Association Between Partner Treatment and Repeat Sexually Transmitted Infections Positivity in Pregnant Women in, East London, South Africa

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MMM wrote the first manuscript draft supported by RPHP and with contributions from all the co-authors. MMM and RPHP led the overall main study implementation, in addition, MMM and RMSG were responsible for daily operations at the clinical research sites. All co-authors critically revised the versions of the manuscript and approved the final submitted version.

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Declaration of interests

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ABSTRACT (274 words)

Objectives Sexually transmitted infections (STIs) are common in pregnant women. Effective partner treatment of women with an STI is essential to prevent reinfection. We evaluated the impact of partner notification and treatment based on the occurrence of repeat STIs in pregnant women in South Africa.

Methods We used data from one of the intervention arms in a randomised clinical trial of STI diagnostic screening strategies in pregnancy. In this cohort, women were tested at their first antenatal care visit (<27 weeks gestational age) using onsite Xpert® test assays (Cepheid, Sunnyvale, California) for *Chlamydia trachomatis* (CT), *Neisseria gonorrhoeae* (NG) and *Trichomonas vaginalis* (TV). Women with a positive STI results received pathogen-directed treatment, partner notification slips, and a test-of-cure visit was scheduled 21-35 days post-treatment. At the test of cure visit, sexual behaviour and partner treatment data were collected, and STI testing was repeated. Cure was defined as a negative result at the test-of-cure visit.

Results Of 754 women tested, 193 (26%) tested positive for an STI and 183 (95%) received pathogen-directed treatment. Test-of-cure visit was attended by 108/183 (59%) women within the time window. Of those, 19/108 (18%) had a positive repeat STI results. Most women attending the test-of-cure visit (95%; 103/108) reported disclosure of their STI to their partner however only 44% (48/108) reported that their partner received treatment. Among those who reported partner treatment, the repeat STI positivity was 4% versus 27% in those with reported untreated partners (risk ratio 0.15 with 95% CI 0.03 to 0.7).

Conclusions Reported partner treatment reduced the likelihood of a repeat positive test result in pregnant women. Strengthening partner notification and treatment is essential to prevent reinfection.

RESEARCH IN CONTEXT

What is already known on this topic

- Repeat STIs during pregnancy are associated with adverse pregnancy complications
- Partner management is a cornerstone of STI control and prevention; however, partner treatment rates remain low in many settings.
- Limited data on the direct association between partner treatment and repeat STI positivity in pregnant women, particularly in sub-Saharan Africa

Added value of this study

- We evaluated the STI treatment outcomes based on test-of-cure result in relation to reported partner notification and treatment among pregnant women in South Africa.
- Partner treatment is essential in STI management to prevent reinfection.

How this study might affect research, practice or policy

- Supports integrating partner services into routine antenatal care to improve pregnancy outcomes.
- Provides evidence to inform the South African national STI guidelines and interventions aimed at reducing reinfection during pregnancy.

INTRODUCTION

Each year, an estimated 340 million new cases of curable sexually transmitted infections (STIs) occur globally, with most affecting low- and middle-income countries.[1] In South Africa, the prevalence of *Chlamydia trachomatis* (CT), *Neisseria gonorrhoeae* (NG) and *Trichomonas vaginalis* (TV) among pregnant women is estimated at 25-40%, with a higher burden among those with HIV infection.[2-4] Those infections can be associated with adverse pregnancy outcomes such as still birth, low birthweight and pre-term delivery, and may facilitate HIV transmission.[5] Syndromic management is the standard of care in South Africa.[5] In South Africa, partner management is carried out through a passive contact referral system. Index patients are given a referral slip to provide to their sex partner(s), informing them of the condition and the need for them to receive the same antimicrobial treatment even if asymptomatic.[5] With the current standard of passive partner information, an important gap exists in effective partner management. High acceptability of partner notification is reported; however, the uptake of partner treatment remains low.[6] A test of cure at 3-5 weeks after completing STI treatment may be performed to determine treatment outcome.[1] A negative STI test result confirms cure while a positive test indicates a persistent STI due to new or persistent infection.[1]

There is limited data on the impact of partner treatment on STI treatment outcomes in pregnant women. Therefore, we evaluate STI treatment outcomes based on test-of-cure result in relation to reported partner notification and treatment among pregnant women in South Africa.

METHODS

Study design and setting

We conducted a cross-sectional analysis of test-of-cure outcomes within a larger randomised clinical trial of diagnostic STI strategies to improve pregnancy outcomes (Philani Ndiphile study) in four primary health care facilities in Buffalo City Metropolitan Health District, Eastern Cape Province, South Africa.[7]

Study population

In a completed randomised controlled trial from 2021 to 2025, pregnant women (≥18 years, <27 weeks gestation based on ultrasound) were enrolled at their first antenatal care visit. At the baseline visit women were randomised to one of three arms: to receive either baseline STI testing with test-of-cure 3-4 weeks after treatment (arm 1), baseline STI testing with repeat testing at 30-34 weeks gestational age (arm 2), or syndromic management as the standard of care (arm 3). This analysis includes data for women enrolled in arm 1 from their baseline and test-of-cure study visits.

Study procedures

Research nurses collected demographic, clinical, and sexual behaviour data using REDCap system. Nurse-collected vaginal swabs using the Xpert® Vaginal/Endocervical Specimen Collection Kit (Cepheid, Sunnyvale, CA) were tested by trained clinical staff on site for *Chlamydia trachomatis* (CT), *Neisseria gonorrhoeae* (NG) and *Trichomonas vaginalis* (TV) using the Xpert® CT/NG and Xpert® TV (Cepheid, Sunnyvale, CA) molecular assays.

All women with a positive STI test result received pathogen directed treatment, single dose 1g oral azithromycin for CT infection, 500mg ceftriaxone intramuscular injection for NG infection, and a 7-day course of 400mg oral metronidazole twice daily for TV infection. When possible, same-day treatment was offered, otherwise participants were contacted telephonically to return to the study site for treatment. Following treatment, women were issued partner notification slips for the number of sex partners reported within the preceding six months.

Women were scheduled for a test-of-cure visit 21 days after treatment initiation, with an allowable visit window of up to 35 days post-treatment.

At the test-of-cure visit, sexual behaviour and partner notification and treatment data were collected. Repeat STI testing was performed for the pathogen(s) that were positive at the baseline visit and cure was defined as a negative test result at the test-of-cure for each specific pathogen.

Ethics

The study was approved by the Faculty of Health Sciences Human Research Ethics Committee at the University of Cape Town (676/2019). All women provided written informed consent before enrolment.

RESULTS

A total of 754 women were included in this analysis with a median age of 28 years (IQR 24-33); 417 (55%) were unemployed. Most women were asymptomatic (627/754, 83%) and 30% (225/754) were living with HIV. Median gestational age at enrolment was 13 weeks (IQR 8-18); 225 (30%) women were primigravida. Of the 754 women, 193 (26%) tested positive for any STI (15% (112/754) for CT, 5% (37/754) for NG, and 11% (81/754) for TV).

Of the 193 women with a positive STI test result, 183 (95%) received treatment (107 for CT, 33 for NG, and 78 for TV) (**Supplementary Table 1**); and 176/183 (96%) accepted a partner notification slip. There was no difference by HIV status for test of cure visit and repeat test positivity.

Test-of-cure visit was attended within the study window by 59% (108/183) of treated women with positive STI test result at baseline (65 CT, 19 NG, 45 TV). Of the 108 women who attended the test-of-cure visit, 19/108 (18%) had a repeat positive STI test (8/65 (12%) for CT, 2/19 (11%) for NG, and 11/45 (24%) for TV). At the test-of-cure visit, 95% of women (103/108) reported disclosure of their STI to their partner however only 44% (48/108) reported that their partner received treatment **(Figure 1)**. Among those who reported partner treatment, the

repeat STI positivity was 4% (2/48) versus 27% (6/22) in those with reported untreated partners (risk ratio 0.15 with 95% CI 0.03-0.7) which did not change when adjusting for HIV status (adjusted risk ratio 0.15 with 95% CI 0.03-0.9).

DISCUSSION

Curable STIs are prevalent among pregnant women in Southern Africa ranging from 15-30%.[8] We assessed the impact of partner notification and treatment in a study where aetiological STI testing was integrated into antenatal care. While most women accepted and reported that they delivered partner notification slips, fewer than half reported that their partners received treatment. Effective partner management reduced repeat STI positivity, underscoring its critical role in STI management, especially during pregnancy.

A substantial proportion of women whose partners did not receive treatment had a repeat positive STI test at the test-of-cure visit. In contrast, women who reported partner treatment were significantly more likely to test negative, supporting the association between effective partner management and successful treatment outcomes. Compared to a similar studies in Botswana and Kenya providing expedited partner treatment, our cohort demonstrated a higher rate of repeat positivity, highlighting the possible positive effects of expedited partner management.[9 10] Additionally, among pregnant women living with HIV, persistent CT and TV infections have been associated with unknown partner treatment status.[6]

This study has several limitations. Partner notification and treatment data were self-reported and may reflect overreporting of socially desirable behaviours. In addition, there is a potential for selection bias with unclear effect, as only 58% of women returned for their test-of-cure visit. Generalizability may be limited due to relatively small sample size and loss to follow-up. Last, we did not collect any data on factors that facilitated uptake or provided barriers to partner services. Stigma and fear of partner violence may be important barriers that should be considered for successful partner notification and treatment services. Multifaceted packages addressing barriers for both the index individual and partner and influencing multiple points in

the partner notification and treatment pathway, are likely required to facilitate partner management.[11]

Our findings reinforce that partner treatment is an important component of syndromic or diagnostic STI management and effective in preventing re-infection. Despite high rates of partner disclosure, the gap between reported partner notification and reported confirmed treatment was substantial, i.e. women did notify their partners but were not certain about whether these went to receive treatment. This indicates that current partner notification strategies may be insufficient without additional interventions such as expedited partner therapy, partner tracing, or community-based treatment support. Aetiological testing provides a valuable opportunity for targeted treatment, but without robust partner management systems, its impact on STI management will remain limited. Strengthening partner services within antenatal care could reduce STI reinfection, improve pregnancy outcomes, and interrupt onward transmission in high-burden settings.

REFERENCES

1. World Health Organization. Geneva. Global prevalence and incidence of selected curable sexually transmitted infections: overview and estimates: WHO/HIV_AIDS/2001.02, WHO/CDS/CSR/EDC, 2001.
2. Nyemba DC, Medina-Marino A, Peters RP, et al. Prevalence, incidence and associated risk factors of STIs during pregnancy in South Africa. *Sexually transmitted infections* 2021;97(5):375-81.
3. Mukavhanyedzi D, Rukasha I. Sexually transmitted pathogens in asymptomatic women at Rethabile clinic, Limpopo, South Africa. *S Afr J Infect Dis* 2024;39(1):618. doi: 10.4102/sajid.v39i1.618 [published Online First: 20241127]
4. Peters R, Klausner J, de Vos L, et al. Aetiological testing compared with syndromic management for sexually transmitted infections in HIV-infected pregnant women in South Africa: a non-randomised prospective cohort study. *BJOG: An International Journal of Obstetrics & Gynaecology* 2021;128(8):1335-42. doi: https://doi.org/10.1111/1471-0528.16617
5. Peters RP, Garret N, Chandiwana N, et al. Erratum: Southern African HIV Clinicians Society 2022 guideline for the management of sexually transmitted infections: Moving towards best practice. *Southern African Journal of HIV Medicine* 2022;23(1)
6. Medina-Marino A, Mudau M, Kojima N, et al. Persistent Chlamydia trachomatis, Neisseria gonorrhoeae or Trichomonas vaginalis positivity after treatment among human immunodeficiency virus-infected pregnant women, South Africa. *Int J STD AIDS* 2020;31(4):294-302. doi: 10.1177/0956462419898612 [published Online First: 20200223]
7. Medina-Marino A, Cleary S, Muzny CA, et al. Sexually transmitted infection screening to prevent adverse birth and newborn outcomes: study protocol for a randomized-controlled hybrid-effectiveness trial. *Trials* 2022;23(1):441. doi: 10.1186/s13063-022-06400-y [published Online First: 20220524]
8. Shaetonhodi NG, de Voux A, Babalola CM, et al. Prevalence, symptomology, and correlates of curable sexually transmitted infections among pregnant women in Eastern Cape, South Africa. *Int J STD AIDS* 2025:9564624251347484. doi: 10.1177/09564624251347484 [published Online First: 20250611]
9. Mussa A, Wynn A, Ryan R, et al. High Cure Rate Among Pregnant Women in a Chlamydia trachomatis and Neisseria gonorrhoeae Testing and Treatment Intervention Study in Gaborone, Botswana. *Sex Transm Dis* 2023;50(2):124-27. doi: 10.1097/olq.0000000000001725 [published Online First: 20221029]
10. Unger JA, Matemo D, Pintye J, et al. Patient-Delivered Partner Treatment for Chlamydia, Gonorrhea, and Trichomonas Infection Among Pregnant and Postpartum Women in Kenya. *Sex Transm Dis* 2015;42(11):637-42. doi: 10.1097/olq.0000000000000355
11. Martin K, Mackworth-Young CRS, Nyamwanza R, et al. Financial incentives to improve uptake of partner treatment for sexually transmitted infections in antenatal care: a cluster randomised trial in Zimbabwe. *The Lancet Global Health* 2025;13(12):e2097-e110. doi: 10.1016/S2214-109X(25)00306-7