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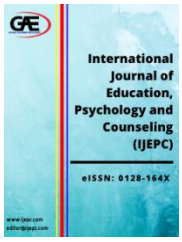

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NAVIGATING THE IMPACT OF NURSE WORKLOAD ON MEDICATION ERRORS: A SYSTEMATIC REVIEW

Sharifah Abdul Manaf[1,2*], Salimah Japar[1], Azura Abdul Halain[1], Nurul Fariza Mohd Mustafa[2], Annamma Kunjukunju[2]

[1] Department of Nursing, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia
Email: Sharifah.manaf@kpju.edu.my, j_salimah@upm.edu.my, azurahalain@upm.edu.my
[2] School of Nursing, KPJ Healthcare University College, Lot PT 17010, Persiaran Seriemas, Kota Seriemas, 71800 Nilai, Negeri Sembilan.
Email: nurulfariza@kpju.edu.my, ann@kpju.edu.my
[*] Corresponding Author

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Abstract:

Background & Aim: The healthcare industry is consistently working to ensure safe, high-quality patient care, but medication errors continue to be a major concern globally. This systematic literature review to explore and analyse the relationship between nurse workload and medication errors in healthcare settings. **Methods & Materials:** To achieve this, an extensive search of scholarly articles was conducted from reputable databases such as Scopus and Wiley focusing on studies published between 2014 and 2024. The flow of study based on PRISMA framework. **Results:** A total of 22 articles were included in the review. The findings were divided into three themes which are (1) Medication Errors and Prevention Strategies, (2) Impact of Interruptions and Workload on Medication Safety, (3) Nurses' Roles, Perceptions, and Decision-Making in Medication Management. The findings from various studies highlight that increased nurse workload significantly contributes to the incidence of medication errors, impacting patient safety and the quality of care provided. Furthermore, the physical and psychological strain associated with heavy workloads can impair nurses' decision-making abilities. **Conclusion:** The conclusion emphasises how a high workload, frequent interruptions, and cognitive overload not only increase the likelihood of mistakes but also impair nurses' capacity to make wise clinical judgements. This emphasises how important it is to take care of nurses' emotional and physical needs.

Keywords:

Medication Error, Nurse, Workload, Patient Safety, Patient Care

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Introduction

Medication errors remain a pervasive challenge in healthcare, with significant consequences for patient safety, morbidity, mortality, and healthcare costs (Kim & Chae, 2022; Ratanto et al., 2021). These errors frequently occur during the prescription and administration stages, with nurses often directly involved due to their central role in medication management (Ta'an et al., 2021; Yousef et al., 2021). The implications extend beyond immediate patient harm, leading to increased hospital stays, additional treatments, and substantial financial burdens for healthcare systems (Assaye et al., 2021).

The process of medication administration is multifaceted, involving several steps-prescribing, transcribing, dispensing, and monitoring-each of which presents opportunities for error (D'Errico et al., 2022; A.de Magalhães et al., 2019; Tu et al., 2023; Zirpe et al., 2020)Nurses must not only follow precise protocols but also adapt to frequent changes in patient conditions and medication regimens. The process is further complicated by the need for manual documentation, especially when electronic systems are incomplete or require additional steps, increasing the time and attention required for each patient (Aydin et al., 2019).

Other contributing factors include insufficient experience or training, particularly among new staff or those unfamiliar with specific protocols, as well as poor communication within the healthcare team (Ta'an et al., 2021; Yousef et al., 2021). Environmental stressors, such as noisy or chaotic work settings, and distractions during medication rounds, also increase the likelihood of mistakes (Alshyyab et al., 2024). In addition, while technological solutions like electronic health records and automated dispensing machines are designed to streamline processes, they can inadvertently introduce new challenges if not properly implemented or if they add to the documentation burden (A.de Magalhães et al., 2019).

The psychological and emotional impact of excessive workload on nurses cannot be overlooked, as it can lead to stress, reduced job satisfaction, and further compromise patient safety (Sabzi et al., 2019). Addressing these issues requires a holistic approach that goes beyond individual performance. Systemic and organizational factors, such as workflow design, staffing policies, and the overall culture of safety, play a crucial role in shaping nurse workload and the risk of medication errors (Beaudart et al., 2023; Fernandez et al., 2023; Kuppadakkath et al., 2023; Mulac et al., 2021; Savva et al., 2022). Therefore, effective strategies must include optimizing staffing levels, improving workflow efficiency, fostering open communication, supporting nurse well-being, and ensuring that technological solutions are user-friendly and enhance, rather than hinder, the medication administration process (Kuppadakkath et al., 2023).

The healthcare industry continually strives to provide safe, high-quality patient care, yet medication errors remain a significant concern worldwide (Aidah et al., 2021). These errors, defined as preventable events that may cause or lead to inappropriate medication use or patient harm, have far-reaching implications, including increased morbidity and mortality, extended hospital stays, and escalated healthcare costs (Vinod, 2023). Among the various healthcare professionals, nurses play a pivotal role in medication administration, a process that encompasses multiple steps including prescribing, transcribing, dispensing, and monitoring (Samad et al., 2019). Given the critical nature of their responsibilities, understanding the factors contributing to medication errors within nursing practice is paramount.

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Nurse workload has emerged as a crucial factor influencing the incidence of medication errors (Ratanto et al., 2021). The workload encompasses both the volume of tasks and the complexity of the care provided. It is influenced by numerous variables, such as patient acuity, staffing levels, shift length, and administrative responsibilities (Kerari & Innab, 2021; Tarulitua Simamora et al., 2021). The intricate interplay between these elements can create a stressful environment, potentially compromising nurses' ability to perform their duties safely and effectively. High workloads can lead to fatigue, burnout, and decreased cognitive function, all of which are known precursors to errors in clinical settings (Banda et al., 2022; Diehl et al., 2021; Ebrahimi et al., 2021; Reganata & Saputra, 2022).

Research indicates that nurse workload and medication errors are intricately linked (Jin et al., 2018, Kuppadakkath et al., 2022; Ratanto et al., 2021). Studies have shown that increased patient-to-nurse ratios are associated with higher rates of medication errors (Latimer et al., 2023; Zarea et al., 2018). Overburdened nurses are more likely to experience interruptions, distractions, and time pressures, all of which can lead to mistakes in medication administration (Jin et al., 2018). Furthermore, the complexity of managing multiple patients simultaneously can lead to cognitive overload, where the nurse's mental capacity is exceeded, increasing the likelihood of errors (Blignaut et al., 2022). Despite the clear association, the specific mechanisms through which workload influences medication errors remain underexplored.

Several frameworks and theories have been proposed to elucidate the relationship between nurse workload and medication errors. The Systems Engineering Initiative for Patient Safety (SEIPS) model, for example, emphasizes the importance of the work system and its components including people, tasks, tools and technologies, physical environment, and organizational conditions in shaping healthcare outcomes (Carayon et al., 2020; Lumley et al., 2020; Weaver et al., 2021). Applying such models can provide a holistic understanding of how workload affects nurses' performance and identify potential intervention points to mitigate errors.

Efforts to address medication errors through workload management have led to various strategies, such as optimizing nurse staffing levels, redesigning workflow processes, and incorporating health information technologies (Abdulmutalib & Safwat, 2020; Hutchinson et al., 2020). For instance, electronic health records (EHRs) and computerized physician order entry (CPOE) systems can reduce the cognitive burden on nurses by streamlining medication administration processes and minimizing manual entry errors (Jungreithmayr et al., 2021; Rouayroux et al., 2019; Xiao et al., 2022). However, the implementation of such technologies must be carefully managed to avoid unintended consequences, such as new types of errors or increased workload due to poor system usability (Abbassi et al., 2022; Rouayroux et al., 2019).

Despite the advancements in understanding and addressing nurse workload and medication errors, significant gaps remain. Future research should focus on longitudinal studies to capture the dynamic nature of workload and its impact over time. Additionally, exploring the role of organizational culture, leadership, and policy in shaping workload and medication safety can provide deeper insights. Interdisciplinary approaches that integrate perspectives from nursing, human factors engineering, and organizational psychology are particularly valuable in developing comprehensive strategies to reduce medication errors.

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The relationship between nurse workload and medication errors is a critical area of study in healthcare. Multiple studies have shown that high nurse workload contributes significantly to medication errors. Xu et al. (2017) observed that medication-related events (MREs) were prevalent in intensive care units (ICUs), with a notable correlation between increased workload and MREs, especially during night shifts. Similarly, Groves et al. (2020) highlighted that barriers to fatigue management among acute care nurses, such as high workload and shift schedules, directly impact patient care and increase the risk of medication errors.

Nurse workload is a multifaceted issue affecting medication safety. Kuppadakkath et al. (2023) found that in residential aged care facilities, medication errors were often due to excessive workload, use of agency staffing, and delays in laboratory results. These findings align with Ratanto et al. (2021) who identified workload as the most significant factor influencing medication errors by nurses, emphasizing the need for better workload management to enhance patient safety.

Interruptions and distractions during medication administration are another significant factor contributing to errors. Kellogg et al. (2021) and Thomas et al. (2017) both reported that interruptions during medication tasks are common and often lead to procedural failures and medication errors. The use of interventions like ‘do not interrupt’ vests, as studied by Berdot et al. (2021) was shown to reduce such interruptions but not significantly affect the overall error rates, indicating the complexity of addressing this issue effectively.

Medication errors in hospitals have also been linked to the organizational environment and safety culture. Johnson et al. (2017) observed that frequent interruptions during medication rounds led to both procedural failures and clinical errors. This was further corroborated by Chiang et al. (2017) who found that job satisfaction, error-reporting culture, and workload were major predictors of nurses' safety practices. These studies underline the importance of a supportive work environment and robust safety culture in minimizing medication errors.

The effectiveness of various strategies to mitigate medication errors has been explored. Huckels-Baumgart et al. (2017) demonstrated that a combination of staff training and safety vests reduced interruptions during medication preparation. Similarly, Alomari et al. (2018) identified that the busy-ness of nurses, physical environment design, and compliance with medication policies are barriers to safe medication practice. They suggested that involving nurses in designing clinical guidelines could improve medication safety.

Overall, these studies provide a comprehensive understanding of the relationship between nurse workload and medication errors. Excessive workload, frequent interruptions, and inadequate organizational support are recurrent themes that contribute to medication errors. Addressing these issues through effective workload management, minimizing interruptions, and fostering a positive safety culture is crucial for improving medication safety and patient care.

In conclusion, nurse workload is a critical factor influencing medication errors, with substantial implications for patient safety and healthcare quality. Understanding this relationship through rigorous research is essential for developing effective interventions. As the healthcare landscape continues to evolve, ensuring that nurses are supported with manageable workloads and robust safety systems remains a fundamental priority. This article aims to explore the

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intricate relationship between nurse workload and medication errors, highlighting the current evidence, identifying gaps, and proposing directions for future research.

Methods

The flow of the study follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, ensuring a structured and transparent approach. It involves four key phases: identification, screening, eligibility, and inclusion. These steps systematically refine relevant studies, minimize bias, and enhance the reliability of the systematic review process.

Identification

Three fundamental stages of the systematic review procedure were employed to choose a large number of pertinent publications for this investigation. In the first stage, keywords are chosen, and similar terms are looked for utilising thesaurus, dictionaries, encyclopaedias, and previous research. Following the creation of search strings for the Scopus and Wiley databases (see Table 1), all applicable keywords were chosen. 234 publications were successfully obtained for the present study project during the initial phase of the systematic review procedure from both databases. In this step, two duplicate papers were removed from the list of searched papers.

Table 1: The Search String

Database	Search String
Scopus	TITLE-ABS-KEY (nurse AND workload AND medication AND errors) AND PUBYEAR > 2013 AND PUBYEAR < 2025 AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) **Date access: August 2024**
Wiley	Nurse AND Workload AND 'Medication Errors' **Date access: August 2024**

Screening

During the screening step, the collection of potentially relevant research items is examined to determine their alignment with the predefined research objective. Frequently used content-related criteria in this phase include selecting research items based on the relationship between nurses workload and medication error. The first stage of screening excluded 100 publications out of 232 articles. These 232 articles examined based on various exclusion and inclusion criteria of the study (see Table 2). Total 100 article was meet the exclusion criteria, thus exclude to be reviewed.

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Table 2: The Selection Criterion In Searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Time line	2021 – 2024	< 2021
Literature type	Journal (Article)	Conference, Book, Review
Publication Stage	Final	In Press

Eligibility

In the third phase, referred to as the eligibility assessment, a compilation of 132 articles was assembled. During this stage, a meticulous examination of the titles and core content of all the articles was conducted to confirm their alignment with the inclusion criteria and their relevance to the ongoing study's research objectives. Consequently, 110 data, paper, article were excluded as they did not qualify as due to the out of field, title not significantly, abstract not related on the objective of the study and no full text access founded on empirical evidence. As a result, a total of 22 articles remain for the upcoming review.

Data Abstraction and Analysis

An integrative analysis was used as one of the assessment strategies in this study to examine and synthesise a variety of research designs. The goal of the competent study was to identify relevant topics and subtopics. The stage of data collection was the first step in the development of the theme. Figure 1 shows how the authors meticulously analysed a compilation of 22 publications for assertions or material relevant to the topics of the current study. The methodology used in all studies, as well as the research results, are being investigated. Next, the author collaborated with other co-authors to develop themes based on the evidence in this study's context. A log was kept throughout the data analysis process to record any analyses, viewpoints, riddles, or other thoughts relevant to the data interpretation. Finally, the authors compared the results to see if there were any inconsistencies in the theme design process. It is worth noting that, if there are any disagreements between the concepts, the authors discuss them amongst themselves. The produced themes were eventually tweaked to ensure consistency. The analysis selection was carried out by two experts, one in clinical and the other in nursing education to determine the validity of the problems. The expert review phase ensured the clarity, importance, and suitability of each subtheme by establishing domain validity. The authors also compared the findings to resolve any discrepancies in the theme creation process. Finally, the developed themes were tweaked to ensure their consistency. These are the research questions:

- To investigate the relationship between nurse workload and the incidence of medication errors in healthcare settings, with a focus on understanding how increased workload affects patient safety and the quality of care.
- To identify and evaluate effective interventions that can mitigate the impact of nurse workload on medication administration accuracy, particularly addressing the physical and psychological demands placed on nurses.

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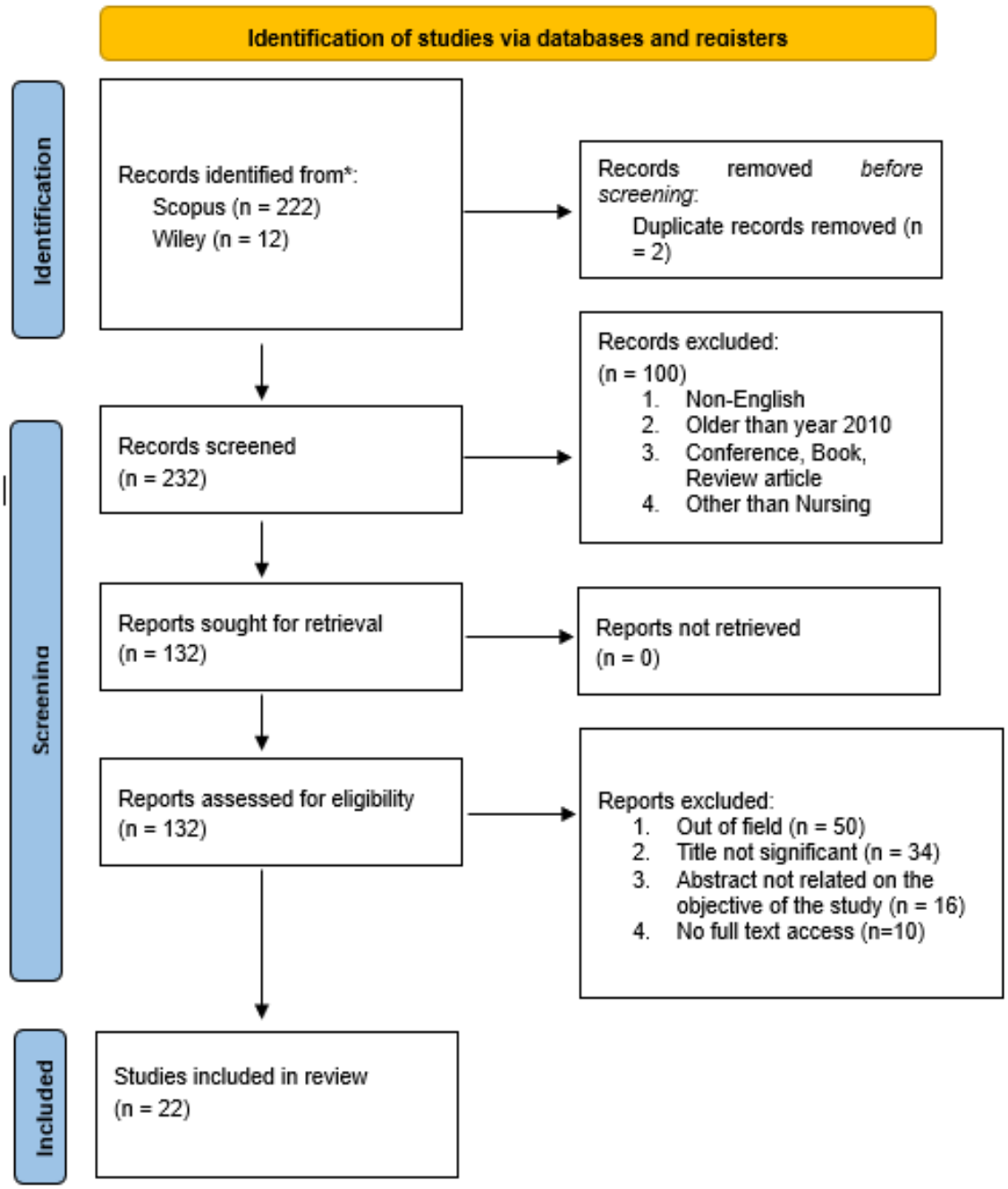

Figure 1. The PRISMA Flow Diagram Of Studies Included In The Systematic Review Results

The detailed analysis of 38 primary studies that were included in this systematic review. Through a meticulous examination of these studies, three prominent themes emerged, each highlighting critical aspects of nurse workload and medication errors. These findings summarized in table form; Theme 1: Medication Errors and Prevention Strategies, Theme 2:

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Impact of Interruptions and Workload on Medication Safety, Theme 3: Nurses' Roles, Perceptions, and Decision-Making in Medication Management. The included studies are summarized in Table 3.

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Table 3: Description Of The Included Studies

No	Author and Year	Objectives	Methodologies	Findings	Conclusion
1	Xu J. et al.(2017)	Explore the utility of facilitated MRE reporting in identifying system deficiencies and the relationship between MREs and nurses' work in the ICUs.	124 structured 4-hour observations, measurement of nurse's activities, self-reports, and structured MRE reports	MREs reported in 35% of observations; task/process deficiencies were common contributory factors; increased workload correlated with MREs.	Facilitated MRE reporting provides robust information on medication management safety and system improvement opportunities. Future research should focus on refining reporting systems and addressing task/process deficiencies.
2	Kuppadakkath S.C et al. (2023)	Examine and quantify the contributing factors of medication errors from nurses' perspectives and prevention strategies in RACFs.	National survey with 140 responses, descriptive statistics, and exploratory factor analysis	Identified contributing factors like use of agency staffing and delays in lab results; suggested strategies like electronic alerts and efficient lab communication.	Highlighted global issue of medication errors in RACFs and suggested best practices such as interprofessional collaboration and standardized policies. Future research should evaluate the implementation of these strategies.
3	Cottney A. et al. (2015)	Identify incidence, type, and potential clinical consequences of medication-administration errors in a mental health hospital.	Prospective direct observational technique, regression analysis	Detected 139 errors in 4177 opportunities; common errors were incorrect dose omission, incorrect form, and time; factors increasing error risk included task interruption and high workload.	Suggests adopting systems to minimize task interruptions and 'when required' medications, and reducing nursing workload. Future research should test the effectiveness of these interventions.
4	Al Tehewy M. et al. (2016) (Al	Measure the rates and determinants of medication	Descriptive direct-observational study, standardized	Observed 5531 errors in 2090 drug administration opportunities; common errors	Indicates the need for urgent interventions to optimize medication administration, considering identified determinants. Future

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	Tehewy et al., 2016)	administration errors in a university hospital.	observational checklist, and medical record audit	were wrong documentation and technique; identified risk factors included high shifts, night shifts, and patient characteristics.	research should focus on intervention strategies tailored to these risk factors.
5	Suclupe S. et al. (2020)	Determine the prevalence and magnitude of medication errors and their association with patient and nurse characteristics.	Observational analytical cross-sectional study	Identified 650 prescription errors and 294 administration errors; common errors were omission and interruption; risk factors included ICU stay, nurse shifts, and workload perception.	Emphasizes the need for timely error detection and promotion of a medication safety culture. Future research should investigate methods for timely error detection and fostering safety culture.
6	Salami I. et al. (2019)	Explore Jordanian nurses' perceptions about MAEs.	Cross-sectional design with a convenience sample of 470 nurses	Common MAEs included wrong time and wrong patient; workload and night shifts were major contributing factors.	Calls for developing quality assurance programs and creating distraction-free zones. Future research should evaluate the impact of these programs and zones on reducing MAEs.
7	Ali L. et al. (2021)	Investigate nurses' experiences related to medication errors from the perspective of Jordanian nurses.	Qualitative descriptive approach, semi-structured face-to-face interviews with 24 nurses	Identified individual factors like lack of knowledge and systemic factors like workload as main causes of MEs.	Highlights the need for increased awareness and addressing these factors to improve care. Future research should explore interventions targeting both individual and systemic factors.
8	Härkänen M. et al. (2018)	Describe factors related to wrong-patient medication administration and how patient identification is mentioned in incident reports.	Descriptive content analysis of 103 incident reports	Found nurse-related factors (tiredness, lack of skills) and system-related factors (rushing, workload) contributed to wrong-patient incidents; 77% of reports lacked patient identification process description.	Suggests more attention to patient identification training and adjusting system factors to support nurses. Future research should develop and test comprehensive patient identification training programs and system adjustments.

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9	Kellogg et al., (2021)	Identify clinical processes frequently interrupted and the reported outcomes of those interruptions.	Retrospective analysis of PSE reports from January 2013 to January 2016	Interruptions most often affected nurses (50%), with medication tasks being frequently interrupted, leading to errors like wrong dose administration.	Future research should focus on developing and testing interruption management strategies to reduce clinical interruptions and enhance patient safety.
10	Thomas L. et al., (2017)	Investigate the impact of interruptions, distractions, and cognitive load on procedure failures and medication administration errors.	Observational study of registered nurses during medication administration	Interruptions and cognitive load significantly contribute to medication administration errors and procedure failures.	Implementing interventions to reduce cognitive load and manage interruptions can help mitigate errors. Future studies should explore these interventions' effectiveness.
11	Berdot S. et al., (2021)	Evaluate the impact of a 'do not interrupt' vest on reducing medication administration errors.	Multicenter cluster randomized controlled trial	The vest did not significantly reduce medication administration errors or interruptions.	Further studies should consider other risk factors and interventions such as nurse training and barcode systems to improve medication safety.
12	Sassaki R.L. et al., (2019)	Investigate sources and causes of interruptions during medication administration and their impact on nursing workload.	Observational study of 121 medication rounds in a Neonatal ICU	Frequent interruptions occurred mainly during the preparation phase, increasing workload and potentially impacting safety.	Strategies to reduce interruptions, such as improved communication protocols, should be tested for effectiveness in reducing workload and enhancing safety.

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13	Johnson M. et al., (2017)	Explore the consequences of interruptions during medication preparation and administration.	Non-participant observational study	Most medication events were interrupted, leading to procedural failures and clinical errors.	Implementing systems to reduce non-patient-related interruptions can improve medication safety. Future research should focus on evaluating such systems.
14	Kiymaz D. et al., (2018)	Determine factors affecting emergency unit nurses' tendency to make medical errors and their attitudes towards these errors.	Descriptive cross-sectional study with 284 nurses	High workload, insufficient staffing, and fatigue were major contributors to medical errors.	Developing training programs and non-punitive reporting environments can help reduce errors. Future studies should evaluate these interventions' impact.
15	Castro-Rodríguez C. et al., (2023)	Assess professionals' perceptions of using vests to reduce interruptions during medication handling.	Cross-sectional survey of pediatric emergency physicians and nurses	Professionals found vests effective in minimizing interruptions, though adherence to the protocol was low.	Promotion strategies are needed to increase adherence to vest usage. Future research should assess the long-term effectiveness of such strategies.
16	Kuppadakkath S.C. et al. (2022)	Explore nurses' experiences of medication errors and their suggestions to reduce these in residential aged care facilities.	Exploratory descriptive design; semi-structured interviews with 12 registered nurses	Identified factors like inadequate staffing, work interruptions, and multidisciplinary team involvement as causes of medication errors. Practical suggestions were provided to reduce errors.	Highlighted the impact of medication errors on staff, residents, and families. Future research should focus on implementing and evaluating practical strategies to reduce medication errors in RACFs.

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17	Høghaug G. et al. (2019)	Investigate nurses' experiences with implementation of knowledge gained through an obligatory medication management programme (MMP).	Qualitative study using semi-structured interviews	Nurses experienced greater awareness and confidence but faced barriers like time pressures and poor organizational planning.	Ensuring a secure knowledge base and a positive working environment can improve professional skills. Future studies should focus on organizational strategies to support the implementation of training programs.
18	Alomari A., et al. (2018)	Explore pediatric nurses' perceptions of medication safety and medication error.	Mixed methods study; direct observation, audit, and focus groups	Identified barriers to safe medication practice including workload, frequent interruptions, poor physical environment design, and impractical medication policies	Organizations should review medication process policies and engage nurses in designing clinical guidelines. Future research should test interventions aimed at overcoming these barriers.
19	Latimer S. (2023)	Describe acute care nurses' perceptions of their roles and responsibilities in medication reconciliation at hospital discharge.	Focus groups with nurses from five acute care clinical units	Nurses had a minor role in medication reconciliation due to lack of organization, clinical practice guidance, and training.	Standardizing interprofessional processes and increasing nurses' involvement can streamline reconciliation and improve patient safety. Future studies should explore the impact of such standardization.
10	Isaacs A. et al. (2023)	Analyze nurses' reflections on medication errors in a regional hospital	Content analysis of 68 reflective summaries over five years	Identified individual characteristics, nature of work, and physical environment as main categories of medication errors.	Provision of medicine information resources and managing workload can help reduce errors. Future research should focus on enhancing graduate nurse education with simulation of real-life settings.
21	Bucknall T. et al. (2019)	Describe nurses' decision-making practices and perceptions of	Descriptive exploratory study; observation and	Found that managing interruptions and involving patients are crucial for medication safety.	Understanding cognitive workload and interactions can improve patient safety. Future studies should develop interventions

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		patient involvement in medication administration in acute hospital settings.	interviews with 20 nurses		for patient involvement during medication administration.
22	Sloss et al. (2024)	Describe medication administration and alert patterns among new graduate nurses.	Descriptive longitudinal observational cohort design using secondary data analysis	New graduate nurses experienced a high volume of medication administration and numerous alerts.	Understanding medication administration patterns can help optimize nursing workflow. Future research should focus on interventions to support new graduate nurses in managing medication workloads and alerts.

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Theme 1: Medication Errors and Prevention Strategies

Medication errors are a critical patient safety issue, particularly in hospital and aged care settings. Research has identified multiple contributing factors to these errors, including increased nurse workload, frequent interruptions, inadequate staffing, and insufficient training. Higher nurse workload significantly correlates with medication-related errors (MREs) (Xu et al., 2017). Factors such as agency staffing, nurse shift patterns, and ICU stays increase the likelihood of errors (Kuppadakkath et al., 2023; Suclupe et al., 2020). Similarly, task interruptions during medication administration have been recognized as a leading cause of mistakes. Frequent interruptions, particularly during medication preparation, compromise accuracy and lead to errors such as incorrect dosing Cottney & Innes, 2015). Cognitive overload exacerbates these mistakes, affecting both procedural adherence and patient safety (Thomas et al., 2017).

Beyond workload and interruptions, deficiencies in nurse training and knowledge have been identified as significant contributors to medication errors. Nurses' lack of knowledge and patient identification skills were key factors in wrong-patient medication incidents (Härkänen et al., 2018) (Ali et al., 2021). Additionally, systemic issues within healthcare institutions play a role in medication errors. Poor documentation, incorrect medication techniques, and the ineffectiveness of interventions like the ‘do not interrupt’ vest in reducing errors (Al Tehewy et al., 2016; Berdot et al., 2021). These findings underscore the need for improved training programs, structured reporting systems, and enhanced safety protocols to minimize medication errors. Moving forward, research should focus on refining these interventions and assessing their effectiveness in reducing medication administration errors across diverse healthcare settings.

Theme 2: Impact of Interruptions and Workload on Medication Safety

Interruptions and excessive workload have a profound impact on medication safety, often leading to increased medication errors and compromised patient care. Research has consistently shown that frequent disruptions during medication preparation and administration contribute to clinical errors. Medication tasks were among the most frequently interrupted nursing activities, often leading to wrong-dose administration Al Tehewy et al. (2016). Most medication events were interrupted, resulting in procedural failures and a heightened risk of clinical mistakes (Johnson et al., 2017). These findings suggest that reducing non-patient-related interruptions is crucial for improving medication safety.

Workload is another significant factor affecting medication administration safety. Increased workload in intensive care units (ICUs) directly correlates with higher rates of medication-related errors (MREs) (Xu et al., 2017). The study highlighted that task and process deficiencies, often caused by excessive workload, contribute to the unsafe administration of medications. High workload increases the likelihood of dose omissions and incorrect timing of medication administration (Cottney & Innes, 2015). In the mental health hospital setting, factors such as task interruptions and an overwhelming number of responsibilities further exacerbated the risk of errors.

Interventions aimed at minimizing interruptions and managing workload have shown varying degrees of effectiveness. Use of a "do not interrupt" vest in reducing medication administration errors but found no significant improvement (Berdot et al., 2021). Improving communication protocols could help mitigate interruptions, particularly during the medication preparation phase in neonatal ICUs (Sassaki et al., 2019b). Additionally, cognitive overload due to

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multitasking and continuous interruptions significantly increases the likelihood of medication administration errors (Thomas et al., 2017). Their study recommended implementing structured interventions to manage interruptions and reduce nurses' cognitive burden.

Addressing the dual challenge of interruptions and workload requires system-level changes and targeted interventions. Frequent interruptions, poor physical environment design, and impractical medication policies create barriers to safe medication administration, suggesting that organizations should engage nurses in designing clinical guidelines (Alomari et al., 2018). Similarly, high workload, insufficient staffing, and fatigue were major contributors to medical errors in emergency units, advocating for the development of training programs and a non-punitive reporting environment to improve safety (Kiymaz & Koç, 2018).

Overall, the evidence underscores the need for comprehensive strategies to reduce interruptions and workload pressure on nurses. Implementing structured communication protocols, optimizing staffing levels, and fostering a safety culture can help mitigate the risks associated with these factors. Future research should focus on evaluating the effectiveness of such interventions in diverse healthcare settings to enhance medication safety and patient outcomes.

Theme 3: Nurses' Roles, Perceptions, and Decision-Making in Medication Management

Nurses play a crucial role in medication management, and their perceptions and decision-making significantly impact patient safety. Research highlights that nurses' responsibilities extend beyond medication administration to include ensuring patient adherence, verifying prescriptions, and addressing system inefficiencies. Acute care nurses had limited involvement in medication reconciliation at hospital discharge due to organizational barriers, lack of clinical guidance, and insufficient training. This indicates the need for standardized interprofessional processes to strengthen nurses' roles in medication management (Latimer et al., 2023).

Nurses' decision-making practices and found that managing interruptions and involving patients in the medication process are essential for enhancing safety (Bucknall et al., 2019). The study emphasized the importance of understanding cognitive workload and the need for interventions to optimize patient involvement in medication administration. Further examined nurses' reflections on medication errors in a regional hospital and identified individual characteristics, work nature, and environmental factors as key contributors to errors (Isaacs et al., 2023). The study suggested that providing accessible medication information resources and managing workload can help reduce errors, particularly among newly graduated nurses.

The impact of a mandatory medication management program (MMP) and found that while nurses gained greater awareness and confidence, they faced barriers such as time constraints and inadequate organizational planning (Høghaug et al., 2019). This suggests that professional development programs must be supplemented with organizational strategies that facilitate effective implementation. There is barriers to safe medication practice, including frequent interruptions, poor environmental design, and impractical medication policies (Alomari et al., 2018). Their findings emphasize the need for hospitals to engage nurses in developing clinical guidelines that are both practical and effective.

Nurses' experiences with medication errors in residential aged care facilities (RACFs) and found that inadequate staffing, work interruptions, and poor interdisciplinary collaboration were major contributors (Kuppadakkath et al., 2022). The study recommended implementing practical strategies, such as structured reporting systems and interprofessional collaboration, to

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improve medication safety. Medication administration and alert patterns among new graduate nurses, highlighting that they frequently encounter medication-related challenges due to high workloads and numerous alerts (Sloss et al., 2024). These findings suggest the need for tailored interventions to support new graduate nurses in managing medication workloads effectively.

Overall, these studies underscore the complex role of nurses in medication management and the need for structural and educational interventions to support their decision-making processes. Strengthening training programs, reducing environmental and organizational barriers, and promoting patient involvement can enhance medication safety and reduce errors in clinical settings. Future research should focus on evaluating the effectiveness of these interventions and developing best practices for integrating nurses into comprehensive medication safety strategies.

Discussion

The relationship between nurse workload and medication errors is a critical concern in healthcare settings, as evidenced by the systematic literature review conducted. The findings from various studies highlight that increased nurse workload significantly contributes to the incidence of medication errors, impacting patient safety and the quality of care provided. This discussion synthesizes the insights gained from the reviewed studies, emphasizing the multifaceted nature of this relationship and suggesting potential interventions.

Nurse workload is a complex and multifactorial issue that encompasses various dimensions, including the number of patients assigned, the complexity of care required, time pressures, and the occurrence of interruptions during medication administration (Sassaki et al., 2019a). The reviewed studies consistently found that high workload, particularly when combined with frequent interruptions, leads to cognitive overload, which in turn increases the likelihood of errors (Johnson et al., 2017). For instance, interruptions during medication administration were identified as a significant contributor to procedural failures and clinical errors, as nurses often have to divert their attention away from critical tasks, increasing the risk of mistakes (Bucknall et al., 2019).

Moreover, heavy workloads' physical and psychological strain can impair nurses' decision-making abilities (Mekonen et al., 2020). Stress, fatigue, and burnout were frequently mentioned as factors that increase the likelihood of medication errors. Additionally, in environments where nurses are overburdened, the opportunity for thorough double-checking, patient interaction, and adherence to protocols diminishes, further compounding the risk of errors (Isaacs et al., 2023).

Addressing the association between nurse workload and medication errors requires a multifaceted approach. Interventions such as optimizing nurse-to-patient ratios, reducing non-essential interruptions, implementing supportive technologies (e.g., barcode-assisted medication administration), and fostering a positive work environment are essential (Antony et al., 2019; Ragau et al., 2018; Thompson et al., 2018). , providing ongoing education and training to enhance nurses' skills in managing high workloads and interruptions is crucial.

Limitation

The relationship between nurse workload and medication errors is a critical concern in healthcare settings, as evidenced by the systematic literature review conducted. The findings from various studies highlight that increased nurse workload significantly contributes to the

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Implication

This study highlights the critical need to address nurse workload to reduce medication errors and improve patient safety. Healthcare institutions should implement workload management strategies, optimize staffing ratios, and integrate supportive technologies. Additionally, policymakers must develop standardized guidelines to enhance working conditions, ensuring sustainable and high-quality patient care delivery.

Conclusion

In conclusion, this systematic literature review highlights the profound impact that nurse workload has on the incidence of medication errors within healthcare settings. The analysis of multiple studies reveals that as nurse workload increases, so does the likelihood of errors in medication administration, which can lead to serious consequences for patient safety and the overall quality of care. The findings emphasize that heavy workloads, coupled with frequent interruptions and the resulting cognitive overload, not only increase the risk of errors but also impair nurses' ability to make sound clinical decisions. This underscores the importance of addressing both the physical and psychological demands placed on nurses.

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References

Abbassi, A., Hasni, N., & Ben Hamida, E. B. (2022). Impact of computerized physician order entry system on parenteral nutrition medication errors in a teaching neonatal intensive care unit. *Annales Pharmaceutiques Francaises*, *80*(6), 819–826. https://doi.org/10.1016/j.pharma.2022.05.002

Abdulmutalib, I., & Safwat, A. (2020). Nursing Strategies for Reducing Medication Errors. *Egyptian Journal of Nursing and Health Sciences*, *1*(1), 26–41. https://doi.org/10.21608/ejnhs.2020.80266

Aidah, S., Gillani, S., Alderazi, A., & Abdulazeez, F. (2021). Medication error trends in middle eastern countries: A systematic review on healthcare services. In *Journal of Education and Health Promotion* (Vol. 10, Issue 1). https://doi.org/10.4103/jehp.jehp-1549-20

Al Tehewy, M., Fahim, H., Gad, N. I., El Gafary, M., & Rahman, S. A. (2016). Medication administration errors in a university hospital. *Journal of Patient Safety*, *12*(1), 34–39. https://doi.org/10.1097/PTS.0000000000000196

Ali, L., Saifan, A., Alrimawi, I., & Atout, M. (2021). *Nurses' perceptions toward factors that cause medication errors in Jordan: A qualitative study*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85097215118&doi=10.1111%2fppc.12707&partnerID=40&md5=3f07eb2f5f01587ef337ff327d3eee93

Alomari, A., Wilson, V., Solman, A., Bajorek, B., & Tinsley, P. (2018). *Pediatric Nurses' Perceptions of Medication Safety and Medication Error: A Mixed Methods Study*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-

International Journal of Education, Psychology and Counseling
IJEPC
EISSN : 0128-164X
Volume 10 Issue 58 (June 2025) PP. 87-110
DOI 10.35631/IJEPC.1058007

85019675996&doi=10.1080%2f24694193.2017.1323977&partnerID=40&md5=6fb33e192aa5fe2562cdc6217f963a48

Alshyyab, M. A., Ebbini, M. A. L., Alslewi, A., Hughes, J., Borkoles, E., FitzGerald, G., & Albsoul, R. A. (2024). Factors Influencing Medication Administration Errors as Perceived by Nurses in Pediatric Units in a Jordanian Tertiary Hospital: A Qualitative Descriptive Study. *Western Journal of Nursing Research*, *46*(3), 201–209. https://doi.org/10.1177/01939459241227768

Antony, J., Forthun, S. C., Trakulsunti, Y., Farrington, T., McFarlane, J., Brennan, A., & Dempsey, M. (2019). An exploratory study into the use of Lean Six Sigma to reduce medication errors in the Norwegian public healthcare context. *Leadership in Health Services*, *32*(4), 509–524. https://doi.org/10.1108/LHS-12-2018-0065

Assaye, A. M., Wiechula, R., Schultz, T. J., & Feo, R. (2021). Impact of nurse staffing on patient and nurse workforce outcomes in acute care settings in low- And middle-income countries: A systematic review. In *JBI Evidence Synthesis* (Vol. 19, Issue 4, pp. 751–793). https://doi.org/10.11124/JBISRIR-D-19-00426

Aydin, M. U., Kucuk, S., & Filizoglu, O. (2019). Electronic drawer application for high risk medications in hospital inventory. *TIPTEKNO 2019 - Tip Teknolojileri Kongresi*. https://doi.org/10.1109/TIPTEKNO.2019.8895244

Banda, Z., Simbota, M., & Mula, C. (2022). Nurses' perceptions on the effects of high nursing workload on patient care in an intensive care unit of a referral hospital in Malawi: a qualitative study. *BMC Nursing*, *21*(1). https://doi.org/10.1186/s12912-022-00918-x

Beaudart, C., Witjes, M., Rood, P., & Hiligsmann, M. (2023). Medication administration errors in the domain of infusion therapy in intensive care units: a survey study among nurses. *Archives of Public Health*, *81*(1). https://doi.org/10.1186/s13690-023-01041-2

Berdot, S., Vilfaillot, A., Bezie, Y., Perrin, G., Berge, M., Corny, J., Thi, T. T. P., Depoisson, M., Guihaire, C., Valin, N., Decelle, C., Karras, A., Durieux, P., Lê, L. M. M., & Sabatier, B. (2021). Effectiveness of a "do not interrupt" vest intervention to reduce medication errors during medication administration: a multicenter cluster randomized controlled trial. *BMC Nursing*, *20*(1). https://doi.org/10.1186/s12912-021-00671-7

Blignaut, A. J., Coetzee, S. K., Klopper, H. C., & Ellis, S. M. (2022). Nurses' perceptions of medication administration safety in public hospitals in the Gauteng Province: A mixed method study. *International Journal of Africa Nursing Sciences*, *17*. https://doi.org/10.1016/j.ijans.2022.100504

Bucknall, T., Fossum, M., Hutchinson, A. M., Botti, M., Considine, J., Dunning, T., Hughes, L., Weir-Phyland, J., Digby, R., & Manias, E. (2019). *Nurses' decision-making, practices and perceptions of patient involvement in medication administration in an acute hospital setting; [护士对急诊医院环境中患者参与药物管理的决策、实践和看法]*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85062786966&doi=10.1111%2fjan.13963&partnerID=40&md5=02c28cdad68c5c9d423b55cabeab5e2d

Carayon, P., Wooldridge, A., Hoonakker, P., Hundt, A. S., & Kelly, M. M. (2020). SEIPS 3.0: Human-centered design of the patient journey for patient safety. *Applied Ergonomics*, *84*. https://doi.org/10.1016/j.apergo.2019.103033

Chiang, H.-Y., Hsiao, Y.-C., & Lee, H.-F. (2017). *Predictors of Hospital Nurses' Safety Practices: Work Environment, Workload, Job Satisfaction, and Error Reporting*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84996844726&doi=10.1097%2fNCQ.0000000000000240&partnerID=40&md5=0321f8338e563b15c7c71199d7e838d4

International Journal of Education, Psychology and Counseling
IJEPC
EISSN : 0128-164X
Volume 10 Issue 58 (June 2025) PP. 87-110
DOI 10.35631/IJEPC.1058007
Cottney, A., & Innes, J. (2015). Medication-administration errors in an urban mental health hospital: A direct observation study. *International Journal of Mental Health Nursing*, *24*(1), 65–74. https://doi.org/10.1111/inm.12096

D'Errico, S., Zanon, M., Radaelli, D., Padovano, M., Santurro, A., Scopetti, M., Frati, P., & Fineschi, V. (2022). Medication Errors in Pediatrics: Proposals to Improve the Quality and Safety of Care Through Clinical Risk Management. In *Frontiers in Medicine* (Vol. 8). https://doi.org/10.3389/fmed.2021.814100

de Magalhães, A. M. M., Kreling, A., Chaves, E. H. B., Pasin, S. S., & Castilho, B. M. (2019). Medication administration – nursing workload and patient safety in clinical wards. *Revista Brasileira de Enfermagem*, *72*(1), 183–189. https://doi.org/10.1590/0034-7167-2018-0618

Diehl, E., Rieger, S., Letzel, S., Schablon, A., Nienhaus, A., Pinzon, L. C. E., & Dietz, P. (2021). The relationship between workload and burnout among nurses: The buffering role of personal, social and organisational resources. *PLoS ONE*, *16*(1 January). https://doi.org/10.1371/journal.pone.0245798

Ebrahimi, H., Jafarjalal, E., Lotfolahzadeh, A., & Kharghani Moghadam, S. M. (2021). The effect of workload on nurses' quality of life with moderating perceived social support during the COVID-19 pandemic. *Work*, *70*(2), 347–354. https://doi.org/10.3233/WOR-210559

Fernandez, R., tenHam-Baloyi, W., Mathew, E., Secginli, S., Bahar, Z., Jans, C., Nahcivan, N., Torun, G., Lapkin, S., & Green, H. (2023). Predicting behavioural intentions towards medication safety among student and new graduate nurses across four countries. *Journal of Clinical Nursing*, *32*(5-6), 789–798. https://doi.org/10.1111/jocn.16330

Groves, P. S., Farag, A., & Bunch, J. L. (2020). Strategies for and Barriers to Fatigue Management Among Acute Care Nurses. *Journal of Nursing Regulation*, *11*(2), 36–43. https://doi.org/10.1016/S2155-8256(20)30108-3

Härkänen, M., Tiainen, M., & Haatainen, K. (2018). Wrong-patient incidents during medication administrations. *Journal of Clinical Nursing*, *27*(3-4), 715–724. https://doi.org/10.1111/jocn.14021

Høghaug, G., Skår, R., Tran, T. N., & Schou-Bredal, I. (2019). *Nurses' experiences with newly acquired knowledge about medication management: A qualitative study*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85075538711&doi=10.1111%2fjonm.12864&partnerID=40&md5=06c2bda06cc6a358f0ef00b6b63df101

Huckels-Baumgart, S., Niederberger, M., Manser, T., Meier, C. R., & Meyer-Massetti, C. (2017). *A combined intervention to reduce interruptions during medication preparation and double-checking: a pilot-study evaluating the impact of staff training and safety vests*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85021783187&doi=10.1111%2fjonm.12491&partnerID=40&md5=538 9c1b2f01301781033bde91df378d2

Hutchinson, A. M., Brotto, V., Chapman, A., Sales, A. E., Mohebbi, M., & Bucknall, T. K. (2020). Use of an audit with feedback implementation strategy to promote medication error reporting by nurses. *Journal of Clinical Nursing*, *29*(21-22), 4180–4193. https://doi.org/10.1111/jocn.15447

Isaacs, A., Raymond, A., & Kent, B. (2023). *Content analysis of nurses' reflections on medication errors in a regional hospital*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85163077936&doi=10.1080%2f10376178.2023.2220432&partnerID=40&md5=972a98ec95e9e1f56f8a473d3b2e2675

International Journal of Education, Psychology and Counseling
IJEPC
EISSN : 0128-164X
Volume 10 Issue 58 (June 2025) PP. 87-110
DOI 10.35631/IJEPC.1058007
Jin, H., Chen, H., Munechika, M., Sano, M., & Kajihara, C. (2018). The effect of workload on nurses' non-observance errors in medication administration processes: A cross-sectional study. *International Journal of Nursing Practice*, *24*(5). https://doi.org/10.1111/ijn.12679

Jin, H., Yao, J., Xiao, Z., Qu, Q., & Fu, Q. (2023). Effects of nursing workload on medication administration errors: A quantitative study. *Work*, *74*(1), 247–254. https://doi.org/10.3233/WOR-211392

Johnson, M., Sanchez, P., Langdon, R., Manias, E., Levett-Jones, T., Weidemann, G., Aguilar, V., & Everett, B. (2017). *The impact of interruptions on medication errors in hospitals: an observational study of nurses*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85030834540&doi=10.1111%2fjonm.12486&partnerID=40&md5=8a59cc266c2504df5a8f04d802137c00

Jungreithmayr, V., Meid, A. D., Bittmann, J., Fabian, M., Klein, U., Kugler, S., Löpprich, M., Reinhard, O., Scholz, L., Zeeh, B., Bitz, W., Bugaj, T., Kihm, L., Kopf, S., Liemann, A., Wagenlechner, P., Zemva, J., Benkert, C., Merle, C., … Seidling, H. M. (2021). The impact of a computerized physician order entry system implementation on 20 different criteria of medication documentation—a before-and-after study. *BMC Medical Informatics and Decision Making*, *21*(1). https://doi.org/10.1186/s12911-021-01607-6

Kellogg, K. M., Puthumana, J. S., Fong, A., Adams, K. T., & Ratwani, R. M. (2021). *Understanding the types and effects of clinical interruptions and distractions recorded in a multihospital patient safety reporting system*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85120827290&doi=10.1097%2fPTS.0000000000000513&partnerID=40&md5=f4b8d3970c39c474357d206e5aea28e5

Kerari, A., & Innab, A. (2021). The Influence of Nurses' Characteristics on Medication Administration Errors: An Integrative Review. In *SAGE Open Nursing* (Vol. 7). https://doi.org/10.1177/23779608211025802

Kim, S., & Chae, S. M. (2022). Missed nursing care and its influencing factors among neonatal intensive care unit nurses: A descriptive study. *Child Health Nursing Research*, *28*, 142–153. https://doi.org/10.4094/chnr.2022.28.2.142

Kiymaz, D., & Koç, Z. (2018). Identification of factors which affect the tendency towards and attitudes of emergency unit nurses to make medical errors. *Journal of Clinical Nursing*, *27*(5-6), 1160–1169. https://doi.org/10.1111/jocn.14148

Kuppadakkath, S. C., Bhowmik, J., Olasoji, M., & Garvey, L. (2023). *Nurses' perspectives on medication errors and prevention strategies in residential aged care facilities through a national survey*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85168377173&doi=10.1111%2fopn.12567&partnerID=40&md5=d9e760d1d8eaf0b64d943d35c60faaf4

Kuppadakkath, S. C., Olasoji, M., & Garvey, L. (2022). Nurses' experience of medication errors in residential aged care facilities: An exploratory descriptive study. *Collegian*, *29*(6), 880–886. https://doi.org/10.1016/j.colegn.2022.04.006

Latimer, S., Hewitt, J., de Wet, C., Teasdale, T., & Gillespie, B. M. (2023). Medication reconciliation at hospital discharge: A qualitative exploration of acute care nurses' perceptions of their roles and responsibilities. *Journal of Clinical Nursing*, *32*(7-8), 1276–1285. https://doi.org/10.1111/jocn.16275

Lumley, C., Ellis, A., Ritchings, S., Venes, T., & Ede, J. (2020). Using the Systems Engineering Initiative for Patient Safety (SEIPS) model to describe critical care nursing

Volume 10 Issue 58 (June 2025) PP. 87-110
DOI 10.35631/IJEPC.1058007
during the SARS-CoV-2 pandemic (2020). In *Nursing in Critical Care* (Vol. 25, Issue 4, pp. 203–205). https://doi.org/10.1111/nicc.12514

Mekonen, E. G., Gebrie, M. H., & Jemberie, S. M. (2020). Magnitude and associated factors of medication administration error among nurses working in Amhara Region Referral Hospitals, Northwest Ethiopia. *Journal of Drug Assessment*, *9*(1), 151–158. https://doi.org/10.1080/21556660.2020.1841495

Mulac, A., Mathiesen, L., Taxis, K., & Gerd Granås, A. (2021). Barcode medication administration technology use in hospital practice: A mixed-methods observational study of policy deviations. *BMJ Quality and Safety*, *30*(12), 1021–1030. https://doi.org/10.1136/bmjqs-2021-013223

Ragau, S., Hitchcock, R., Craft, J., & Christensen, M. (2018). Initiative To Reduce Medication Errors. *British Journal of Nursing*, *27*(22), 1330–1335.

Ratanto, Hariyati, R. T. S., Mediawati, A. S., & Eryando, T. (2021). Workload as the most Important Influencing Factor of Medication Errors by Nurses. *The Open Nursing Journal*, *15*(1), 204–210. https://doi.org/10.2174/1874434602115010204

Reganata, G. P., & Saputra, I. G. N. M. Y. (2022). Workload and Performance of Nurses During The Covid-19 Pandemic: A Meta Analysis Study. *Jurnal Varian*, *5*(2), 107–114. https://doi.org/10.30812/varian.v5i2.1657

Rouayroux, N., Calmels, V., Bachelet, B., Sallerin, B., & Divol, E. (2019). Medication prescribing errors: a pre- and post-computerized physician order entry retrospective study. *International Journal of Clinical Pharmacy*, *41*(1), 228–236. https://doi.org/10.1007/s11096-018-0747-0

Sabzi, Z., Mohammadi, R., Talebi, R., & Roshandel, G. R. (2019). Medication errors and their relationship with care complexity and work dynamics. *Open Access Macedonian Journal of Medical Sciences*, *7*(21), 3579–3583. https://doi.org/10.3889/oamjms.2019.722

Samad, I. A., Mastura, S., Rahim, A., Khalid, K., Tang, W., & Nordin, A. A. (2019). Conference Proceedings knowledge, attitude and practice on importance of medication checking in in-patient setting among staff nurses in hospital slim river, perak. In *Perak Medical Journal* (Vol. 1, Issue 2).

Sassaki, R. L., Cucolo, D. F., & Perroca, M. G. (2019a). Interruptions and nursing workload during medication administration process. *Revista Brasileira de Enfermagem*, *72*(4), 1001–1006. https://doi.org/10.1590/0034-7167-2018-0680

Sassaki, R. L., Cucolo, D. F., & Perroca, M. G. (2019b). *Interruptions and nursing workload during medication administration process; [Interrupções e carga de trabalho de enfermagem durante a administração de medicamentos]; [Interrupciones y carga de trabajo de enfermería durante la administración de medicament*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85071765946&doi=10.1590%2f0034-7167-2018-0680&partnerID=40&md5=ab4eb30a8850e8081dbe27678024207e

Savva, G., Papastavrou, E., Charalambous, A., Vryonides, S., & Merkouris, A. (2022). Exploring Nurses' Perceptions of Medication Error Risk Factors: Findings From a Sequential Qualitative Study. *Global Qualitative Nursing Research*, *9*. https://doi.org/10.1177/23333936221094857

Sloss, E. A., Jones, T. L., Baker, K., Robins, J. L. W., & Thacker, L. R. (2024). *Describing Medication Administration and Alert Patterns Experienced by New Graduate Nurses During the First Year of Practice*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-

International Journal of Education, Psychology and Counseling
IJEPC
EISSN : 0128-164X
Volume 10 Issue 58 (June 2025) PP. 87-110
DOI 10.35631/IJEPC.1058007

85184152552&doi=10.1097%2fCIN.0000000000001035&partnerID=40&md5=d5c7b324ed7f671194956f0a16fd7875

Suclupe, S., Martinez-Zapata, M. J., Mancebo, J., Font-Vaquer, A., Castillo-Masa, A. M., Viñolas, I., Morán, I., & Robleda, G. (2020). *Medication errors in prescription and administration in critically ill patients; [危重患者处方用药错误失误分析]*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85082733556&doi=10.1111%2fjan.14322&partnerID=40&md5=3d997d9cd8d305958744f5bc03204525

Ta'an, W. F., Suliman, M. M., Al-Hammouri, M. M., & Ta'an, A. (2021). Prevalence of medical errors and barriers to report among nurses and nursing students in Jordan: A cross-sectional study. *Nursing Forum*, *56*(2), 284–290. https://doi.org/10.1111/nuf.12542

Tarulitua Simamora, H., Tarigan, E., Tjitra, E., Keperawatan, D., Hospital Lippo Cikarang, S., Studi Magister Keperawatan, P., & Sint Carolus, S. (2021). Hubungan Faktor Perawat dan Kebenaran Penyiapan Obat Injeksi. *Nursing Current*, *9*(1), 23–35.

Thomas, L., Donohue-Porter, P., & Stein Fishbein, J. (2017). Impact of Interruptions, Distractions, and Cognitive Load on Procedure Failures and Medication Administration Errors. *Journal of Nursing Care Quality*, *32*(4), 309–317. https://doi.org/10.1097/NCQ.0000000000000256

Thompson, K. M., Swanson, K. M., Cox, D. L., Kirchner, R. B., Russell, J. J., Wermers, R. A., Storlie, C. B., Johnson, M. G., & Naessens, J. M. (2018). Implementation of Bar-Code Medication Administration to Reduce Patient Harm. *Mayo Clinic Proceedings: Innovations, Quality & Outcomes*, *2*(4), 342–351. https://doi.org/10.1016/j.mayocpiqo.2018.09.001

Tu, H. N., Shan, T. H., Wu, Y. C., Shen, P. H., Wu, T. Y., Lin, W. L., Yang-Kao, Y. H., & Cheng, C. L. (2023). Reducing Medication Errors by Adopting Automatic Dispensing Cabinets in Critical Care Units. *Journal of Medical Systems*, *47*(1). https://doi.org/10.1007/s10916-023-01953-0

Vinod, P. (2023). A Study to Assess the Knowledge Regarding Medication Errors among Nursing Students in Selected Colleges of the City in View to Prepare Information Booklet. *International Journal For Multidisciplinary Research*, *5*(2). https://doi.org/10.36948/ijfmr.2023.v05i02.2521

Weaver, S., Stewart, K., & Kay, L. (2021). Systems-based investigation of patient safety incidents. *Future Healthcare Journal*, *8*(3), e593–e597. https://doi.org/10.7861/fhj.2021-0147

Xiao, S. Q., Liu, J. E., & Chang, H. (2022). Physician-nurse communication surrounding computerized physician order entry systems from social and technical perspective an ethnographic study. *CIN - Computers Informatics Nursing*, *40*(4), 258–268. https://doi.org/10.1097/CIN.0000000000000809

Xu, J., Reale, C., Slagle, J. M., Anders, S., Shotwell, M. S., Dresselhaus, T., & Weinger, M. B. (2017). *Facilitated Nurse Medication-Related Event Reporting to Improve Medication Management Quality and Safety in Intensive Care Units*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85030611505&doi=10.1097%2fNNR.0000000000000240&partnerID=40&md5=a58be25b384d2aada58d9992742725bb

Yousef, A., Abu Farha, R., & Da'meh, K. (2021). Medication administration errors: Causes and reporting behaviours from nurses perspectives. *International Journal of Clinical Practice*, *75*(10). https://doi.org/10.1111/ijcp.14541

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Zarea, K., Mohammadi, A., Beiranvand, S., Hassani, F., & Baraz, S. (2018). Iranian nurses' medication errors: A survey of the types, the causes, and the related factors. *International Journal of Africa Nursing Sciences*, *8*, 112–116. https://doi.org/10.1016/j.ijans.2018.05.001

Zirpe, K. G., Seta, B., Gholap, S., Aurangabadi, K., Gurav, S. K., Deshmukh, A. M., Wankhede, P., Suryawanshi, P., Vasanth, S., Kurian, M., Philip, E., Jagtap, N., & Pandit, E. (2020). Incidence of medication error in critical care unit of tertiary care hospital: Where do we stand? *Indian Journal of Critical Care Medicine*, *24*(9), 799–803. https://doi.org/10.5005/jp-journals-10071-23556