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RESEARCH ARTICLE

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Causes of Medication Error in Nursing

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Abstract

Ensuring patient safety is the primary goal of the healthcare facility. It is the duty of every healthcare professional involved in patient care to collaborate to administer medication safely without errors. Medication errors can happen in every healthcare facility; they can cause patient harm, delay in discharges, financial burdens, and stressful events for the families. Medication errors can have multiple causes in different settings. Optimal and standard integration of medication safety principles and practices comes from leadership, nursing commitment, and the nursing knowledge of causes and how to avoid medication errors and what leads to medication errors. A culture of medication safety shines in an environment of learning and interprofessional collaboration under the umbrella of a transformational leadership style of commitment to patient safety, high-quality, and effective care. This article will elaborate on the common causes and solutions for medication errors made by nurses.

1 | INTRODUCTION

Medication errors can occur in every hospital worldwide and can lead to unpleasant consequences for patients and patients' families and add to escalating medical costs. According to the Centers for Medicare and Medicaid (2021), healthcare costs in the United States total $3.8 trillion in 2019. Industrialized countries, including the U.S., spend more money per person on healthcare than developing countries where the U.S. has the highest per capita globally (Centers for Medicare & Medicaid Services, 2020). A significant amount of healthcare expenses can be attributed to prescribed medication prices (Watcher & Gupta, 2012). In 2016,

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approximately $450 billion was spent on therapeutic medication (Aitken & Kleinrock, 2017). Over time, the medication expenses have increased to between $580 and $610 billion in 2021 (IQVIA Institute for Human Data Science, 2017).

One of the primary goals of a healthcare facility is to deliver safe and effective care to the patient. Healthcare organizations are facilitating electronic medical record platforms to prescribe medications accurately and provide high-quality care in healthcare settings (Carayon et al., 2020; Musharyanti et al., 2019). Nurses are front-line staff required to monitor the safety and dosing of prescription medications in healthcare settings. Studies have indicated that 38% of medication errors are nursing-related (Al-Warofi, 2020). This paper will shed light on some of the causes of nursing-related medication errors, solutions for how to avoid them, and effective leadership styles in effective medication management.

Definition

Medication errors do not have a universal definition. The concept of medication error might vary from country to country based on differing local laws. In the U.S., the National Coordinating Council for Medication Error Reporting and Prevention (2021) has defined medication error as:

”any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing, order communication, product labeling, packaging, and nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use.” (NCCMERP, 2021 para. 1).

Identification of factors and Causes of Medication Errors in Nursing Practice Human Factors

Human factors linked to healthcare professionals and delivering safe healthcare services to patients are complex. Healthcare personnel mindset, health status, education, and mental processing can potentially enhance the likelihood of a medication error (Pelletier & Beaudin, 2018). Multiple human factors are identified that can contribute to medication errors, for example (a) weariness (Patterson et al., 2012), (b) poor communication (Mitchell et al., 2015), (c) disruption (Bannan et al., 2018), (d) unbalanced shifts and work (Holden et al., 2011), and (e) absence of workflow uniformity (McPhillips et al., 2005). The current theories on human-related medication error factors are changing course from blaming individuals toward examining theories of system failure (Pelletier & Beaudin, 2018). Studies regarding human-related factors studies focus on carrying out the findings regarding human nature and their synergy with supplies and surroundings to create effective and safe systems (Henriksen et al., 2008).

Human-related factors leading to medication are classified into five classes: individual, organizational, task, work, and team factors. Multiple studies have suggested that fatigue, imbalanced work shifts, ineffective communication, emotional burdens, and a dearth of supporting decision systems can lead to medication errors during healthcare services delivery (Al-Ahmadi et al., 2020; Bannan et al., 2018; Schiff et al., 2015; Weir et al., 2019). Furthermore, Al-Ahmadi et al. (2020) indicated that even moderate fatigue could lead to medication errors. Moreover, fatigue and emotional burdens could partly coincide in time due to multiple elements, which can amplify one another. For example, participants indicated how their social life and work impact their sleep and energy levels (Al-Ahmadi et al., 2020).

Psychosocial Factors

Psychosocial risks are caused by multiple factors such as the fast-paced nature of workflow, management systems, organization structure, and extensive context of work (Leka et al., 2011). Psychosocial risks correlate with issues such as emotional stress due to pressure that can negatively impact the health status of the employees (Rasmussen et al., 2011) In addition , psychosocial risk can contribute to cause burn-out, weakened cognitive functions, and increased job dissatisfaction (Ilic et al., 2017). A study in China indicated that psychosocial risks impaired workers’ well-being and decreased productivity (Arandjelovic et al., 2010). Thus, it is essential to identify psychosocial issues to enhance health services outcomes and improve the well-being of healthcare personnel and their productivity and work

efficiency (Angerer & Weigl, 2015; Langenhan et al., 2013).

Technological Factors

Advanced technology has assisted humans in the management and diagnosis of different diseases. The question remains: Does technology lead to medication errors, reduce these errors, and improve patient safety? Technology application in healthcare practice ought to be equipped with decision-support aids to flag wrong dose and other errors related to medication to prevent technology-related medical errors (Schiff et al., 2015). Technology equipped with clinical decision support features, including medication combination, allergy alerts, and wrong dose warnings, play a crucial mediator in effective and safe medication therapy management (Alotaibi & Federico, 2017).

Communication Factors

Doctors' and nurses' mutual harmonized communication and interprofessional education are the cornerstones of high-quality care delivery. When the correct information is not communicated between the attending team and nursing staff during patient visits, medication errors can happen at any stage of the process including ordering, reading, interpreting appropriate drug dosage. In addition, busy providers, both nurses and doctors, who lack adequate knowledge of medication management may result in incorrect administration of medication with errors in type, usage, and dosage of an ordered medication (Farzi, 2017). During patient visits, communication and interprofessional bonding can increase nurse knowledge and lessen medication errors (Irajpour et al., 2019).

In healthcare, nearly 46-60% of medication errors are caused by unclear information transmitted through various routes (Parry et al., 2015). The World Health Organization (2017) set a Global Patient Safety Challenge to decrease medication errors nearly 50% worldwide, in which communication was termed a critical domain. Nevertheless, comprehensive priority areas of communication improvement are not coherent. Detailed information about communication challenges that contribute to medication error is required for ongoing planning and creation of medication safety policies (Syyrila et al., 2020).

Syyrila et al. (2020) indicated that various communication issues related to healthcare professionals, organization, process, and prescription could lead to medication error. Many studies highlight the most common problems associated with medication errors are digital communication, inadequate communication with the team, erroneous presumption regarding the work process, and unawareness of guidelines (Karttunen et al., 2020; Karttunen et al., 2019; Keers et al., 2018; Syyrila et al., 2020).

Punishment and Stigmatization in Error Reporting

Stigma present in medication error reporting by nurses can results in blame and potential punishment throughout their carrier for a medical error in the healthcare industry. The creation of a culture of stigmatizing and blaming nursing for medication errors can lead to underreporting. Multiple studies have indicated that nearly 50%-96% of medical errors were not reported thoroughly (Chiang et al., 2010; Kingston et al., 2004; Pham et al., 2013). Studies have suggested that the culture of blaming individuals for medication errors would mediate as an obstacle to reporting them (Koehn et al., 2016; Soydemir et al., 2017). Underreporting medication errors due to retaliation will not facilitate opportunities for nursing leadership to repair the broken system and prevent future errors (Copeland, 2019). Furthermore, suboptimal styles of leadership can negatively impact patient safety reporting behaviors, a climate where healthcare personnel may feel intimated and stigmatized for reporting an error (Copeland, 2019).

Leadership Styles and Relationship to Medication Error

Leadership in an organization can assist in prioritizing needs, choosing principles for healthcare services improvement, and designating resources to optimally enforce patient safety practices (Pelletier & Beaudin, 2018). Fostering patient safety outcomes requires efficiency in nursing leadership. Moreover, leaders are responsible for propelling the change and improvement in patient safety principles and policies

that reduce medication errors and adverse events (Pelletier & Beaudin, 2018). Effective leadership in nursing can improve nursing staff job satisfaction and reduce nursing staff anxiety (World Health Organization, 2019). Reducing anxiety for staff nurses can result in lower rates of medication errors.

Nursing leadership can have an essential effect on patient care and can promote nursing personnel well-being and enforce new strategies and policies to improve workflow in healthcare systems (Cummings et al., 2018). In healthcare organizations, leadership styles can, directly and indirectly impact quality measures (Kiwanuka et al., 2021). Wong et al. (2013) indicated an association between leadership and patient mortality. Furthermore, Leadership style is a critical initiative to reduce nursing job-related stress and anxiety (Khamisa et al., 2015; Lotfi et al., 2018). Nursing leadership can impact the culture of error management, and reinforce a commitment to safe healthcare delivery which is essential for improving patient safety climate (Fischer et al., 2018). One type of leadership will be explored here. Transformational will be defined in its relationship to medication errors in nursing practice.

Transformational Leadership Style

Recent psychological research has indicated that a transformational leader can nurture a safe working environment and improve nurses' safety behaviors (Jiang & Probst, 2016). Transformational leadership can enhance safety behaviors and improve safety culture in a healthcare setting (Hoffmeister et al., 2014). According to Bass (1985), Transformational leadership can enhance followers' advancement, autonomy, self-reliance, and self-determination. In the healthcare industry, transformational leadership has been broadly investigated and cited as one of the most preferred leadership styles in multiple disciplines (Wu et al., 2020).

Lappalainen et al. (2020) performed a cross-sectional study in eastern Finland, and questionnaires were sent to 1002 registered nurses involved in drug administration via emails. Survey response resulted in 161 answered the surveys. The study was to evaluate the relationship between drug safety and transformational leadership. The findings showed a statistically significant correlation between transformational leadership and total medication safety ($r = 0.541$, $p < 0.001$) (Lappalainen et al., 2020). Furthermore, the study suggested that a transformational leadership style of management in nursing decreased medication errors. This study by Lappalainen et al. (2020) healthcare organizations need to support a working climate that promotes drug safety through transformational leadership (Lappalainen et al., 2020).

Other Methods and Solutions to Foster Patient Safety

Providing safe and high-quality healthcare services is one of the vital priorities of health sectors in the world. Medication safety is a complex concept, and medication errors causes are dependent on multiple factors that can happen across the various stages of drug-to-patient (Tully & Franklin, 2015). Studies have indicated that effective workplace culture can lead to the improvement of health systems, while poor workplace culture can cause the failure of health systems (Braithwaite et al., 2017). Machen et al. (2019) evaluated the impact of healthcare professionals and workplace culture on medication safety. Professional healthcare settings contain various elements, such as individual hierarchy, fear of questioning and raising concerns about someone senior, and organization punitive policies for errors, which were determined to affect medication safety practices (Machen et al., 2019).

Nursing Knowledge and Education about Medications

Some studies have indicated that nurses may possess an only basic knowledge about medications, which can increase the chance of medication errors, mostly in critically ill patients. At the Intensive Care Unit level of care, patients receive more intensive medication regimens and less commonly used medications (Irajpour et al., 2019). Every day, nearly 78% of devastating medical errors account for medication errors due to multi-complex, less commonly used drugs in treating more critically ill patients (Tully et al., 2019). Nurses may not know how these medications can affect patient outcomes indicating a need for ongoing education on medication safety and management of potential side effects. Multiple studies

have concluded that poor knowledge of medication safety among nurses, especially in the intensive care unit, can contribute to a higher medication error rate and poor patient outcomes (Farzi et al., 2017; Garcia et al., 2019; Pelletier & Beaudin, 2018).

It is essential to have periodic educational programs for nurses, especially to highlight high-risk medication, to foster medication safety ensure proper administration of medication, and improve quality. Nurses' engagement and commitment to promoting higher-level knowledge about drugs, their uses, and potential side effects can be a significant initiative in reducing medication errors.

In some developing countries, nursing education and organized training on medication safety might not substantially reduce medication errors as the curriculum may cover merely the basics of pharmacology. A qualitative study in Indonesia indicated that limited training and skills for nursing students on drug safety could contribute to medication error (Musharyani et al., 2019). The study pointed out that the topics on patient safety and medication management safety were assigned to the last year of their bachelor program. Nursing students felt unprepared to implement the safety practices during their rotations (Musharyani et al., 2019).

Therefore, nursing personnel should have access to resources such as supervision from and collaboration with senior nurses in practice settings and ongoing educational programs directed specifically towards improved knowledge of medication safety to build upon their knowledge received during academic education. The application of collaborative models to encourage staff nurses to work with senior nurses with advanced knowledge of medication management can enhance nursing performance in medication safety influence quality patient care delivery.

Possible Solutions for Communication

Teamwork is essential in most healthcare sectors (Shoemaker et al., 2016). Various healthcare facilities enforce team-based healthcare services (Schottenfeld et al., 2016). Effective communication is the core component of teamwork and teamwork is important for safe and effective quality of care (Alonso et al., 2011). In healthcare settings, the leading cause of medical errors is ineffective communication (Carson-Steven et al., 2016).

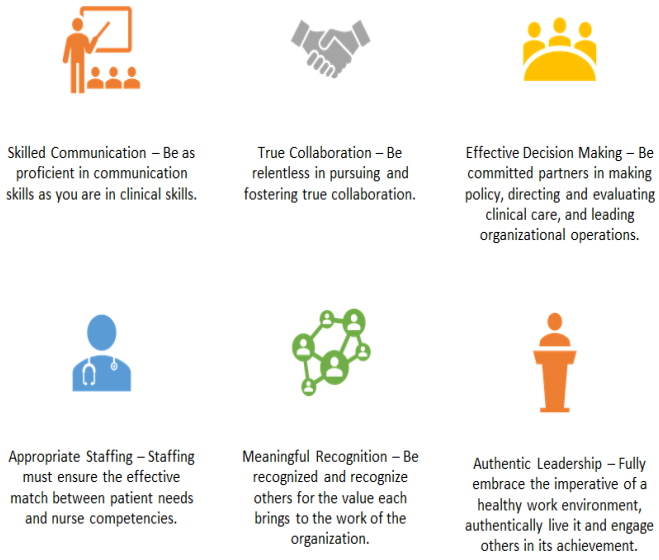
Besides digital communication, face-to-face interaction has a significant role (Gharaveis et al., 2017). Studies have indicated that face-to-face interaction rather than the sole use of digital systems (i.e. EMRs) can enhance communication among healthcare professionals in healthcare settings (Liebler & McConnell, 2020; Wilson et al., 2016). Lim et al. (2020) indicated that nurses' and physicians' communication patterns were heavily associated with their verbal interaction with each other. Healthcare settings with higher face-to-face interactions between physicians and nurses demonstrated superior communication, effectiveness, and improved outcomes (Liebler & McConnell, 2020). One of these models is effective Hand-off Communication

Patient care transition among nurses is named differently in healthcare organizations worldwide (Galatzan et al., 2021). In the United States health care system transition of care between shifts is termed "hand-off or handover". In the United States, annually, nursing hand-off communication occurs nearly 300 million times (Eggins & Slade, 2015). Patient clinical hand-off encompasses transferring patient information and care that can be achieved via effective communication (Pokojová & Bártlová, 2018). A study from an oncology center indicated that 60% of medication errors were related to ineffective hand-off communication (Pandya et al., 2019). Poor communication and ineffective hand-off can lead to interruption in patient care, medication error, and poor quality of healthcare services (Kitch et al., 2008). Therefore, training nurses in the use of effective hand-off communication strategies can positively influence medication safety and reduce errors.

Possible Solution for Workplace Culture, Environment, and Leadership

Effective healthcare services delivered without harm and with improved patient safety should be assimilated by leadership into strategic planning. The American Association of Critical-Care Nurses (2016) summarizes six domains that can be consid-

ered for workplace culture, environment, and leadership in their efforts to improve patient safety and decrease medication errors Figure 1.



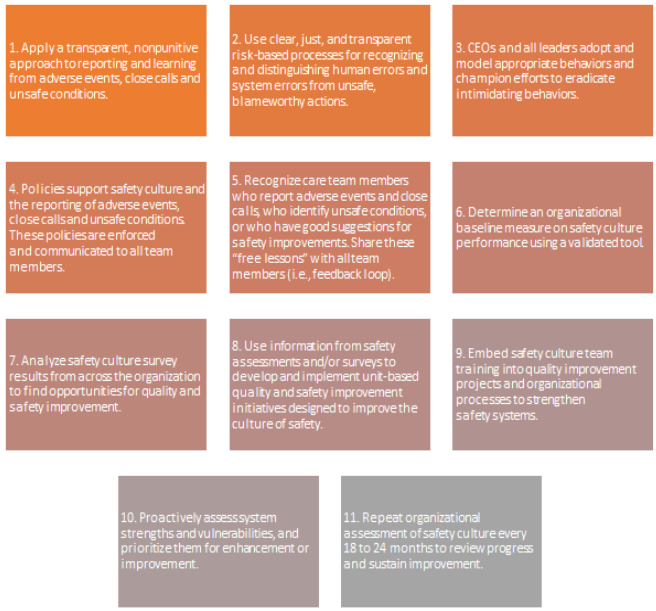
HealthyWork Environment Domains

American Association of Critical-Care Nurses. (2016). *Healthy work environments*. https://www.aacn.org/nursing-excellence/healthy-work-environments.

Evolving healthy climate at work can facilitate an environment for nursing to deliver practical, safe, and high-quality care to a patient. Data from the American Association of Critical-Care Nurses (AACN) indicates that organization that implements the six domains of healthy work environment in their practices surpass those organizations that do not implement the domains of the healthy work environment (AACN, 2016).

Solutions for Stigmatization

According to the Joint Commission (2017), appropriate leadership can enhance patient safety and promote safety culture tenets in a healthcare facility, as described in Figure 2. It is essential to promote a safety culture (a collection of activities a healthcare facility performs to pursue safety) and reduce stigmatization in error reporting within the organization. Vital ingredients of safety culture are (a) just culture where healthcare personnel is encouraged and appraised for reporting errors, (b) reporting culture, creating a climate where nursing and other healthcare personnel reports errors without fear and concerns, and (c) learning culture to learn from mistakes to prevent future errors (Joint Commission, 2017).



11 Tenet of Safety Culture

The Joint Commission. (2017). *11 tenets of a safety culture*. https://www.jointcommission.org/-/media/tjc/documents/resources/patient-safety-topics/sentinel-event/sentinel_events_11_tenets_of_a_safety_culture_infographic_2018pdf.pdf.

Summary of Recommendations for Practice

Medication errors occur in every healthcare facility worldwide; it is crucial to discover the leading causes of medication errors by region, developing countries vs. industrialized countries. In some developing countries, leadership might play a critical role in decreasing medication errors. On the other hand, in some countries, nursing education might have a substantial impact in reducing medication error as the curriculum merely covers merely the basics of pharmacology in some developing countries. Studies in developing countries need to investigate the cause of medical errors and explore solutions for approaches that decrease medication errors in a different cultural and working environment.

Some of the still recommended strategies to improve medication safety as described above include (a) the provision of ongoing nursing educa - tion and training on management of less commonly

used medication, (b) implementation of Hand-Off Communication model to improve face-to-face communication among nursing staff and providers, (c) the implementation of Transformational Leadership style of management to enhance safety behaviors and improve safety culture, and (d) the adoption of six strategies o nursing communication and decision making as described by the American Association of Critical Care Nurses (2016) which include skilled communication,true collaboration, effective decision making, appropriate staffing, meaningful recognition, and authentic leadership.

To address possible perceived stigmatization of nurses who report medication errors, it is critical to evolve the just, reporting, and learning cultures in eliminating blaming climate at work. According to Hashemi et al. (2012) the culture of blaming individual can lead to negative implications such as increasing the possibility of preferring silence instead of reporting and creating the feeling of guilt and uselessness among nurses.

2 | CONCLUSIONS

Humans are the core component involved in routine work in the health care setting, and humans are prone to making errors. To administer medication for patient safely, healthcare professionals need to learn from their mistakes. Strengthening the culture of reporting medication errors without punishment and stigmatization will be an avenue to learn from our errors and modify nurse workflow to avoid or decrease the chance of future medication errors in healthcare settings. Adopting transformational leadership style can play a significant in promoting reporting and reducing medication errors. The appropriate leadership style can enhance nursing staff confidence and lessen nursing staff stress and anxiety that lay out the platform for optimal medication administration. Furthermore, a positive attitude and interprofessional communication are important approaches to reduce medication errors. The use of an effective Hand-off communication model can provide strategies to improve inter-professional communication and reduce medication errors.

Interprofessional communication and education can enhance nursing staff knowledge on less commonly used medications. When nurses have better knowledge of the medication and its potential side effects, the chances of medication error decrease in the medication administration process (right dose, route, time, and drug). Additionally, reducing perceived workplace stigma among nurses can enhance willingness to report medication errors through organization initiatives to improve human-related and system-related errors in a just culture. Future studies should explore medication error management strategies in developing countries to posit solutions based on workplace culture, environment, and specific patient population.

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