Drug Utilisation Pattern in the Accident and Emergency Unit of a General Hospital in Abuja, Nigeria

Kosisochi C. Amorha[1,2,3], Tomi J. Solomon[3], Ruth N. Sabastine[1,2], Gerald O. Ozota[1,2], Chiamaka C. Okonkwo[4]

[1]Department of Clinical Pharmacy and Pharmacy Management, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka, PMB 410001, Enugu State, Nigeria.
[2]Asthma Awareness and Care Group (AACG), Nsukka, Enugu State, Nigeria (https://www.asthmacaregroup.org.ng)
[3]Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmaceutical Sciences, Bingham University, PMB 005, Karu, Nasarawa State, Nigeria.
[4]Department of Pharmacy, State House Medical Center, Aso Rock, Abuja, Nigeria

Corresponding Author: Kosisochi C. Amorha
Email: kosisochi.amorha@unn.edu.ng
Telephone: +2348038539349

ABSTRACT

Background: Irrational prescribing is a major contributor to drug-related problems in emergency departments. The World Health Organization (WHO) and the International Network for Rational Use of Drugs (INRUD) developed prescribing indicators to measure prescribing performance.

Objective: To evaluate drug utilisation patterns in the accident and emergency (A&E) unit of a general hospital in Abuja, Nigeria.

Methods: A five-year retrospective, observational study (January 2018 - December 2022) was conducted using patient medical records from the A&E unit. Data were collected with a structured proforma based on WHO/INRUD prescribing indicators.

Results: From 100 folders, 211 prescriptions were reviewed. Most patients were male (n = 149, 70.6%) and aged ≤ 40 years (n = 175, 82.9%). The major admission causes were accidents (n = 102, 48.3%) and assaults (n = 78, 37.0%). The common drug classes were vitamins (n = 3063, 41.3%), anti-inflammatory drugs (n = 1400, 18.9%), antibiotics (n = 1221, 16.5%), and analgesics (n = 1118, 15.1%). The average number of drugs per encounter (3.5) exceeded the WHO standard. Generic prescribing (27.7%) and essential drug list use (27.9%) were suboptimal, while antibiotic (55.5%) and injection (85.3%) use exceeded recommended limits.

Conclusion: There is a need for rational prescribing interventions in Nigerian hospitals.

Keywords: Accident and emergency, drug utilization, hospital, Nigeria

 DOI: https://doi.org/10.82351/wajp.vol37no2.493

Profil d'utilisation des médicaments dans le service des urgences d'un hôpital général d'Abuja, au Nigéria

Kosisochi C. Amorha[1,2,3], Tomi J. Solomon[3], Ruth N. Sabastine[1,2], Gerald O. Ozota[1,2], Chiamaka C. Okonkwo[4]

[1]Département de pharmacie clinique et de gestion pharmaceutique, Faculté des sciences pharmaceutiques, Université du Nigéria, Nsukka, PMB 410001, État d'Enugu, Nigéria.
[2]Asthma Awareness and Care Group (AACG: Groupe de sensibilisation et de prise en charge de l'asthme), Nsukka, État d'Enugu, Nigéria (https://www.asthmacaregroup.org.ng)
[3]Département de pharmacie clinique et de pratique pharmaceutique, Faculté des sciences pharmaceutiques, Université de Bingham, PMB 005, Karu, État de Nasarawa, Nigéria.
[4]Département de pharmacie, centre médical du State House (de la présidence nigériane), Aso Rock, Abuja, Nigéria

Auteur correspondant : Kosisochi C. Amorha
E-mail : kosisochi.amorha@unn.edu.ng
Téléphone : +2348038539349

RÉSUMÉ

Contexte : La prescription irrationnelle contribue fortement aux problèmes liés aux médicaments dans les services d'urgence. L'Organisation mondiale de la Santé (OMS) et le Réseau international pour l'usage rationnel des médicaments (INRUD) ont élaboré des indicateurs de prescription permettant d'évaluer les pratiques de prescription.

Objectif : Évaluer les schémas d'utilisation des médicaments au sein d'un service des urgences d'un hôpital général d'Abuja, au Nigéria.

Méthodes : Une étude observationnelle rétrospective sur cinq ans (janvier 2018 - décembre 2022) a été menée à partir des dossiers médicaux des patients du service des urgences. Les données ont été recueillies à l'aide d'un formulaire structuré basé sur les indicateurs de prescription de l'OMS/INRUD.

Résultats : Sur 100 dossiers, 211 ordonnances ont été analysées. La majorité des patients étaient de sexe masculin (n = 149, soit 70,6 %) et âgés de 40 ans ou moins (n = 175, soit 82,9 %). Les principaux motifs d'hospitalisation étaient les accidents (n = 102, soit 48,3 %) et les agressions (n = 78, soit 37,0 %). Les classes de médicaments les plus fréquemment prescrites étaient les vitamines (n = 3 063, soit 41,3 %), les anti-inflammatoires (n = 1 400, soit 18,9 %), les antibiotiques (n = 1 221, soit 16,5 %) et les analgésiques (n = 1 118, soit 15,1 %). Le nombre moyen de médicaments par consultation (3,5) était supérieur à la norme de l'OMS. La prescription de génériques (27,7 %) et le recours à la liste des médicaments essentiels (27,9 %) étaient insuffisants, tandis que l'utilisation d'antibiotiques (55,5 %) et des injections (85,3 %) dépassait les limites recommandées.

Conclusion : Il est nécessaire de mettre en place des interventions de prescription rationnelle dans les hôpitaux nigérians.

Mots-clés : Urgences, utilisation des médicaments, hôpital, Nigéria

INTRODUCTION

The primary purpose of hospital Accident and Emergency (A&E) departments is to manage severe or life-threatening conditions rather than minor injuries or illnesses.[1] A defining characteristic of A&E presentations is the presence of time-critical conditions requiring prompt diagnosis and immediate therapeutic intervention to prevent avoidable morbidity and mortality.[2] More than a decade ago, the leading causes of mortality in emergency departments (EDs) comprised a combination of non-communicable and communicable diseases, with cardiovascular conditions accounting for more than half of reported cases.[3]

Drug-related incidents constitute a substantial health burden in EDs.[4] Adverse outcomes associated with drug-related events include increased morbidity and mortality, prolonged hospital stay, and higher healthcare costs.[5] Identifying drug-related events (DREs) necessitates a high index of suspicion and comprehensive medication history taking, processes that are often compromised by the fast-paced environment of emergency care.[4] An adverse drug reaction (ADR) arising from a medication error-defined as an unintended failure in the drug-use process that results in potential or actual harm-is considered preventable.[6] Studies conducted in specialised hospital units have reported high proportions of patients presenting with ADRs at admission, particularly in emergency settings.[7]

The ED plays a crucial role in the immediate management of critically ill patients; therefore, the early identification and prevention of drug-related problems in this setting can significantly influence clinical outcomes and patient survival.[4] Optimising medication use in emergency care is thus essential for improving patient safety and quality of care.

Drug utilisation studies are vital tools in clinical and pharmacy practice, as they describe prescribing patterns, evaluate factors influencing prescribing behaviour, assess adverse drug reactions, examine medication non-adherence, and analyse cost-effectiveness.[8-9] Findings from such studies support evidence-based decision-making, formulation of hospital drug policies, and development of standard treatment guidelines. Monitoring medication use against established guidelines also provides insight into evolving prescribing trends within healthcare systems.

This study aimed to evaluate drug utilisation patterns among patients managed in the A&E unit of a general hospital in Abuja, Nigeria, using WHO/INRUD core prescribing indicators. The findings are expected to identify gaps in prescribing practices, inform strategies for rational drug use, and contribute to improved pharmaceutical care delivery. Given the constraints on healthcare resources in developing countries such as Nigeria, rational prescribing is particularly critical for optimising patient outcomes and system efficiency.

METHODS

Study design

A five-year retrospective observational study (January 2018 to December 2022) was conducted using patient medical records from the Accident and Emergency (A&E) unit of a General Hospital in Abuja, Nigeria. Data were collected with a structured proforma based on WHO/INRUD prescribing indicators.

Study setting

The General Hospital is a secondary healthcare facility which serves as a major referral centre within the Federal Capital Territory (FCT) healthcare system. It operates a 24-hour emergency service, providing urgent care for patients presenting with acute and life-threatening conditions. This setting offers a representative environment for assessing emergency prescribing practices in secondary healthcare facilities in Nigeria.

Ethical approval

Ethical clearance was obtained from the Federal Capital Territory Health Research Ethics Committee prior to commencement of the study (Approval number: FHREC/2023/01/172/01-09-23; approved on 1 September 2023).

The study included folders of all patients who presented to the Accident and Emergency (A&E) unit of the hospital within the study period (1 January 2018 to 31 December 2022).

Sample size and selection

One hundred patient folders were provided by the Medical Records Department of the hospital. A total of 211 prescriptions within these folders met the inclusion criteria and were analysed. All eligible prescriptions were included due to the retrospective nature of the study and the manageable dataset size.

Data collection

Data were collected using a structured proforma

comprising two sections. Section A captured patients' demographic characteristics, while Section B documented prescription details, including number of drugs prescribed, use of generic names, antibiotic prescriptions, injection use, and prescription from the essential drugs list (EDL) or hospital formulary.

Data analysis

Data were analysed using IBM SPSS version 29.0. Descriptive statistics were used to summarise patient demographics and prescribing patterns. WHO/INRUD core prescribing indicators were calculated and compared with recommended reference values.

RESULTS

From the 100 folders and 211 prescriptions reviewed, most patients were male (n = 149, 70.6 %) and aged ≤ 40 years (n = 175, 82.9 %). The major causes of admission were accidents (n = 102, 48.3 %) and assaults (n = 78, 37.0%) as shown in Table 1. The most commonly prescribed drug classes were vitamins (41.3 %), anti-inflammatory drugs (18.9%), antibiotics (16.5 %), and analgesics (15.1 %) as shown in Table 2. The average number of drugs per encounter (3.5) exceeded the WHO standard. Generic prescribing (27.7 %) and essential drug list use (27.9 %) were suboptimal, while antibiotic (55.5%) and injection (85.3 %) use exceeded recommended limits (Table 3).

Table 1: Demographic details, N = 211

Variables	n (%)
Date on prescription	
2018	39 (18.5)
2019	38 (18.0)
2020	42 (19.9)
2021	45 (21.3)
2022	47 (22.3)
Age (in years)	
≤ 20	45 (21.3)
21 – 30	88 (41.7)
31 – 40	42 (19.9)
41 – 50	24 (11.4)
51 – 60	6 (2.8)
> 60	6 (2.8)
Gender	
Male	149 (70.6)
Female	62 (29.4)
Reasons for admission to Accident and Emergency Unit	
Accident	102 (48.3)
Assault	78 (37.0)
Rape	27(12.8)
Expulsion of the foetus	2 (0.9)
Intoxicated patient	1 (0.5)
Periorbital swelling	1 (0.5)
Medical history	
Hypertension	6 (2.8)
Psychosis	3 (1.4)
Nil	202 (95.7)

Table 2: Drug count per class, N = 7409

Variables	n (%)
Multivitamins/Vitamins	**3063 (41.3)**
Tabs. Vitamin C 200 mg	1371 (44.8)
Tabs. Vitamin C 500 mg	902 (29.4)
Tabs. Vitamin C 100 mg	714 (23.3)
Caps. Vitamin C 1000 mg	60 (1.9)
Syrup Vitamin C 100 mg/5 mL	1 (0.03)
Tabs. Vitamin B-complex	15 (0.5)
Anti-Inflammatory drugs	**1400 (18.9)**
Tabs. Trypsin/Chymotrypsin	1400 (100.0)
Antibiotics	**1221 (16.5)**
Caps. Amoxicillin 1 g	276 (22.6)
Tabs. Ampicillin/Cloxacillin 500 mg	140 (11.5)
Tabs. Cefixime 400 mg	106 (8.7)
Tabs. Ciprofloxacin 500 mg	98 (8.0)
Tabs. Cefpodoxime 200 mg	70 (5.7)
Tabs. Cefuroxime 500 mg	68 (5.6)
Tabs. Ampicillin/Cloxacillin 250 mg	60 (4.9)
Tabs. Amoxicillin 500 mg	60 (4.9)
Tabs. Ofloxacin/Ornidazole 700 mg	56 (4.6)
Tabs. Amoxicillin/Clavulanic acid 625 mg	44 (3.6)
Tabs. Ceftriaxone 500 mg	40 (3.3)
Inj. Ceftriaxone 1 g	33 (2.7)
Tabs. Amoxicillin/Clavulanic acid 1 g	31 (2.5)
Caps. Ampicillin/Cloxacillin 500 mg	30 (2.5)
Caps. Doxycycline 100 mg	28 (2.3)
Inj. Ceftriaxone 2 g	23 (1.9)
Caps. Cephalexin 750 mg	20 (1.6)
Inj. Ceftriaxone 250 mg	20 (1.6)
Tabs. Cefixime 200 mg	10 (0.8)
Inj. Amoxicillin/clavulanic acid 1.2 g	3 (0.3)
Inj. Ceftriaxone 100 mg	2 (0.2)
Inj. Gentamicin 80 mg/2 mL	2 (0.2)
Syr. Amoxicillin/Clavulanic acid 457 mg/5 mL	1 (0.1)

Table 2: Drug count per class, N = 7409 (Continued)

Variables	n (%)
Analgesics	**1118 (15.1)**
Tabs. Ibuprofen 400 mg	269 (24.1)
Tabs. Diclofenac 50 mg	243 (21.7)
Tabs Diclofenac 100 mg	240 (21.5)
Tabs. Ibuprofen 200 mg	151 (13.5)
Inj. Diclofenac 75 mg	99 (8.9)
Inj. Pentazocine 30 mg	23 (2.1)
Tabs. Nimesulide/Paracetamol (100 mg/325 mg)	56 (5.0)
Tabs. Codeine/Paracetamol (8 mg/500 mg)	20 (1.8)
Inj. Paracetamol 600 mg/5 mL	12 (1.1)
Inj. Paracetamol 300 mg/2 mL	3 (0.3)
Diclofenac gel	1 (0.1)
Syr. Ibuprofen 100 mg/5 mL	1 (0.1)
Antihypertensives	**209 (2.8)**
Inj. Labetalol 50 mg	3 (1.4)
Tabs. Amlodipine 10 mg	81 (38.8)
Tabs. Lisinopril 10 mg	51 (24.4)
Tabs. Losartan 50 mg	14 (6.7)
Tabs. Nifedipine 20 mg	60 (28.7)
Anti-ulcer drugs	**8 (0.1)**
Inj. Omeprazole 40 mg	8 (100.0)
Anti-malarial drugs	**12 (0.2)**
Inj. Alpha-beta Arteether injection 150 mg/2 mL	12 (100.0)
Corticosteroids	**10 (0.1)**
Tabs Dexamethasone 4 mg	10 (100.0)
Anti-anxiety drugs	**3 (0.04)**
Tabs. Bromazepam 3 mg	3 (100.0)
Antigens	**84 (1.1)**
Inj. Tetanus Toxoid	84 (100.0)
Progestins	**4 (0.1)**
Tabs. Levonorgestrel 1.5 mg	4 (100.0)

Table 2: Drug count per class, N = 7409 (Continued)

Variables	n (%)
Intravenous fluids	**82 (1.1)**
IVF Normal saline	61 (74.3)
IVF Dextrose saline (5 %)	17 (20.7)
IVF Ringer lactate	2 (2.4)
IVF Mannitol	2 (2.4)
Skeletal muscle relaxant	**30 (0.4)**
Tabs. Orphenadrine 100 mg	30 (100.0)
Benzodiazepines	**1 (0.01)**
Diazepam 10 mg	1 (100.0)
Haematinics	**168 (2.3)**
Tabs. Ferrous sulphate 200 mg	168 (100.0)

Table 3: WHO/INRUD core prescribing indicators

Prescribing indicators	n or % (study result)	n or % (reference result)
Total number of different products prescribed (A)	745	-
Number of encounters surveyed (B)	211	-
Number of drugs prescribed by generic name (C)	206	-
Total number of patients who received one or more antibiotics (D)	117	-
Total number of patients who received one or more injections (E)	180	-
Total number of EDL drugs prescribed (F)	208	-
Average number of drugs per encounter (A/B)	3.5	1.6 – 1.8
Percentage of drugs prescribed by generic name (C/A x 100 %)	27.7%	100%
Percentage of encounters with an antibiotic prescribed (D/B x 100 %)	55.5%	20.0% – 26.8%
Percentage of encounters with an injection prescribed (E/B x 100 %)	85.3%	13.4% – 24.1%
Percentage of drugs prescribed from EDL or formulary (F/A x 100 %)	27.9%	100%
Total drug count	7409	-

DISCUSSION

This study assessed drug utilisation patterns in the Accident and Emergency Unit of a general hospital in Abuja using WHO/INRUD prescribing indicators. Multivitamins, anti-inflammatory drugs, antibiotics, and analgesics were most frequently prescribed. The findings revealed deviations from the recommended prescribing standards.

Most patients were aged 40 years or younger, with a higher proportion of males than females. This demographic pattern is consistent with findings from a similar study conducted in Nigeria,[10] Ethiopia,[11,12] and India,[13,14] which reported a predominance of younger male patients in emergency departments. In contrast, two studies from India reported a higher proportion of patients above 40 years of age. The high frequency of accidents and assaults observed in this study likely explains the younger age distribution, as younger individuals are generally more physically active and therefore more prone to trauma-related emergencies. This trend has been consistently reported in studies from Nigeria,[10] Ethiopia,[11,12] and India.[13,14]

The most frequently prescribed drug classes-multivitamins, anti-inflammatory drugs, antibiotics, and analgesics-reflect the therapeutic priorities in trauma and emergency care, including pain management, tissue healing, and infection prevention.[17] Similar prescribing patterns have been reported in studies conducted in Nigeria and India.[13,16] The frequent use of Trypsin/Chymotrypsin and Vitamin C suggests an emphasis on reducing inflammation and promoting wound healing, which is common in trauma management.

The average number of drugs prescribed per encounter exceeded the WHO recommended range of 1.6-1.8, indicating possible polypharmacy. This finding is consistent with a Nigerian study that reported an average of three drugs per encounter.[10] Although higher drug counts in emergency settings have been attributed to the need for empirical therapy before definitive diagnosis,[10,11,18] polypharmacy has been associated with increased risks of hospitalisation and all-cause mortality.[19] Therefore, efforts should be made to minimise unnecessary drug exposure while ensuring effective emergency care. Compared with studies from Ethiopia reporting lower averages (2.19-2.36),[11,12] the value observed in this study was lower than those reported in India, where averages ranged from 4.01 to 8.02.[13-15,18] These differences may reflect variations in case severity, duration of emergency department stay, and prescribing practices across settings.

The proportion of drugs prescribed from the essential drugs list or hospital formulary was substantially lower than the WHO ideal of 100 %. The essential medicines list promotes rational prescribing by prioritising safe, effective, and cost-efficient medicines, and low utilisation may indicate limited awareness or adherence among prescribers.[20] Higher rates of EDL prescribing have been reported in studies from Ethiopia and India.[12,14,16,18] Similarly, the proportion of drugs prescribed by generic name (27.7 %) was markedly low compared with the WHO standard. Prescribing by generic name improves affordability and access to medicines, and the low rate observed aligns with findings from several Indian studies.[13,14,16,18] However, studies conducted in Ethiopia showed a much higher percentage of greater than 90 % prescribed by generic name.[11,12] Prescriber preference for branded medicines may stem from misconceptions about the quality or bioequivalence of generic products.[14]

The proportion of encounters involving antibiotics (55.5%) exceeded WHO/INRUD recommended values. Comparable findings have been reported in studies from Ethiopia and India,[11,15,18] although Patidar and Pichholiya[16] reported values within acceptable limits. While Kumaraswamy *et al*. reported 18.7 %,[14] a value lower than the stipulated range. Excessive antibiotic use in emergency settings may be driven by diagnostic uncertainty, perceived severity of illness, or patient expectations. Such practices contribute to antimicrobial resistance, underscoring the need for robust antimicrobial stewardship programmes in hospitals.

Injectable medicines were prescribed in more than 80 % of encounters, far above recommended ranges. The preference for injectable routes in emergency care is often justified by the need for rapid onset of action and the inability of critically ill patients to take oral medications. Similar findings have been reported across emergency units in Nigeria, Ethiopia, and India.[10-16] Nevertheless, timely switching to oral formulations once patients are clinically stable is essential to reduce complications associated with injectable therapy.

This study has some limitations. The findings are based on data from a single hospital and may not be generalisable to other healthcare settings. Additionally, the retrospective design limited the ability to assess clinical

outcomes or prescriber rationale. Despite these limitations, the study provides valuable insight into prescribing practices in emergency care within a Nigerian secondary healthcare facility.

CONCLUSION

Prescribing practices in the Accident and Emergency unit deviated from WHO/INRUD standards, indicating a need for targeted interventions to promote rational drug use in Nigerian hospitals.

ACKNOWLEGEMENTS

No funding was received to conduct the study. The authors appreciate the members of staff of the Medical Records Unit who provided a convenient environment for data collection.

REFERENCES

1. Pini R, Ralli ML, Shanmugam S (2020). Emergency department clinical risk. In: Donaldson L, Ricciardi W, Sheridan S, *et al.*, eds. *Textbook of Patient Safety and Clinical Risk Management* [Internet]. Cham (CH): Springer; Chapter 15. Available at: https://www.ncbi.nlm.nih.gov/books/NBK585618 / doi: 10.1007/978-3-030-59403-9_15.
2. Kirolos E (2024). Time critical emergencies: a comprehensive review of rapid decision-making in emergency medicine. *Journal de la Faculté de Médecine d Oran* 8(2):1025-1084. https://doi.org/10.51782/jfmo.v8i2.247.
3. Olusegun-Joseph AD, Akande O, Otrofanowei E, Nwoye E, Olopade OB, Ajuluchukwu JN (2021). Medical mortality in an emergency department in Nigeria: the transition is obvious! *African Health Sciences* 21(1):172-179. https://doi.org/10.4314/ahs.v21i1.23.
4. Opadeyi AO, Ayinbuomwan SA, Isah AO (2020). Drug-related events in an emergency department of a tertiary health care facility in South- South Nigeria. *Highland Medical Research Journal* 20(2):13-18. https://www.ajol.info/index.php/hmrj/article/view/208045.
5. Brandariz-Núñez D, Ferreiro-Gómez M, Suanzes J, Margusino-Framiñán L, de la Cámara-Gómez M, Fandiño-Orgueira JM, Martín-Herranz MI (2022). Prevalence of adverse drug reactions associated with emergency department visits and risk factors for hospitalization. *Farmacia Hospitalaria* 47(1):T20-T25. https://doi.org/10.1016/j.farma.2022.12.007.
6. Schurig AM, Böhme M, Just KS, Scholl C, Dormann H, Plank-Kiegele B, Seufferlein T, Gräff I, Schwab M, Stingl JC (2018). Adverse drug reactions (ADR) and emergencies. *Deutsches Ärzteblatt International* 115:251-258. https://doi.org/10.3238/arztebl.2018.0251.
7. Patel TK, Patel PB, Bhalla HL, Kishore S (2022). Drug-related deaths among inpatients: a meta-analysis. *European Journal of Clinical Pharmacology* 78(2):267-278. https://doi.org/10.1007/s00228-021-03214-w.
8. Nishtala P, Narayan SW (2019). Application of pharmacoepidemiology and pharmacovigilance studies. In: *Encyclopedia of Pharmacy Practice and Clinical Pharmacy*. Elsevier; 445-450. https://doi.org/10.1016/B978-0-12-812735-3.00212-0.
9. Prihayati A, Pujiyanto P (2019). Drug utilization pattern and cost estimates of anti-hypertensive drugs in pharmacies under the National Health Insurance Program. In: *6th International Conference on Public Health*. https://doi.org/10.26911/the6thicph-fp.04.06.
10. Ganiyu KA, Didei AD (2019). Assessment of presentations and medication management of health conditions at the emergency department of a tertiary hospital in Bayelsa State, Nigeria. *Nigerian Journal of Pharmaceutical and Applied Science* Research 8(3):23-28. https://nijophasr.net/index.php/nijophasr/article/view/318.
11. Mishore KM, Girma Y, Tola A, Mekuria AN, Ayele Y (2020). Evaluation of medication use pattern among patients presenting to the emergency department of Hiwot Fana Specialized University Hospital, using WHO prescribing indicators. *Frontiers in Pharmacology* 11:509. https://doi.org/10.3389/fphar.2020.00509.
12. Mishore KM, Bekele NA, Yirba TY, Abone TF (2020). Evaluation of drug use pattern in emergency department of Dilchora Referral Hospital, Dire Dawa, Ethiopia. *Emergency Medicine International* 2020:4173586. https://doi.org/10.1155/2020/4173586.
13. Karuna SP, Roopa B, Venkata RY, Sai Satyanarayana PV (2022). Drug prescribing pattern in the medical emergency unit - The patient's first point of contact. *World Journal of Pharmaceutical Research* 11(4):1307-1314. https://doi.org/10.20959/wjpr20224-23538.

14. Kumaraswamy M, Wagle L, Moktan JB, Shrestha N, Augustine T (2017). A study on evaluating prescriptions in emergency unit of tertiary care teaching hospital based on WHO prescribing indicator. *International Journal of Pharmaceutics* 7(1):56-61. Available at: https://www.pharmascholars.com/articles/a-study-on-evaluating-prescriptions-in-emergency-unit-of-tertiary-care-teaching-hospital-based-on-who-prescribing-indica.pdf. Accessed August 22, 2026.
15. Pandey K, Khan IA (2016). Drug prescribing patterns in patients visiting the emergency medicine department at a tertiary care teaching hospital: a prospective study. *International Journal of Basic & Clinical Pharmacology* 5(1):163-168. https://doi.org/10.18203/2319-2003.ijbcp20160121.
16. Patidar R, Pichholiya M (2016). Analysis of drugs prescribed in emergency medicine department in a tertiary care teaching hospital in southern Rajasthan. *International Journal of Basic & Clinical Pharmacology* 5(6):2496-2499. https://doi.org/10.18203/2319-2003.ijbcp20164111.
17. Fabbri A, Voza A, Riccardi A, Serra S, De Iaco F (2023). The pain management of trauma patients in the emergency department. *Journal of Clinical Medicine* 12(9):3289. https://doi.org/10.3390/jcm12093289.
18. Binu KM, Panavila L, Sagar VV, Patil S, Doddayya H (2017). A prospective study on prescribing practices in emergency department of a tertiary care teaching hospital. *European Journal of Pharmaceutical and Medical Research* 4(8):287-291. Available at: https://storage.googleapis.com/innctech/ejpmr/article_issue/1501484601.pdf. Accessed August 22, 2026.
19. Chang TI, Park H, Kim DW, Jeon EK, Rhee CM, Kalantar-Zadeh K, Kang EW, Kang SW, Han SH (2020). Polypharmacy, hospitalization, and mortality risk: a nationwide cohort study. *Scientific Reports* 10(1):18964. https://doi.org/10.1038/s41598-020-75888-8.
20. Hassan A, Abdullahi GA, Ahmed AA, Sabiu A, John U, Ezekeil G, Ibrahim YA (2018). Assessing prescriber's awareness of essential medicine list, hospital drug formulary and utilization of standard treatment guidelines in a tertiary healthcare facility in North-Central Nigeria. *Alexandria Journal of Medicine* 54(1):81-84. https://doi.org/10.1016/j.ajme.2017.03.006.
21. Chukwu EE, Oladele DA, Enwuru CA, Gogwan PL, Abuh D, Audu RA, Ogunsola FT (2021). Antimicrobial resistance awareness and antibiotic prescribing behavior among healthcare workers in Nigeria: a national survey. *BMC Infectious Diseases* 21(1):22. https://doi.org/10.1186/s12879-020-05689-x.