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Original Research Article

Effect of Treatment of Vaginal Infections During Pregnancy on the Prevention of Preterm Delivery: A Prospective Cohort Study

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Abstract:

Background: Preterm delivery, defined as birth before 37 completed weeks of gestation, is the leading cause of neonatal morbidity and mortality worldwide. Vaginal infections—particularly bacterial vaginosis (BV), vulvovaginal candidiasis (VVC), and trichomoniasis—are prevalent during pregnancy and are independently associated with an increased risk of preterm delivery through mechanisms involving ascending infection and exaggerated inflammatory responses.

Objective: To determine whether the prompt treatment of clinically diagnosed vaginal infections during the second trimester of pregnancy significantly reduces the incidence of preterm delivery compared with untreated controls.

Methods: A prospective cohort study was conducted at a tertiary antenatal care centre over 24 months. Three hundred pregnant women with confirmed vaginal infection (gestational age 14–24 weeks) were enrolled and allocated to a treated group (n = 150) and an untreated comparison group (n = 150). Bacterial vaginosis was treated with oral metronidazole 400 mg twice daily for 7 days;if weight <60 kg, metronidazole 400 mg TDS for 7 days;if weight > 60 kg,VVC with intravaginal clotrimazole 500 mg single dose; and trichomoniasis with oral metronidazole 2 g single dose. The primary outcome was preterm delivery at < 37 weeks of gestation. Secondary outcomes included mean birth weight, NICU admission, and preterm premature rupture of membranes (PPROM). Statistical analysis was performed using chi-square tests and logistic regression with odds ratios (OR) and 95% confidence intervals (CI).

Results: The overall preterm delivery rate was significantly lower in the treated group (12.0%) compared with the untreated group (32.0%) (OR 0.29, 95% CI 0.15–0.55; p < 0.001). Mean birth weight was significantly higher in treated women (3,012 g vs. 2,680 g; p < 0.001). Rates of low birth weight, NICU admission, and PPROM were all significantly reduced in the treated group. Bacterial vaginosis was the most prevalent infection (44.0%), followed by VVC (32.0%) and trichomoniasis (16.0%).

Conclusion: Treatment of vaginal infections during the second trimester of pregnancy is associated with a clinically and statistically significant reduction in preterm delivery and improved neonatal outcomes. Universal antenatal screening for vaginal infections should be integrated into routine antenatal care, particularly in low-resource settings.

Keywords: Vaginal Infections, Pregnancy, Bacterial Vaginosis, Vulvovaginal Candidiasis, Trichomoniasis, Preterm Birth, Preterm Delivery, Antenatal Care, Metronidazole, Clotrimazole.

Introduction

Vaginal Infections in Pregnancy: Vaginal infections represent one of the most common complications encountered in antenatal care. Three principal infections account for the majority of cases: bacterial vaginosis (BV), vulvovaginal candidiasis (VVC), and trichomoniasis. Each has a distinct microbiological aetiology, clinical presentation, and treatment approach, yet all share a common thread—their potential to adversely alter the course of pregnancy [1,2].

Bacterial vaginosis is characterised by the replacement of the normal Lactobacillus-dominant vaginal flora with polymicrobial anaerobic organisms including Gardnerella vaginalis, Prevotella spp., and Mobiluncus spp. [3]. It affects approximately 15–25% of pregnant women globally and is diagnosed using Amsel criteria or the Nugent scoring system [4]. Vulvovaginal candidiasis, caused predominantly by Candida albicans, affects up to 30% of pregnant women, particularly in the second trimester, owing to the elevated oestrogen levels that promote fungal adherence [5]. Trichomoniasis, caused by the protozoan

Trichomonas vaginalis, has a global prevalence of 8–11% in pregnancy and is the most common non-viral sexually transmitted infection worldwide [6].

Global Burden of Preterm Birth: Preterm birth—delivery before 37 completed weeks of gestation—is a global public health emergency. According to the World Health Organization (WHO), an estimated 15 million babies are born preterm every year, and preterm birth complications are the single largest direct cause of neonatal death, responsible for approximately 1 million deaths annually [7]. The burden is disproportionately borne by low- and middle-income countries, where more than 80% of preterm births occur [7]. Survivors face risks of long-term neurological, respiratory, and developmental impairment, with enormous implications for health systems and families.

Relationship Between Vaginal Infection and Preterm Labour: The biological plausibility of a link between vaginal infection and preterm labour is well established. Ascending infection from the lower genital tract triggers the release of pro-inflammatory cytokines—particularly interleukin (IL)-1β, IL-6, IL-8, and tumour necrosis factor-alpha (TNF-α)—from the decidua and fetal membranes [8]. These cytokines activate prostaglandin synthesis and matrix metalloproteinases that weaken the chorioamniotic membranes, promote cervical ripening, and stimulate uterine contractions, culminating in preterm labour and premature rupture of membranes (PPROM) [9,10].

Multiple observational and case–control studies have demonstrated that women with BV in early pregnancy are two to three times more likely to deliver preterm than those without BV [11]. Similarly, untreated trichomoniasis has been associated with up to 1.3-fold increased risk of preterm delivery in high-prevalence populations [12]. Although the evidence for VVC as an independent cause of preterm labour remains more limited, its co-occurrence with BV and the resultant disruption to vaginal epithelial integrity suggest a contributory role [13].

Rationale for the Study: Despite compelling mechanistic and epidemiological evidence linking vaginal infections to preterm birth, the evidence base for whether their treatment reduces this risk remains heterogeneous. Several landmark trials—including the ORACLE trials and studies by McDonald et al.—have produced conflicting results, partly attributed to differences in study design, timing of intervention, gestational age at treatment, and the specific antibiotics or antifungals used [14,15]. Given the availability of safe and effective pharmacological treatments, establishing a definitive association between treatment and preterm birth prevention carries substantial public health implications. This study was designed to address this evidence gap in a prospective cohort setting.

Literature Review

Epidemiology of Vaginal Infections in Pregnancy

Global Prevalence: The global prevalence of vaginal infections during pregnancy varies considerably by geographic region, socioeconomic context, and diagnostic criteria. A systematic review by Koumans et al. (2007) reported BV prevalence of 29.2% among pregnant women in the United States, with higher rates observed in African-American women (50.4%) compared with white women (22.7%), highlighting the role of racial and socioeconomic disparities [16]. In sub-Saharan Africa, BV prevalence among pregnant women ranges from 20–49%, and in South Asia from 15–30% [7]. Trichomonas vaginalis infection affects approximately 8–15% of pregnant women in developing countries, and up to 30–40% of women with symptomatic VVC are pregnant due to hormonally mediated changes in vaginal physiology [5,6].

Risk Factors: Established risk factors for vaginal infections in pregnancy include low socioeconomic status, poor access to antenatal care, prior history of sexually transmitted infections, multiple sexual partners, tobacco use, and intrauterine device use (prior to conception). Hormonal changes of pregnancy—particularly elevated progesterone and oestrogen—alter the vaginal pH and glycogen content, creating conditions favourable to both candidal overgrowth and anaerobic bacterial proliferation [3,13].

Pathophysiology

Ascending Infection Mechanism: The ascending infection hypothesis posits that pathogenic organisms from the vagina traverse the cervical canal, breach the cervico-uterine barrier, and establish infection within the decidua, fetal membranes, and—in severe cases—the amniotic cavity [8]. This process may be subclinical for extended periods before triggering the inflammatory cascade that initiates preterm labour. The cervical mucus plug, which normally acts as a physical and immunological barrier, is compromised in the setting of BV, where alkalinisation of vaginal pH by amine-producing anaerobes disrupts mucus architecture [9].

Inflammatory Response and Cytokine Production: Infection-driven activation of toll-like receptors (TLRs) on decidual and membrane cells stimulates the nuclear factor kappa-B (NF-κB) pathway, leading to the production of prostaglandins E2 and F2α (PGE2, PGF2α), IL-1β, IL-6, TNF-α, and granulocyte-colony stimulating factor [9,10].

These mediators act synergistically to promote myometrial contractility, cervical dilation, and membrane degradation. The amniotic fluid levels of IL-6 and IL-8 are consistently elevated in women with histological chorioamnionitis who subsequently deliver preterm [10].

Premature Rupture of Membranes: Matrix metalloproteinases (MMP-8 and MMP-9), activated by infection-mediated cytokine release, degrade collagen within the fetal membranes, significantly reducing their tensile strength and predisposing them to PPROM [9]. The amniotic membranes of women with BV have been shown in vitro to be more susceptible to rupture than those of women with normal flora. PPROM precedes approximately 30–40% of all preterm births and is therefore a major pathway through which vaginal infections exert their deleterious effect [11].

Vaginal Infections and Adverse Pregnancy Outcomes: The spectrum of adverse outcomes associated with untreated vaginal infections in pregnancy extends beyond preterm delivery to encompass low birth weight (LBW < 2500 g), neonatal sepsis, neonatal pneumonia (notably due to vertical transmission of T. vaginalis and Group B Streptococcus co-colonisation with BV), postpartum endometritis, and increased susceptibility to HIV acquisition [7,12]. A meta-analysis by Flynn et al. (1999) found that BV was associated with a twofold increase in risk of preterm delivery (relative risk [RR] 2.19, 95% CI 1.54–3.12) and a threefold increase in PPROM (RR 2.9, 95% CI 1.9–4.5) [11].

Current Treatment Approaches

Antibiotics for BV and Trichomoniasis: The WHO, the American College of Obstetricians and Gynecologists (ACOG), and the Royal College of Obstetricians and Gynaecologists (RCOG) all recommend oral metronidazole (400–500 mg twice daily for 5–7 days) as first-line therapy for BV in pregnancy [7,15]. Metronidazole 2 g single dose is recommended for trichomoniasis, with partner treatment essential to prevent re-infection. Clindamycin (300 mg twice daily for 7 days) is an alternative for BV, particularly in the first trimester when metronidazole is used cautiously. Meta-analyses confirm that antibiotic treatment of BV eradicates infection in 70–90% of cases, though the impact on preterm birth risk has been variable across trials depending on the timing of treatment and underlying risk profile [14].

Antifungal Therapy for VVC: Topical imidazoles—clotrimazole, miconazole, and econazole—are the recommended first-line treatments for VVC in pregnancy, as systemic oral azoles (fluconazole) are relatively contraindicated owing to teratogenic concerns in the first trimester and possible fetal cardiac effects with high-dose use [5]. Clotrimazole 500 mg intravaginal pessary as a single dose, or clotrimazole 100 mg pessary for 6 nights, achieves cure rates exceeding 90%. Treatment relieves symptoms and reduces fungal colonisation that may contribute to ascending membrane infection [13].

Screening Programmes: Routine universal vaginal infection screening in pregnancy is not currently recommended by most high-income country guidelines, except for Group B Streptococcus in the third trimester. However, there is growing evidence supporting targeted screening in high-risk populations, including women with a prior history of preterm birth or those presenting with symptoms. The WHO's 2015 antenatal care model recommends symptom-based screening and treatment of BV in low-resource settings given the high prevalence and low cost of effective treatment [7].

Objectives

Primary Objective: To assess whether prompt treatment of confirmed vaginal infections during the second trimester of pregnancy significantly reduces the incidence of preterm delivery (< 37 weeks of gestation) compared with untreated controls.

Secondary Objectives

- To identify the relative frequency of bacterial vaginosis, vulvovaginal candidiasis, and trichomoniasis among pregnant women attending antenatal care.
- To evaluate the microbiological cure rates of standard antibiotic and antifungal treatment regimens.
- To assess the impact of treatment on mean birth weight and rates of low birth weight.
- To examine the effect of treatment on rates of PPROM, NICU admission, and neonatal morbidity.
- To identify subgroups of women who may derive the greatest benefit from early treatment.

Methodology

Study Design: This was a prospective cohort study conducted over 24 consecutive months. Participants were enrolled at the first antenatal visit at which vaginal infection was confirmed and followed through to delivery. The study was approved by the Institutional Ethics Committee and conducted in accordance with the Declaration of Helsinki. Informed written consent was obtained from all participants.

Hypothesis

H_1: Appropriate treatment of vaginal infections during pregnancy significantly reduces the incidence of preterm delivery compared with untreated infection.

H_0: Treatment of vaginal infections during

pregnancy does not significantly reduce the incidence of preterm delivery.

Study Setting: The study was conducted at a tertiary-level hospital with a dedicated antenatal care (ANC) clinic receiving a mixed urban and peri-urban patient population. The clinic serves approximately 2,400 antenatal bookings annually and offers comprehensive obstetric, microbiological, and neonatal services.

Study Population

Inclusion Criteria

- Pregnant women aged 18–45 years attending for routine antenatal care.
- Singleton pregnancy at gestational age 14–24 weeks (confirmed by ultrasound).
- Confirmed diagnosis of vaginal infection (BV, VVC, or trichomoniasis) by clinical and microbiological assessment.
- Willingness to provide written informed consent.

Exclusion Criteria

- Multiple pregnancy.
- Major fetal structural or chromosomal anomaly.
- Cervical cerclage in situ.
- Chronic systemic illness (diabetes mellitus, hypertension, renal disease, autoimmune conditions).
- Current antibiotic use for any indication.
- Known allergy to metronidazole or imidazoles.
- Loss to follow-up within four weeks of enrolment.

Data Collection: All enrolled women underwent a structured clinical interview using a standardised data collection form capturing demographic details, obstetric history, gestational age, and symptom history. High vaginal swabs were collected under direct visualisation and processed within two hours. BV was diagnosed using Amsel criteria (three of four criteria met) and confirmed by Nugent scoring (score ≥ 7). VVC was diagnosed by wet mount microscopy and/or culture on Sabouraud's dextrose agar. Trichomoniasis was identified by wet mount microscopy and, in equivocal cases, by point-of-care nucleic acid amplification test (NAAT).

Treated women received standard therapy as follows: BV—oral metronidazole 500 mg twice daily for 7 days; VVC—intravaginal clotrimazole 500 mg single dose; trichomoniasis—oral metronidazole 2 g single dose with simultaneous partner treatment. All participants were followed up at 28 weeks, 32 weeks, 36 weeks, and at delivery. Gestational age at delivery, birth weight, mode of delivery, NICU admission, and maternal morbidity were recorded.

Outcome Measures

- Primary: Incidence of preterm delivery at < 37 completed weeks of gestation.
- Secondary: Mean gestational age at birth; birth weight; rates of low birth weight (< 2,500 g); PPROM; NICU admission; neonatal sepsis.

Statistical Analysis: Data were analysed using SPSS version 26.0 (IBM Corp., Armonk, NY). Normally distributed continuous variables are presented as mean ± standard deviation; non-normally distributed variables as median (interquartile range). Categorical variables are presented as frequencies and percentages. Baseline comparability between treated and untreated groups was assessed using independent samples t-test (continuous variables) and chi-square test (categorical variables). The primary outcome was analysed by chi-square test. Logistic regression was used to calculate unadjusted and adjusted odds ratios (OR) with 95% confidence intervals (CI), controlling for age, parity, gestational age at enrolment, and prior preterm birth. A two-sided p-value < 0.05 was considered statistically significant.

Results

Demographic Characteristics: A total of 300 pregnant women with confirmed vaginal infection were enrolled over the 24-month study period. Table 1 summarises the baseline characteristics of both groups. The two groups were well-matched with no statistically significant differences in mean age, gestational age at enrolment, parity, prior preterm birth history, or socioeconomic status, supporting the comparability of the cohorts.

Table 1: Baseline demographic and obstetric characteristics of study participants

Characteristic	Treated Group (n=150)	Untreated Group (n=150)	p-value
Mean Age (years)	26.4 ± 4.2	27.1 ± 4.8	0.213
Gestational Age at Enrolment (weeks)	18.3 ± 3.6	18.7 ± 3.9	0.347
Primigravida	68 (45.3%)	72 (48.0%)	0.631
Multigravida	82 (54.7%)	78 (52.0%)	0.631
Previous Preterm Birth	22 (14.7%)	24 (16.0%)	0.748
Socioeconomic Status (Low)	94 (62.7%)	98 (65.3%)	0.622

Values are mean ± SD or n (%). p-values from independent t-test or chi-square test.

Distribution of Vaginal Infections: Bacterial vaginosis was the most prevalent infection, accounting for 44.0% of cases, followed by VVC

(32.0%) and trichomoniasis (16.0%). Mixed infections (BV + VVC or BV + TV) accounted for 8.0% (Table 2). This distribution is consistent with previously reported epidemiological data from similar antenatal populations.

Table 2: Distribution of vaginal infections among study participants (N = 300)

Type of Infection	Frequency (n=300)	Percentage (%)
Bacterial Vaginosis (BV)	132	44.0%
Vulvovaginal Candidiasis (VVC)	96	32.0%
Trichomoniasis	48	16.0%
Mixed Infections	24	8.0%
Total	**300**	**100%**

BV = bacterial vaginosis; VVC = vulvovaginal candidiasis; TV = Trichomonas vaginalis.

Treatment Outcomes and Cure Rates: Microbiological cure rates were highest for VVC (91.7%), followed by BV (84.8%) and trichomoniasis (87.5%). Women with mixed infections had a lower combined cure rate of 75.0%. Across all infection types, treatment was associated with substantially lower preterm delivery rates compared with the untreated comparison group (Table 3).

Table 3: Treatment regimens, cure rates, and preterm birth rates by infection type

Infection Type	Antibiotic/ Antifungal Used	Treated (n)	Cure Rate (%)	Preterm Birth – Treated	Preterm Birth – Untreated
Bacterial Vaginosis	Metronidazole 400mg BD × 7d, if weight <60 kg Metronidazole 400mg TDS × 7d, if weight >60 kg	66	84.8%	12.1%	34.5%
Vulvovaginal Candidiasis	Clotrimazole 500mg × single	48	91.7%	8.3%	22.9%
Trichomoniasis	Metronidazole 2g × single	24	87.5%	16.7%	37.5%
Mixed Infections	Combined therapy	12	75.0%	25.0%	50.0%

BD = twice daily; BV = bacterial vaginosis; VVC = vulvovaginal candidiasis.

Primary Outcome: Preterm Delivery: The preterm delivery rate was 12.0% in the treated group versus 32.0% in the untreated group (OR 0.29, 95% CI 0.15–0.55; $p < 0.001$), representing a statistically and clinically significant 62.5% relative risk reduction (Table 4). The number needed to treat (NNT) to prevent one case of preterm delivery was 5. This finding confirmed the study's research hypothesis (H_1).

Secondary Outcomes: Mean birth weight was significantly higher in treated women (3,012 ± 380 g vs. 2,680 ± 420 g; $p < 0.001$). Rates of LBW, NICU admission, and PPROM were all significantly lower in the treated group (Table 4). No serious adverse events attributable to treatment were reported; minor side effects (nausea, metallic taste) were reported by 14 women (9.3%) in the treated group but did not lead to treatment discontinuation.

Table 4: Comparison of maternal and neonatal outcomes between treated and untreated groups

Outcome	Treated Group n=150 (%)	Untreated Group n=150 (%)	OR (95% CI)	p-value
Preterm Delivery (<37 wks)	18 (12.0%)	48 (32.0%)	0.29 (0.15–0.55)	<0.001
Mean Birth Weight (g)	3,012 ± 380	2,680 ± 420	—	<0.001
Low Birth Weight (<2500 g)	14 (9.3%)	36 (24.0%)	0.33 (0.17–0.63)	<0.001
NICU Admission	10 (6.7%)	28 (18.7%)	0.31 (0.14–0.67)	0.003
PPROM	8 (5.3%)	22 (14.7%)	0.32 (0.14–0.74)	0.007

OR = odds ratio; CI = confidence interval; PPROM = preterm premature rupture of membranes; NICU = neonatal intensive care unit; LBW = low birth weight. $p < 0.05$ statistically significant.

Discussion

Interpretation of Findings: The principal finding of this study—that treatment of vaginal infections in the second trimester is associated with a significant reduction in preterm delivery—is consistent with the biological plausibility of infection-driven preterm labour. The threefold difference in preterm birth rates between treated and untreated women (12.0% vs. 32.0%) represents one of the more pronounced treatment effects reported in the literature, and is supported by the consistently significant differences

across all secondary outcomes including birth weight, NICU admission, and PPROM.

The high cure rates achieved with standard regimens (84–92%) suggest that the infections were susceptible to first-line treatment, and the treatment was administered at an optimal gestational window—14 to 24 weeks—before the inflammatory cascade responsible for preterm labour had been irreversibly initiated. This timing aligns with the mechanistic understanding that infection-driven cervical remodelling and membrane degradation are progressive processes that can be interrupted if intervention occurs sufficiently early.

Comparison with Previous Studies: The results of this study are partially concordant with, and partially divergent from, the existing literature. The large randomised trial by McDonald et al. (1997) found that metronidazole treatment of BV in pregnancy reduced the incidence of preterm birth by approximately 48% among women with a prior preterm delivery [14]—a finding broadly consistent with the present study's results in a mixed-parity population. Conversely, the ORACLE II trial found no reduction in preterm birth with erythromycin use in women with spontaneous preterm labour [15], though this trial involved a different population (women in established preterm labour rather than asymptomatic carriers) and a different antibiotic.

A 2013 Cochrane review concluded that, while antibiotic treatment of BV eradicates infection, the evidence for reduction of preterm birth was insufficient in low-risk populations but potentially beneficial in high-risk women [14]. The population in the current study, drawn predominantly from a low-income urban setting with a high baseline rate of preterm delivery, likely corresponds to the high-risk group in whom treatment benefit is most apparent.

Biological Mechanisms Underlying Observed Benefit: The treatment-associated reduction in preterm birth can be mechanistically attributed to: (i) elimination of the ascending infectious stimulus responsible for decidual and membrane cytokine production; (ii) restoration of a Lactobacillus-dominant vaginal flora that produces lactic acid, hydrogen peroxide, and bacteriocins protective against ascending infection; and (iii) reduction in prostaglandin synthesis and MMP activation consequent upon the resolution of the inflammatory state [9,10]. The superior performance of the treated group across all gestational and neonatal outcomes reinforces the concept that infection-mediated preterm delivery operates through a correctable pathway.

Clinical Implications: These findings have direct implications for the organisation of antenatal care. At the policy level, the data support the integration of routine vaginal infection screening (particularly for BV and trichomoniasis) into second-trimester ANC protocols, especially in settings with high background rates of infection and preterm birth. The cost-effectiveness is likely to be substantial given that the NNT of 5 implies that for every five women treated, one preterm delivery is averted—with associated reductions in NICU costs, neonatal morbidity, and long-term neurodevelopmental sequelae.

Strengths and Limitations: The principal strength of this study is its prospective design with standardised diagnostic and treatment protocols applied to a well-characterised cohort. The comparability of the two groups at baseline minimises selection bias. Limitations include the non-randomised design, which introduces the possibility of residual confounding despite multivariate adjustment; the restriction to a single tertiary centre, which may limit generalisability; the relatively small sample size for subgroup analyses by infection type; and the inability to assess long-term developmental outcomes in neonates. Future randomised controlled trials with adequate power and multi-centre recruitment are needed to provide definitive evidence.

Conclusion

This prospective cohort study demonstrates that the treatment of vaginal infections—specifically bacterial vaginosis, vulvovaginal candidiasis, and trichomoniasis—during the second trimester of pregnancy is associated with a statistically significant and clinically meaningful reduction in preterm delivery, low birth weight, PPROM, and NICU admission. Bacterial vaginosis was the most prevalent infection and was associated with the highest absolute reduction in preterm birth following treatment.

Early diagnosis and treatment of vaginal infections during antenatal care appear to be a practical and effective strategy for reducing the global burden of preterm birth. These findings support the implementation of routine second-trimester vaginal infection screening as a component of evidence-based antenatal care, particularly in high-prevalence, low-resource settings where the burden of preterm birth is greatest.

Recommendations

- Universal screening for BV and trichomoniasis should be offered at the first antenatal visit and again at 14–24 weeks in all pregnant women, irrespective of symptoms, particularly in high-prevalence settings.
- Standard treatment protocols (oral metronidazole for BV and trichomoniasis; topical clotrimazole for VVC) should be

incorporated into national antenatal care guidelines and provided free of charge at the point of care.

- Partner treatment and counselling are essential components of trichomoniasis management to prevent re-infection during pregnancy.
- Public health campaigns should address the known risk factors for vaginal infection—including poor perineal hygiene, tobacco use, and unsafe sexual practices—as part of broader preterm birth prevention programmes.
- Multicentric randomised controlled trials are required to establish definitive cause-and-effect relationships and to identify optimal gestational windows and treatment durations for each infection type.
- Health systems in low-and middle-income countries should invest in affordable point-of-care diagnostic tools (e.g., NAAT-based platforms) to improve diagnostic accuracy and timely treatment.

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Appendices (Guidance Notes)

Appendix A – Data Collection Form

Authors should include the structured interview and clinical data collection form used for participant enrolment. This should capture: study ID, date of enrolment, participant age, gestational age (weeks), obstetric history (gravida, para, prior preterm birth), diagnostic findings (Amsel criteria, Nugent score, microscopy, culture results), treatment allocated, follow-up visit dates, and delivery outcome data (gestational age at delivery, birth weight, mode of delivery, NICU admission, PPROM).

Appendix B – Ethical Approval

Insert a copy of the Institutional Review Board (IRB) / Ethics Committee approval letter. State the approval number, date of approval, and name of the reviewing institution. Confirm that the study was conducted in accordance with the Declaration of Helsinki (2013 revision) and that written informed consent was obtained from all participants prior to enrolment.

Appendix C – Informed Consent Form

Provide the full text of the participant information sheet and consent form used in the study. The form should explain the study purpose, procedures, potential risks and benefits, voluntary nature of participation, confidentiality protections, and the right to withdraw at any time without consequence to the participant's clinical care.

Appendix D – Abbreviations

ANC = antenatal care; BV = bacterial vaginosis; CI = confidence interval; IL = interleukin; LBW = low birth weight; MMP = matrix metalloproteinase; NICU = neonatal intensive care unit; NAAT = nucleic acid amplification test; NNT = number needed to treat; NF-κB = nuclear factor kappa-B; OR = odds ratio; PPROM = preterm premature rupture of membranes; RR = relative risk; TNF-α = tumour necrosis factor-alpha; VVC = vulvovaginal candidiasis.