



## REDUCING MEDICAL ERRORS AMONG CRITICAL CARE NURSING STAFF

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### Abstract:

Medical errors are a significant concern in healthcare settings, and critical care units are particularly vulnerable due to the high acuity and complexity of patient conditions. Nursing staff play a crucial role in patient care and are often involved in the frontline delivery of care, making them susceptible to errors. This study aims to explore strategies to reduce medical errors among critical care nursing staff. The study will use a mixed-methods approach, including a literature review, surveys, and interviews with critical care nursing staff. The literature review will provide an overview of the current state of medical errors in critical care settings and identify potential contributing factors. Surveys will be used to assess the prevalence of medical errors and the perceived barriers to error reduction among nursing staff. Additionally, interviews will be conducted to gather in-depth insights into the experiences and perspectives of nursing staff regarding medical errors and potential solutions. In conclusion, reducing medical errors among critical care nursing staff is a critical priority for improving patient safety and quality of care. This study will provide valuable insights into the factors contributing to medical errors and identify potential strategies for error reduction, ultimately contributing to the advancement of patient safety in critical care settings.

**Keywords:** medical errors, critical care, nursing staff, emergency, hospital administration

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**Introduction:**

In the fast-paced and high-stress environment of critical care units, the potential for medical errors is a constant concern. These errors can have serious consequences for patients, ranging from prolonged recovery times to life-threatening complications. In order to ensure the highest standard of care for patients, it is crucial to address the issue of medical errors among critical care nursing staff [1].

Inaccurate choices, omissions, or acts that nurses are responsible for that have an adverse or potentially adverse effect on the patient during the planning and provision of care are referred to as nursing errors. Recent studies emphasise the significance of reducing adverse events and nursing errors in order to improve patient outcomes [2]. In a hospital context, for example, the introduction of a medication error reduction programme led to a significant drop in medication errors and an improvement in patient safety. Similarly, systematic studies have demonstrated that hospital-based interventions targeted at lowering adverse drug events and prescription errors can greatly improve patient outcomes while also saving costs [3].

One of the key factors contributing to medical errors in critical care units is the complex and demanding nature of the work. Critical care nurses are often responsible for caring for multiple patients with complex medical conditions, and they must make quick decisions under pressure. This can lead to fatigue, stress, and burnout, all of which can increase the likelihood of errors. In addition, the high acuity of patients in critical care units means that the margin for error is extremely narrow, making it even more important to address this issue [4].

One approach to reducing medical errors among critical care nursing staff is to focus on improving communication and teamwork. Effective communication is essential in a critical care setting, as it ensures that all members of the care team are on the same page and working together to provide the best possible care for patients [5]. This can be achieved through regular team meetings, clear and concise documentation, and the use of standardized communication tools such as SBAR (Situation, Background, Assessment, Recommendation). By fostering a culture of open communication and collaboration, critical care units can reduce the likelihood of errors and improve patient outcomes [6, 7].

This study aims to explore strategies to reduce medical errors among critical care nursing staff. The study will use a mixed-methods approach, including a literature review, surveys, and interviews with critical care nursing staff. The

literature review will provide an overview of the current state of medical errors in critical care settings and identify potential contributing factors.

**Prevalence of medical errors in critical care**

The ICU is a complex environment where high-risk patients are treated, with patient illness severity being a strong predictor of adverse events (ADE). Critically ill patients are prescribed twice as many medications as those outside the ICU, with most being administered as weight-based infusions, which increase the risk of error. Studies have identified certain medications with the greatest risk of error, such as potassium chloride, heparin, magnesium sulphate, vasoactive drugs, sedatives, and analgesics [8]. Critically ill patients have fewer defenses against adverse events, limited participation in medical care, and lack the physiological reserve to tolerate additional injury. They rely on sophisticated technologies and equipment, but there is limited knowledge about equipment failures and associated safety risks. Lack of continuity of care at discharge from the ICU puts patients at risk for errors and emphasizes the importance of communication with future caregivers [9].

In critically ill adults, the rate of errors ranges from 1.2 to 947 errors per 1,000 patient ICU days, with a median of 106 errors per 1,000 patient ICU days. In children, 100 to 400 prescribing errors have been reported per 1,000 patients. Factors contributing to this variation include the definition of medication errors, the process node under investigation, the method of reporting medication errors, and the culture of individual ICUs [10].

The rate of medication errors varies between clinical settings, patient populations, and studies. In critically ill adults, errors range from 1.2 to 947 errors per 1,000 patient ICU days, with a median of 106 errors per 1,000 patient ICU days. In children, 100 to 400 prescribing errors have been reported per 1,000 patients [11].

The method of reporting medication errors also influences rate estimates, with spontaneous reporting potentially under-reporting events. Automation of medical record reviews can improve efficiency and allow for prospective reviews. Direct patient monitoring may be the ultimate reference standard, but it is labor-intensive and dependent on observer expertise [12, 13].

**Challenges encountered in the intensive care unit**

Medication errors in critical care settings are a significant challenge, as they are dynamic environments with critically ill patients who often require rapid adaptation of on-going management.

Intensive care units (ICUs) can be error-prone settings, with an average of 1.75 medication errors per patient per day. These errors are more frequent and more likely to be severe and cause harm [14]. Several factors contribute to the high incidence and associated morbidity of medication errors in ICUs. Patients are the most complex and critically ill in the hospital setting, and their illness, age, and comorbidities make them less resilient to errors. They also require higher intensification of care and may receive more medications, increasing their risk of iatrogenic harm [15].

Pharmacokinetics of medications can be altered in critically ill patients due to changes in volume of distribution and drug clearance. Large volume resuscitations, positive pressure ventilation, surgical procedures, systemic inflammatory response, and protein binding changes also affect the pharmacokinetics of many drugs. Additionally, patients in ICUs are often unable to facilitate their own care, aggravated by the volume of transfers to and from ICUs [16].

Medication safety in ICUs may be compromised due to the risks associated with multiple medications per patient and high-risk drugs. Drugs used in ICUs are more potent, require dose calculations, have medication interactions, and are continuous infusions, making patients in critical care areas particularly vulnerable to medication errors and their potential consequences [17].

### **Strategies to reduce medical errors in critical care:**

The prevention of medication errors in healthcare settings can be achieved through various strategies, including computer-based entry systems, medication-error analysis, programmed dispensing cabinets, bar-coding systems, and the involvement of clinical pharmacists. These strategies aim to ensure consistent and correct use of medications, such as medication reconciliation, education and training, and the use of double-check procedures [18].

Medication administration policies and procedures are crucial for ensuring the correct administration, storage, ordering, receipt, and return of medication. A permanent chart record is available, detailing best practices in administration, storage, ordering, receipt, and the return of medication. Reconciliation is another strategy that can reduce medication errors, such as pharmacists. The Irish government was the first to use medication reconciliation at the transfer of care, with clinical pharmacists conducting a trial phase among patients selected randomly within 24-hours of admission [19].

Education and safe practice are essential for reducing medication errors. Encouraging all healthcare professionals involved in the medication process is vital, as understanding the contributing factors that may increase the likelihood of medication errors is important. Encouraging everyone in the healthcare continuum to understand the contributing factors that may increase the likelihood of medication errors is essential [20].

Double-check procedures involve having two people observe the person who prepares medication and report what they should observe regarding safe medication administration, even if an error has happened. This technique has been found to reduce medication administration errors by using double-check techniques [19].

Staffing (Patient-Nurse Ratio) and working hours are also crucial in reducing medication errors. A retrospective study found that an increase in the proportion of RN hours and a decrease in the proportion of Licensed Practice Nurse hours could effectively reduce the problem of medication errors. However, insufficient nursing staff can lead to omissions, deviance from approved standards, and short cuts to get the work done, ultimately compromising the quality of care [17].

The rights rule of medication administration is essential for nurses to ensure the safety and quality of patient care. The right patient, route, drug, dose, and time are the five rights of medication administration that nurses have traditionally followed for decades. To increase efficiency, documentation and reason have been added to the seven rights of medication administration. Other scholars argue that ten rights of medication administration should be observed, including rights drug, patient, dose, route, time and frequency, documentation, history, and assessment, right to refuse, right drug-drug interaction and evaluation, and right education and information [21].

Distraction/interruption during medication administration is significant for the safety of the medication. Avoidance of distraction during medication administration is important for the safety of the medication [5].

Barcoding has a significant effect on the reduction of medication error incidents. The application of barcode verification and scanning technology has been proven to be useful in eliminating medication errors. Bar-code verification works by scanning the code on the patients' identification band, which contains a unique patient's identifiers. This action leads to the appearance of the patient's prescribed medical information appearing on the screen [22]. As more options are proposed to improve medication safety in prescribing, dispensing, transcribing, and administering, a focus on

medication reconciliation, computerized physician order entry, bar code, automated medication dispensing, and smart pumps is recommended [22]. The clinical pharmacist plays a significant role in reducing medication errors. They should participate during ward rounds to optimize the planning and implementation of quality care through quality drug administration. Clinical pharmacists have an integral role in the prevention of medication errors, detecting different categories of errors compared to those detected by different healthcare providers [13].

Also, ICU is facing a multimodal approach to mitigate medication-related errors, which includes issues related to human factors engineering, such as unique ports for different routes of administration, local technologies such as computerized provider order entry (CPOE), decision support systems, and barcode administration. These systems can improve safety and efficiency by guiding providers toward appropriate medication regimens, providing direction when initiating a regimen, grouping orders together to streamline processes for frequently repeated tasks, and removing the problematic step of retranscription [23].

Technology has played an increasing role in healthcare, with new tools regularly introduced to mitigate harm. Computerized Provider Order Entry (CPOE) has dramatically influenced clinical practice and medication safety, but many challenges still remain. Prebuilt orders and order sets can be too rigid and prevent individualized care in unique situations. Implementing new CPOE systems can guide providers toward appropriate medication regimens, while decision support software can address potential errors and adverse events immediately. However, "alert fatigue" is a concern with decision-support software, as prescribers are less likely to read and react to them [24].

Barcode medication administration provides a double-check to verify the medication, dose, route, patient, and dosing time. These systems can interface with the electronic medication administration record to automatically chart a dose when the barcode is scanned, improving safety and efficiency simultaneously. However, not all medications will have barcodes, such as unit dose items made from a bulk container. Pharmacies must be able to produce barcodes that can interface with the system. Encouraging nurses to scan medications only immediately before administration would help address this issue [21, 23].

Telemedicine has spread rapidly over the last decade, particularly in the ICU setting. It allows clinicians to assess and monitor patients using

technology applications and to provide information and participate in multiple aspects of patient care. Studies show that tele-ICU clinicians improve medication management and safety. Physician-related medication errors were shown to be significantly lower in patients who received telemedicine consults rather than those who received telephone consults or no consultation at all. Reductions in reported medication errors were also noted when a clinical pharmacist was part of the tele-ICU team [25].

Simulation for education is a vital part of a strategy to prevent medication errors. Simulation-based education has been shown to be more interactive and pragmatic than traditional didactic sessions. It allows the development of nontechnical skills, such as real-time assessment, practical and clinical judgment, as well as psychomotor and communication skills to optimize understanding of material and improve task execution. Such an approach has the potential to not only prevent similar errors from recurring but also to improve health care provider awareness to detect medication errors in the first place [26].

Safety culture and reporting are essential strategies to reduce medication errors in various settings. Organizations must commit to improving patient safety as a priority, ensuring that staff are aware of their role in medication administration and that they are aware of the importance of a safe work environment [27].

### **Conclusion:**

In conclusion, reducing medical errors among critical care nursing staff is a complex and multifaceted challenge that requires a comprehensive approach. By focusing on communication, education, systems and processes, and a culture of accountability, critical care units can work towards minimizing the potential for errors and providing the highest standard of care for patients. Ultimately, this will lead to improved patient outcomes and a safer healthcare environment for all.

Medication error analysis, automated dispensing tanks, bar-coding systems, medication reconciliation, standardisation of pharmaceutical processes, education, and the use of clinical pharmacists in emergency medicine are just a few of the options available for minimising and mitigating these errors.

Another important aspect of reducing medical errors among critical care nursing staff is to provide ongoing education and training. This includes not only clinical skills and knowledge, but also training in areas such as critical thinking, decision-making, and stress management. By investing in the



professional development of critical care nurses, healthcare organizations can empower their staff to make informed and confident decisions, even in high-pressure situations. This can ultimately lead to a reduction in medical errors and an improvement in patient safety.

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