

Profile of Antibiotics Used at General Hospital Tungan Magajiya, Rijau Local Government, Niger State, Nigeria

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Abstract: **Background:** Antibiotics are among the most frequently prescribed medicines in hospital practice, and their inappropriate use accelerates the emergence of antimicrobial resistance. **Objective:** To determine the profile of antibiotics used at General Hospital Tungan Magajiya (GHTM), Rijau Local Government, Niger State, Nigeria. **Methods:** This was a retrospective cross-sectional study of 592 patient prescription records dispensed at the pharmacy department between January and May 2019, selected by simple random sampling and analysed descriptively using the Statistical Package for the Social Sciences and the WHO core prescribing indicators. **Results:** Of the 592 patients, 316 (53.38%) were female and 201 (33.95%) were aged 21-25 years. A total of 838 single antibiotics comprising 12 agents were prescribed; metronidazole was the most prescribed (281, 33.53%) and ciprofloxacin the least (4, 0.48%). Of 1035 antibiotic prescriptions, 197 were combinations, of which ceftriaxone/ciprofloxacin was commonest (46, 23.35%). The leading indications were typhoid enteritis (63, 10.29%), stooling (51, 8.33%) and anaemia (48, 7.84%). The average number of drugs per encounter was 2.78 (WHO standard 1.6-1.8), generic prescribing was 37.59%, encounters with an antibiotic were 70% (standard 20-26.8%) and encounters with an injection were 88% (standard 20-26%). **Conclusion:** Antibiotic prescribing at GHTM was largely indication-appropriate, but core prescribing indicators deviated markedly from WHO reference standards, reflecting polypharmacy and weak adherence to standard treatment guidelines. Strengthening antibiotic stewardship, laboratory-guided prescribing, and generic prescribing is recommended.

Keywords: Antibiotics; Prescribing Pattern; Rational Drug Use; WHO Core Prescribing Indicators; Antimicrobial Resistance; Niger State.

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I. INTRODUCTION

Antibiotics remain among the most frequently prescribed classes of medicines in hospital practice worldwide, and their appropriate use is central to safe, cost-effective patient care. Inappropriate prescribing and the accompanying rise in antimicrobial resistance are now recognised as major threats to global health, prompting calls for structured antimicrobial stewardship programmes in both developed and developing health systems^{1,2}. Prescribing decisions are shaped by factors that extend beyond clinical need, including patient characteristics, prescriber experience, workplace pressures and the reliability of the drug supply system, and these factors interact differently across health systems³. Where stewardship structures are weak or absent, broad-spectrum antibiotics tend to be used more liberally, accelerating the selection of resistant organisms and raising the cost and complexity of treatment^{4,5}.

In Nigeria, as in many low- and middle-income countries, empirical prescribing without laboratory confirmation, polypharmacy and low compliance with standard treatment guidelines have repeatedly been documented as drivers of irrational antibiotic use^{6,7}. The World Health Organization (WHO) core prescribing indicators, namely the average number of drugs per encounter, the percentage prescribed by generic name, the percentage of encounters with an antibiotic, the percentage with an injection and the percentage prescribed from an essential medicines list, provide an internationally comparable framework for auditing prescribing quality against defined reference standards^{8,9}. Facility-level studies applying this framework across African and Asian health institutions have consistently reported deviation from WHO reference values, particularly with regard to antibiotic and injection use^{10,11}.

General Hospital Tungan Magajiya (GHTM), in Rijau Local Government Area of Niger State, serves a predominantly rural population with limited access to microbiology diagnostic support, conditions under which empirical antibiotic prescribing is common but rarely audited. No prior facility-level assessment of antibiotic prescribing had been conducted at GHTM. This study was therefore designed to determine the profile of antibiotics used at the hospital, describe the pattern of single and combined antibiotic prescribing, identify the leading clinical indications for antibiotic use, and assess prescribing quality against the WHO core prescribing indicators, with a view to informing local antimicrobial stewardship efforts.

II. MATERIALS AND METHODS

➤ Study Design and Area

This was a retrospective, descriptive cross-sectional study conducted at General Hospital Tungan Magajiya (GHTM), Rijau Local Government Area, Niger State, Nigeria (Latitude 11°5'56.80" N, Longitude 5°15'9.99" E; elevation 365.27 m). Rijau LGA had an estimated population of 176,689 at the 2006 census. GHTM runs outpatient, pharmacy, nursing, medical records and laboratory departments, together with maternity, theatre and male/female medical-surgical in-patient wards.

➤ Data Collection, Sample Size and Study Population

Prescription data covering January to May 2019 were obtained from the pharmacy department. A total of 592 patient prescription records were selected from the study population by simple random sampling, with records drawn at random from the beginning to the end of each month.

➤ Inclusion and Exclusion Criteria

All patient prescription records attended to in the pharmacy department between January and May 2019 were included. Records of patients not attended to in the pharmacy department during this period were excluded.

➤ Data Analysis

Data were analysed descriptively as frequencies and percentages using the Statistical Package for the Social Sciences (SPSS), and presented in tables. Prescribing quality was additionally assessed using the WHO core prescribing indicators, namely the average number of drugs per encounter, percentage of drugs prescribed by generic name, percentage of encounters with an antibiotic prescribed, percentage of encounters with an injection prescribed, and percentage of drugs prescribed from the essential medicines list.

➤ Ethical Consideration

An introduction letter obtained from Saint Monica Higher Institute was submitted with a written application to the Head of Hospital Services of GHTM for permission to conduct the study. Patient information obtained was treated as confidential and used solely for the purpose of this study.

III. RESULTS AND DISCUSSION

A total of 592 patient prescription records were evaluated. Female patients accounted for 316 (53.38%) and males for 276 (46.62%). The 21-25 year age group had the highest representation, 201 (33.95%), while patients older than 36 years were least represented, 96 (16.22%) (Table 1, Table 2).

Table 1: Age Distribution of Patients

S/N	Age group (years)	Frequency	Percentage (%)
1	15-20	110	18.58
2	21-25	201	33.95
3	26-30	99	16.72
4	31-35	86	14.53
5	>36	96	16.22
	Total	592	100.00

Table 2: Gender Distribution of Patients

S/N	Gender	No. of patients	Percentage (%)
1	Male	276	46.62
2	Female	316	53.38
	Total	592	100.00

Of 838 drugs administered by route, oral administration was most common in both sexes, 149 (17.78%) in males and 168 (20.04%) in females, followed by the intramuscular and intravenous routes (Table 3). This predominance of oral therapy is consistent with its established advantages of convenience, lower cost and reduced risk of injection-associated complications.

Table 3: Route of Antibiotic Administration by Gender

Route	Male	Percentage (%)	Female	Percentage (%)
Oral (PO)	149	17.78	168	20.04
Intravenous (IV)	133	15.87	138	16.46
Intramuscular (IM)	119	14.08	132	15.75

Twelve different single antibiotics, totalling 838 prescriptions, were identified. Metronidazole (Flagyl®) was the most frequently prescribed agent, 281 (33.53%), followed by amoxicillin-clavulanate (Augmentin®), 99 (11.81%), and amoxicillin (Amoxyl®), 108 (12.89%); ciprofloxacin was the least prescribed, 4 (0.48%) (Table 4). Of 1035 antibiotic prescriptions overall, 197 (19.03%) were combination prescriptions comprising 19 distinct combinations; ceftriaxone/ciprofloxacin was the commonest combination, 46 (23.35%), followed by amoxyl/flagyl, 38 (19.29%), and doxycycline/flagyl, 33 (16.75%) (Table 5).

Table 4: Single Antibiotics Prescribed

S/N	Antibiotic	Frequency	Percentage (%)
1	Ampiclox®	92	10.98
2	Amoxyl®	108	12.89
3	Doxycycline	88	10.5
4	Flagyl® (metronidazole)	281	33.53
5	Azithromycin	24	2.86
6	Erythromycin	38	4.53
7	Augmentin®	99	11.81
8	Seprin® (co-trimoxazole)	42	5.01
9	Tetracycline	19	2.27
10	Chloramphenicol	6	0.72
11	Ciprofloxacin	4	0.48
12	Ofloxacin	37	4.42
	TOTAL	838	100.00

Table 5: Combined Antibiotics Prescribed

S/N	Combined antibiotics	Frequency	Percentage (%)
1	Ceftriaxone/Ciprofloxacin	46	23.35
2	Amoxyl/Flagyl	38	19.29
3	Doxycycline/Flagyl	33	16.75
4	Azithromycin/Ampiclox	11	5.58
5	Seprin/Flagyl	8	4.06
6	Ciprofloxacin/Doxycycline/Flagyl/Azithromycin	9	4.57
7	Ciprofloxacin/Flagyl	7	3.55
8	Ampiclox/Flagyl	7	3.55
9	Ciprofloxacin/Flagyl/Doxycycline	6	3.05
10	Azithromycin/Flagyl/Ofloxacin	5	2.52
11	Ciprofloxacin/Flagyl/Azithromycin	4	2.03
12	Doxycycline/Azithromycin	4	2.03
13	Ampiclox/Doxycycline	3	1.52

S/N	Combined antibiotics	Frequency	Percentage (%)
14	Ofloxacin/Flagyl	3	1.52
15	Chloramphenicol/Ampiclox	3	1.52
16	Ciprofloxacin/Doxycycline	3	1.52
17	Amoxyl/Septrin	2	1.01
18	Augmentin/Flagyl	2	1.02
19	Ampiclox/Doxycycline/Flagyl	1	0.51
	Total	197	100.00

By therapeutic class, nitroimidazoles (metronidazole) accounted for the largest share, 281 (33.53%), followed by penicillins, 249 (26.73%), macrolides, 137 (16.35%), and tetracyclines, 107 (12.76%); chloramphenicol was the least-used class, 6 (0.72%) (Table 6). The dominance of penicillins and macrolides is consistent with reports from other Nigerian tertiary and secondary facilities, where their broad spectrum of activity, established clinical efficacy and favourable tolerability have sustained their position as first-line agents.

Table 6: Classes of Antibiotics Prescribed

S/N	Antibiotic class	Frequency	Percentage (%)
1	Others (nitroimidazoles)	281	33.53
2	Penicillins	249	26.73
3	Macrolides	137	16.35
4	Tetracyclines	107	12.76
5	Co-trimoxazole	42	5.01
6	Quinolones	41	4.89
7	Chloramphenicol	6	0.72
	Total	863	100.00

Of the 592 patients evaluated, a total of 1650 drugs were prescribed; antibiotics constituted 1035 (76.67%) of all drugs, and 556 (93.92%) of patients received at least one antibiotic. Typhoid enteritis was the leading indication for antibiotic therapy, 63 (10.29%), followed by stooling, 51 (8.33%), anaemia, 48 (7.84%), heat rashes, 45 (7.35%), and cough and fever, 42 (6.86%); the least frequent indications were accident injury/wound, 4 (0.65%), sepsis, 5 (0.81%), and appendicitis, 6 (0.98%) (Table 7).

Table 7: Prevalent Conditions Treated with Antibiotics

S/N	Disease/Condition	Frequency	Percentage (%)
1	Typhoid enteritis	63	10.29
2	Stooling	51	8.33
3	Anaemia	48	7.84
4	Heat rashes	45	7.35
5	Cough and fever	42	6.86
6	Gastroenteritis	39	6.37
7	Urinary tract infection	39	6.37
8	Respiratory tract infection	31	5.06
9	Asthma	33	5.39
10	Helminthiasis	25	4.08
11	Chickenpox	21	3.43

S/N	Disease/Condition	Frequency	Percentage (%)
12	Dysentery	19	3.1
13	Cellulitis	18	2.94
14	Neonatal jaundice	18	2.94
15	Surgeries	16	2.61
16	Amenorrhoea	14	2.29
17	Dermatitis	12	1.96
18	Peptic ulcer disease	11	1.8
19	Eye infection	13	2.12
20	Meningitis	8	1.31
21	Bruises/laceration	8	1.31
22	Appendicitis	6	0.98
23	Sepsis	5	0.81
24	Accident injury/wound	4	0.65
	Total	521	100.00

Assessment against the WHO core prescribing indicators showed that the average number of drugs per encounter was 2.78, well above the WHO reference range of 1.6-1.8, indicating a tendency toward polypharmacy. Only 37.59% of drugs were prescribed by generic name, against a target of 100%, while 88% of encounters involved an injection and 70% involved an antibiotic, both far exceeding the WHO reference ranges of 20-26% and 20-26.8% respectively (Table 8). Comparable deviations from WHO standards, particularly for antibiotic and injection use, have been reported in other resource-limited hospital settings^{12,13}, suggesting that this pattern reflects broader systemic pressures on prescribing rather than a facility-specific problem alone.

Table 8: Analysis of Who Core Prescribing Indicators

S/N	WHO core prescribing indicator	Result obtained	WHO standard
1	Average number of drugs per encounter	2.78	1.6-1.8
2	Percentage of drugs prescribed by generic name	37.59%	100%
3	Percentage of encounters with an injection prescribed	88%	20-26%
4	Percentage of encounters with an antibiotic prescribed	70%	20-26.8%
5	Percentage of drugs prescribed from the essential medicines list	50.79%	100%

Drug availability, 23 (25.27%), cost of the drug, 18 (19.78%), previous use of the drug, 14 (15.38%), and laboratory results, 13 (14.29%), were the leading factors reported to influence the choice of antibiotic prescribed (Table 9). The influence of drug availability and cost on prescribing choice, rather than laboratory-confirmed diagnosis, has similarly been described in other Nigerian facility-based studies^{7,14}, and reflects the constraints that supply-chain and diagnostic limitations place on rational prescribing in resource-limited settings.

Table 9: Factors Influencing the Profile of Antibiotic Use

S/N	Factor influencing antibiotic prescription	Frequency	Percentage (%)
1	Drug availability	23	25.27
2	Previous use of drug	14	15.38
3	Cost of drug	18	19.78
4	Hours of operation by pharmacy	12	13.18
5	Laboratory result	13	14.29
6	Resistance to previous treatment	8	8.79

S/N	Factor influencing antibiotic prescription	Frequency	Percentage (%)
7	Disease pattern	3	3.3
	Total	91	100.00

A review of the components of a standard prescription format showed full documentation (100%) of patient name, age, sex and address, drug name, dose, dosage form, dosage directions, quantity to be dispensed, instructions for use, and prescriber's name and address; however, the Rx symbol was absent from all prescriptions reviewed. No antibiotic policy, medication advisory committee, or storage and administration policy for regulating antibiotic use was found to be in place at the facility, and a copy of the WHO Model List of Essential Medicines was not available on site, although 14 of 29 key essential drugs were available in stock at the time of the study.

Overall, the antibiotics used at GHTM were largely appropriate to the indications for which they were prescribed, with the majority of conditions treated being confirmed or presumed bacterial infections. This finding is consistent with facility audits elsewhere that found antibiotic prescribing predominantly directed at bacterial rather than non-bacterial conditions.

Nonetheless, the deviation of the core prescribing indicators from WHO standards, together with the absence of an antibiotic policy or medication advisory committee, points to weak adherence to standard treatment guidelines as the principal driver of polypharmacy and empirical, availability-driven prescribing at the facility, a pattern also reported in tertiary care settings in India and other Nigerian secondary facilities^{15,16}. Strengthening laboratory-guided prescribing, generic substitution and formal antibiotic stewardship structures is therefore likely to have a measurable impact on prescribing quality at GHTM.

IV. CONCLUSION

Antibiotic prescribing at General Hospital Tungan Magajiya was largely appropriate to clinical indication, with metronidazole, penicillins and macrolides forming the mainstay of therapy. However, the core WHO prescribing indicators deviated substantially from reference standards, reflecting polypharmacy, low generic prescribing and high rates of antibiotic and injection use. The principal underlying challenge was poor adherence and compliance of prescribers with standard treatment guidelines, compounded by the absence of a facility antibiotic policy or medication advisory committee. Strengthening antibiotic stewardship structures, laboratory-guided prescribing, and generic prescribing at the facility is recommended to promote more rational antibiotic use.

RECOMMENDATIONS

Based on the study findings, it is recommended that the hospital enforce adherence to standard treatment guidelines; develop and implement a facility antibiotic policy and

medication advisory committee; hold regular clinical meetings to review drug use; strengthen laboratory facilities so that prescribing can be guided by laboratory findings; ensure the availability of the WHO Model List of Essential Medicines and key essential drugs in the pharmacy store; institute continuing education on rational antibiotic use for prescribers and dispensers; and promote generic prescribing to improve identification, information exchange and cost of therapy.

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➤ Conflict of Interest

The author declares no conflict of interest with respect to the publication of this manuscript.

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