



Review Article

Clinically Prioritized Drug-Related Problems in Hospital Practice

Vishnumaya A. M.*¹, Jeffnisha J.¹, Alnon L. J.², Shaiju S. Dharan³

¹PharmD Intern, Ezhuthachan College of Pharmaceutical Sciences, Marayamuttom, Thiruvananthapuram

²Assistant Professor, Department of Pharmacy Practice Ezhuthachan College of Pharmaceutical Sciences, Marayamuttom, Thiruvananthapuram

³Principal/HOD, Department of Pharmacy Practice Ezhuthachan College of Pharmaceutical Sciences, Marayamuttom, Thiruvananthapuram

Drug-related problems (DRPs) are a major contributor of preventable patient harm and therapeutic failure in hospital practice, particularly among patients receiving complex pharmacotherapy. Despite the availability of multiple DRP classification systems, practical guidance on prioritizing and managing clinically significant DRPs in routine hospital-settings remains limited. In routine ward settings, clinical pharmacists are often required to identify, prioritize and intervene in DRPs under time and resource constraints, highlighting the need for practical, patient-centered approaches rather than purely theoretical frameworks. This review focus on the clinical relevance of drug-related problems in hospitalized patients, with emphasis on prioritization based on clinical risk, urgency and potential impact on patient outcome. Common DRP categories encountered in hospital practice are discussed with attention to their potential impact on patient outcomes. In addition, a pragmatic decision-making toolkit is proposed to assist clinical pharmacists in systematically identifying high-risk DRPs, prioritizing interventions and facilitating communication within multidisciplinary teams. By adopting a clinically oriented approach, this review aims to strengthen pharmacists' role in improving medication safety and optimizing patient care in hospital settings.

Keywords: Drug-related Problems, Hospital practice, Clinical pharmacist.

INTRODUCTION

Drug-related problems (DRPs) refer to events or circumstances involving drug therapy that have the potential to interfere with desired health outcomes. In hospital practice, DRPs are common due to factors such as polypharmacy, complex disease states and frequent changes in therapy admission. If not identified and addressed promptly, DRPs can result in adverse drug reactions, therapeutic failure, prolonged hospital stays, increased healthcare costs, and in severe cases significant morbidity and mortality [1-3]. Hospitalized patients particularly those with multiple comorbidities or organ dysfunction are at increased risk of clinically significant DRPs [4]. Errors in dosing, inappropriate drug selection, drug-drug interactions and omission of necessary therapy are

frequently encountered in routine ward settings and can negatively impact patient outcomes. Effective identification and management of these problems are therefore essential components of safe and rational pharmacotherapy [5, 6]. Although several classification systems have been developed to describe drug-related problems, their application in real-time clinical decision making remains inconsistent [7]. Existing literature often emphasizes theoretical categorization rather than practical prioritizing based on clinical risk and urgency, leaving clinicians with limited guidance on how to manage DRPs in busy hospital environments [8,9]. In this context, this review aims to provide a clinically oriented overview of drug-related problems in

hospital practice, with emphasis on prioritization and decision-making. By proposing a pragmatic toolkit to support identification, risk stratification and intervention, this review seeks to assist clinical pharmacists in delivering timely, patient-centered care and improving medication safety across hospital settings.

Clinical Significance of DRPs

Drug-related problems frequently challenge patient safety in hospital practice. Studies report high DRP prevalence among inpatients often 20-80% driven by complex pharmacotherapy and admission-related changes, consistently linking DRPs to medication harm and poor outcomes [3, 10]. Global trend of Clinically prioritized drug related problem (from 2000- 2025) shows steady upward trajectory is observed (Fig:1). This increase correlates with factors such as growing polypharmacy, increasing elderly patients, high prevalence of chronic disease and use

of complex drug regimen [1,11]. High-risk medications including anticoagulants [12], antibiotics and chemotherapeutic agents pose elevated threats due to narrow therapeutic indices [13], intricate dosing and interaction risks. Inappropriate dosing, failure to adjust therapy based on hepatic or renal function or overlooked drug-drug interactions with agents often trigger severe adverse events [14, 15]. Patient factors amplify vulnerability especially elderly individuals with multiple comorbidities or organ dysfunction face heightened DRP risk, where even minor errors escalate to serious harm [16]. The clinical consequences of DRPs range from adverse drug reactions and therapeutic failure to prolonged hospital stays, readmissions and in severe cases, morbidity and mortality. These outcomes highlight the importance of early detection and effective management of DRPs as a critical component of safe and rational medication use in hospital practice [3, 17].

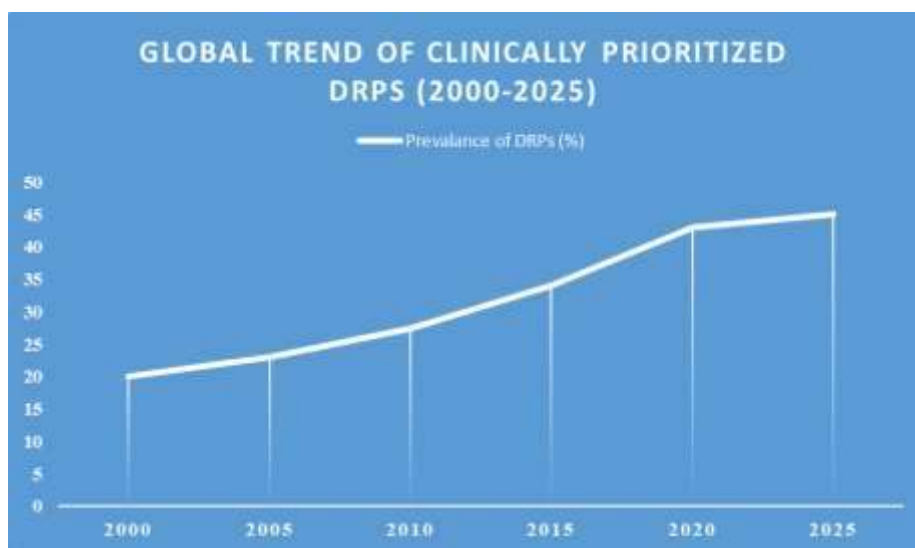


Chart 1. Global trend of Clinically Prioritized Drug Related Problem (2000- 2025)

Classification and Clinical Prioritization of DRPs

Several classification systems have been developed to describe DRPs, with the framework proposed by Cipolle, Strand and Morley [18] being among the most widely used in clinical pharmacy practice. This system categorizes DRPs into issues related to indication, effectiveness, safety and adherence, providing a structured approach to identifying problems associated with pharmacotherapy. While ideal for documentation and research, these systems

do not consistently guide clinicians in determining which DRPs require immediate attention in routine hospital practice [8, 19, 20]. In real world clinical settings, pharmacists are often required to manage multiple DRPs simultaneously under time and resource constraints. Pharmacist must triage DRPs by clinical risk and urgency, rather than solely on categorical classification. A clinically significant DRP is one that has the potential to cause immediate harm, worsen patient outcomes or delay recovery if not addressed promptly [21, 22]. Clinical

prioritization of DRPs should consider both severity of potential harm and the urgency of intervention. High risk DRPs typically involve medications with a narrow therapeutic index, critical dosing requirements, or a strong association with serious adverse outcomes [23]. Examples include inappropriate anticoagulant dosing, untreated severe infections or drug-drug interactions that increase the risk of life-threatening toxicity. These problems require immediate pharmacist intervention and close monitoring [24]. Moderately risk DRPs are those that may not pose an immediate threat to life but can negatively affect therapeutic outcomes if left unaddressed. These include suboptimal dosing, clinically relevant but non-critical drug interactions and delayed initiation of indicated therapy. Low risk DRPs are less likely to result in significant patient harm in the short term and can be managed through routine follow-up and documentation [3, 25]. In addition to severity, patient-specific factors such as age, comorbidities, organ function and overall clinical stability play a crucial role in determining the priority of a given DRP [22]. The same DRP may therefore require different levels of urgency depending on the clinical context. Integrating these considerations into a structured prioritization approach enables pharmacists to focus their efforts on interventions with greatest potential impact on patient outcomes [1, 26].

Common Drug-Related Problems In Hospital Settings

Drug-related problems encountered in hospital settings are diverse and often multifactorial, arising from complex therapeutic regimens, patient-specific factors and transitions of care [3, 4]. The following are among the most commonly encountered DRP categories in routine hospital practice.

1. Dosing Errors and need for dose adjustment

Inappropriate dosing is one of the most frequent DRPs in hospitalized patients, particularly in those with renal or hepatic impairment [27]. Failure to adjust drug doses based on organ function can lead to drug accumulation and toxicity, while underdosing may result in therapeutic failure [4, 28]. Clinical

pharmacist should review renal or hepatic function, recommend dose adjustment and monitor therapeutic response and toxicity [29].

2. Drug-Drug Interactions

Drug-drug interactions are common in patients receiving multiple medications and may result in reduced efficacy or increased risk of adverse effects. Some interactions may be clinically insignificant, while others can be life-threatening. Pharmacists have a role in identifying clinically significant interactions, assessing severity and relevance of the interactions and also recommending alternative therapy or monitoring [14, 30].

3. Adverse Drug Reactions (ADRs)

Adverse drug reactions contribute significantly to morbidity in hospital settings and may mimic disease progression, making detection challenging. Early identification and pertinent management are crucial for preventing ADR associated complications. The pharmacist plays an essential role in assessing causality, recommending discontinuation or substitution of the suspected agent and ensuring proper documentation and reporting of the adverse event [31, 32].

4. Therapeutic Duplication

Therapeutic duplication occurs when two or more drugs from the same class or with similar pharmacological effects are prescribed unnecessarily, increasing the risk of adverse effects without added benefit [33]. The clinical pharmacist contributes by identifying unnecessary duplication, recommending discontinuation of redundant therapy and promoting rational prescribing practices [34].

5. Omission of Indicated Therapy

Failure to initiate necessary treatment is an often overlooked DRP that can significantly impact patient outcomes. The pharmacist plays a proactive role in identifying gaps in therapy, recommending initiation of appropriate treatment and supporting adherence to established clinical guidelines [35, 36].

Table 1: Common DRPs in Hospital Practice

DRP Category	Prevalence in Hospitals	Example Risk level	Key Pharmacist action
Dosing Errors	17-38% of errors	High (especially in renal/hepatic impairment)	Adjust per CrCl/eGFR
Drug Interactions	15-25% of errors	Moderate to High	Use interaction checker and recommend alternatives
Adverse Drug Reactions	6-15% of admissions	High	Naranjo causality
Therapeutic Duplication	10-20% in transitions	Moderate	Deprescribe redundant agents
Omission of Therapy	23-30% of errors	Variable (High if prophylactic)	Guideline review

Clinical Decision-Making Toolkit for Prioritizing Drug-Related Problems

Effective management of drug-related problems in hospital practice requires more than identification alone; it demands structured clinical reasoning to prioritize interventions based on patient risk and potential outcomes [37]. Building on common DRP categories (Table 1), the following 6-step toolkit operationalizes clinical prioritization for daily hospital practice which assist clinical pharmacists in systematically evaluating and prioritizing DRPs in routine practice [38, 39].

Step 1: Identify the Drug-related problem

The initial step involves recognizing the presence of a DRP using clinical judgment supported by established classification systems such as Cipolle-Strand-Morley framework [18] and the PCNE classification [40]. This ensures a structured approach to identifying issues related to indication, effectiveness, safety and adherence.

Step 2: Assess Clinical Severity

Evaluate potential patient impact using time-based criteria:

- **High severity:** Immediate harm risk (<24h) such as severe adverse drug reactions, critical drug interactions or significant dosing errors.
- **Moderate severity:** Short-term deterioration (2-7 days) such as suboptimal dosing, delayed therapy.

- **Low severity:** Minimal or no immediate clinical impact but routine monitoring required [4, 25].

Step 3: Evaluate Patient-Specific Risk Factors

The clinical relevance of a DRP is strongly influenced by individual patient characteristics. Factors such as age, comorbidities, organ dysfunction, polypharmacy and clinical status must be considered when prioritizing interventions. For example, vincristine dose error in a neutropenic pediatric oncology patient escalates from moderate to high risk due to infection vulnerability while the same error in stable adult may remain moderate [41].

Step 4: Determine Urgency of Intervention

Based on severity and patient-specific factors, the urgency of intervention should be established. DRPs requiring immediate action such as discontinuation of a harmful drug or dose correction should be prioritized over those that can be addressed during routine review. This step ensures efficient allocation of clinical attention in time-sensitive hospital environments [42].

Step 5: Plan and Communicate Intervention

After prioritization, appropriate interventions should be planned and communicated effectively to the healthcare team. Clear, concise and evidence-based recommendations enhance acceptance and facilitate timely implementation.

Step 6: Monitor and Follow-up

Continuous monitoring is essential to evaluate the effectiveness of interventions and to detect any new or unresolved DRPs. Follow-up ensures that patient outcomes are optimized and that therapy remains appropriate over time.

DISCUSSION

Drug-related problems remain a significant challenge in hospital practice, contributing to preventable adverse events, prolonged hospital stays, and increased healthcare costs [43]. Despite the availability of established classification systems such as the Cipolle–Strand–Morley framework [18] and the PCNE classification [40], the management of DRPs in routine clinical settings often lacks a structured approach to prioritization. Most existing models are primarily focused on categorization and documentation, with limited emphasis on real-time clinical decision-making [44, 45]. This gap becomes particularly relevant in complex hospital environments, where patients are exposed to polypharmacy, comorbid conditions, and dynamic clinical changes [46]. In such settings, not all DRPs carry equal clinical significance, and the ability to differentiate between high-risk and low-risk problems is essential. Failure to prioritize appropriately may result in delayed interventions for critical issues while less significant problems receive unnecessary attention [47]. The decision-making toolkit proposed in this review addresses this limitation by integrating clinical severity, patient-specific risk factors, and urgency of intervention into a structured framework [48]. Unlike traditional classification systems, this approach emphasizes practical applicability and supports pharmacists in making timely, patient-centered decisions. By shifting the focus from identification alone to prioritization and action, the toolkit aligns more closely with the realities of clinical practice [49]. Furthermore, the integration of such a framework into routine pharmacy practice has the potential to enhance interdisciplinary collaboration [21, 38]. Clear prioritization and communication of DRPs can improve acceptance of pharmacist recommendations and facilitate more efficient clinical workflows. This is particularly important in high-risk settings such as critical care and oncology, where the margin for error is minimal [50]. However, this review has certain limitations. The proposed toolkit is

conceptual in nature and has not been validated through prospective clinical studies. Additionally, variations in hospital settings, resource availability, and clinical expertise may influence its applicability. Future research should focus on validating this approach and assessing its impact on clinical outcomes, medication safety, and healthcare efficiency.

CONCLUSION

Drug-related problems are a major contributor to preventable patient harm in hospital settings, particularly in the context of complex pharmacotherapy and high-risk patient populations. While existing classification systems such as the Cipolle–Strand–Morley framework and the PCNE classification provide a structured approach to identifying and documenting DRPs, they offer limited guidance on clinical prioritization in real-time practice. This review highlights the need for a clinically oriented approach that goes beyond categorization and emphasizes the importance of prioritizing DRPs based on severity, patient-specific risk factors, and urgency of intervention. The proposed decision-making toolkit provides a practical framework to support clinical pharmacists in identifying high-risk problems, guiding timely interventions, and improving communication within the healthcare team. Adopting such a structured approach can enhance medication safety, optimize therapeutic outcomes, and strengthen the role of clinical pharmacists in patient-centered care. Further studies are warranted to validate this framework and explore its impact on clinical practice.

REFERENCES

1. Deawjaroen K, Sillabutra J, Poolsup N. Characteristics of drug-related problems and pharmacist's interventions in a tertiary university hospital. *Scientific Reports*. 2022; 12:17107.
2. World Health Organization. The Third WHO Global Patient Safety Challenge: Medication without Harm [Internet]. 2017 [cited on Mar18]. Available from: <https://www.who.int/publications/i/item/WHO-HIS-SDS-2017.6>
3. Koh Y, Kutty FB, Li SC. Drug-related problems in hospitalized patients on polypharmacy: the

- influence of age and gender. *Ther Clin Risk Manag.* 2005 Mar;1(1):39-48.
4. Albayrak A, Başgüt B, Bıkmaz GA, Karahalil B. Clinical pharmacist assessment of drug-related problems among intensive care unit patients in a Turkish university hospital. *BMC Health Service Research.* 2022 Jan 15;22(1):79.
 5. Tariq R, Scherbak Y, Vashisht R, Sinha A. Medication dispensing errors and prevention [Internet]. National Library of Medicine. StatPearls Publishing; 2024 [cited on Mar18]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK519065/>
 6. Al Hamid A, Ghaleb M, Aljadhey H, Aslanpour Z. A systematic review of hospitalization resulting from medicine-related problems in adult patients. *British Journal of Clinical Pharmacology* [Internet]. 2013 Nov 28;78(2):202–17 [cited on Mar 18]. Available from: <http://onlinelibrary.wiley.com/doi/10.1111/bcp.12293/full>
 7. Ruths S, Viktil KK, Blix HS. Classification of drug-related problems. *Tidsskrift for Den norske legeforening* [Internet]. 2007 Nov 29; 127:3073–6 [cited on Mar 18]. Available from: <https://tidsskriftet.no/en/2007/11/classification-drug-related-problems>
 8. Robert L, Cuvelier E, Rousselière C, Gautier S, Odou P, Beuscart JB, et al. Detection of Drug-Related Problems through a Clinical Decision Support System Used by a Clinical Pharmacy Team. *Healthcare.* 2023 Mar 11;11(6):827.
 9. Linden-Lahti C, Takala A, Holmström AR, Airaksinen M. Applicability of drug-related problem (DRP) classification system for classifying severe medication errors. *BMC Health Service Research.* 2023 Jul 10;23(1):743.
 10. AbuRuz S, Jaber D, Basheti I, Sadeq A, Arafat M, AlAhmad M, et al. Impact of pharmacist interventions on drug-related problems in general surgery patients: a randomised controlled trial. *European Journal of Hospital Pharmacy.* 2021 Nov 13;28(Suppl 2): s72–8.
 11. Demessie MB, Berha AB. Prevalence and predictors of drug-related hospitalisation among patients visiting emergency departments of Addis Ababa city hospitals in Ethiopia: a multicentre prospective observational study. *BMJ Open* 2022;12: e054778. doi: 10.1136/bmjopen-2021-054778
 12. Sharma M, Krishnamurthy M, Snyder R, Mauro J. Reducing Error in Anticoagulant Dosing via Multidisciplinary Team Rounding at Point of Care. *Clinics and Practice.* 2017 Apr 20;7(2):72–4.
 13. Blix HS, Viktil KK, Moger TA, Reikvam A. Drugs with narrow therapeutic index as indicators in the risk management of hospitalised patients. *Pharmacy Practice.* 2010 Jan;8(1):50-5. doi: 10.4321/s1886-36552010000100006.
 14. Papotti B, Marchi C, Adorni MP, Potì F. Drug-drug interactions in polypharmacy patients: The impact of renal impairment. *Current Research in Pharmacology and Drug Discovery.* 2021 Mar 29; 2:100020.
 15. Tamargo J, Le Heuzey JY, Mabo P. Narrow therapeutic index drugs: a clinical pharmacological consideration to flecainide. *European Journal of Clinical Pharmacology.* 2015 May;71(5):549-67.
 16. Olyaei AJ, Bennett WM. Chapter 9: Drug Dosing and Renal Toxicity in the Elderly Patient [Internet]. American Society of Nephrology; 2009 [cited 2026 Mar 20]. Available from: <https://www.asn-online.org/education/distancelearning/curricula/geriatrics/Chapter9.pdf>
 17. Konuru V, Naveena B, Reddy ES, Vivek BC, Shravani G. A prospective study on hospitalization due to drug-related problems in a tertiary care hospital. *Journal of Pharmacy and Bioallied Sciences.* 2019;11(4):328-32.
 18. Cipolle RJ, Strand LM, Morley PC. *Pharmaceutical Care Practice: The Patient-Centered Approach to Medication Management.* 3rd ed. New York: McGraw-Hill; 2012.
 19. Lekpittaya N, Kocharoen S, Angkanavisul J, Siriudompas T, Montakantikul P, Paiboonvong T. Drug-related problems identified by clinical pharmacists in an academic medical centre in Thailand. *Journal of Pharmaceutical Policy and Practice.* 2023 Dec 16;17(1):2288603.
 20. Björkman IK, Sanner MA, Bernsten CB. Comparing 4 classification systems for drug-related problems: Processes and functions. *Research in Social and Administrative Pharmacy.* 2008 Dec;4(4):320–31.

21. Hohmeier KC, Shelton C, Havrda D, Gatwood J. The need to prioritize “prioritization” in clinical pharmacy service practice and implementation. *Research in Social and Administrative Pharmacy*. 2020 Dec;16(12):1785–8.
22. Kaufmann CP, Stämpfli D, Hersberger KE, Lampert ML. Determination of risk factors for drug-related problems: a multidisciplinary triangulation process. *BMJ Open*. 2015 Mar 20;5(3):e006376.
23. Jackson LD, Yang D, Vella D. Pharmaceutical care- urgency: Proposing a practical clinical framework for pharmacy students. *Currents in Pharmacy Teaching and Learning*. 2022 Dec;14(12):1535–42.
24. Wiggins BS, Saseen JJ, Page RL, Reed BN, Sneed K, Kostis JB, et al. Recommendations for Management of Clinically Significant Drug-Drug Interactions with Statins and Select Agents Used in Patients with Cardiovascular Disease: A Scientific Statement from the American Heart Association. *Circulation* [Internet]. 2016 Nov 22;134(21). [cited 2026 Mar 20]. Available from: <https://www.ahajournals.org/doi/10.1161/CIR.000000000000456>
25. Garin N, Sole N, Lucas B, Matas L, Moras D, Rodrigo-Troyano A, et al. Drug related problems in clinical practice: a cross-sectional study on their prevalence, risk factors and associated pharmaceutical interventions. *Scientific Reports* [Internet]. 2021 Jan 13;11(1):883. [cited 2026 Mar 20]. Available from: <https://doi.org/10.1038/s41598-020-80560-2>
26. Falconer N, Barras M, Cottrell N. How hospital pharmacists prioritise patients at high-risk for medication harm. *Research in Social and Administrative Pharmacy*. 2019 Oct;15(10):1266–73.
27. Sweileh WM, Janem SA, Sawalha AF, Abu-Taha AS, Zyoud SH, Sabri IA, et al. Medication dosing errors in hospitalized patients with renal impairment: a study in Palestine. *Pharmacoepidemiology and Drug Safety*. 2007;16(8):908–12.
28. Lopez-Martin C, Garrido Siles M, Alcaide-Garcia J, Faus Felipe V. Role of clinical pharmacists to prevent drug interactions in cancer outpatients: a single-centre experience. *International Journal of Clinical Pharmacy*. 2014 Dec;36(6):1251-9.
29. Jiang SP, Zhu ZY, Wu XL, Lu XY, Zhang XG, Wu BH. Effectiveness of pharmacist dosing adjustment for critically ill patients receiving continuous renal replacement therapy: a comparative study. *Therapeutics and Clinical Risk Management*. 2014 Jun 3; 10:405-12.
30. Očovská Z, Maříková M, Vlček J. Potentially clinically significant drug-drug interactions in older patients admitted to the hospital: A cross-sectional study. *Frontiers in Pharmacology*. 2023 Feb 2;14.
31. Giardina C, Cutroneo PM, Mocciaro E, Russo GT, Mandraffino G, Basile G, Rapisarda F, Ferrara R, Spina E, Arcoraci V. Adverse Drug Reactions in Hospitalized Patients: Results of the FORWARD (Facilitation of Reporting in Hospital Ward) Study. *Frontiers in Pharmacology*. 2018 Apr 11; 9:350.
32. Salazar A, Amato MG, Shah SN, Khazen M, Aminmozaffari S, Klinger EV, Volk LA, Mirica M, Schiff GD. Pharmacists' role in detection and evaluation of adverse drug reactions: Developing proactive systems for pharmacosurveillance. *American Journal of Health-System Pharmacy*. 2023 Feb 15;80(4):207-214.
33. Lee H, Song I, Shin SM, Jeong HE, Lee EK, Shin JY. Regulatory effect of decreasing therapeutic duplication of respiratory drugs using a prescription database between 2012 and 2015. *Regulatory Toxicology and Pharmacology*. 2019 Apr; 103:218–28.
34. Choi W, Koo H, Jeong KH, Kim E, You SH, Lee MT, et al. Therapeutic Duplication as a Medication Error Risk in Fixed-Dose Combination Drugs for Dyslipidemia: A Nationwide Study. *Korean Journal of Clinical Pharmacy*. 2023 Sep 22;33(3):168–77.
35. Green CJ, Du-PreP, Elahi N, Dunckley P, McIntyre AS. Omission after admission: failure in prescribed medications being given to inpatients. *Clinical Medicine*. 2009 Dec;9(6):515-8.
36. McNeely EB. Treatment Considerations and the Role of the Clinical Pharmacist Throughout Transitions of Care for Patients with Acute Heart Failure. *Journal of Pharmacy Practice*. 2017 Aug;30(4):441-50.
37. Plourde M, Gilbert C, Noël M, Ruelland S, Carmichael PH, Laurin D. Patient prioritization

- for pharmaceutical intervention in the hospital setting: a retrospective cross-sectional study. *International Journal of Pharmacy Practice*. 2025 Jul 24;33(4):431-438.
38. Foroughinia F, Tazarehie SR, Petramfar P. Detecting and managing drug-related problems in the neurology ward of a tertiary care teaching hospital in Iran: A clinical pharmacist's intervention. *Journal of Research in Pharmacy Practice*. 2016 Oct-Dec;5(4):285-289.
39. Using pharmaceutical prioritisation tools to improve patient care [Internet]; 2026. *The Pharmaceutical Journal*. [cited 2026 Mar 20]. Available from: <https://pharmaceutical-journal.com/article/ld/using-pharmaceutical-prioritisation-tools-to-improve-patient-care>
40. Fauziah A, Kardela W, Bellatasie R. PCNE and Cipolle Classification for Drug Related Problems in Tuberculosis: A Review [Internet]. *IOSR Journal of Pharmacy and Biological Sciences*. 2022. [cited 2026 Mar 20];17:16–23. Available from: <https://iosrjournals.org/iosr-jpbs/papers/Vol17-issue1/Ser-4/C1701041623.pdf>
41. Barnett S, Hellmann F, Parke E, Makin G, Tweddle DA, Osborne C, Hempel G, Veal GJ. Vincristine dosing, drug exposure and therapeutic drug monitoring in neonate and infant cancer patients. *European Journal of Cancer*. 2022 Mar; 164:127-136. doi: 10.1016/j.ejca.2021.09.014.
42. Haerdtlein A, Boehmer AM, Karsten Dafonte K, Rottenkolber M, Jaehde U, Dreischulte T. Prioritisation of Adverse Drug Events Leading to Hospital Admission and Occurring during Hospitalisation: A RAND Survey. *Journal of Clinical Medicine*. 2022 Jul 22;11(15):4254.
43. de Lemos J, Loewen P, Nagle C, McKenzie R, You YD, Dabu A, Zed P, Ling P, Chan R. Preventable adverse drug events causing hospitalisation: identifying root causes and developing a surveillance and learning system at an urban community hospital, a cross-sectional observational study. *BMJ Open Qual*. 2021 Jan;10(1): e001161.
44. Plourde M, Gilbert C, Noël M, Ruelland S, Carmichael PH, Laurin D. Patient prioritization for pharmaceutical intervention in the hospital setting: a retrospective cross-sectional study. *International Journal of Pharmacy Practice*. 2025 Jul 24;33(4):431-8.
45. Kateryna Hoshtynar, Mykola Khaitovych, Oleksandr Kryvanych, Viktoriia Potaskalova. Drug-related problems in comorbid patients with anxiety-depressive disorders. *ScienceRise Pharmaceutical Science*. 2025 Aug 30;(4 (56)):56–64.
46. Lim XY, Yeo QQ, Kng GLL, Chung WL, Yap KZ. Validation of a Drug-Related Problem Classification System for the Intermediate and Long-Term Care Setting in Singapore. *Pharmacy (Basel)*. 2018 Oct 3;6(4):109.
47. Kjeldsen LJ, Nielsen TRH, Olesen C. Investigating the Relative Significance of Drug-Related Problem Categories. *Pharmacy (Basel)*. 2017 Jun 9;5(2):31.
48. Vest TA, Simmons A, Morbitzer KA, McLaughlin JE, Cicci J, Clarke M, Valgus JM, Falato C, Waldron KM. Decision-making framework for an acute care clinical pharmacist productivity model: Part 1. *American Journal of Health System Pharmacy*. 2021 Jul 22;78(15):1402-9.
49. Mertens JF, Koster ES, Deneer VHM, Bouvy ML, van Gelder T. Factors influencing pharmacists' clinical decision making in pharmacy practice. *Research In Social & Administrative Pharmacy*. 2023 Sep;19(9):1267-77.
50. Cao DX. Collaborative Health Care: The Essential Role of Pharmacists in Multidisciplinary Teams [Internet]. *Pharmacy Times*. 2024 [cited 2026 Mar 20]. Available from: <https://www.pharmacytimes.com/view/collaborative-health-care-the-essential-role-of-pharmacists-in-multidisciplinary-teams>.

Cite: Vishnumaya A. M.*, Jeffnisha J., Alnon L. J., Shaiju S. Dharan, Clinically Prioritized Drug-Related Problems in Hospital Practice, *Int. J. Med. Pharm. Sci.*, 2026, 2 (9), 360-367. <https://doi.org/10.5281/zenodo.22811517>