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Impact of discontinuing systematic postpartum antibiotic prophylaxis on the incidence of puerperal infection: a before-and-after study at the maternity unit of Hôpital Principal de Dakar

Abstract

Introduction: The aim of this study was to compare the incidence of puerperal infection in patients who received systematic postpartum antibiotic prophylaxis with those who did not.

Methods: We conducted a quasi-experimental, uncontrolled, before-and-after study at the maternity unit of Hôpital Principal de Dakar, with a retrospective arm (1 March to 31 May 2023) and a prospective arm (1 March to 31 May 2024). Term patients who delivered vaginally or by caesarean section without identifiable infection risk factors at delivery were included. The "before" cohort (T, 2023) had received systematic postpartum antibiotic prophylaxis, whereas the "after" cohort (C, 2024) had not, apart from peri-operative prophylaxis at caesarean section. Puerperal infection was defined using standardized CDC/NHSN criteria for surgical site infection and clinical criteria for endometritis, and was ascertained at day 3 and day 7 postpartum in both cohorts. Data were analyzed with R version 4.3.3 using descriptive and univariate analyses, with the significance threshold set at $\alpha = 5\%$.

Results: A total of 442 patients were included (183 in 2023 and 259 in 2024). No puerperal infection was observed after vaginal delivery in either cohort. Among caesarean deliveries, seven puerperal infections were recorded in 2024 versus none in 2023; we did not detect a statistically significant difference between the two periods ($p = 0.064$). Given the very small number of events, this result should not be interpreted as evidence of equivalence between the two strategies.

Conclusion: Discontinuation of systematic postpartum antibiotic prophylaxis after vaginal delivery was not associated with a detectable increase in puerperal infection in our series, although the study was underpowered to exclude a clinically meaningful difference. These findings require confirmation in a larger, fully prospective cohort before any change in practice can be recommended.

Keywords: antibiotic prophylaxis, postpartum, puerperal infection, caesarean section, antimicrobial resistance; Senegal

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Introduction

Puerperal infection is defined as an infection occurring in the postpartum period, with the genital tract — particularly the placental site — as its usual portal of entry.[1] It encompasses urinary tract infections, acute endometritis, abdominal wall abscesses, and deep pelvic suppurations. The World Health Organization recognizes puerperal infection as one of the leading direct obstetric causes of maternal mortality worldwide.[2–4] Its management relies primarily on antibiotics, used both therapeutically and prophylactically.[1,5,6]

After vaginal delivery, antibiotics are indicated only when clinical or bacteriological evidence of infection is present, when intrapartum infection has been documented, or when an intrauterine procedure has been performed. Routine antibiotic prophylaxis is not justified in this setting, and the World Health Organization explicitly recommends against its systematic use after uncomplicated vaginal delivery, including in the presence of episiotomy.[7] Strict aseptic precautions, minimally invasive obstetric techniques, and a clean delivery environment remain the cornerstones of infection prevention.

Caesarean section, in contrast, carries an increased risk of postpartum infection, and peri-operative antibiotic prophylaxis significantly reduces this risk.[8] The procedure is classified as Altemeier class 2 (clean-contaminated).[9] Prophylaxis is most often given intravenously, and current guidelines recommend slow intravenous cefazolin before skin incision or at cord clamping.[10,11] Outside of operative complications, antibiotics are not recommended beyond the operating room.

In Senegal, national obstetric practice generally aligns with these recommendations, but routine clinical conditions sometimes limit their consistent application. In a multicenter survey conducted across five Senegalese facilities in 2018, Ali Mohamed found that 95.7% of providers systematically prescribed antibiotics in the postpartum period.[12] Two-thirds (67.1%) of these prescriptions were intended as prophylaxis, despite the absence of any supporting recommendation.[13] The present study addresses the following question: at the maternity unit of Hôpital Principal de Dakar, does withholding systematic postpartum antibiotic prophylaxis increase the incidence of puerperal infection compared with routine prophylaxis?

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Methodology

Study design

This was a quasi-experimental, uncontrolled, before-and-after study, combining retrospective and prospective data on women in the immediate postpartum period.

Setting and duration

The study was conducted at the maternity unit of Hôpital Principal de Dakar over two consecutive 3-month periods: 1 March to 31 May 2024 (prospective arm) and 1 March to 31 May 2023 (retrospective arm).

Study population

The target population consisted of women of childbearing age who delivered at term — vaginally or by caesarean section — at the facility during the study periods and were in the immediate postpartum period.

Inclusion criteria

We included all patients who delivered at term at the facility during the study period, provided that aseptic precautions had been respected during vaginal delivery, and that they had received either no postpartum antibiotic prophylaxis or peri-operative prophylaxis not exceeding 48 hours after caesarean section.

Exclusion criteria

We excluded:

a) Patients who had undergone manual revision of the uterine cavity;

b) Patients with prelabor rupture of membranes at term;

c) Patients with antepartum hemorrhage (placenta previa or placental abruption);

d) Patients with immediate postpartum hemorrhage or preterm delivery (before 37 weeks);

e) Patients with known immunosuppression.

Group allocation

The After group (C) included patients who delivered at term in 2024 without complications and who did not receive postpartum antibiotic prophylaxis. The Before group (T) included patients who delivered at term in 2023 and received systematic postpartum antibiotic prophylaxis.

The peri-operative antibiotic prophylaxis protocol for caesarean section was identical during both study periods and consisted of a single dose of intravenous antibiotic like cefazolin administered before skin incision, as recorded on the anaesthesia monitoring charts. Only the systematic postpartum antibiotic prophylaxis administered beyond the immediate operative period differed between the two cohorts.

Variables collected

For each patient, we recorded sociodemographic characteristics (age, place of residence, marital status), antenatal follow-up (iron supplementation, intermittent preventive treatment of malaria), and obstetric data (mode of onset of labor, mode of delivery, gestational age at delivery, year of delivery, use of systematic antibiotic prophylaxis, and type of antibiotic prescribed).

Definition of puerperal infection: Puerperal infection was the primary outcome. Surgical site infection following caesarean section was defined according to the United States Centers for Disease Control and Prevention / National Healthcare Safety Network (CDC/NHSN) criteria, namely an infection occurring at the incision site or in the deep tissues within 30 days of the procedure, with at least one of the following: purulent drainage, organisms isolated from a sterile sample, or clinical signs of infection leading to wound reopening. Endometritis and other puerperal infections were defined on clinical grounds (temperature ≥ 38 °C, uterine tenderness, purulent or foul-smelling lochia, or an identified infectious focus), supported when available by biological markers (complete blood count, C-reactive protein) and bacteriological sampling. These standardized definitions were applied identically to both cohorts.

Data collection

Data were entered into a structured form built in Google Forms.

For the 2023 cohort, postpartum infections were identified retrospectively from the medical records of patients who returned for the systematic postnatal consultation, complemented by emergency department records for patients who presented with complications. Case ascertainment was restricted to the day 3 and day 7 postpartum visits, the same time window used for the prospective cohort, in order to standardize the observation period across the two years.

For the 2024 cohort, sources included medical records, patients' personal health booklets, delivery registers, and direct review at the postnatal consultation conducted by the research team at day 3 and day 7.

Data processing and analysis

Data processing: Data on 2024 patients were entered prospectively into Google Forms by members of the research team. Data were subsequently exported and processed with Excel and R version 4.3.3.

Statistical analysis: Statistical analyses were performed in R. Descriptive statistics were used to characterize the study population, with frequency tables, measures of central tendency, and measures of dispersion. Quantitative variables were compared with Student's t-test or the Wilcoxon-Mann-Whitney test, and qualitative variables with Pearson's chi-square test, the Yates-corrected chi-square test, or Fisher's exact test, as appropriate.

A multivariable logistic regression had initially been planned to adjust for potential confounders. However, with only seven infectious events and several zero-event cells, the model was statistically unstable (complete or quasi-complete separation), yielding non-estimable or implausibly wide confidence intervals. Multivariable modelling was therefore not retained, and the analysis was limited to descriptive and univariate methods, which are appropriate for this event count. Statistical significance was set at $\alpha = 5\%$.

Results

Descriptive analysis

Sample size and inclusion rate: During the 3-month study period in 2024, 530 deliveries were recorded, including 217 caesarean sections. In 2023, 509 deliveries had been recorded during the same period. In total, 442 patients met the inclusion criteria, of whom 163 had delivered by caesarean section (Figure 1). The caesarean section rate was 36% for 2023 versus 49% for 2024.

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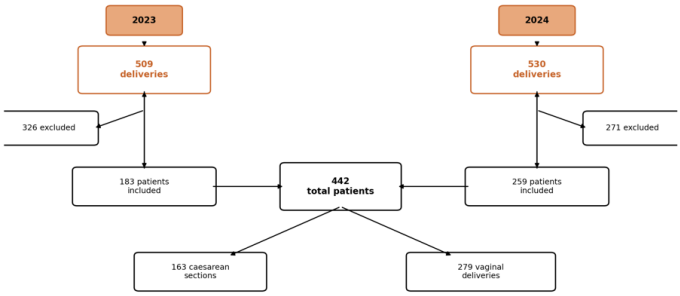

Figure 1 Flow diagram of the study population.

Figure 2 illustrates the distribution of modes of delivery for each study year.

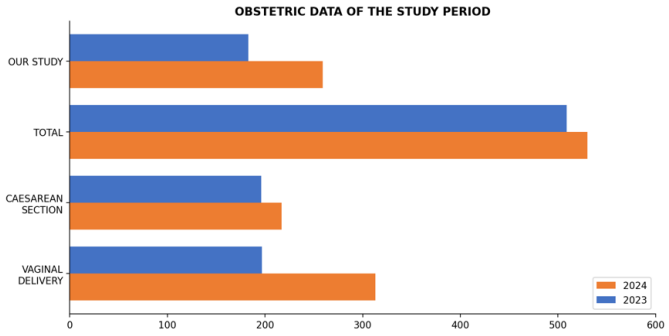

Figure 2 Obstetric data of the study population.

Sociodemographic characteristics: The median age of the study population was 32 years (range 19–46). The [30–35[age group was the most represented, and patients over 35 years accounted for more than 34% of the sample (Figure 3).

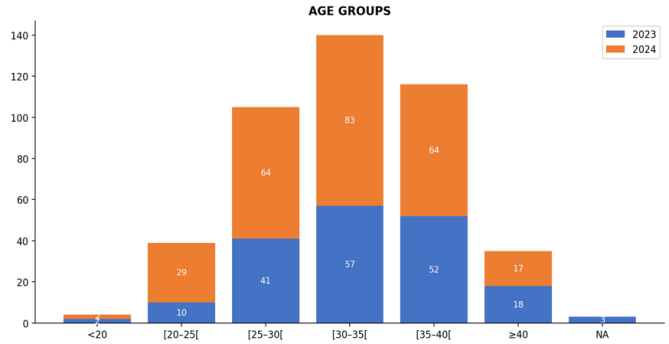

Figure 3 Distribution of patients by age group and study year.

The majority of patients lived in Dakar; however, more than 36% came from the suburbs (Figure 4) (Figure 5).

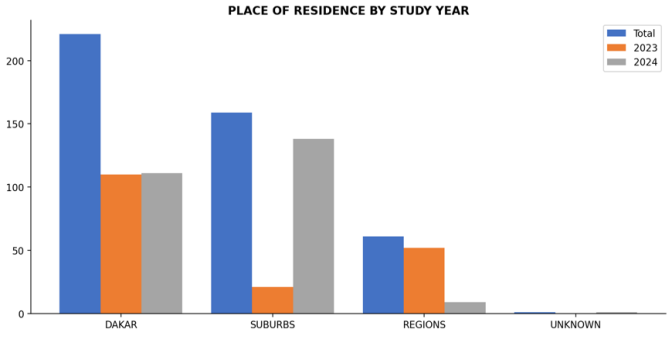

Figure 4 Distribution of patients by place of residence.

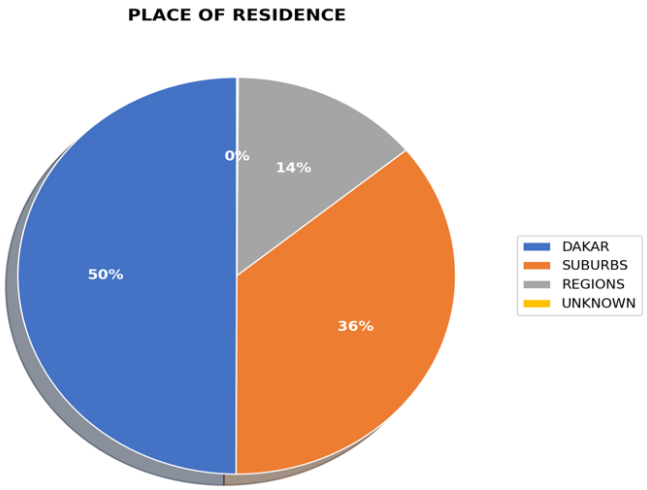

Figure 5 Distribution of patient origin by study year.

Antenatal follow-up data: One hundred and four patients had a pathology during pregnancy; gestational diabetes was the most frequent (Figure 6). Patients had received iron supplementation in 76% of cases, with higher rates in 2024 (Figure 7).

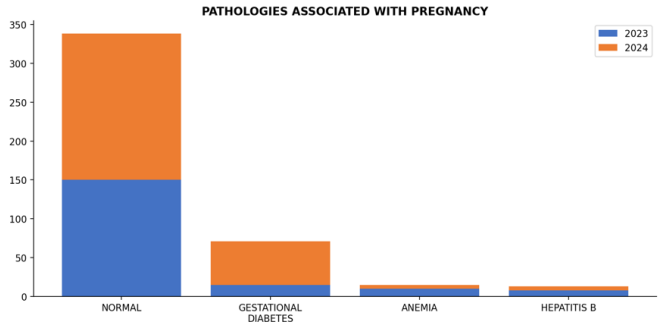

Figure 6 Distribution of patients by pregnancy-associated pathologies.

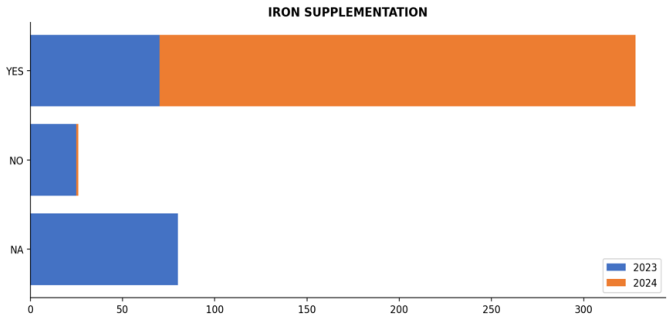

Figure 7 Iron supplementation during antenatal follow-up.

Obstetric data: Spontaneous labor remained largely predominant in both cohorts (Figure 8). The vaginal delivery rate was 62% and the caesarean section rate 37%; three patients had instrumental extraction (Figure 9). The [37–38[gestational age interval was the most represented (Figure 10).

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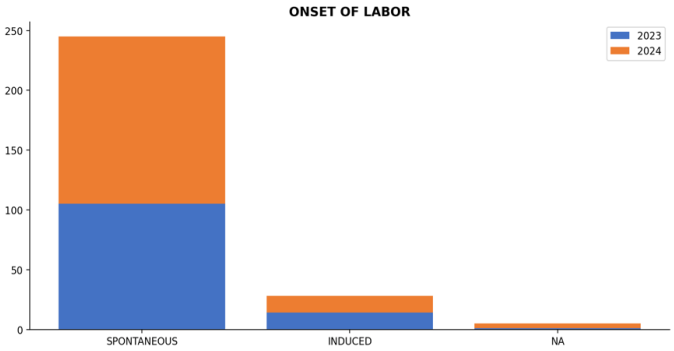

Figure 8 Mode of onset of labor by study year.

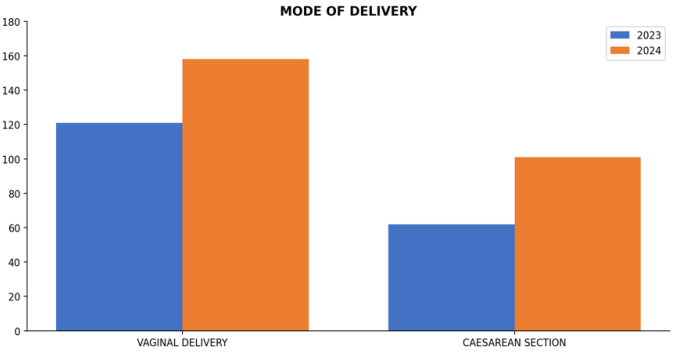

Figure 9 Mode of delivery by study year.

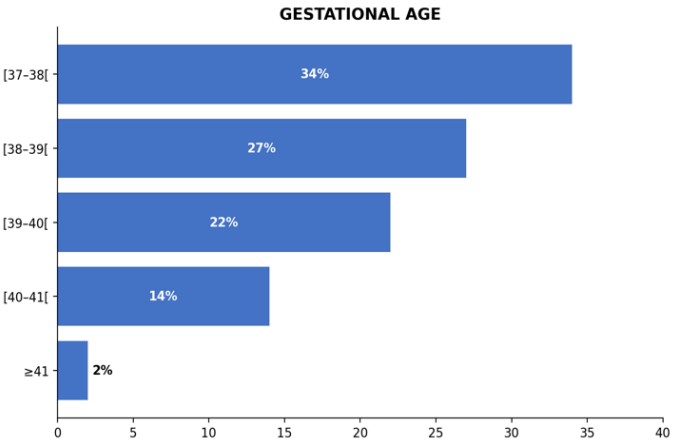

Figure 10 Distribution of patients by gestational age range.

Table 1 shows the perineal status of patients who delivered vaginally.

Table 1 Distribution of patients by perineal status in those who delivered vaginally, by study year

Perineal status	2023 N (%)	2024 N (%)
Tear	31 (26)	38 (24)
Episiotomy	27 (22)	39 (25)
Episiotomy + tear	1 (1)	3 (2)
Intact	60 (50)	74 (47)
Not specified	2 (2)	4 (3)
Total	121 (100)	158 (100)

Clinical course: Seven cases of puerperal infection were identified in 2024, during the period without routine prophylaxis. All occurred in women who had undergone caesarean section. At day 3, two patients had surgical site infection, one had infectious endometritis, one had gastroenteritis, and in a fifth patient no infectious focus could be identified despite clinical signs of sepsis. Figure 11 shows the chronology of these events.

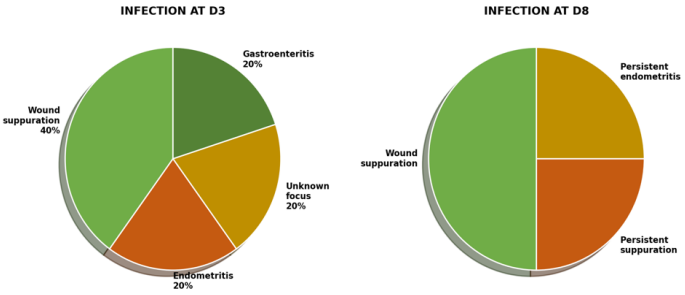

Figure 11 Chronology of puerperal infections at days 3 and 8 after caesarean section.

Surgical site infections diagnosed by day 3 were treated with metronidazole and ceftriaxone. Endometritis was treated with cefixime and metronidazole. A multidrug-resistant *Escherichia coli* was isolated in the patient with endometritis and treated successfully with imipenem. From day 8, two additional surgical site infections were identified and treated according to the same protocol. Bacteriological samples were non-contributory in the other six cases.

Analytical study

Seven puerperal infections were identified in 2024; no cases were recorded in 2023. Factors associated with puerperal infection in univariate analysis are summarized in Table 2.

Table 2 Factors associated with puerperal infection in univariate analysis (main variables)

Characteristic	Without infection (N=435)	With infection (N=7)	p-value
Median age (years)	32.0 (27.0–36.0)	33.0 (28.5–34.5)	0.7
Mode of delivery			0.002
Vaginal delivery	276 (100%)	0 (0%)	
Caesarean section	156 (96%)	7 (4.3%)	
Year of delivery			0.064
2023	183 (100%)	0 (0%)	
2024	252 (97%)	7 (2.7%)	

Only the mode of delivery was significantly associated with puerperal infection ($p = 0.002$): all infectious events occurred in women who delivered by caesarean section. As explained in the Methods, multivariable logistic regression was not retained because the small number of events and the presence of zero-event cells made the model statistically unstable and uninterpretable. The univariate association with year of delivery did not reach statistical significance ($p = 0.064$); given the limited statistical power, this finding cannot be interpreted as evidence of equivalence between the two strategies.

Discussion

Study limitations

Several limitations should be acknowledged. First, the before-and-after design is inherently susceptible to temporal confounding and does not allow firm causal inference. A particular concern is the asymmetry of case ascertainment between the two periods: data for the 2023 cohort were collected retrospectively, whereas the 2024 cohort was followed prospectively. This asymmetry may have resulted in

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differential case detection, with more complete capture of infectious events in the prospective arm, and it limits the comparability of infection rates between the two years. Although case ascertainment was restricted to the same day 3 and day 7 postpartum window in both cohorts, retrospective ascertainment relies on the completeness of documentation and on patients re-presenting to our facility; infections managed elsewhere after discharge could therefore have been missed in 2023, contributing to possible under-reporting that year. Second, the very small number of infectious events (n = 7) markedly limited statistical power and precluded any stable multivariable adjustment, so residual confounding cannot be excluded. Third, the caesarean section rate was higher in 2024 (49%) than in 2023 (36%); since all observed puerperal infections occurred after caesarean delivery, this between-period imbalance in the proportion of caesareans is an additional source of residual confounding that may have contributed to the apparent excess of infections in the 2024 cohort, beyond any effect of the change in antibiotic policy.

Epidemiological profile

The typical patient was a woman in her thirties, living in the Dakar area, with no pregnancy-associated comorbidity, who delivered vaginally with an intact perineum after spontaneous onset of labor between 37 and 38 weeks of gestation.

Discussion and clinical implications

Two main findings emerge from these results.

First, no puerperal infection occurred after vaginal delivery in either cohort, despite the absence of systematic prophylaxis in 2024. This is consistent with WHO recommendations and with published evidence showing no benefit from routine antibiotic prophylaxis after uncomplicated vaginal delivery, including in cases of episiotomy.[7] In a Cochrane review, Williams *et al.* similarly found no benefit of routine prophylaxis in the absence of identifiable risk factors.[8]

Second, in caesarean deliveries, seven puerperal infections, including four surgical site infections, were observed in 2024 versus none in 2023. We did not detect a statistically significant difference ($p = 0.064$), but, as noted above, this does not establish equivalence, and the apparent excess of infections in the unexposed period must be interpreted with great caution given the differential ascertainment and the small event count. Our findings are nonetheless broadly consistent with those of Nabhan et al.[10] and Van Schalkwyk et al.,[11] who showed that peri-operative prophylaxis alone is generally sufficient to minimize surgical site infections after caesarean section.

From an antimicrobial stewardship perspective, the systematic postpartum prescription of antibiotics in the absence of evidence of benefit is of particular concern. The isolation of a multidrug-resistant Escherichia coli in one of our patients illustrates the selection pressure generated by unnecessary antibiotic exposure. This observation is consistent with the increasing prevalence of resistant Enterobacteriaceae, including extended-spectrum beta-lactamase–producing strains, reported in clinical settings in Senegal and across West Africa. In a context where therapeutic options are limited and microbiological surveillance is incomplete, rationalizing postpartum antibiotic prescribing is an important contribution to local and global efforts to contain antimicrobial resistance. A multicenter cluster-randomized trial, stratified by mode of delivery and with prospective ascertainment of infections up to day 30 postpartum, would be the most appropriate design to address the residual uncertainties highlighted by our work.

Conclusion

Our study did not detect an increase in puerperal infections after vaginal delivery when systematic antibiotic prophylaxis was withheld; however, because of its before-and-after design, differential case ascertainment, and very small number of events, it cannot establish the safety or equivalence of this strategy. For caesarean section, the data are likewise insufficient to draw firm conclusions. Provided that strict aseptic precautions are maintained and that peri-operative prophylaxis is used for caesarean sections, discontinuing routine postpartum antibiotic prescription appears a reasonable direction, but should be evaluated prospectively before being adopted as policy. These results support a structured re-evaluation of local prescribing practices, in line with global efforts to reduce antimicrobial resistance and healthcare-associated infections.

Acknowledgments

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Ethical considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki. Data were collected during routine clinical care, with patient anonymity and confidentiality maintained throughout. Institutional ethical approval was obtained in accordance with local procedures.

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Conflicts of interest

The authors declare no conflicts of interest.

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