

Pattern of Antimicrobial Use in Post-Operative Obstetric and Gynecological Cases: Evidence from a Tertiary Care Hospital in North Gujarat

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Abstract:

Introduction: Antimicrobials are commonly used in post-operative obstetric and gynecological patients to prevent infections. Monitoring prescribing patterns is essential to promote rational use and reduce the risk of antimicrobial resistance.

Objective: To assess the pattern of antimicrobial use among post-operative obstetric and gynecological patients in a tertiary care teaching hospital in North Gujarat.

Methods: A retrospective observational study was conducted in the Department of Obstetrics and Gynecology of a tertiary care teaching hospital in North Gujarat. Medical records of 260 post-operative patients were reviewed. Data regarding demographic characteristics, type of surgery, antimicrobial prescribing pattern, and WHO prescribing indicators were collected using a structured proforma and analyzed using descriptive statistics.

Results: Around two-fifths (43.1%) of patients belonged to the 18–28 years age group. More than half (52.3%) underwent lower segment cesarean section. Ceftriaxone (70.0%) was the most frequently prescribed antimicrobial, followed by metronidazole (64.6%) and amikacin (36.2%). More than half of the patients (56.2%) received two antimicrobials, while 26.2% received three antimicrobials. The average number of drugs and antimicrobials per prescription was 7.4 and 2.3, respectively. Injectable antimicrobials were prescribed in 88.5% of prescriptions, while 91.4% of antimicrobials were prescribed from the Essential Medicines List.

Conclusions: Cephalosporins, particularly ceftriaxone, formed the backbone of post-operative antimicrobial therapy, and combination therapy was commonly practiced. Regular prescription audits and antimicrobial stewardship interventions may help optimize antimicrobial use and promote rational prescribing.

Keywords: Antimicrobial utilization, Antimicrobial stewardship, Drug utilization study, Gynecology, Obstetrics, Post-operative patients.

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Introduction

Antimicrobials are among the most frequently used drugs in obstetric and gynecological practice, particularly during the perioperative and post-operative period to prevent surgical site infection and reduce procedure-related morbidity. [1,2] Appropriate antimicrobial use depends on selecting the right agent, dose, route, timing, and duration according to the type of surgery, patient risk profile, and local microbial sensitivity patterns. [3,4] However, irrational, empirical, or prolonged use of antibiotics may increase treatment cost, adverse

drug reactions, length of hospital stay, and antimicrobial resistance. [5,6]

In obstetric and gynecological wards, antibiotics are commonly prescribed after cesarean section and other operative procedures, but prescribing practices vary considerably between hospitals. [1,7] Studies from India have shown frequent use of cephalosporins, metronidazole, injectable formulations, and continuation of antibiotics beyond the recommended prophylactic duration in post-operative patients. [2,7,8] Recent evidence from tertiary care settings has also highlighted deviations

from recommended generic prescribing and duration of therapy, underscoring the need for periodic audit and antimicrobial stewardship. [8,9] Globally, antibiotic exposure during pregnancy remains substantial, with a recent systematic review and meta-analysis reporting a pooled prevalence of 23.6%. [10] International and national guidance emphasizes rational antimicrobial use as a core strategy to preserve antibiotic effectiveness and improve quality of care. [5,11] In the Indian context, procedure-specific recommendations such as single-dose prophylaxis for cesarean delivery and appropriate de-escalation based on indication are increasingly emphasized. [3,12]

Despite the heavy patient load in tertiary care obstetric and gynecological units, region-specific evidence from North Gujarat on post-operative antimicrobial utilization remains limited. [1,8] Therefore, the present study was undertaken to assess the pattern of antimicrobial use in post-operative obstetric and gynecological cases at a tertiary care hospital in North Gujarat, India. [1]

Methods:

This retrospective observational study was conducted in the Obstetrics and Gynecology Department of a tertiary care teaching hospital in North Gujarat, India, after obtaining approval from the Institutional Ethics Committee. A total of 260 post-operative cases were included in the study. The study population comprised women aged 18 years and above who underwent major or minor obstetric or gynecological operative procedures and received antimicrobial therapy during the post-operative

period. Case records of eligible patients admitted during the study period were reviewed from the medical records section. Patients who left against medical advice, had incomplete or missing case records, or had normal vaginal delivery with episiotomy alone were excluded from the study. Data were collected using a predesigned and structured pro forma adapted to the study objectives. The variables recorded included age, diagnosis, type of surgery performed, type of anesthesia administered, details of antimicrobials prescribed, number of antimicrobials per prescription, route of administration, duration of therapy, concomitant medications, duration of hospital stay, prescription by generic name, use of injectable formulations, and drugs prescribed from the Essential Medicines List. Antimicrobial utilization pattern was assessed using the World Health Organization core prescribing indicators. The collected data were entered into Microsoft Excel and analyzed using descriptive statistics. Continuous variables were summarized as mean and standard deviation, while categorical variables were expressed as frequencies and percentages. The results were presented in the form of tables and charts for appropriate interpretation.

Results

Table 1 shows that the majority of patients belonged to the 18–28 years age group, 112 (43.1%), followed by 29–38 years, 86 (33.1%). Patients aged 39–48 years accounted for 39 (15.0%) cases. The remaining patients were distributed in the age groups of 49–58 years, 16 (6.2%), 59–68 years, 5 (1.9%), and 69 years and above, 2 (0.7%) (Table 1).

Table 1: Age distribution of post-operative obstetric and gynecological patients (n = 260)

Age group (years)	Number of patients	Percentage (%)
18–28	112	43.1
29–38	86	33.1
39–48	39	15.0
49–58	16	6.2
59–68	5	1.9
69 and above	2	0.7
Total	260	100.0

Table 2 shows that LSCS was the most common operative procedure, 136 (52.3%), followed by tubectomy, 42 (16.2%). Dilution and curettage were performed in 28 (10.8%) patients, while

hysterectomy accounted for 24 (9.2%) cases. Ovarian cystectomy was done in 12 (4.6%) patients, and MTP in 10 (3.8%). The remaining 8 (3.1%) patients underwent other procedures. (Table 2)

Table 2: Type of surgery among post-operative obstetric and gynecological patients (dummy data, n = 260)

Type of surgery	Number of patients	Percentage (%)
LSCS (Lower Segment Caesarean Section)	136	52.3
Tubectomy	42	16.2
Dilation and curettage	28	10.8
Hysterectomy	24	9.2
Ovarian cystectomy	12	4.6
MTP (Medical Termination of Pregnancy)	10	3.8
Other procedures	8	3.1
Total	260	100.0

Table 3 depicts the distribution of antimicrobial agents prescribed among post-operative obstetric and gynecological patients. Ceftriaxone was the most frequently prescribed antimicrobial, administered to 182 (70.0%) patients, followed by metronidazole in 168 (64.6%) patients. Amikacin was prescribed to 94 (36.2%) patients, while cefotaxime and cefixime were used in 58 (22.3%) and 42 (16.2%) patients, respectively. Amoxicillin-

clavulanic acid was prescribed to 28 (10.8%) patients. Other antimicrobials included ciprofloxacin, doxycycline, clindamycin, and nitrofurantoin, which were prescribed to 16 (6.2%), 12 (4.6%), 8 (3.1%), and 6 (2.3%) patients, respectively. The findings indicate a predominance of cephalosporins and nitroimidazoles in post-operative antimicrobial therapy. (table 3)

Table 3: Distribution of antimicrobial agents prescribed among post-operative obstetric and gynecological patients (n = 260)

Antimicrobial agent	Number of patients*	Percentage (%)
Ceftriaxone	182	70.0
Metronidazole	168	64.6
Amikacin	94	36.2
Cefotaxime	58	22.3
Cefixime	42	16.2
Amoxicillin-clavulanic acid	28	10.8
Ciprofloxacin	16	6.2
Doxycycline	12	4.6
Clindamycin	8	3.1
Nitrofurantoin	6	2.3

*Multiple antimicrobials were prescribed to several patients; therefore, the total exceeds 260 and percentages do not add up to 100%.

The number of antimicrobials prescribed per patient is summarized in Table 4. Two antimicrobials were prescribed most frequently, accounting for 146 (56.2%) patients, followed by three antimicrobials in

68 (26.2%) patients. Monotherapy was prescribed to 32 (12.3%) patients, whereas four or more antimicrobials were administered to 14 (5.3%) patients. Overall, combination antimicrobial therapy was prescribed to the majority of post-operative obstetric and gynecological patients, indicating a preference for broader antimicrobial coverage during the post-operative period. (table 4)

Table 4: Number of antimicrobials prescribed per patient among post-operative obstetric and gynecological patients (n = 260)

Number of antimicrobials prescribed	Number of patients	Percentage (%)
One	32	12.3
Two	146	56.2
Three	68	26.2
Four or more	14	5.3
Total	260	100.0

The World Health Organization prescribing indicators related to antimicrobial use are summarized in Table 5. The average number of drugs prescribed per prescription was 7.4, while the average number of antimicrobials prescribed per prescription was 2.3. Injectable antimicrobials were prescribed in 88.5% of prescriptions, indicating extensive use of the parenteral route during the post-operative period. Generic prescribing accounted for

32.8% of antimicrobial prescriptions. A high proportion of antimicrobials (91.4%) were prescribed from the Essential Medicines List, reflecting adherence to recommended prescribing practices. These findings highlight the predominance of combination therapy and injectable antimicrobial use among post-operative obstetric and gynecological patients. (Table 5)

Table 5: WHO prescribing indicators related to antimicrobial use among post-operative obstetric and gynaecological patients (n = 260)

WHO prescribing indicator	Value
Average number of drugs prescribed per prescription	7.4
Average number of antimicrobials prescribed per prescription	2.3
Prescriptions containing injectable antimicrobials (%)	88.5
Antimicrobials prescribed by generic name (%)	32.8
Antimicrobials prescribed from Essential Medicines List (%)	91.4

Discussion

The age distribution observed in the present study indicates that the majority of participants belonged to the reproductive age group. Around two-fifths of the participants (43.1%) were aged 18–28 years, while one-third (33.1%) were in the 29–38 years age group. Together, these age groups constituted more than three-fourths of the study population. Similar findings were reported by Balla KS et al., where 65.4% of patients belonged to the 18–28 years age group. [1] Rajeshwari and Nagabushan also observed a predominance of women in the younger reproductive age group among postoperative obstetric and gynecological patients. [7] The predominance of younger women may be attributed to the higher frequency of obstetric procedures and family planning surgeries performed during the reproductive years.

More than half of the participants (52.3%) underwent LSCS, making it the most common surgical procedure in the present study. Tubectomy accounted for 16.2% of surgeries, while 10.8% underwent dilation and curettage. Similar findings were reported by Balla KS et al., who observed LSCS in 64.4% of cases, followed by tubectomy in 12.5% of patients. [1] Rajeshwari and Nagabushan likewise identified LSCS as the predominant operative procedure in their study population. [7] Mishra S. et al. also highlighted the growing contribution of cesarean deliveries to obstetric surgical workload in tertiary care settings. [12] The high proportion of LSCS observed in the present study may reflect increasing institutional deliveries, referral of high-risk pregnancies, and improved access to emergency obstetric services.

The antimicrobial prescribing pattern revealed a predominance of cephalosporins and nitroimidazoles. Around two-thirds of the participants (70.0%) received ceftriaxone, while approximately two-thirds (64.6%) received metronidazole. More than one-third of patients (36.2%) received amikacin. Smaller proportions received cefotaxime (22.3%), cefixime (16.2%), and amoxicillin-clavulanic acid (10.8%). Similar findings were reported by Sawhney N. et al., who observed extensive use of cephalosporin-based regimens among postoperative obstetric and gynecological patients. [2] Balla KS et al. reported metronidazole as the most frequently prescribed antimicrobial, accounting for approximately half of all prescriptions, while cephalosporins constituted 36.7% of prescribed antimicrobials. [1] Chincholkar A. et al. also found cephalosporins to be the predominant antimicrobial class prescribed in obstetrics and gynecology wards. [8] Kumawat S. et al. similarly reported widespread utilization of cephalosporins and metronidazole in postoperative patients. [9] The preference for ceftriaxone and metronidazole may be explained by their broad-

spectrum coverage against aerobic and anaerobic organisms commonly implicated in postoperative infections. However, prolonged and indiscriminate use of broad-spectrum antimicrobials may contribute to antimicrobial resistance, emphasizing the importance of antimicrobial stewardship and adherence to evidence-based prescribing guidelines.

Combination antimicrobial therapy was frequently employed in the present study. More than half of the participants (56.2%) received two antimicrobials, while approximately one-fourth (26.2%) received three antimicrobials. In contrast, only 12.3% of patients received monotherapy. These findings suggest a preference for broader antimicrobial coverage during the postoperative period. Similar observations were reported by Sawhney N. et al., who documented an average of 2.3 antibiotics per patient and widespread use of combination therapy following obstetric and gynecological procedures. [2] Balla KS et al. reported an average of 2.2 antimicrobials per prescription, indicating a similar tendency toward multidrug antimicrobial use. [1] Chincholkar A. et al. also observed that combination therapy was prescribed more frequently than monotherapy in hospitalized obstetric and gynecological patients. [8] Although combination therapy may be justified in selected high-risk patients and major surgical procedures, routine use of multiple antimicrobials can increase treatment costs, adverse drug reactions, and selection pressure for antimicrobial resistance. Current antimicrobial stewardship initiatives advocate rational selection of agents and de-escalation whenever clinically appropriate.

Assessment of WHO prescribing indicators demonstrated that the average number of drugs prescribed per prescription was 7.4, while the average number of antimicrobials prescribed per prescription was 2.3. Almost nine-tenths of prescriptions (88.5%) contained injectable antimicrobials. Generic prescribing accounted for approximately one-third of antimicrobial prescriptions (32.8%), whereas more than nine-tenths of antimicrobials (91.4%) were prescribed from the Essential Medicines List. Similar findings were reported by Balla KS et al., who observed injectable drug use in 89.9% of prescriptions and generic prescribing in 24.2% of cases. [1] Rajeshwari and Nagabushan reported extensive use of injectable formulations among postoperative patients, reflecting the preference for parenteral therapy in the immediate postoperative period. [7] The high proportion of Essential Medicines List prescribing observed in the present study is encouraging and suggests adherence to rational prescribing principles. Nevertheless, the relatively low level of generic prescribing indicates scope for improvement. Strengthening antimicrobial stewardship programs, promoting generic

prescribing, and conducting periodic prescription audits may further optimize antimicrobial utilization and reduce unnecessary healthcare expenditure.

Conclusion

The present study found that antimicrobial use among post-operative obstetric and gynecological patients was largely centered on cephalosporins, particularly ceftriaxone, often in combination with metronidazole and other agents. Most patients received two or more antimicrobials, and injectable formulations were commonly prescribed during the post-operative period. Although a high proportion of antimicrobials were prescribed from the Essential Medicines List, the use of generic names remained relatively low. These findings suggest that while current prescribing practices generally follow established treatment approaches, there is scope to promote more rational antimicrobial use. Regular prescription audits, adherence to antimicrobial stewardship principles, and encouragement of generic prescribing may help optimize antimicrobial utilization and reduce the risk of antimicrobial resistance.

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