CHRISTIAN JOURNAL for GLOBAL HEALTH

Interventions on medication administration errors in Nigerian and Indonesian hospitals: a narrative review

Oyebode Dosunmu[a], Eliza Dwinta[b], Fatma Siti Fatimah[c]

[a] Department of Clinical Pharmacy and Pharmacy Administration, Faculty of Pharmacy, University of Ibadan, Ibadan, Nigeria

[b] Department of Pharmacy, Faculty of Health Science, Universitas Alma Ata, Yogyakarta, Indonesia

[c] Department of Hospital Administration, Faculty of Health Science, Universitas Alma Ata, Yogyakarta, Indonesia

Abstract

Objectives: Medication administration error is causing patient harm. The study aims to review the interventions on and recommended interventions to medication administration errors in hospitals in Indonesia and Nigeria.

Methods: A mixed-method approach was employed to review available quantitative and qualitative studies. Eligible studies were sought in Scopus and Embase/Medline.

Results: The review elicited two interventions that were conducted and fifteen recommended interventions. The conducted interventions include medication safety practice training and pharmacist-led intervention in a hemodialysis room. The most recommended interventions are education/training, having a medication administration error reporting system, proper drug labelling and packaging, provision of in-hospital clinical pharmacy service, and adequate staffing, among others.

Conclusions: There were identified conducted interventions on, and recommended interventions to, medication administration errors. Based on context appropriateness, a combination of any of these interventions is recommended for the prevention, reduction, and elimination of medication administration errors.

Keywords: Interventions, Medication administration error, Patient safety, Nigeria, Indonesia, Review

Introduction

Globally, patient harms occur in healthcare institutions.[1,2,3] Such harms are a threat to patient safety. They are being experienced in both developed and developing countries. Therefore, the World Health Organisation came up with strategies to address these harms.[4,5] Guidelines were developed to be adopted or adapted by nations to address the menace of patient harm in their healthcare system.

Threats to patient safety are more prevalent in developing countries than in developed countries.[6] Access to quality healthcare services and the availability of infrastructure are not optimal in these countries.[7] These, among other factors, exposed them to the experience of more prevalent patient harm.

Medication error is one of the leading causes of patient harm.[8,9,10] Medication errors can occur in any of the stages of the medication use process

(MUP).[9] The MUP stages include prescribing, transcribing, dispensing, administration, and monitoring. All stages have witnessed medication errors resulting in patient harm.

Medication administration errors are a major problem in healthcare institutions.[11] Some interventions have been made to solve the problem of medication administration error, but the problem persists.[12-16] A multi-approach intervention may be needed to curb the menace of medication administration errors to prevent, reduce, or eliminate them. Prevention of these harms should be the most preferred.

Developing countries abound in Africa and Asia.[17-19] Nigeria and Indonesia are typical examples of these countries. Both are lower-middle-income countries (LMIC) and densely populated. Indonesia is the fourth most populous country in the world and the third highest in Asia.[20] Nigeria has the sixth-highest population in the world and the highest population in Africa.[21] Both countries provide a blend of geographical location, population, and income status of developing countries.

Previous reviews on interventions for medication administration errors have a global focus with attention more on developed countries.[22-29] There is no review on interventions on medication administration errors conducted specifically in Asian and African countries. It means that no review has been conducted in Nigeria and Indonesia. The researchers are based in the two countries. Therefore, the review is needed for the appropriate implementation of interventions by the researchers in the future.

There is a need to conduct a review of interventions on and recommended interventions to medication administration errors in Asia and Africa for evidence-based decision-making. Indonesia and Nigeria, having a high ranking among countries that have high populations in the world, serve as good references and starting points for the selection of the two developing countries for commencing efforts towards eradicating medication administration errors in the Asian and African regions. Comparing the interventions in these countries will also give a brief depiction of the intervention practices on or intervention recommendations to medication administration errors for probable implementation of context-applicable interventions across the two countries.

The study aims to review interventions on and recommended interventions to medication administration errors in Indonesia and Nigeria using a narrative review methodology. The interventions on medication administration errors will be determined, recommended interventions examined, and a comparison will be made.

Methods

Research Design

The research design is a mixed-method review. Both quantitative and qualitative studies were selected for the review to help obtain all information available on interventions on and recommendations to medication administration errors.

Identification of the Review Question

The PICO (Population, Intervention, Comparison, Outcome) was used for formulating the review question. The domains of the PICO used are in Table 1.

Table 1. PICO for Formulating Review Question

Domain	Definition
Population	Hospitals, Indonesia, Nigeria
Intervention	Intervention on and recommended intervention to drug administration errors
Comparison	Nil
Outcome	Nil

The review question: What are the interventions on and recommended interventions to medication administration errors in hospitals in Indonesia and Nigeria?

Criteria for Considering Studies for The Review

All studies conducted on medication administration errors in Nigeria and Indonesia were considered for the review. The included studies were peer-reviewed. There was no restriction on the study design. Only studies conducted in the English Language were

eligible. The exclusion criteria include studies that were not peer-reviewed and studies conducted in languages other than English. Reviews and preprints were excluded.

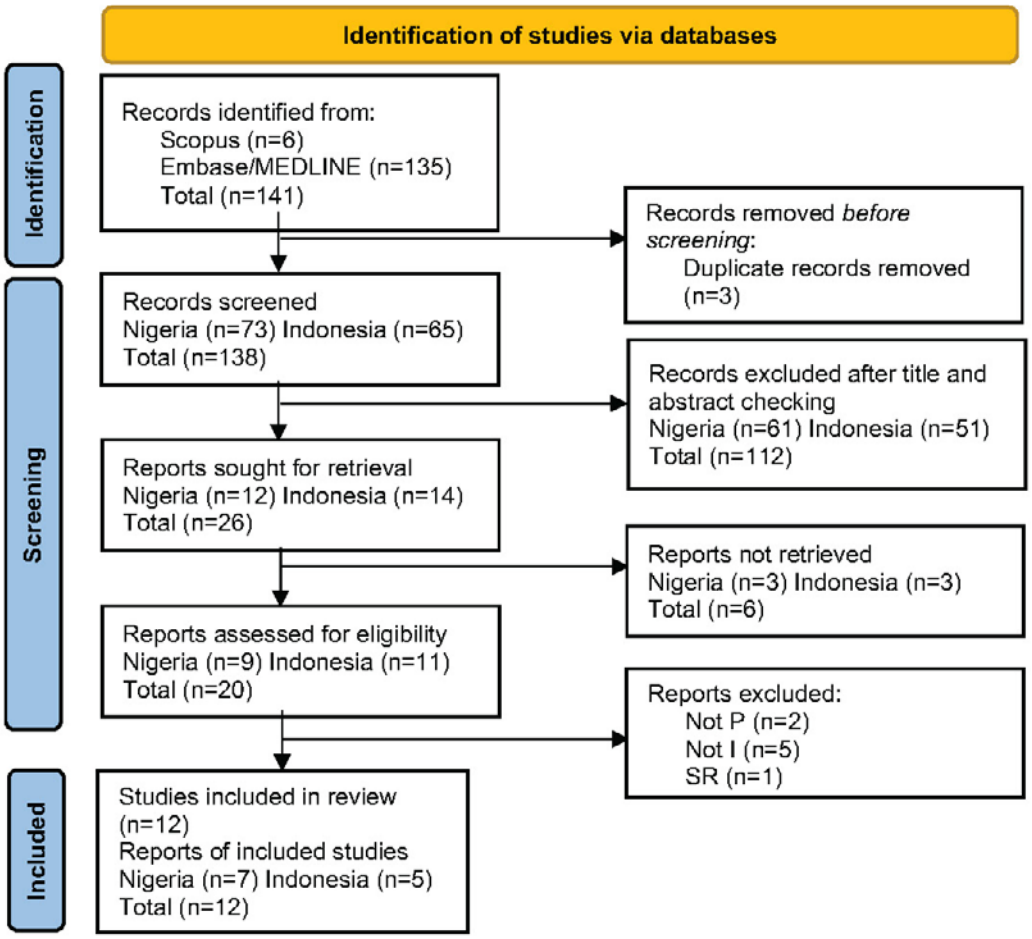
Search Strategy

An electronic literature search was conducted on two databases, Scopus and Embase/Medline, to identify eligible articles based on the inclusion and exclusion criteria. The search was conducted on 8th, 9th, and 10th December 2024. The keywords employed in the search include drug administration, intervention, medication error, hospital, Nigeria, and Indonesia. A combination of these keywords using Boolean operators AND and/or OR resulted in the search output.

Study Selection

All studies were exported to EndNote. EndNote was employed for screening, reviewing, and selecting eligible studies for review. Screening of eligible studies by title and abstract and full texts for inclusion was conducted independently by two reviewers. The screening process is summarized using the PRISMA flow diagram in Figure 1 below.

Figure 1. PRISMA flow diagram



Data Extraction

Data extraction of characteristics of studies, results, intervention on, and recommended interventions to medication administration errors was done using a purposefully designed data extraction table.

Ethics Statement

The study is a review. It does not deal with human participants or animals.

Results

Description of Included Studies

There were twelve studies included in the review. Five of the studies (41.67%) were from Indonesia, while seven (58.33%) were from Nigeria (Table 2). Eleven of the studies (91.67%) were quantitative research, and one (8.33%) was qualitative. Two of the studies (16.67%) had a reported intervention, while the other ten (83.33%) recommended interventions for medication administration error prevention or reduction. Studies conducted focused on patients, nurses, anaesthetics, clinical nursing students, and prescriptions for sourcing information on medication administration errors.

Table 2. Included Studies for Review

Country	Author (Year)	Study Aim	Setting	Study Design
Indonesia	Mahendra (2021) [31]	Explored the rate of medication errors reporting	Dr. Soeradji Tirtonegoro General Hospital Medical Center	Retrospective and descriptive
	Musharyanti et al. (2019) [32]	Explored Indonesian nursing students' perceptions of the types and causes of medication errors in clinical rotations.	A closed discussion room	Descriptive qualitative study
	Mulatsih et al. (2018) [33]	Determined the effects of the implementation of MSP in chemotherapy on the incidence of medication errors	Dr. Sardjito Hospital	Quasi-experimental study with pre- and post-intervention without control
	Lumbantobing et al. (2017) [34]	Assessed the effect of pharmacist intervention on the number and types of drug-related problems in outpatients undergoing hemodialysis	Indonesia Christian University Hospital	Pre- and post-prospective study
	Ernawati et al. (2014) [35]	Determine frequency of medication errors during medication delivery processes the nature	Public teaching hospital geriatric ward in Bali	Prospective study
Nigeria	Adeleye et al. (2021) [36]	Explored inappropriate use of mannitol (medical error) amongst head injury (HI) patients	Neurosurgery unit	Cross-sectional study
	Bello (2021) [37]	Assessed adherence to medication administration guidelines among nurses	State Specialist Hospital Akure	Cross-sectional study
	Ayorinde and Alabi (2019) [38]	Assessed perception and contributing factors to medication administration errors	University College Hospital Ibadan	Quantitative descriptive design
	Johnson and Ebirim (2017) [39]	Assessed the frequency of drug administration errors by anaesthetists, the drugs commonly involved, and the effects of such errors.	–	Cross-sectional study
	Ilesanmi et al. (2016) [40]	Examined the methods of reporting medication administration errors (MAEs) by nurses	University College Hospital, Ibadan	Cross-sectional study
	Nwasor et al. (2014) [41]	Studied the incidence of medication errors among anesthesia practitioners	Secondary and tertiary hospitals in Kaduna State	Cross-sectional study
	Ogboli-Nwasor (2013) [42]	Highlighted the significance of medication errors and discussed the best methods of prevention	Teaching hospital	Case report

Interventions and Recommended Interventions on Medication Administration Errors

Table 3 reveals the interventions that have been conducted on medication administration errors and recommended interventions in Nigeria and Indonesia.

Table 3. Interventions on and Recommended Interventions to Medication Administration Errors for Prevention or Elimination

Category	Interventions/ Recommended interventions	Country(ies) where intervention was recommended	Author										
			[31]	[36]	[37]	[32]	[38]	[33]	[34]	[39]	[40]	[41]	[35]	[42]
Intervention	Medication Safety Practice (MSP) training	Indonesia						√						
	Pharmacist-led intervention in haemodialysis room	Indonesia							√					
Recommended intervention	Education/Training	Indonesia and Nigeria	√	√	√	√					√	√		
	Reporting system	Nigeria					√				√	√		√
	Proper drug labeling and packaging	Indonesia and Nigeria	√				√		√					√
	Provision of in-hospital clinical pharmacy services	Indonesia	√						√				√	
	Adequate staffing	Indonesia and Nigeria	√				√					√		
	Ensure double-checking of drugs/drug labels	Indonesia and Nigeria	√									√		
	Color coding of syringes	Nigeria										√		√
	Vigilance	Nigeria										√		√
	Timeliness of drug supply to wards	Indonesia	√											
	Develop a universal medication procedure/protocol	Nigeria			√									
	Enabling environment for reporting	Nigeria					√							
	Address the interdisciplinary communication problem	Nigeria					√							
	Pharmacists collaborate with other healthcare professionals	Indonesia							√					
	Improve drug ampoule design	Nigeria								√				
	Organisation of drug drawers and workspaces	Nigeria										√		

Notes. Keys:

[31]: Mahendra (2021)
[36]: Adeleye et al. (2021)
[37]: Bello (2021)
[32]: Musharyanti et al. (2019)
[38]: Ayorinde and Alabi (2019)
[33]: Mulatsih et al. (2018)
[34]: Lumbantobing et al. (2017)
[39]: Johnson and Ebirim (2017)
[40]: Ilesanmi et al. (2016)
[41]: Nwasor et al. (2014)
[35]: Ernawati et al. (2014)
[42]: Ogboli-Nwasor (2013)

Interventions on Medication Administration Errors

There were no reported interventions on medication administration errors in Nigeria. Two reported interventions on medication administration errors in Indonesia were retrieved. The retrieved interventions on medication administration errors included Medical Safety Practice (MSP) training for nurses and pharmacist-led intervention in a haemodialysis unit. The pharmacist-led intervention entailed adjustments to the dose of drugs, administration frequency, and administration time. Information on drug side effects or simultaneous drug administration effects was rendered. Drug monitoring was also done.

Recommended Interventions on Medication Administration Errors

Fifteen (15) recommended interventions were obtained from the studies. The most recommended intervention was education/training on medication administration errors and their negative effects on patients and practice. This was followed by having a reporting system for medication administration errors (to learn from them) and proper drug labelling and packaging. The provision of in-hospital, clinical pharmacy services and adequate staffing were the third-most recommended interventions.

Comparison of Recommended Interventions in Indonesia and Nigeria

Four out of the fifteen recommended interventions (26.67%) of the included studies had the same recommendation from Indonesia and Nigeria. The recommendations were education/training on medication administration errors, proper drug labelling and packaging, adequate staffing, and ensuring double-checking of drugs/drug labels before administration.

Eight of the fifteen recommendations (53.33%) were from studies in Nigeria. These included a reporting system for medication administration errors, color coding of syringes, being vigilant, and developing universal medication procedures/protocols. Others are creating an enabling environment for reporting, addressing interdisciplinary communication problems, improving drug ampoule design, and organizing drug drawers and workspaces.

Three of the fifteen recommendations (20%) were from Indonesian studies only. They were the provision of in-hospital clinical pharmacy services, the timeliness of drug supply to wards, and pharmacists collaborating with other healthcare professionals.

Discussion

Patient safety is an emerging field in developing countries and has not garnered the necessary attention that it is worth.[43] In the same vein, medication administration errors have garnered minimal attention in healthcare institutions. A reflection of this claim is revealed in the fact that there have been no studies that have conducted interventions on and given solutions to medication administration errors in hospitals in Nigeria. Indonesia, on the other hand, had two interventional studies on medication administration errors. This is low when compared to the high prevalence rate of medication administration errors in healthcare institutions in developing countries .[44,45,46,47] Both countries are lagging in the area of interventional studies on medication administration errors.

Medication Safety Practice training is important to address medication administration errors.[32] It will ensure awareness is created about the harm caused to patients due to medication administration errors and their prevalence in healthcare institutions. Healthcare professionals will be trained on ways to reduce these errors. This will, in turn, make healthcare services in hospitals safer for patients.[48,49]

A pharmacist, being a drug expert, is key to addressing medication administration errors.[50,51] It was reflected in the study where pharmacists were part of the medication administration team in a haemodialysis room and improvement in medication administration safety was recorded.[33] Therefore, it is expedient that pharmacists are assigned tangible roles in inpatient wards and are involved in ward rounds to avert potential medication administration error dangers.

Patients' and healthcare professionals' reports of the incidence of medication administration errors are a good way of sourcing data on medication administration errors for informed decision-making. As both are stakeholders in medication administration, necessary information can be gathered from them. The hospital management and leaders, therefore, must learn from these medication errors and prevent their further occurrence in the future. A Critical Incident Reporting system and committee can be created to look into these errors to learn from them.[52] Institutional structures, such as Drug and Therapeutics Committees (DTCs), that offer regular forums for collaborative review and learning across disciplines are also recommended.[53] These committees' roles in preventing prescribing and dispensing errors can be part of a holistic approach to reducing medication administration errors.

The revealing of fifteen (15) recommended interventions from the studies in the review attests to the fact that multiple approaches are needed to tackle medication administration errors. Intervention should come from all stakeholders involved in medication administration.[54,55] All stakeholders have a role to play. For instance, pharmaceutical industries need to improve the design of ampoules, drug labelling, and packaging of manufactured drugs; it will decrease the likelihood of errors that come from look-alike, sound-alike medications.[56] Healthcare professionals need to be vigilant , pay attention to details, and report any incident of medication administration errors to learn from them.[41,42] The healthcare institution needs to address the errors systemically through the provision of necessary training, employment of adequate staff, and creation of a just and trusting culture, among others.[31,32,36,37,38,57]

Education and/or training are the most recommended interventions needed to address medication administration errors from the studies in the two countries.[31,32,36,37,40,41] This is the first critical step needed to proffer solutions to medication administration errors. Awareness has to be created on medication administration errors and their untoward effect on patient safety. Healthcare professionals need to be trained on practices that will ensure medication administration errors are averted. Also, it will be good to provide the necessary education on medication errors to students in the healthcare discipline to prepare them ahead for the prevention or reduction of the errors in their professional practice.[4]

Creating a reporting system for medication administration errors was highly recommended by studies from the two countries.[38,40,41,42] A reporting system will permit learning from incidents to prevent future occurrences and harm.[52] Proper drug labelling and packaging were also highly recommended.[31,34,38,42] This can help ensure the error will not be due to illegibility or look-alike medicines.[56] The proper labelling and packaging will ensure that a design has been made that will prevent healthcare professionals from making errors. Such a design is the basis of the importance of ergonomics in healthcare.[58,59]

The need for integration of pharmacists into clinical rotation in the ward has been recommended in developed and developing countries.[60,61,62,63] It was recommended by three studies in Indonesia for the prevention of medication administration errors.[31,34,35] Therefore, attention should be drawn to the integration of pharmacists into clinical rotation in developing countries as is the experience in some developed countries.[61,62,63] Also, adequate staffing recommended by studies from Indonesia and Nigeria is essential to prevent medicine administration errors.[31,38,41] It will ensure enough staff are available and prevent errors that might occur from the fatigue of a short-staffed institution.

Having four agreements in recommended interventions on medicine administration errors reveals that the occurrence of these errors has some similar root causes in the two countries involved. It attests to the fact that medication administration error is a global menace and has no boundaries.[8,11] However, there may be some peculiarities with the healthcare system of the countries involved. This is revealed by the recommendations that were singly received from studies in each country.

Limitation

All identified settings in the included studies are in the secondary and tertiary healthcare level categories. Therefore, the review did not factor primary healthcare into consideration. It implies the recommendations may not be practical or feasible in lower-income healthcare settings because pharmacy personnel are most times unavailable in these settings.

Conclusion

There were identified interventions on medication administration errors from the included studies in Indonesia. Recommended interventions for medication administration errors were seen in the included studies in Nigeria and Indonesia. As medication administration errors still abound in these countries, a combination of any of these interventions should be employed to prevent, reduce, and eliminate medication administration errors in their healthcare institutions.

References

1. Institute of Medicine (US) Committee on Quality of Health Care in America. To err is human: building a safer health system [Internet]. Kohn LT, Corrigan JM, Donaldson MS, editors. Washington (DC): National Academies Press (US); 2000 [cited 2025 Jan 4]. Available from: https://pubmed.ncbi.nlm.nih.gov/25077248/
2. Leape LL, Berwick DM. Five years after to err is human: what have we learned?. JAMA. 2005;293(19):2384-90. https://doi.org/10.1001/jama.293.19.2384
3. Grimm CA. Adverse events in hospitals: a quarter of Medicare patients experienced harm in October 2018 [Internet]. Office of Inspector General, I. 2022 [cited 2025 Jan 4];117. Available from: https://collections.nlm.nih.gov/catalog/nlm:nlmuid-9918697339306676-pdf
4. World Health Organization. WHO patient safety curriculum guide for medical schools [Internet]. 2009 [cited 2025 Jan 4]. Available from: https://www.who.int/publications/i/item/9789241598316
5. World Health Organization. Global patient safety action plan 2021-2030: towards eliminating avoidable harm in health care. 2021 [cited 2025 January 4]. Available from: https://www.who.int/teams/integrated-health-services/patient-safety/policy/global-patient-safety-action-plan
6. Flott K, Fontana G, Darzi A. The global state of patient safety. London: Imperial College London. 2019 Dec 9 [cited 2025 January 4]. Available from: https://www.pslhub.org/learn/research-data-and-insight/data-and-insight/the-global-state-of-patient-safety-imperial-college-london-2019-r1046/
7. Harrison R, Cohen AW, Walton M. Patient safety and quality of care in developing countries in Southeast Asia: a systematic literature review. Int J Qual Health Care. 2015;27(4):240-54. Available from: https://www.jstor.org/stable/48518600
8. Meyer R, Orser BA, Byrick R. Medication error: a leading cause of anesthesia-related morbidity and mortality. Anesthesiol. 2007;107(6):1033. https://doi.org/10.1097/01.anes.0000290620.54964.96
9. Wittich CM, Burkle CM, Lanier WL. Medication errors: an overview for clinicians. Mayo Clin Proc. 2014;89(8):1116-25. https://doi.org/10.1016/j.mayocp.2014.05.007
10. Al-Worafi YM. Medication errors. In: Drug safety in developing countries. Academic Press. p. 59-71. https://doi.org/10.1016/C2019-0-00778-9
11. Al Tehewy M, Fahim H, Gad NI, El Gafary M, Rahman SA. Medication administration errors in a university hospital. J Patient Saf. 2016;12(1):34-9. https://doi.org/10.1097/PTS.0000000000000196
12. Keers RN, Williams SD, Cooke J, Walsh T, Ashcroft DM. Impact of interventions designed to reduce medication administration errors in hospitals: a systematic review. Drug Saf. 2014;37:317-32. https://doi.org/10.1007/s40264-014-0152-0
13. Berdot S, Roudot M, Schramm C, Katsahian S, Durieux P, Sabatier B. Interventions to reduce nurses' medication administration errors in inpatient settings: a systematic review and

meta-analysis. Int J Nurs Stud. 2016;53:342-50. https://doi.org/10.1016/j.ijnurstu.2015.08.012

14. Raban MZ, Westbrook JI. Are interventions to reduce interruptions and errors during medication administration effective?: a systematic review [Internet]. BMJ Qual Saf. 2014;23(5):414-21. Available from: https://qualitysafety.bmj.com/content/23/5/414
15. Lapkin S, Levett-Jones T, Chenoweth L, Johnson M. The effectiveness of interventions designed to reduce medication administration errors: a synthesis of findings from systematic reviews. J Nurs Manag. 2016;24(7):845-58. https://doi.org/10.1111/jonm.12390
16. Manias E, Kusljic S, Wu A. Interventions to reduce medication errors in adult medical and surgical settings: a systematic review. Ther Adv Drug Saf. 2020;11:2042098620968309. https://doi.org/10.1177/2042098620968309
17. Nasrin D, Wu Y, Blackwelder WC, Farag TH, Saha D, Sow SO, et al. Health care seeking for childhood diarrhea in developing countries: evidence from seven sites in Africa and Asia. Am J Trop Med Hyg. 2013;89(1):3.
18. Molina GG, Ortiz-Juarez E, NETWORK UG. Temporary basic income: protecting poor and vulnerable people in developing countries [Internet]. New York: United Nations Development Programme. 2020 [cited 2025 Jan 4]. Available from: https://www.undp.org/arab-states/publications/temporary-basic-income-protecting-poor-and-vulnerable-people-developing-countries
19. Banerjee R, Mishra V, Maruta AA. Energy poverty, health and education outcomes: evidence from the developing world. Energy Econ. 2021;101:105447. https://doi.org/10.1016/j.eneco.2021.105447
20. Muzayanah IF, Lean HH, Hartono D, Indraswari KD, Partama R. Population density and energy consumption: a study in Indonesian provinces. Heliyon. 2022;8(9). https://doi.org/10.1016/j.heliyon.2022.e10634
21. Hassan Z, Hashim MJ, Khan G. Population risk factors for COVID-19 deaths in Nigeria at sub-national level. Pan Afr Med J. 2020;35(2).
22. Keers RN, Williams SD, Cooke J, Walsh T, Ashcroft DM. Impact of interventions designed to reduce medication administration errors in hospitals: a systematic review. Drug Saf. 2014;37:317-32. https://doi.org/10.1007/s40264-014-0152-0
23. Berdot S, Roudot M, Schramm C, Katsahian S, Durieux P, Sabatier B. Interventions to reduce nurses' medication administration errors in inpatient settings: a systematic review and meta-analysis. Int J Nurs Stud. 2016;53:342-50. https://doi.org/10.1016/j.ijnurstu.2015.08.012
24. Raban MZ, Westbrook JI. Are interventions to reduce interruptions and errors during medication administration effective?: a systematic review. BMJ Qual Saf. 2014;23(5):414-21.
25. Lapkin S, Levett-Jones T, Chenoweth L, Johnson M. The effectiveness of interventions designed to reduce medication administration errors: a synthesis of findings from systematic reviews. J Nurs Manag. 2016;24(7):845-58. https://doi.org/10.1111/jonm.12390
26. Härkänen M, Voutilainen A, Turunen E, Vehviläinen-Julkunen K. Systematic review and meta-analysis of educational interventions designed to improve medication administration skills and safety of registered nurses. Nurse Educ Today. 2016;41:36-43. https://doi.org/10.1016/j.nedt.2016.03.017
27. Berdot S, Vilfaillot A, Bezie Y, Perrin G, Berge M, Corny J, et al. Effectiveness of a 'do not interrupt'vest intervention to reduce medication errors during medication administration: a multicenter cluster randomized controlled trial. BMC Nurs. 2021;20(1):153. https://doi.org/10.1186/s12912-021-00671-7
28. Manias E, Kusljic S, Wu A. Interventions to reduce medication errors in adult medical and surgical settings: a systematic review. Ther Adv Drug Saf. 2020 Nov;11:2042098620968309.
29. Koyama AK, Maddox CS, Li L, Bucknall T, Westbrook JI. Effectiveness of double checking to reduce medication administration errors: a systematic review. BMJ Qual Saf. 2020;29(7):595-603. https://doi.org/10.1136/bmjqs-2019-009552
30. Moola S, Munn Z, Tufanaru C, Aromataris E, Sears K, Sfetcu R, et al. F. Chapter 7: Systematic reviews of etiology and risk. In:

Aromataris E, Munn Z, editors. Joanna Briggs institute reviewer's manual. JBI; 2017 [cited 2024 Dec 19]. https://doi.org/10.46658/JBIMES-24-06

31. Mahendra AD. The natural and prevalence of medication errors in a tertiary hospital in Indonesia. Int Curr Pharm J. 2021;13(3):55-8. https://doi.org/10.22159/ijcpr.2021v13i3.42096
32. Musharyanti L, Claramita M, Haryanti F, Dwiprahasto I. Why do nursing students make medication errors? A qualitative study in Indonesia. J. Taibah Univ. Medical Sci. 2019;14(3):282-8. https://doi.org/10.1016/j.jtumed.2019.04.002
33. Mulatsih S, Dwiprahasto I, Sutaryo. Implementation of medication safety practice in Childhood Acute Lymphoblastic Leukemia treatment. Asian Pac J Cancer Prev. 2018;19(5):1251-7. https://doi.org/10.22034/APJCP.2018.19.5.1251
34. Lumbantobing R, Sauriasari R, Andrajati R. Role of pharmacists in reducing drug-related problems in hemodialysis outpatients. Asian J Pharm Clin Res. 2017;10:108-13. https://doi.org/10.22159/ajpcr.2017.v10s5.23110
35. Ernawati DK, Lee YP, Hughes JD. Nature and frequency of medication errors in a geriatric ward: an Indonesian experience. Ther Clin Risk Manag. 2014;10(1):413-21. https://doi.org/10.2147/TCRM.S61687
36. Adeleye AO, Oyemolade TA, Malomo TA, Okere OE. Mannitol dosing error during pre-neurosurgical care of head injury: a neurosurgical in-hospital survey from Ibadan, Nigeria. J Neurosci Rural Pract. 2021;12(1):171-6. https://doi.org/10.1055/s-0040-1722093
37. Bello CB. Adherence to medication administration guidelines among nurses in a health facility in South-West Nigeria. Pan Afr Med J. 2021;40. Available from: https://www.panafrican-med-journal.com//content/article/40/56/ful
38. Ayorinde MO, Alabi PI. Perception and contributing factors to medication administration errors among nurses in Nigeria. Int J Africa Nurs Sci. 2019;11. https://doi.org/10.1016/j.ijans.2019.100153
39. Johnson UU, Ebirim LN. Drug errors and protocol for prevention among anaesthetists in Nigeria. Anesthesiol Res Pract. 2017;2017. https://doi.org/10.1155/2017/2045382
40. Ilesanmi RE, Okojie EO, Ojerinde AC. Methods of voluntary reporting medication administration errors among nurses in the University College Hospital, Ibadan, Nigeria. Afr J Med Med Sci. 2016;45(2):197-206. https://doi.org/10.1155/2017/2045382
41. Nwasor EO, Sule ST, Mshelia DB. Audit of medication errors by anesthetists in North Western Nigeria. Niger J Clin Pract. 2014;17(2):226-31. https://doi.org/10.4103/1119-3077.127563
42. Ogboli-Nwasor E. Medication errors in anaesthetic practice: a report of two cases and review of the literature. Afr Health Sci. 2013;13(3):845-9. https://doi.org/10.4314/ahs.v13i3.46
43. Al-Worafi Y. Patient safety in developing countries: education, research, case studies. CRC Press; 2023. https://doi.org/10.1201/9781003230465
44. Belal AS, AL-Gailani KH, Shady SM, Shima AS, Ruba RR, Bushra NM, et al. Prevalence and associated medication errors in hospitalized pediatric patients in Yemen-across sectional study. Med Sci Acad J-Multidisciplin. 2024;1(1). Available from: https://riyadahpublishers.com/index.php/MSAJM/article/view/8
45. Assunção-Costa L, de Sousa IC, Silva RK, do Vale AC, Pinto CR, Machado JF, et al. Observational study on medication administration errors at a University Hospital in Brazil: incidence, nature and associated factors. J Pharm Policy Pract. 2022;15(1):51. https://doi.org/10.1186/s40545-022-00443-x
46. Assuncao-Costa L, Costa de Sousa I, Alves de Oliveira MR, Ribeiro Pinto C, Machado JF, Valli CG, et al. Drug administration errors in Latin America: a systematic review. PLoS One. 2022;17(8):e0272123. https://doi.org/10.1371/journal.pone.0272123
47. Alemu W, Belachew T, Yimam I. Medication administration errors and contributing factors: a cross sectional study in two public hospitals in Southern Ethiopia. Int J Afr Nurs

Sci. 2017;7:68-74. https://doi.org/10.1186/s12912-020-0397-0

48. Khalil H, Lee S. The implementation of a successful medication safety program in a primary care. J Eval Clin Pract. 2018;24(2):403-7. https://doi.org/10.1111/jep.12870
49. Nahi SA, AL-Zaid MD, Alamri AS, alThabiti MaM, Alshahrani DA, Alsaadi RA. Medication safety practices in healthcare settings: an analysis. JICRCR. 2024:1706-10. Available from: https://powertechjournal.com/index.php/journal/article/view/3001
50. Rothschild JM, Churchill W, Erickson A, Munz K, Schuur JD, Salzberg CA, et al. Medication errors recovered by emergency department pharmacists. Ann Emerg Med. 2010;55(6):513-21. https://doi.org/10.1016/j.annemergmed.2009.10.012
51. Mansur JM. Medication safety systems and the important role of pharmacists. Drugs Aging. 2016;33:213-21. https://doi.org/10.1007/s40266-016-0358-1
52. Mahajan RP. Critical incident reporting and learning. Br J Anaesth. 2010;105(1):69-75. https://doi.org/10.1093/bja/aeq133
53. Kiruyi S, Nagadya C, Walusimbi D, Mukooza EK, Higenyi E, Rajab K. Drug and therapeutics committee structure and roles in hospitals: a scoping review. Int J Public Health. 2023 Dec 29. https://doi.org/10.21522/TIJPH.2013.11.04.Art006
54. Adhikari R, Tocher J, Smith P, Corcoran J, MacArthur J. A multi-disciplinary approach to medication safety and the implication for nursing education and practice. Nurse Educ Today. 2014;34(2):185-90. https://doi.org/10.1016/j.nedt.2013.10.008
55. Wong IC. Improving medication safety and diabetes management in Hong Kong–a multi-disciplinary approach. Hong Kong Med J. 2017;23(2):158-67. https://doi.org/10.12809/hkmj165014
56. Bryan R, Aronson JK, Williams A, Jordan S. The problem of look-alike, sound-alike name errors: drivers and solutions. Br J Clin Pharmacol. 2021;87(2):386-94. https://doi.org/10.1111/bcp.14285
57. Stewart D, MacLure K, Pallivalapila A, Dijkstra A, Wilbur K, Wilby K, et al. Views and experiences of decision-makers on organisational safety culture and medication errors. Int J Clin Pract. 2020;74(9):e13560. https://doi.org/10.1111/bcp.14285
58. Carayon P, Wust K, Hose BZ, Salwei ME. Human factors and ergonomics in health care. Handbook of human factors and ergonomics. 2021:1417-37. https://doi.org/10.1007/978-3-030-59403-9_7
59. Sujan M, Pickup L, Bowie P, Hignett S, Ives F, Vosper H, et al. The contribution of human factors and ergonomics to the design and delivery of safe future healthcare. FHJ. 2021;8(3):e574-9. https://doi.org/10.7861/fhj.2021-0112
60. Hatem NA, Yousuf SA, Mohamed Ibrahim MI, Al-Galal GS. Insights into participation in ward rounds in hospitals: a survey of clinical pharmacists' perceptions. J Pharm Policy Pract. 2024;17(1):2285957. https://doi.org/10.1080/20523211.2023.2285957
61. Chowdhury TP, Starr R, Brennan M, Knee A, Ehresman M, Velayutham L, et al. A quality improvement initiative to improve medication management in an acute care for elders program through integration of a clinical pharmacist. J Pharm Pract. 2020;33(1):55-62. https://doi.org/10.1177/0897190018786618
62. Lee KM, Koeper I, Johnson ME, Page A, Rowett D, Johnson J. Multidisciplinary perspectives on roles of hospital pharmacists in tertiary settings: a qualitative study. Int J Qual Health Care. 2024;36(1):mzad110. https://doi.org/10.1093/intqhc/mzad110
63. Hatton K, Bhattacharya D, Scott S, Wright D. Barriers and facilitators to pharmacists integrating into the ward-based multidisciplinary team: a systematic review and meta-synthesis. Res Social Adm Pharm. 2021;17(11):1923-36. https://doi.org/10.1016/j.sapharm.2021.02.006

Submitted 2 Aug 2025, Accepted 26 Jan 2026, Published Apr 2026

Funding: No funding was received for this study.

Competing Interests: The authors have no conflict of interest.

Acknowledgements: The University of Edinburgh Patient Safety and Clinical Human Factors (PSCHF) team is acknowledged for the training of the first author. Edinburgh Surgery Online Scholarship is acknowledged for the scholarship awarded to the first author for the training.

Authors' Contributions: Conceptualization: Dosunmu OO. Data curation: Dosunmu OO. Formal analysis: Dosunmu OO, Dwinta E, and Fatimah FS. Funding acquisition: None. Methodology: Dosunmu OO, Dwinta E. Project administration: Dosunmu OO, Dwinta E, and Fatimah FS. Writing – original draft: Dosunmu OO. Writing – review and editing: Dwinta E, and Fatimah FS.

Correspondence: Oyebode Dosunmu, Nigeria. pharmaseyist@gmail.com

Cite this article as: Dosunmu O, Dwinta E and Fatimah FS. Interventions on medication administration errors in Nigerian and Indonesian hospitals: a narrative review. Christ J Glob Health. 2026 Apr; 13(1). https://doi.org/10.15566/cjgh.v13i1.570