Clinical outcomes of postpartum intrauterine devices inserted by midwives in Tanzania

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Abstract
Objective: To assess the rate of complications following immediate postpartum insertion of intrauterine devices (IUDs) by trained midwives in Tanzania.

Methods: A prospective cohort study of women who underwent immediate postpartum IUD (PPIUD) insertions provided by midwives between December 31, 2016 and October 15, 2017. Midwives received standardized training via the FIGO initiative. Women who returned 6 weeks after delivery were evaluated for complications. Outcomes of interest were uterine infection, IUD expulsion, medical removal of IUD, and method discontinuation.

Results: There were 40,470 deliveries, 2,347 (5.8%) PPIUD insertions, and 1,013 (43.2%) women with a PPIUD who returned for a follow-up visit in the program-affiliated clinics. Midwives were providers in 596 (58.8%) of these follow-up cases and clinicians in 417 (41.2%) cases. All PPIUD insertions by midwives were transvaginal and among them 43 (7.2%) had PPIUD-related complications by the end of sixth week. These complications included 16 (2.7%) cases of uterine infection, 14 (2.3%) IUD expulsions, 26 (4.4%) IUD removals, and 33 (5.5%) with overall method discontinuation. Only one case had uterine infection severe enough to warrant hospitalization.

Conclusion: PPIUD insertion by trained midwives in Tanzania compares favorably with results reported from other settings.

KEYWORDS
Contraception; Family planning; FIGO initiative; Midwife; Postpartum intrauterine device; PPIUD; Safety; Tanzania

1 INTRODUCTION

The intrauterine device (IUD) is an effective, reversible, long-term method of contraception. It is the preferred method used by 14.3% of modern contraception users globally, but by less than 2% of women of reproductive age in Sub-Saharan Africa.1,2 With an estimated 160 million users worldwide, the IUD has been ranked the most widely used modern method of contraception.3

Although the use of modern contraceptives (measured as contraceptive prevalence rate) has steadily increased over the past decade in Tanzania—from 20% in 2004–2005 to 27% in 2010 and 32% in 2015–2016—unmet need for family planning has remained unchanged at 22%–24% since 1999.4 Currently, IUD use among married women remains low, estimated at 0.9% of married women.5,6

Timing PPIUD insertion immediately after childbirth is considered ideal especially in low-resource countries where women do not return...
for postnatal follow-up visits because of cost or distance. Postpartum IUD (PPIUD) practice has the potential to increase IUD uptake because immediately after childbirth there is no fear of an ongoing pregnancy, there is less risk of pain, no risk of interference with breastfeeding, it is easy to insert, and the woman and IUD provider are both available in the same setting, which reduces the time and cost of seeking interval IUD services.\textsuperscript{7,8} Nevertheless, PPIUD insertion has been linked with increased risks of poor outcomes such as IUD expulsion, uterine perforation, and infection, when compared with interval IUD insertions.\textsuperscript{9,10} Increased risks for poor PPIUD outcomes can be improved through standardized training and provider experience; this is supported by the Canadian Contraceptive Consensus, which is based on an extensive literature review.\textsuperscript{1}

In Tanzania, midwives do provide interval IUDs to clients but intrauterine manipulations in relation to childbirth are generally performed by clinicians. Moreover, preservice curricula for midwives do not provide sufficient knowledge and skills for them to perform PPIUD insertion.\textsuperscript{11} In December 2015, the International Federation of Gynecology and Obstetrics (FIGO) introduced a program in Tanzania to institutionalize PPIUD through training of healthcare workers on counselling, provision of immediate PPIUD, advocacy to local health management teams, and information delivery to women during prenatal clinic and delivery services.\textsuperscript{12}

Task sharing of PPIUD insertion to midwives is relatively new in Tanzania although it is well known that delegation of some tasks to less-specialized healthcare workers improves access to services and interventions in resource-limited settings.\textsuperscript{13} Since midwives are more readily available in delivery rooms than clinicians, they have a better opportunity to provide PPIUD and increase access to PPIUD services for women after delivery. The aim of the present study was to evaluate the safety of immediate PPIUD insertion measured by complications experienced within 6 weeks of insertion, by women whose providers were midwives. An additional aim was to discuss the implication of this task sharing in the light of complication rates in comparable studies in the literature when providers were clinicians.

2 | MATERIALS AND METHODS

All women who gave birth between December 31, 2016, and October 15, 2017, in the six training hospitals under the PPIUD program in Tanzania (Muhimbili National Hospital, Mbeya Zonal Referral Hospital, Dodoma Regional Referral Hospital, Mount Meru Regional Hospital, Tumbi Hospital, and Nyamagana District Hospital) were interviewed on their postpartum family planning choices before discharge as part of routine monitoring and evaluation procedure for the program. Written consent was obtained from each woman willing to participate in the program. The study received ethical approval from the National Institute for Medical Research, Tanzania (reference number NIMR/HQ/R.8a/Vol. IX/2006).

The six hospitals were selected as training centers, based on their geographic location in the country, delivery intensity of at least 5000 deliveries per year, their affiliation with a medical university or midwifery school, or involvement in exit training of intern doctors. Recruitment and training of PPIUD providers started with three hospitals: Muhimbili National Hospital, Mbeya Zonal Referral Hospital, and Dodoma Regional Referral Hospital. These Phase 1 hospitals began training PPIUD providers 10 months ahead of the remaining three hospitals (Phase 2 hospitals). The December 31st start date was selected because this is the time when rigorous uterine infection follow-up and documentation in the program in affiliated clinics was introduced.

The study was conducted in line with PPIUD program protocol whereby women delivering in hospitals and clinics under the program were routinely given information on postpartum family planning (PPFP) during prenatal clinics or in the maternity ward early in the latent phase of labor or before discharge from hospital. Women who were counselled on PPFP in the prenatal period had their reproductive and child health (RCH) cards labelled with a sticker of appropriate color highlighting their consent status regarding PPIUD insertion. Women who did not consent to PPIUD but opted for other PPFP methods were referred to the linked RCH clinic. Women who reaffirmed their consent for IUD insertion had the service provided by the attending midwife or clinician immediately after delivery of the placenta or within 48 hours. All PPIUD insertions using the CuT380A (Pregna Copper T 380A; Pregna International, Chakan, India) were conducted independently by clinicians (Assistant Medical Officers, Medical Officers, and Specialist Obstetricians/Gynecologists) or midwives (Nurse Midwives, Nursing Officers, and Trained Nurses) who also completed a form documenting the insertion procedure and any problems encountered. A trained midwife or clinician who assisted the delivery was also responsible for PPIUD insertion as part of routine delivery services whether in the labor room or theatre.

Exit interviews were conducted by trained Data Collection Officers (DCOs) in privacy to all delivered and consenting women prior to discharge. The exit interview asked about women’s experiences with the components of the PPIUD program including counselling, information about PPFP, and their postpartum contraceptive choices. All women who had PPIUD insertions were given an option to attend one of the program-affiliated clinics 4–6 weeks later. There are 3–4 of these clinics per hospital and these are strategically chosen to minimize the distance covered by clients during postnatal follow-up. During attendance at follow-up clinics, women were asked for any clinical symptoms attributable to PPIUD complications and their responses were entered in a follow-up form by the attending midwife. In addition, women were examined for the presence of threads at the cervical os, as confirmation of the presence of the IUD and to rule out the presence of any signs of complications attributable to PPIUD. Data were entered into a questionnaire form and the hard copy was stored in a secure place within the facility premises. All results were uploaded onto tablets and transferred in a secure form to our database using the CommCare platform (Dimagi, Cambridge, MA, USA). Analysis was conducted using SPSS version 20 (IBM, Armonk, NY, USA) and included women who delivered and received PPIUD during the study period who subsequently attended the program’s follow-up clinics between four and 6 weeks after delivery.
The primary outcome for this analysis is a composite variable of PPIUD complications experienced by the woman since the time of insertion to the day of follow-up, which is defined by the presence of any of the following specific outcome variables: uterine infection, confirmed expulsion of IUD, and removal of IUD. A significant clinical symptom was defined as a complaint given by the woman that was attributed to PPIUD insertion, including severe abdominal pain and abnormal vaginal discharge in terms of amount, color, and smell. The presence of any of these, or both, with or without fever, was interpreted as uterine infection. Confirmation of IUD expulsion was based on the woman’s account that she had seen the expelled IUD and then confirmed by absence of visible strings on examination. If there was no history of expelled IUD and strings were not visualized on pelvic examination, an ultrasound scan was required to confirm expulsion or dislocation. Medical removal of IUD was defined as any removal carried out by the service provider owing to maternal request, dislocated or partially expelled IUD, presence of uterine infection, or accidental removal while retrieving the strings. IUD discontinuation was defined as the woman’s or provider’s decision not to continue with an IUD at the 6-week follow-up visit following spontaneous expulsion or medical IUD removal. Women who opted for re-insertion at the follow-up visit and received this were not counted as discontinuation.

3 | RESULTS

A total of 40,470 deliveries occurred in the six hospitals over the study period. PPIUDs were inserted in 2347 (5.8%) women. In total, 1013 (43.2%) women attended a program-affiliated clinic for follow-up 4–6 weeks after delivery. Among these attendees, midwives had performed 596 (58.8%) insertions, all of which were transvaginal. The majority of women were aged 20 years or older (87.4%), had five or fewer past pregnancies (95.8%), and came from Phase 2 hospitals (71.1%) (Table 1).

In total, 43 women reported a PPIUD-related complication by the end of the sixth week after IUD insertion, giving an overall complication rate of 7.2% (Table 2). Complications included IUD expulsion in 14 cases (2.3%), IUD removal in 26 (4.4%) cases, and uterine infection in 16 (2.7%) cases. Among the 16 women diagnosed with uterine infection, only one had severe infection to warrant hospitalization. Among the 40 women who had IUD expulsion or medical removal, IUD was re-inserted in seven, another seven opted for other methods, and the remaining 26 did not opt for another method. This makes the IUD discontinuation rate at the end of 6 weeks 5.5% (33/596). IUD removal was a result of various reasons including maternal request, dislocation or partial expulsion, presence of uterine infection, death of the baby, and iatrogenic reasons (caused accidentally during thread retrieval) (Table 2).

Providers in Phase 1 hospitals had relatively longer practical experience in PPIUD insertion than those in Phase 2 hospitals. Figure 1 provides a visual comparison of each complication by Phase 1 and Phase 2 PPIUD training. Although the difference in complication rates among Phase 1 and Phase 2 did not reach statistical significance (P>0.05 for all), Phase 2 insertions tend to have higher rates of complications than Phase 2, for all items except uterine infection (Fig. 1). Strict uterine infection follow-up measures and documentation were implemented since the inception of Phase 2 training.

4 | DISCUSSION

The present study was conducted in the context of a crisis for human resources in health in Tanzania; across regions the human resource density ranged between 4 and 10 per 10,000 population, which is well below the global critical line of human resources for health of 23 per 10,000.14 Given this context, task sharing of PPIUD insertions to

| TABLE 1 | Characteristics of women whose PPIUD insertions were conducted by midwives. |
|-----------------|-----------------|-----------------|
| Characteristic   | No. (%)         | No. (%)         |
| Age, y          |                 |                 |
| ≤19             | 75 (12.6)       | 521 (87.4)      |
| ≥20             | 521 (87.4)      | 234 (39.3)      |
| Pregnancies     |                 |                 |
| 1               | 234 (39.3)      | 337 (56.5)      |
| 2–5             | 337 (56.5)      | 44 (7.4)        |
| 6–12            | 44 (7.4)        | 26 (4.4)        |
| Phase 1 hospital|                 |                 |
| Dodoma          | 102 (17.0)      | 26 (4.4)        |
| Mbeya           | 44 (7.4)        | 44 (7.4)        |
| Dar es Salaam   | 44 (7.4)        | 44 (7.4)        |
| Total Phase 1   | 172 (28.9)      | 172 (28.9)      |
| Phase 2 hospital|                 |                 |
| Mwanza          | 143 (24.0)      | 143 (24.0)      |
| Arusha          | 240 (40.3)      | 240 (40.3)      |
| Tumbi           | 41 (6.9)        | 41 (6.9)        |
| Total Phase 2   | 424 (71.1)      | 424 (71.1)      |

| TABLE 2 | Rates of PPIUD-related complications 6 weeks after insertion. |
|-----------------|-----------------|-----------------|
| PPIUD complication | No. (%)         | No. (%)         |
| Uterine infection |                 |                 |
| Yes              | 16 (2.7)        | 580 (97.3)      |
| No               | 580 (97.3)      | 580 (97.3)      |
| IUD expulsion    |                 |                 |
| Yes              | 14 (2.3)        | 14 (2.3)        |
| No               | 582 (97.7)      | 582 (97.7)      |
| IUD medical removal |              |                 |
| Yes              | 26 (4.4)        | 570 (95.6)      |
| No               | 570 (95.6)      | 570 (95.6)      |
| Any complication |                 |                 |
| Yes              | 43 (7.2)        | 553 (92.8)      |
| No               | 553 (92.8)      | 553 (92.8)      |
midwives who account for two-thirds of human resources for health in Tanzania could be a useful strategy to promote PPIUD access and uptake particularly in Basic Emergency Obstetric and Neonatal Care facilities. As evidence for this, in almost all cases of women who delivered vaginally and received a PPIUD in the current study, the provider was a midwife (93%). Among follow-up cases, 58.8% of PPIUDs had been inserted by midwives.

There were 14 cases of spontaneous expulsion of IUD, which is equivalent to 2.3% and an overall method discontinuation rate of 5.5% by the end of 6 weeks. These findings are generally better compared with other studies that have used the Copper IUD for postpartum contraception. In a study by Sucak et al., comparing complication rates among women who had immediate PPIUD insertion using CuT380A in Turkey, the expulsion rate was 9.3% at the sixth week follow-up and the cumulative IUD removal rate was 10% compared with a 4.4% IUD removal rate in the present study. In contrast, whereas the providers in the present study were midwives who had just recently been trained on IUD insertion, in the Turkish study all insertions were done by experienced physicians using an IUD inserter.

The importance of experience was echoed by the consistently higher rates of complications among insertions done in Phase 2 compared with Phase 1 hospitals where the providers had relatively longer experience of practice—a trend that has also been noted by others.\(^2\) Two studies in USA estimated higher expulsion rates of copper IUD (CuT380A) including Goldthwaite et al.,\(^16\) who reported a 20% rate at 12 weeks with 86% of these occurring within 6 weeks, and 17% at 4–8 weeks among trained physicians in Atlanta.\(^17\) Other studies and reviews have reported higher IUD expulsion rates ranging from 9.5%–38% when an IUD is inserted within 10 minutes of delivery of the placenta, although the reference duration of follow-up was somewhat longer (3–12 months) than the 6 weeks in the current study.\(^10,18–21\) Although studies on postpartum complications following CuT380A IUD insertion are generally sparse, these cited comparable studies clearly indicate the relative safety of PPIUD insertion by midwives in Tanzania. In all of the cited studies, providers were physicians who had longer experience with PPIUD insertions or who had received training; therefore, the results for midwives in the present study, who had no prior experience, suggest a successful task sharing of PPIUD insertion services in Tanzania.

Spontaneous expulsion of IUD is usually considered to be due to puerperal uterine remodeling, although low insertion of the IUD could be a contributory factor.\(^15\) It is considered that adherence to the standard guidelines, including insertion of the IUD high up in the fundus using long curved Kelly forceps and careful selection of eligible clients\(^22\) would be the main reason for the reduced rates of complications in the present study. The difference in expulsion rates could be attributed to different insertion techniques. Some of the cited studies used ring forceps or hands for IUD insertion\(^16,21,23\) and others have used IUD inserters\(^15\) that may not have placed IUDs in the uterine fundus. Kelly forceps allows for true fundal insertion of the device, aided by the longer length (33 cm compared with 24 cm for ring forceps). It can also be argued that the complication rates for the present study are higher compared with the actual rates for the PPIUD project in Tanzania since the analyzed sample comprises only women who reported back to the project-affiliated follow-up clinics and who were more likely to have complications than the women who did not seek attention or decided to go to other clinics. Moreover, the midwives carried out IUD insertions solely on women who delivered vaginally. Since many studies have consistently reported increased risk for PPIUD-related complications after vaginal compared with cesarean delivery,\(^15,20,24,25\) this reaffirms that the complication rates in the literature are higher than the combined rates for the program in Tanzania.

This is one of few large studies that have prospectively followed-up women who have had CuT380A IUD insertion after vaginal delivery. Most studies reporting outcomes of PPIUD complications have either been confined to levonorgestrel IUDs or other forms of copper IUD inserted intraoperatively at cesarean delivery.\(^25\) There is little literature on the impact of midwives on PPIUD insertion. The strengths of the present study are its large sample size and focus on midwives who provide services to most delivering mothers in low-resource countries and the CuT380A IUD, which is available and affordable.

The study was limited because only half of the women with PPIUD insertions voluntarily came for follow-up at the program-affiliated clinics. Since it would have been unethical to force women who have benefited from the program to come for follow-up in the specified clinics, the study operated on the natural situation whereby women seek medical and reproductive healthcare services at the nearest location and where they believe they can get the desired service. To mitigate this bias, the selected follow-up clinics were geographically well distributed to capture women from diverse geographical locations. Nevertheless, it is acknowledged that the selection of the study sample could have led to bias toward women with higher complication rates than the reality for the PPIUD program as the assumption is that women would be more likely to attend follow-up if they had a problem. Another important limitation is a relatively short follow-up of 6 weeks, which limits comparability with other similar studies. Nevertheless, it is well accepted that most PPIUD complications occur within the initial 6 weeks after insertion.\(^16,26\) The present study, however, was able to demonstrate the safety of task sharing of PPIUD to midwives albeit within a short follow-up interval. Moreover, a cohort study on the long-term impact and effectiveness of PPIUD under the FIGO program in Tanzania is ongoing.

**FIGURE 1** PPIUD complication rates by phase of training. [Colour figure can be viewed at wileyonlinelibrary.com]
CONCLUSION

PPIUD insertion performed by midwives under the FIGO PPIUD program in Tanzania was safe and comparable to similar services reported in the literature. In Tanzania, where human resources for health is a major problem, allowing midwives to perform PPIUD insertions can promote access to postpartum family planning and reduce the unmet need for contraception, especially in lower level facilities where clinicians are scarce.

AUTHOR CONTRIBUTIONS

PSM, GK, AM developed the concept; PSM, PP, MS were involved in data management and analysis; PSM, AM, KH were involved in writing the manuscript draft. All authors read, interpreted the results, and approved the final manuscript. MS worked on the project while employed by FIGO.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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