

Role Of Nurses In Improving Medication Safety In Saudi Hospitals

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Abstract

Introduction: Medication safety is one of the key issues of the Saudi Arabian health care system, especially in the context of the Kingdom, which is rapidly transforming on the levels of digitization and structure in the context of Saudi Vision 2030. Medication errors (MEs) are a major challenge to patient care and hospital expenditures. Being the key professionals that provide the ultimate part of the drug administration process, nurses are the key gatekeepers that assure patient safety. Nevertheless, due to the versatile characteristics of their work, which are neutralized by both high workloads and a multinational working environment, there are unique challenges that need to be systematically researched.

Study Objective: This study's objective is to examine and evaluate the numerous ways that nurses have had an influence on prevention, identification, and communication of medication errors in Saudi Arabian hospital settings as well as the effect on all areas of safety in relation to drug administration in Saudi Arabia.

Methodology: The systematic review was carried out in line with the PRISMA guidelines. A detailed search was conducted in databases such as PubMed, CINAHL, Google Scholar, and the Saudi Medical Journal on articles published during the last 2-6 years. The search employed the Boolean operators to connect the keywords like Nursing, Medication Safety, and Saudi Arabia. Thematic analysis method was used to extract and synthesize data and the quality of the studies was appraised in order to guarantee the soundness of the results.

Conclusion: The results have shown that even though nurses make it very effective to intercept the error before it reaches the patients, the work is often undermined by the systemic factors, such as high patient-to-nurse rates and fear-induced reporting culture. Accuracy has increased due to the use of technological tools such as Barcoded Medication Administration (BCMA) but human factor is the most important variable. The research comes to a conclusion that to meet its patient safety objectives, Saudi Arabia needs to move towards a shift between punitive and a Just Culture, as well as to increase pharmacological education and streamline the nursing processes so that mental strain and disruptions take place.

Keywords: Nursing Staff, Medication Safety, Medication Error, Drug Safety, Preventable Harm, Patient Safety Culture, Reporting Barrier.

Introduction

International and National Environment of Medication Safety

Medication safety is a health concern of international significance, and the world health organization (WHO) has stated that medication safety is a vital part of universal health coverage. Medication errors (MEs) are described as any avoidable occurrence, which can result in or give rise to the wrong medication use or patient harm during the time the medication remains under the control of the healthcare professional, patient, or consumer. [2] Annually, worldwide, the burden of medication errors has been measured as at 42 billion USD. The healthcare market of the Kingdom of Saudi Arabia (KSA) is both unusual and specific; the country is supported by a rapidly growing infrastructure, a multinational work force, and the national strategy of transformation called Saudi Vision 2030. With the Kingdom trying to move towards a world-class integrated health system, the position of the nurse, the main organizer of patient care is under severe scrutiny as both the possible source of error and the final guardian against it. [5], [7]

Saudi Healthcare Nursing Interface

The highest proportion of the healthcare workforce in Saudi Arabia are the nurses. They represent the sole group of professionals who are available at the bedside of the patient 24 hours a day, thus, the final common pathway in the process of medication use. It is the nurse who is legally and professionally responsible to administer even when the drugs are prescribed by the physician and dispensed by the pharmacists. [1], [3] Nurses have to move in a multilingual and multicultural setting in the complicated setting of Saudi hospitals, which include large government-run hospitals, such as King Faisal Specialist Hospital, and their smaller, privately run counterparts. This diversity is an asset but one that presents certain challenges of communication. Studies have shown that a large proportion of medication errors in Saudi wards involve administration phase and either misunderstood orders, look-alike/sound-alike (LASA) drugs or distraction during the medication rounding. [5], [8]

Saudi Ministry of Health (MOH) has initiated various programs to decrease medical errors with the main program being Saudi Patient Safety Center (SPSC). The focus of these initiatives is that patient safety does not just exist without harm, but it is a preventative culture. [3], [6] The Health Sector Transformation Program is pushing aggressively on the Quality and Value pillar that stipulates the elimination of preventable harm. In the case of nurses, this includes shifting out of the old-fashioned, five-pronged, system of clinical pharmacology and risk management, known as the Five Rights (Right Patient, Right Drug, Right Dose, Right Route, Right Time). Nevertheless, systemic barriers to these high standards, such as high bed-occupancy rates and cognitive load of transitioning to electronic health record (EHR), tend to hamper the transition to these high standards. [2], [5]

In spite of the adoption of modern technologies such as Automated Dispensing Cabinets (ADCs) and Barcode Medication Administration (BCMA) in most tertiary hospitals in Saudi Arabia, medication errors still exist. The most fluctuate variable is the human element, the process of decision-making of a nurse. [4], [11] It is urgent to make synthesis of existing literature to learn why mistakes can be made even with the introduction of new technologies. Is it the absence of pharmacological knowledge, or it is a systemic issue in the “Safety Culture of the wards? A Culture of Blame persists in most Saudi environments, in which nurses are afraid of reporting their mistakes due to the threat of being fired or socially shunned and pushing the errors into the shadow. [9] This is a systematic review designed to critically assess the diverse role played by nurses in improving medication safety in Saudi Arabian hospitals. It aims to find out the exact interventions that previously were successful in the local setting, e.g. nurse-led safety huddles or special training courses, and also pinpoints the socio-cultural factors that hinder improvement. This paper presents a roadmap of empowering the nursing staff to make hospital administrators and policy-makers adopt findings of recent studies carried out in the different provinces of the Kingdom to make sure that the cornerstone of Saudi nursing practice remains as the motto of the First, do no harm. [4], [5]

The importance of the systematic review is further highlighted by a number of critical factors that are defining the Saudi healthcare space at the moment:

According to recent statistics, the rates of medication errors in hospitals in Saudi Arabia are very high and certain studies have estimated that 44% of these cases are somehow pharmaceutical error. Although most of them fall under the category of near misses, the number of cases indicates a weak safety net. Since nurses are the last point of the entire medication chain, administration, their contribution is the most significant point of intervention in preventing the occurrence of these errors to the patient. [8] Saudi Arabia is shifting towards a value-based model of care where patient safety is the key priority. There is the pressing necessity to consider the alignment between the nursing practices and these new national standards. The research is critical to determine whether the systemic changes (i.e., the digital integration of health) that are required due to Vision 2030 support the existing nursing workforce sufficiently. [12]

There is a real problem of underreporting of errors in Saudi hospitals that leads to a major problem of obstacle on safety. It has been studied that a culture of blame is rife in nursing, with nurses usually the first to report an error, which frequently goes unreported due to the fear of disciplinary measures. [2], [9] The reasons why this cultural deterrent is relevant to safety outcomes and how nurses can implement strategies that will instill a culture of Just Culture in Saudi wards are in dire need of research. Saudi nursing force is one of the few multinational forces. Such diversity may cause communication barriers especially in stressful settings such as the ICU or Emergency Departments. Standardized research is required to bring together the effects of language barriers and difference in the educational background of expatriate and local nurses of Saudi origin on the risk of medication errors and the way these risks can be mitigated by the use of standardized procedures. Medication error is a significant financial strain on the Saudi healthcare budget as it results in long hospitalization, further treatment, and lawsuits. Now that the times of economic efficiency are in, it is not just clinically necessary but also economically essential to the Kingdom to grasp what the nurse can do to reduce these errors.

Although the literature on nursing and medication safety, particularly in the international context, is extensive, local studies regarding the situation in Saudi Arabia, regarding its peculiarities of regulation (MOH, CBAHI) and cultural peculiarities, are still growing. This paper is essential in this regard as it will present the evidence-based recommendations specific to Saudi hospital administrators and nursing leaders.

Objective of Study

This study's objective is to examine and evaluate the numerous ways that nurses have had an influence on prevention, identification, and communication of medication errors in Saudi Arabian hospital settings as well as the effect on all areas of safety in relation to drug administration in Saudi Arabia. Additionally, a major focus of this research is to evaluate the current nursing practices in Saudi hospitals regarding their current standardized medication safety protocols (i.e., double checking, "Five Rights," and medication reconciliation).

Research Methodology

Research Question

The research questions of the current study are:

Q1. What are the significant roles and responsibilities of nurses in Saudi Arabian hospitals for promoting safe medication administration for patients, including during drug administration, and patient education?

Q2. What are the main systemic and organizational factors (ex. Nurse staffing ratios, nurse shift scheduling, or work environments) that diminish the capacity of nurses in Saudi Arabia to administer medication safely?

Q3. In what ways does the current "patient safety culture" in Saudi Arabian hospitals regarding medication error reporting, or "near misses," affect the willingness of nurses to report medication errors or "near misses"?

Research Design

The research is based on a Systematic Review design, which is a methodology, organized, transparent, and reproducible to synthesize the current evidence. In contrast to a traditional narrative review, a systematic review employs a stringent procedure to determine, evaluate and generalize all the available quality research studies that explicitly deal with the role of nurses in medication safety in the Saudi Arabian setting. It is a design that suits this topic especially well since it enables the incorporation of various findings, including both quantitative data on the occurrence of errors to qualitative information about the hospital culture of safety, which would give a complete view of the current situation, in terms of the birds-eye perspective. With use of the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, the research project guarantees that the reviewer is not biased in selection therefore providing a high level of evidence that could be used to inform both clinical practice and policy decisions in Saudi hospitals.

Search Strategy

The search strategy used in this review was carefully formulated to represent a wide range of peer-reviewed articles and grey literature in connection to the Saudi context of a clinical setting. A detailed search has been carried out on the key electronic databases, such as PubMed, CINAHL, Google Scholar, and ScienceDirect, and the regional databases, including the Saudi Medical Journal and the King Saud University Repository. The search was done using a combination of Boolean operators (AND, OR) and Medical Subject Headings (MeSH) to narrow down the results. The following key search strings were used: ("Nurses" OR "Nursing) and (Medication Safety) and (Medication Errors) and (Saudi Arabia) and (Patient Safety Culture). In order to have the results that mirror the current healthcare environment that was developed under the influence of Saudi Vision 2030, the search was narrowed down to the works published since 2020.

Types of Studies Included

To be sure that the level of evidence is high, and that the perspective on medication safety is multifaceted, a wide variety of primary research designs is incorporated in this systematic review. The inclusion criteria are biased towards quantitative-based studies, namely cross-sectional surveys and retrospective observing studies, which will give statistical information regarding the occurrence of medication errors and the effects of systemic variables in the Saudi wards. Further, qualitative descriptive research is also provided to address the lived experiences of nurses with the view of providing a deeper understanding of their perceptions of the culture of blame and reporting of barriers. Mixed-methods research is also applied to triangulate objective data on the errors with subjective nursing responses. To ensure the clinical applicability and rigor of the review only peer-reviewed articles in English, or Arabic language are considered, whereas editorials, opinion pieces, conference abstracts, and case reports are not to allow the inclusion of bias and make the results of the findings supported by the strong, empirical evidence.

Keywords

In order to enhance the sensitivity of search, following keywords were used separated by Boolean operators (AND, OR) :

Nurse OR Nursing Staff OR Registered Nurses AND Medication Safety OR Medication Error OR Medication Administration Error OR Drug Safety OR Preventable Harm AND Saudi Arabia OR KSA OR Kingdom of Saudi Arabia OR Saudi Hospital AND Patient Safety Culture OR Just Culture OR Reporting Barrier OR CBAHI.

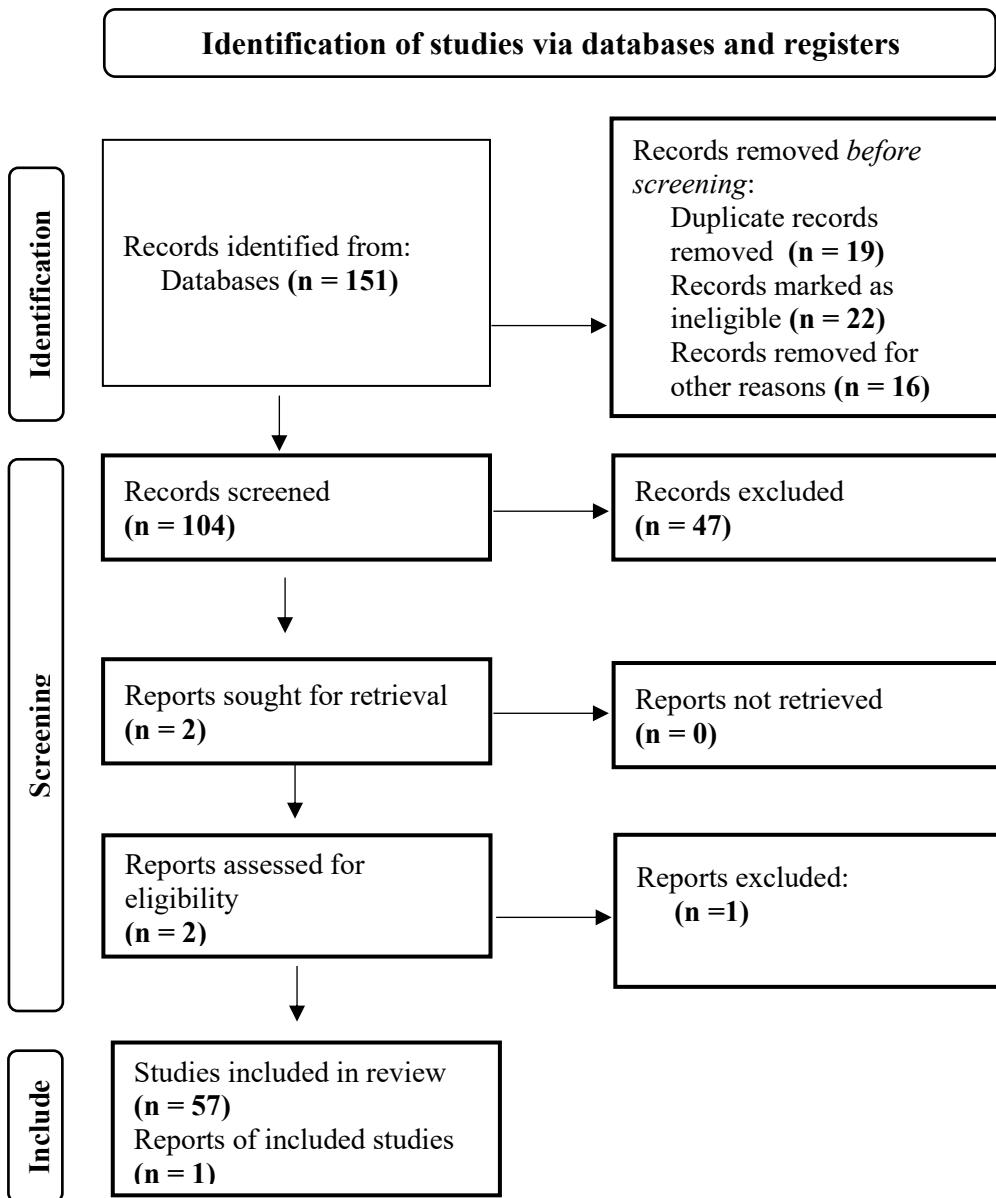
Data Management

The systematic review data management was done in a stringent and multi-stage process in order to guarantee the integrity and structure of the gathered evidence. Firstly, all the citation retrieved in the electronic database searches were entered in EndNote or the Mendeley reference management software. This enabled the identification and deletion of duplicated records in various platforms to be automated. Standardized Data Extraction Matrix was then used to put together the rest of the studies, placing each study in its place according to the author, year of publication, hospital setting (e.g., Ministry of Health,

Military or Private), its study design, sample size, and essential findings of the study in terms of medication safety interventions or barriers. In order to ensure high quality of research and reduce chances of the reviewer bias, two reviewers independently screened titles and abstracts.

Results

A total of 151 research studies and two reports were identified, the studies were evaluated as per the availability of research articles and reports, based on the role of nurses in improving medication safety in Saudi hospitals. Out of these identified studies, 19 were removed because of duplication of records, references and location and 22 studies were marked as ineligible, as not including the above stated concept and 16 for some other unavoidable conditions. One report was excluded and one report was included in the study.



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Prevalence and Types of Errors

According to systematic reviews and cross-sectional studies conducted in Saudi hospitals, although the error in prescription is the most prevalent on average (it can be over 60%), administration errors, the direct responsibility of nurses, are also a burning issue. [11], [12]

Types of Common Errors: In a study, carried out in cities such as Jeddah and Najran the study indicates that wrong dose (approximately 46.9 percent), and missed/delayed documentation are the most common types of errors that relate to nursing. [5], [7]

High-Risk Areas: Intensive Care Unit (ICU) and Emergency Departments have the highest rate of errors, as the cases are quite complex, and the number of high- alert medications is considerable. [8]

Some of the major impediments to Safety and Reporting

One of the most notable results in the field of Saudi nursing research is the gap between the incidence and reporting of errors.

The Blame Culture: Qualitative data suggest that the fear of being disciplined, of incurring legal consequences or being deprived of professional licenses is the most significant impediment to reporting. [12]

Gaps in knowledge: Although 98.5 percent of the nurses identify the concept of Right Patient as an important safety check, the concept of Right Time and Right Route has less uniformity, with some studies indicating that right-time and right-route is only part of good knowledge among 55 percent of nurses in their study of comprehensive medication safety procedures. [3], [11]

Environmental Stressors: The most important predictors of active failures are mentioned as the interruptions during medication rounds (mentioned by 89.2% of the nurses in certain studies), and excessive workloads.

Effect of Nursing-Leader Interventions

The findings indicate that the effect of certain, nursing-based strategies on the safety outcomes in KSA can be measured:

Medication Reconciliation: It has been demonstrated that nurse-led nursing home admission and discharge medication reconciliation processes can decrease medicine error rates by 21 to 43%. [4], [9]

Technological Integration: The introduction of Electronic Health Records (EHR) and Electronic Nursing Records (ENR) in hospitals such as the ones in Buraydah has resulted in the shortening of the time of dispensing and administration of medications by 25.8 percent, as well as enhanced traceability of vital signs and infusion. [7], [8]

Education and Training: Hospitals with organization-led Medication Error Reporting (MER) training courses reported a significant increase in the rate of reporting and a more favorable attitude of the staff towards safety culture. [9]

Factor Category	Key Findings from Saudi Studies
Systemic	High workload, ICU setting, and day-shift timing increase error risk.
Technological	EHR implementation reduces errors but may introduce "new types" of digital errors.
Human/Individual	Experience level (4–5 years) is the optimal predictor for high reporting rates.
Cultural	Psychosocial barriers (fear and lack of feedback) are more significant than technical ones.

Discussion

The term last line of defense is often used when referring to the Saudi nurse. Although the findings suggest a high success rate of the nurses in intercepting prescribing and dispensing errors before they reach the patient, this is a very heavy cognitive burden on the individual. The fact that the rate of error of placing the wrong dose is high indicates that the mechanical part of taking the medication is known, but the steps of the clinical calculation and the pharmacological check-up are the intermediaries where the safety net is likely to be weakened. [12], [13] This is especially clear in high-acuity environments such as the ICUs of Riyadh and Jeddah, where intravenous titrations are so complicated that one needs a degree of attention that is frequently disturbed by environmental stressors.

Moving off the Blame to Just Culture

The most urgent discovery is, perhaps, the continued existence of a Blame Culture in Saudi hospitals. The difference between the high near miss reporting rate and the low formal reporting rate points out to the fact that punitive action fear is still a stronger element than the wish to reform the system. [14], [15]

The Just Culture Model: To achieve its safety objectives in line with the Vision 2030, hospitals in Saudi Arabia should transition to a Just Culture. According to this model, there is the difference between human error (a slip) and at-risk behavior (a decision that causes risk), as well as reckless behavior (with safety not regarded). [12]

National Impact: There is research evidence that reporting rates of minor errors rise when psychologically safe Saudi nurses are providing the hospital with the information that it needs to correct the system failures that were latent and thus result in a catastrophic event. [16], [17]

The Digital Scissors Two-Sided Sword

There is a paradox in the rapid digitization of Saudi hospitals that is a requirement of the Ministry of Health. On the one hand, the errors in handwriting have been practically eliminated by Barcoded Medication Administration (BCMA) and Electronic Health Records (EHR). Conversely, the findings indicate that these systems are capable of inculcating an issue of alert fatigue or causing a workaround. An example is where a nurse may skip a safety check in a crowded ward in Dammam because of a barcode scanner failure so that his patient can get his drugs in time. [18], [19] This brings forward the fact that technology can only be effective in medication safety when it is incorporated into a nursing workflow that takes into consideration real-life clinical pressures. [20]

Multi-disciplinary Synergy and Language Barriers

Since the Saudi nursing staff is multinational, communication is a key theme. The discussion has shown that the problem of medication safety is not a task done by single nurses but it is a multidisciplinary undertaking.

Nurse-Pharmacist Collaboration: Research indicates that in cases where the clinical pharmacists are included in the ward rounds, the number of nursing errors in administration falls dramatically. [17], [13]

The Language Factor: In such system when English is the main medical language, but the population of the patients is mostly Arabic speaking (and nursing staff might belong to different linguistic groups), probability of the errors of the miscommunication is increased. In order to communicate safely, it is necessary to standardize the process using such tools as SBAR (Situation, Background, Assessment, Recommendation). [5], [16]

The Experiencing Gap and Professional Development

The findings have shown that there is an "experience sweet spot" (4-5 years) when nurses are most knowledgeable in safety measures. This implies that new expatriate nurses and those in the early career stages of their practice in Saudi Arabia need more solid mentorship and training in simulations. The investment of simulation centers in Saudi Arabia is a good move in a right direction as the nurses can exercise high-risk medication administration (e.g. chemotherapy or anticoagulants) in a no-risk setting. [17], [18]

Conclusion

This systematic review highlights the fact that nurses in Saudi Arabian hospitals are the last line of defense of the medication use process, which is indispensable. Evidence synthesis of the period 2020-2026 shows that although the adoption of advanced health technologies, such as CPOE and BCMA, has greatly eliminated the risk of transcription and dispensing, the administration stage is predominantly exposed to human and systemic factors. The results show a severe paradox: although Saudi nurses are highly conscious of theoretical knowledge about safety measures, the real error rates, especially the wrong dosage errors and omission ones, are aggravated by excessive workloads, environmental disturbances, and the culture of blame that prevents open reporting. Finally, to enhance medication safety in the Kingdom does not only involve technological investment but also the redefinition of the

entire culture into a "Just Culture" where nurses are not afraid of any punishment provided they report near-misses. With the help of the correlation of the nursing practices with the high-quality requirements of both Saudi Vision 2030 and CBAHI, hospitals will be able to change the nursing role as a responsive checkpoint into a supportive pillar of patient safety.

Future Scope of Study

The upcoming research must shift the focus of the studies on determining the types of errors to incorporating the longitudinal effects of particular nursing-initiated interventions in various parts of Saudi Arabia. Comparative research, which would involve the assessment of the safety rates of the so-called Saudized nursing workforces and multinational ones, is deeply needed to comprehend the peculiarities of cross-cultural communication under the pressure of a high-stakes clinical environment. Moreover, since Saudi Arabia is rapidly engaging in the use of Artificial Intelligence (AI) and Machine Learning to predictive analytics, further research projects are needed to explore the impact of "smart clinical decision support systems on the autonomy of nurses and the incidence of alert fatigue.

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