous study enrolled bar attendants who were at higher risk of acquiring STIs than the participants in the current study.

Regarding *C. trachomatis*, in this study, the prevalence was significantly high compared to a similar study done in Uganda which reported a prevalence of 0.9%⁵ and low compared to a previous study in the same settings.²⁰ This could be explained by the fact that the previous study focused on infertile women.

Factors associated with asymptomatic STIs among women opted for IUCD

Among the factors studied, history of dysuria in the last 3 months before seeking IUCD placement was found to predict STIs among women opted for IUCD use. Similar findings were also observed in previous studies in the USA and India whereby a significant proportion of women with different STIs presented with dysuria.^{16,24} This could be explained by the fact that dysuria has been reported as one of the commonest symptoms of STIs.²⁵ History of STIs to the partner was also found to predict STIs which is similar to a previous report from the USA whereby history of partner STIs was linked to *C. trachomatis* infection.²⁶ As observed in the current study, most of the STIs were asymptomatic and symptoms occurred when the infection has already passed to the partner. This emphasises the need to consider a policy of laboratory screening for women who opted for IUCD use before insertion of the device in LMICs where these infections are common to avoid unnecessary complications such as tubal factor infertility and chronic PID. The recommended changes are possible in LMICs because most of these infections can be screened by the

point of care tests such as those used in the current study. These rapid immunochromatographic tests are less expensive, easy to use (no need of advanced technical skills and equipment) and produce reliable results.

Study limitations

The high prevalence of *C. trachomatis* could be overestimated due to diagnostic technique used in the current study which is less specific as compared to PCR. In addition, *N. gonorrhoea* was not tested because the prevalence of this pathogen has been found to be very low in the study setting.

Conclusion and recommendations

The prevalence of STIs is alarmingly high with *C. trachomatis* being the commonest STI among asymptomatic women opted for IUCD use. There is a paramount need to perform laboratory screening of STIs, especially among women with history of dysuria at least in the past 3 months before seeking placement and partners STIs before IUCD insertion. Further studies to investigate other STIs and outcome of these infections in this population are warranted in this area.

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Author contributions

ESM, AK, MMM and SEM participated in the designing of the study. FM, EC and AK participated in data/sample collection. MMM, SEM, HAN and MM participated in laboratory analysis of samples.

PR did pathological analysis of the samples. MMM and SEM analysed and interpreted data. MMM wrote the first draft of the manuscript, SEM, PR, MM and AK did the critical review of the manuscript. All authors approved the last version of the manuscript.

Availability of data and material

All data generated/ analysed during this study are included in this manuscript. Raw data can be obtained upon request from the director of research and Innovation of the Catholic University of Health and Allied Sciences.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Ethical considerations

Ethical clearance to conduct the study was sought from the joint Catholic University of Health and Allied Sciences/Bugando Medical Centre (CUHAS/BMC) research ethics and review committee (CREC) with ethical clearance number CREC/238/2017 and permission to conduct the study was sought from the hospital and clinic administrations (Regional Medical Officer and Reproductive and Child Health Coordinator). Before being enrolled in the study, participants were given explanations about the study and its objectives and for those who opted to participate were asked to give a written informed consent, and those who were positive to various STIs were given their results and get treated in their family planning attending sites according to the national protocol. Confidentiality was maintained throughout the study.

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Informed consent

Written informed consent was obtained from the patient(s), before being enrolled in the study

ORCID iDs

Helmut A Nyawale  <https://orcid.org/0000-0001-6916-6859>

Mariam M Mirambo  <https://orcid.org/0000-0003-2313-3079>

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