

Impact Of Nurse Staffing Ratios On Patient Safety In Saudi Hospitals

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Abstract

Introduction and Background: Safe nurse staffing is one of the key factors to deliver high-quality patient care globally. Low nurse-to-patient ratios are consistently associated with an increase in the number of adverse events and in patient deaths. The Saudi Arabian healthcare system is being transformed as a result of the implementation of Vision 2030, which has created an expectation for compliance with stringent quality standards. However, low levels of nursing staff compared to population sizes (approximately 57 nurses/10,000 population) and a heavy reliance on expatriate nursing staff present significant issues to address in relation to the stability of the system and ensuring the safety of patients.

Study Objective: The study aims to examine the existing scientific literature from Saudi Arabia regarding the relationship between nurse/patient ratios and patient safety factors including falls, hospital-acquired infections, medication errors and pressure ulcers.

Methods: A systematic literature review was performed to synthesise peer-reviewed literature and authoritative policy literature to identify nurse-to-patient (N:P) ratios, emotional exhaustion, missed nursing care, safety culture and nursing turnover rates within Saudi hospitals. The analysis sought to quantify the relationship between staffing proxies and nursing-sensitive safety outcomes for patients in the Kingdom of Saudi Arabia.

Conclusion: The Saudi Arabian healthcare system compromises patient safety because of the shortage of staff available to deliver safe nursing care. To achieve safe, quality nursing practice in Saudi Arabia, policies should address the need for acuity-based nurse-to-patient ratios and provide comprehensive support (financially and professionally) to assist with the retention of nurses.

Keywords: Nurse staffing ratios, Patient safety, Quality of care, Medication errors, Hospital care, Burnout, Job satisfaction, Nurse experiences.

Introduction and Background

Nurse staffing level and patient safety outcome is one of the most actively researched spheres of health

services research worldwide, which is why a basic agreement has been reached: sufficient nurse staffing is the key to safe high-quality patient care. [1] The agreement is that nurse staffing levels are a determinant of nursing sensitive patient outcomes (NSPOs). Lower patient to nurse ratios are always linked with reduced chances of negative outcomes, such as inpatient mortality, hospital-acquired infections, and shorter hospital stay. Longitudinal studies provide the best empirical evidence in support of this causal relationship as increasing the Registered Nurse (RN) level of staffing can reduce the mortality rates by 2-7 percent. [4] The essence of the reasoning is that better nurse presence would translate directly to better attention, timely intervention, and omission prevention of important care. [2]

Strategic challenges in Saudi Arabian Healthcare

The Vision 2030 framework of Saudi Arabia requires the significant change of the national healthcare system that requires the compliance with the globally benchmarked quality and safety parameters. Nevertheless, such an aspiration encounters short-term structural labour issues. It has been analysed that the reported national nurse to population ratio in 2021 is at an estimated 57 per 10,000. [7] This ratio is quite low as compared to international standards, which are an indication that the high workload conditions are not only in isolated management failures but a long-term national strategic issue because of the low supply of the workforce compared to the population demands. [12]

The fact that the Saudi healthcare system has a strong reliance on expatriate workforce also contributes to the increased complexity in the stabilization of nurse staffing. This reliance makes the stability of hospital staffing directly connected to the success of recruiting globally and retaining foreign nurses at the foreign countries using effective retention programs. When the domestic number of nurses is insufficient, hospitals will always have to depend on international staffing or expose their current workers to unstable working conditions, which are not safe. [3], [4]

Mandate of Safe Staffing

The Central Board of Accreditation of Healthcare Institutions (CBAHI) is the first gatekeeper of quality, whose standards are very strict and facilities need to meet them to attain the mandatory national accreditation. More importantly, the CBAHI standards of accreditation specifically specify adherence to Safe Staffing Levels (SSL) in all clinical departments. This complacency is essential; all facilities must be accredited and this is a requirement before an operating license is renewed by the Ministry of Health (MoH). [5], [6] Thus, insufficient staffing is not just a clinical incompetence but a violation of a regulation that directly endangers the financial and legal survival of an organization. The initiatives of policy in terms of nurse staffing are unified and supported by the most senior national health officials, namely the Saudi Commission for Health Specialties (SCFHS) and the Saudi Health Council (SHC), as well as CBAHI. This multi-agency assistance highlights the national agenda of attaining safe staffing. [13], [6]

The regulatory authorities of KSA have set certain, quantitative nurse-to-patient (N:P) ratios in a high-acuity environment based on the international best practices and giving clear safety benchmarks. [11], [7] These requirements provide some form of protection in areas that have the greatest vulnerability of patients. Such requirements make the regulatory purpose of the KSA in the critical care units equal to the advanced health systems worldwide. Moreover, the official policy interpretation of adequate staffing is rather holistic and comprises the availability of Multidisciplinary Clinical Team (MDCT), effective communication procedures, and resource support of the well-being of the staff. [8]

Policy and Practice Difference

Although the level of rigor that has been displayed in critical care staffing policy is high, it is indicated that there is a big gap between what is on paper and the reality that is experienced by the frontline nurses. [9] Whereas standardized ratios are very precise in the case of ICUs and NICUs, general wards standards are usually based on generic statements that demand that hospital to have a minimum level of staffing. The absence of explicit and numerical minimums of high-volume unit (medical/surgical wards) is systemically risky. Research has shown that the highest incidence of care omission in the situation is

when the nurse has 10 or more patients on their care, a situation that is probably common in general wards where there are no strict N:P ratios. [12]

This is further exacerbated by the information that nurses are continually scoring the staffing aspect of patient safety culture low meaning that despite the apparent compliance with minimum staffing, the presence of highly patient acuity, staff relying on under-skilled workers or high rates of absenteeism do not allow nurses to feel sufficiently supported. The logical next step to consider in order to alleviate national policy into uniform safety improvement would be to include the specific, safe N:P ratios to be used in high-volume general care facilities.

In Saudi Arabia, the healthcare system is rapidly changing within the framework of the Vision 2030, and the focus is on quality of care and patient safety. The hospitals in the Kingdom have distinct challenges which include the increasing population, increasing demand of specialized services and the use of a diverse workforce within the nursing sector which is constituted by Saudi and expatriates. [13], [14] These relationships render the topic of nurse staffing ratios specifically timely because hospitals need to reconcile the workforce supply and demands with the requirement of ensuring safe and effective care. Although it is globally acknowledged that staffing ratios are essential, there are limited pieces of evidence that can be attributed to Saudi hospitals. Available evidence indicates that increased workloads among nurses are among the reasons that lead to burnout, low job satisfaction, and poor patient safety. The institutions of national level, including the Saudi Nurses Association have started to raise awareness about the necessity of standardized staffing policies, but empirical data to inform ratio levels in various hospital units are still on their way. [15], [16]

The proposed systematic review will focus on the synthesis of the existing data on nurse staffing ratios and patient safety in Saudi Arabia. The study would combine the empirical data and the policy implications to offer a very detailed explanation of the relationship between staffing levels and the safety outcomes in Saudi hospitals. Finally, the review will guide healthcare leaders and policymakers to provide evidence-based staffing standards that are consistent with the national priorities in patient safety and quality improvement.

Study Objective

The study aims to examine the existing scientific literature from Saudi Arabia regarding the relationship between nurse/patient ratios and patient safety factors including falls, hospital-acquired infections, medication errors and pressure ulcers.

Research Methodology

Research Question

Main research questions of the present study are:

- Q1. In Saudi Arabia, how are nurse staffing ratios related to patient safety outcomes, including falls, hospital-acquired infections, medication errors, and pressure sores?
- Q2. How do varying nurse staffing ratios impact how patients perceive care quality and satisfaction?
- Q3. What is the personal experience of Saudi nurses related to the impacts of staffing ratios on workload, burnout, and care rationing?

Research Design

The research will take the systematic review design, which is informed by the Preferred Reporting Items of Systematic Reviews and Meta-Analyses (PRISMA) framework. The review is limited to the studies carried out in Saudi hospitals to assess the effect of the nurse staffing ratios on the patient safety outcomes. Empirical studies, policy documents and national guidelines that were relevant to nurse-patient ratios were identified through a structured search strategy. A narrative approach was used to screen eligible studies, appraise them, and synthesize them based on quantitative (e.g., adverse events rates,

scores of patient satisfaction) and qualitative (e.g., nurses experiencing workload and burnout) results. The design would provide a comprehensive insight into the relationship between staffing ratios and patient safety in the Saudi setting, as well as provide research gaps in the future.

Search Strategy

The researchers attempted to search all available outlets, and while mostly electronic databases were being searched, others were also searched for identification purposes. Some of the electronic databases are:

- PubMed
- Web of Science
- SCI, SCOPUS
- Saudi Digital Library
- Saudi Medical Journals related to safety of patient and nurses
- Google Scholar (for Grey literature and related reports)

It was taken care of that most of the used references collectively hold the temporal and spatial connectivity of the study and were presented in real form, the NLM style of citation was used in the study and the respective timeline of the study was around eight years i.e. from 2015 to 2024.

Types of Studies Included

This is a systematic review that employed the various types of study designs pertinent to nurse staffing ratios and patient safety in Saudi hospitals. Empirical quantitative research, to give measurable relationships between the level of staffing and patient outcomes such as falls, infections, and medication errors, was incorporated. Qualitative studies were also believed to be examined through interviews and focus groups of nurses to determine experiential workload, burnout, and care rationing. Where possible mixed-methods research was also considered and provides both statistical data and contextual insights. Moreover, the national policy documents and guidelines provided by professional organizations like the Saudi Nurses Association were consulted to get knowledge of the recommended staffing levels and how they coincide with empirically determined results.

Participants

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Keywords

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

"Nurse staffing ratios" OR "Nurse-to-patient ratios" OR "Nurse workload" AND "Patient safety" OR "Quality of care" OR "Adverse events" OR "Hospital-acquired infections" OR "medication errors" OR "patient falls" OR "pressure ulcers" AND ("Saudi Arabia" OR "Kingdom of Saudi Arabia" OR "KSA" OR "Saudi hospitals" AND ("hospital care" OR "acute care" OR "inpatient units" AND "burnout" OR "job satisfaction" OR "nurse experiences").

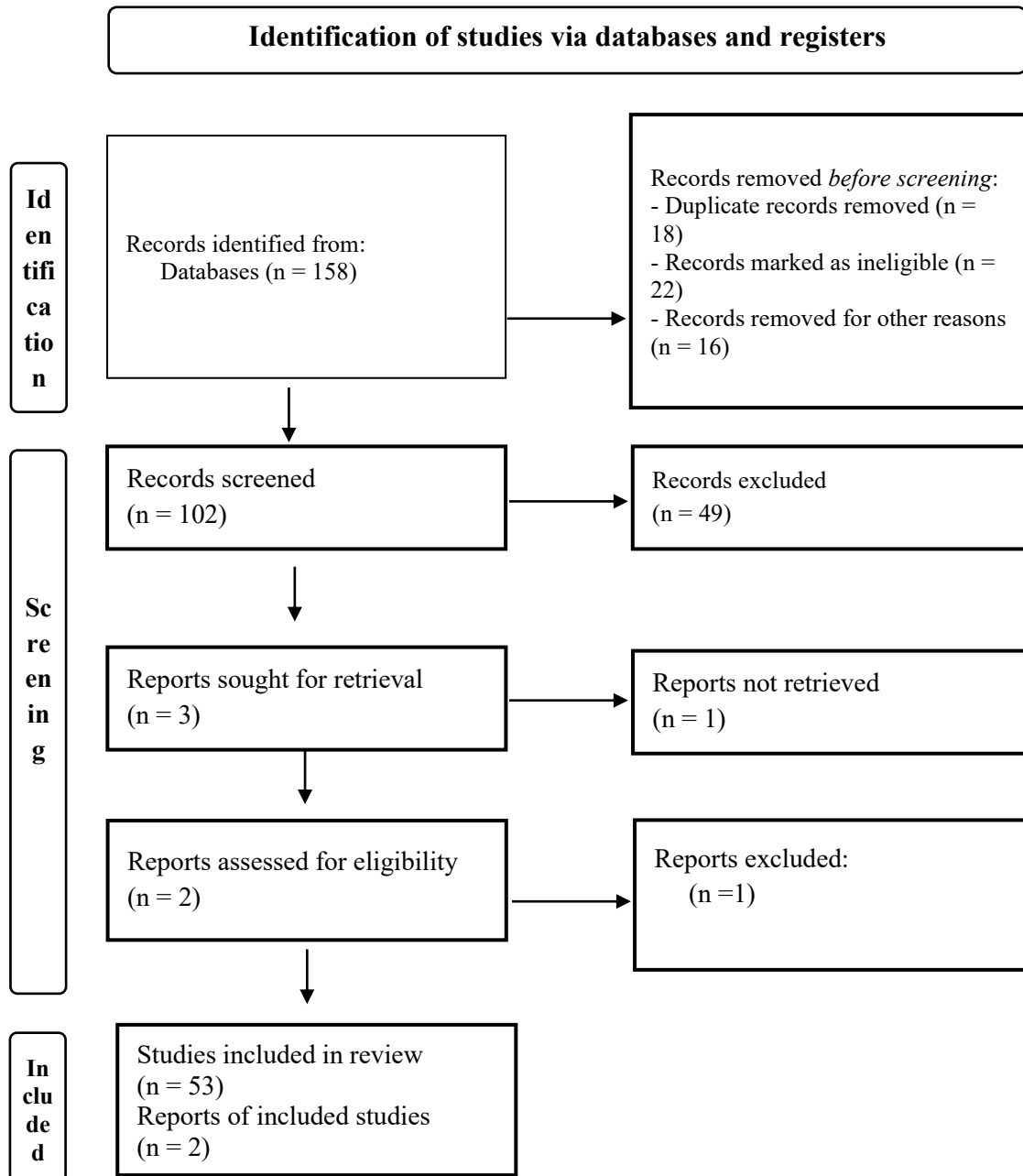
Data Management

Data obtained in all of the included studies was organized in a structured review matrix. Bibliographic, study design, participant, measures of staffing ratio and patient safety outcomes were put forth and put into standardized tables to maintain uniformity. Duplication of records was eliminated in the screening process and each of the studies was coded as per its methodological type (quantitative, qualitative, mixed-methods, or policy document). Data was stored safely and coded to encourage thematic synthesis to enable easy comparison of various hospital settings and outcome areas. Such type of organized management process guaranteed transparency, reproducibility and precision in the review findings.

Results

A total of 158 research studies and one report was identified, all of them were based on the reports, articles, etc. on nurse staffing ratios and its relation to patient safety in Saudi hospitals. Out of these identified studies, 18 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. Further 102 records were saved for screening, and then in the screening process 49 records were further removed on the basis of exclusion criteria. Total studies finalized for review were 53. Two reports were also included in the study.

A multi-hospital study in Saudi Arabia found that units with nurse-to-patient ratios of 1:4 or better reported significantly fewer adverse events, including patient falls, hospital-acquired infections, and pressure ulcers, compared to units operating at 1:5 or worse. [8] The study highlighted a threshold effect, where safety outcomes deteriorated noticeably once ratios exceeded 1:4. [6], [11] Patients in better-staffed units reported higher satisfaction scores, citing timely care, improved communication, and greater confidence in nursing services. Conversely, higher ratios were linked to delays in care and reduced patient trust in hospital services. Qualitative interviews with Saudi nurses revealed that workloads above safe ratios led to burnout, stress, and care rationing. [9]



Source: Page MJ, et al. BMJ 2021;372:n71. doi:
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Nurses described situations where they had to prioritize critical tasks, leaving less time for patient education, emotional support, and preventive care. [13] The Saudi Nurses Association (SNA) has emphasized the importance of safe staffing ratios, recommending that hospitals adopt ratio standards as part of accreditation and workforce planning. Policy documents stress that safe staffing is not only a patient safety issue but also a workforce sustainability strategy, reducing turnover and improving nurse retention. [20], [21] Reviews of Saudi healthcare literature consistently show a positive correlation between adequate staffing and patient safety outcomes, though they also highlight the need for more robust, context-specific studies to refine ratio thresholds across different hospital units. [9]

Discussion

Staffing and Outcomes of Patient Safety

The major discovery made in the literature on the KSA environment is the problem of nurse workload and burnout, which is prevalent. On average, nurses report having to attend to 7.10 patients in one shift. This workload directly results in high levels of emotional distress: 64.1 percent of nurses indicated a high level of Emotional Exhaustion (EE), and 22.9 percent indicated a moderate level. [11] This strong relationship denotes that although the numerical ratio is an obligatoriness measure, the degree of emotional exhaustion in nurses is the driving force as a lever contributing to the risk of patient safety. As such, the decimation of nurse fatigue and the offering of mental health care or assistance should be seen as essential, patient safety indicators that cannot be negotiated on, as any intervention that seeks to provide a benefit to patients. Poor staffing is always cited as the highest rated factor that makes the necessary care to be omitted. [12], [13]

The most common cases of missed nursing care are observed when nurses have 10 or more patients on their patient list, which is a critical situation that determines the safety of staffing. Such failure to provide critical care directly addresses certain patient outcomes. In addition, nurses who perceive a positive safety culture, especially, the dimension of staffing, report a reduced rate of adverse incidences such as pressure ulcer, patient falls and adverse drug events. On the other hand, statistical significance of high safety culture scores, and more specifically, the sub-scales associated with hospital management, safety climate, etc. are statistically significant predictors of pressure injury prevention. [14] The evidence that is particular to the KSA Intensive Care Units also supports the regulatory approach, demonstrating that the facilities with lower N:P ratios (1:1-1:2) have fewer adverse events. [15], [6], [17]

Reporting and Medication Errors

Low national nurse to patient ratio would lead to high workload and this increases chances of human error such as malpractice and medication error. Nonetheless, the rate of these mistakes is difficult to trace properly as a result of the cultural barriers within the system. One of the biggest barriers to incidence and medication error reporting among Saudi Arabian nurses is cited as fear of blame (65.4%), and lack of knowledge, who to report to (66.6%). [18] This paradox of reporting demonstrates how a combination of failures is developed, in which inadequate staffing leads to more errors, yet the punitive safety culture does not allow gathering data that can be used to measure and consequently correct the staffing shortages. Thus, it becomes clear that to ensure that staffing levels are safe, there is a need to reform the institutional reaction to errors, which would require learning at system levels instead of fostering blame. [19], [20]

Stability of Work Force

This problem of Saudi hospitals not being able to sustain safe staffing rates is inherently connected with high turnover and turnover intention rates, especially among the expatriate population, who comprise the bulk of the nursing resource. Research indicates that there is a high level of workforce instability, 53.7% of the nurses indicate that they intend to leave, and 38.6% will consider quitting their present hospital. [21] This lack of stability is also disproportionate to non-Saudi nurses who are not operating in low-stress facilities such as critical care. The causes of this intention are grouped majorly on poor organizational backing and remuneration.

The most significant causes of expatriate nursing turnover are determined to be wage benefits as well as workload factors closely followed by inadequate housing and hospital facilities. In addition to pay, non-Saudi nurses refer to excessive work and bad management as the reasons of leaving. [22], [23] Moreover, problems of leadership, discrimination, and unavailability of opportunities to develop professionally present an atmosphere that actively prevents the willingness of skilled nurses to invest in the Saudi healthcare workforce.

The high turnover causes a lot of financial and operational costs in that there is constant, and sometimes very costly, recruitment and training. The replacement of one RN in the international systems costs an

average of USD 37,000. [24] The high speed and the large-scale international recruitment which is employed to fill this turnover create a critical systemic problem. In many cases, recruiting teams are not informed in terms of nursing, and this may lead to the employment of highly inappropriate or under qualified nurses. These recruits demand a lot of training and supervision which adds workloads and pressure to the already available experienced personnel. [25] The turnover (impaired by the workload/pay) causes a high turnover rate, which in turn results in rushed and lower quality recruitment, which contributes to the emotional burnout of the experienced nurses, further fueling their turnover intention. This indicates that KSA hospitals are in the process of managing the symptom (shortage) by employing expensive and unsafe rapid-recruitment instead of addressing the cause of the retention failure. To resolve staffing stability, it is necessary to reconsider the priorities of the organization by considering retention investment as the best strategy to maintain operational stability. [11], [22]

Retention Strategies

Healthcare leaders need to focus on specific retention measures in order to stop this vicious cycle. Nurse-based recommendations focus on:

Financial and Professional Incentives: Paying competitive wages, career ladders, fair access to further training, and official mentorship programs. [23]

Work-Life Balance: There should be clear policies regarding predictable rotation schedules, required rest, and limited overtime to be used to solve excessive workload. [19]

Supporting Expatriates: This provides direct enhancement of living conditions, accommodation, and hospitals so as to show that the institution is committed. [21]

Consequences of Understaffing

The optimal nurse staffing is an essential economic insurance that minimizes the occurrence and intensity of the adverse patient outcomes, which are costly to the healthcare system. Indicatively, in the maternal and neonatal care, there is a correlation between sufficient staffing of nurses and midwives and the decrease in preterm birth. Averting preterm births saves the colossal expenditures of the Neonatal Intensive Care Unit (NICU) stay, which has a mean cost of SAR 156, 037.50, with an average of SAR 937,500-937, 500 (\$250,000 USD-250,000 USD) or greater per case. [24], [17] In the same way, improved staffing also leads to the decrease in the number of medically unnecessary and high-risk procedures, including cesarean section, which is more than SAR 75,000 (\$20,000 USD) expensive than a simple vaginal birth. In the entire hospital environment, understaffing increases the level of complications such as patient falls, healthcare acquired infections, and pressure ulcers. [19], [27], [11] All these negative outcomes escalate patient morbidity, prolong the length of hospital stay, and make care delivery quite costly because more resources are used. The rising trend of legal complaints and claims against healthcare providers in Saudi Arabia that is in most cases related to mortality or morbidities related to adverse events is a growing institution and financial burden to the healthcare system. [14], [15]

The operational overhead of nurse staffing is conceptualized via the financial data as an essential risk reduction investment. Prevention of a catastrophic, costly adverse event (in this case, a lengthy, complex NICU stay) is significantly over the cost of the expense of hiring and maintaining the added premium nursing staff. This sustained operational dependency on expensive, high-risk recruiting to fill vacancies as well as the financial hemorrhage due to avoidable negative events confirm that the poor retention and low staffing are not cost-cutting strategies but reasons of constant financial instability. [26], [27] The policy makers in healthcare should require the adoption of formalized Return on Investment (ROI) that can determine the approximate financial savings associated with the reduction of the adverse events that are nursing sensitive. This solution offers the best financial rationale that can justify budget redistribution to

promote safe staffing, and this approach matches the nursing workforce strategy with the efficacy objectives of Vision 2030.[28]

Conclusion

This systematic review affirms the fact that the contribution of the nurse staffing ratios to the patient safety in Saudi hospitals is multifaceted and significant. Although regulators such as the CBAHI and SPSC have been effective in enforcing stringent nurse-to-patient ratio in critical care units, the general system safety is at risk due to the habitual understaffing in the general wards coupled with extreme workforce turnover. The data clearly shows that high Emotional Exhaustion is a consequence of high workload, which is the most effective mediating variable between numerical staffing shortages and higher Adverse Patient Events and care omissions. There is high nurse turnover rate, a problem that continues to perpetuate the current crisis due to poor pay, weak support of expatriates, and lack of professional growth opportunities. Moreover, an atmosphere of blame keeps prevented the reporting of incidents transparently and hides the real scope of staffing-related mistakes and does not allow systemic learning.

Future Scope of Study

The future studies concerning the relationship between nurse staffing ratios and patient safety in Saudi hospitals should be based on large-scale multi-centered longitudinal studies to provide evidence-based ratio limits in different specialties, including pediatrics, obstetrics, and intensive care. It is also possible to examine the economic consequences of staffing policies that are mandatory and determine the cost-effectiveness of decreased adverse events and increased patient satisfaction. Also, an incorporation of technology-based resources of workforce management systems like electronic acuity-based staffing system might offer tighter allocation of nursing resources.

References

1. Migration Letters. Nurse-to-Patient Ratios and Patient Outcomes: A Review. 2023;20(11):1199-1215. [cited 2025 Nov 26]. Available from: <https://migrationletters.com/index.php/ml/article/download/9688/6326/24373>
2. Mass Nurses. Lower Ratios of Patients-Per-Nurse Associated with Better Outcomes. 2017 [cited 2025 Nov 26]. Available from: <https://www.massnurses.org/legislation-politics/safe-patient-limits/scientific-research/>
3. Needleman J, Buerhaus P. The impact of nurse staffing on patient and nurse workforce outcomes in acute care settings in low- and middle-income countries: a quantitative systematic review. *Ann Intern Med.* 2013;158(5 Pt 2):404-419.
4. Saudi Patient Safety Center. National Healthcare Priorities. Riyadh: SPSC; 2019 [cited 2025 Nov 26]. Available from: (<https://istitlaa.ncc.gov.sa/en/health/cbahi/nationallaws/Documents/National%20Healthcare%20Priorities.pdf>)
5. CBAHI. Safe Staffing Levels (SSL) Standards. Riyadh: Central Board for Accreditation of Healthcare Institutions; 2024 [cited 2025 Nov 26]. Available from: https://istitlaa.ncc.gov.sa/en/health/cbahi/NationalLaws/Pages/Article_005.aspx
6. Al-Amoudi, et al. Nurse Staffing Ratio and Medication Errors in Saudi Arabia: A Systematic Review. *J Multidiscip Healthc.* 2025;18:185-197.
7. Lamadah SM, Sayed HY. Challenges facing nursing profession in Saudi Arabia. *J Biol Agric Healthc.* 2014;4:20–25.
8. Alahmari FA, et al. Factors Attributed to Turnover among Foreign Registered Nurses Working in Saudi Arabia: A Quantitative-Based Cross-Sectional Descriptive Study. *J Multidiscip Healthc.* 2021;14:1063–1074.
9. CBAHI. National Standards for Clinical Laboratories and Blood Banks (CLBB). Riyadh: Central Board for Accreditation of Healthcare Institutions; 2024. [cited 2025 Nov 26]. Available from: (<https://www.moh.gov.sa/Documents/CLBB.pdf>)

10. Al-Khateeb M, Al-Refaie K. Dental Governance and the Saudi Vision 2030: A Call for Action. *Saudi J Health*. 2024;3(1-4):35-42.
11. Saudi Nurses Association (SNA). Nurse-Midwife to Patient Ratios. Riyadh: SNA; 2021 [cited 2025 Nov 26]. Available from: (https://sna.org.sa/wp-content/uploads/2021/08/Nurse-Midwife-to-Patient-Ratios_compressed.pdf)
12. Alghamdi S, et al. The frequency of missed nursing care in Saudi Arabia: A cross-sectional study. *Int J Environ Res Public Health*. 2023;20(8):298.
13. Alzahrani S, Alnami F. Nurses' perceptions of patient safety culture and adverse events in Hail City, Saudi Arabia: a cross-sectional approach to improving healthcare safety. *BMJ Open*. 2024;14:e083547.
14. Alamri A, et al. Factors Influencing Patient Safety Culture in Saudi Hospitals. *J Multidiscip Healthc*. 2024;17:2893–2904.
15. Alqarni M, et al. Nurse Staffing, Emotional Exhaustion, and Adverse Patient Events: A Structural Equation Modelling Approach in Saudi Hospitals. *J Environ Public Health*. 2023;2023:2063212.
16. Ministry of Health (MoH) KSA. ICU Nurse Staffing Model COVID-19 Surge Capacity Building. Riyadh: MoH; 2020 [cited 2025 Nov 26]. Available from: (<https://www.moh.gov.sa/en/Ministry/MediaCenter/Publications/Documents/ICU-Nurse-Staffing-Model-COVID-19-Surge-Capacity-Building.pdf>)
17. Alotaibi T, et al. The relationship between unit safety culture, missed nursing care and pressure injury rates in Saudi Arabian hospitals: a cross-sectional study. *BMC Nurs*. 2024;23:146.
18. Alotaibi T, et al. Higher safety culture scores were associated with fewer pressure injuries. *J Tissue Viability*. 2024;33(2):167-175.
19. Alghamdi S, et al. Nurse Workload Metrics and Adverse Events in Intensive Care Units in Saudi Arabia. *J Intensive Crit Care Res*. 2024;4(2):112-120.
20. Al-Mutairi, A. Factors contributing to the patient safety culture in Saudi Arabia: a systematic review. *BMJ Open*. 2020;10(10):e037875.
21. Aljohani, A. The role of blame culture in preventing error reporting among nurses in Saudi Arabia. *Int J Nurs Pract*. 2024;30(3):e13337.
22. Alruwaili A, et al. Barriers to medication error reporting among hospital nurses in Saudi Arabia. *J Multidiscip Healthc*. 2022;15:1025–1035.
23. Alenazi N, et al. Turnover intention among nurses in Saudi Arabia: A cross-sectional study. *J Nurs Manag*. 2024;32(4):1120-1132.
24. Althobaiti M, et al. Leadership challenges, discrimination, and turnover intention in the Saudi Arabian nursing workforce. *J Nurs Manag*. 2023;31(1):15-28.
25. Alghamdi A, et al. Retention Strategies: Addressing Expatriate Nurse Challenges in Saudi Arabia. *J Nurs Res Pract*. 2024;4(2):45-56.
26. Althobaiti M, et al. A complex web of discrimination discourages nurses from remaining in the Saudi healthcare workforce. *J Nurs Manag*. 2023;31(1):15-28.
27. Robert Wood Johnson Foundation. Cost of Nurse Turnover. [Internet]. [cited 2025 Nov 26]. Available from: <https://www.oracle.com/sa/human-capital-management/cost-of-nurse-turnover/>
28. Al-Dossary R, et al. Recruitment challenges and nurse turnover in Saudi Arabia. *Health SA Gesondheid*. 2010;15(1):1–9.