Exploring Nurse-To-Patient Ratios In Saudi Arabian Hospitals: Effects On The Quality Of Care; Systematic Review

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Abstract

Background: Nurse staffing and its impact on patient care quality are critical concerns in Saudi Arabian healthcare. However, a comprehensive understanding of the relationships between nurse-to- patient ratios, nurse engagement, and care quality in this context is limited. Adequate nurse staffing is crucial for

maintaining patient safety and ensuring high-quality care, as nursing staff play a vital role in healthcare delivery.

Aim: This systematic literature review aims to explore and synthesize the existing research on nurse-to-patient ratios in Saudi Arabian hospitals, their effects on nurse engagement and the quality of care, and their implications for nurse retention.

Method: Twelve relevant studies were systematically selected and analyzed, spanning topics from nurse-to-patient ratios and missed nursing care to nurse engagement and perceptions of patient safety. These studies provide valuable insights into the current state of nurse staffing and its impact on healthcare delivery in Saudi Arabia. The systematic review process followed the guidelines outlined by Kitchenham, ensuring rigor and consistency in the review methodology.

Results: The review reveals a nuanced interplay between nurse-to-patient ratios, nurse engagement, and the quality of care in Saudi Arabian hospitals. Adequate staffing levels and supportive work environments positively impact care quality and nurse retention. Conversely, high nurse-to-patient ratios lead to missed care opportunities, potentially compromising patient safety. These findings highlight the importance of optimizing nurse staffing and creating a conducive work environment to enhance patient care quality.

Conclusion: Ensuring appropriate nurse staffing ratios, optimizing work environments, providing training, and addressing cultural aspects are crucial for maintaining nurse satisfaction, care quality, and patient safety in Saudi Arabian healthcare settings. Further research is needed to explore the long-term effects of these interventions and identify additional strategies for enhancing nurse retention.

Keywords: Nurse-to-Patient Ratios, Nurse Engagement, Quality of Care, Saudi Arabia, Patient Safety, Nurse Retention.

Introduction

A basic human right, access to high-quality healthcare is dependent on a number of variables, the nurse-to-patient ratio being one of the most important (Mhawish & Rasheed, 2022). The number of nurses caring for a given number of patients is known as the nurse-to-patient ratio, and it has a significant effect on the standard of care given in medical facilities (Chetty, 2021; Gassas & Salem, 2022). In order to understand its impact on the standard of treatment in this distinct setting, this study sets out to investigate this important factor in the context of Saudi Arabian hospitals.

Over the years, Saudi Arabia, a nation renowned for its quick modernization and development, has made significant investments in its healthcare system (Aldhafeeri et al., 2022; Albsoul et al., 2023). Modern hospitals have been built thanks to these expenditures, which have also gone towards purchasing cutting-edge medical equipment and hiring and educating healthcare personnel (Bumstead, 2021; Brayteh, 2023). In this context, the nursing profession has seen tremendous change, with an increasing number of Saudi nationals entering the sector. This change is in line with the Saudi government's objective to promote a culture of indigenous competence and lessen reliance on foreign healthcare personnel (Al Muharraq et al., 2022; Almalki et al., 2023).

Hospital nurse-to-patient ratios in Saudi Arabia are a source of continuous worry and investigation. When kept at the proper level, this ratio can have a big impact on the effectiveness, safety, and general caliber of care given (Nakweenda et al., 2022). Finding the ideal balance is a difficult task, though, as it varies depending on things like the kind of hospital unit and the particular medical requirements of each patient (Wune et al., 2020; Majrabi, 2022).

The concept of quality care in Saudi Arabian hospitals is multifaceted, encompassing aspects like patient safety, satisfaction, clinical outcomes, and nurse job satisfaction (Hussain et al., 2021). Achieving high-quality care is a paramount objective of the Saudi healthcare system, and the nurse-to-patient ratio plays a pivotal role in achieving this goal (Alruwaili 2021; Ghaleb, 2022).

Globally, nations including the US, Canada, and Australia have acknowledged the significance of nurse staffing levels in providing high-quality healthcare. Inadequate nurse-to-patient ratios have been linked to negative patient outcomes and nurse burnout, according to extensive studies conducted in these nations (Alqahtani et al., 2022). However, the Saudi Arabian setting is still unique due to the country's unique cultural, economic, and healthcare system features (Khan & Muhammad, 2022).

There is a dearth of global research on nurse staffing ratios and how they affect the quality of treatment, but none that specifically addresses Saudi Arabia. By thoroughly examining the Saudi Arabian experience, this study aims to close this knowledge gap by illuminating the ways in which nurse-to-patient ratios impact the standard of care in the region's healthcare system. (Alselaml et al., 2023; Alqarni et al., 2023; Shahbal et al., 2022)

Our goal is to get important knowledge from this investigation that will help the Kingdom of Saudi Arabia develop better healthcare practices, reform policies, and ultimately improve patient outcomes. Through comprehension of the complex relationships between the number of nurses on staff and the standard

of treatment, we can support the continuous advancement of healthcare in this quickly industrializing country.

Significant of study

Understanding the significance of exploring nurse-to-patient ratios in Saudi Arabian hospitals and their effects on the quality of care is crucial. This study can contribute to several important aspects of healthcare in the Kingdom of Saudi Arabia. Firstly, it can enhance patient safety by identifying factors that affect patient outcomes. By examining staffing levels, the research aims to minimize the risk of medical errors, falls, and adverse events, ultimately leading to safer healthcare delivery. Secondly, it has the potential to improve healthcare quality by revealing whether optimal nurse-to-patient ratios are linked to higher standards of care, including patient satisfaction and positive clinical outcomes. This, in turn, can raise the overall quality of healthcare services. Thirdly, the findings can inform policy and decision-making by providing evidence-based insights for policymakers and healthcare administrators. These insights can guide the formulation of policies related to nurse staffing levels, potentially leading to improved healthcare practices and resource allocation. Additionally, the study can support nurse well-being by recognizing how nurse staffing ratios influence nurse job satisfaction, morale, and overall well-being.

Problem Statement

The nurse-to-patient ratio is a critical component of healthcare delivery that significantly impacts the quality of care in Saudi Arabian hospitals (Brayteh, 2023). Despite its pivotal role, the specific effects of nurse staffing levels on the quality of care in Saudi Arabia remain underexplored, creating a critical gap in understanding this essential aspect of the healthcare system. This research aims to address this problem by investigating the relationship between nurse-to-patient ratios and healthcare quality in Saudi Arabian hospitals. It seeks to uncover the unique challenges and opportunities within this context and provide valuable insights for informed decision-making and the enhancement of healthcare practices. By identifying the issues and gaps in knowledge, the study aims to contribute to the filling of these gaps, ultimately improving healthcare delivery in Saudi Arabia.
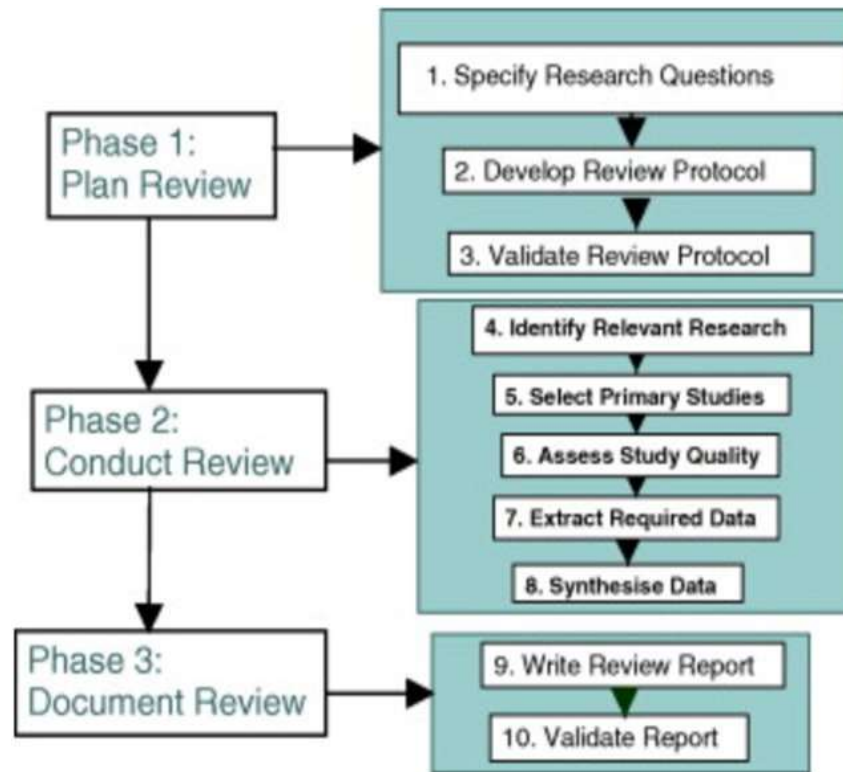
Aim of the Study

The aim of this systematic literature review is to explore the nurse-to-patient ratios in Saudi Arabian hospitals and their effects on the quality of care (Nakweenda et al., 2022). The first objective is to examine the existing body of literature on nurse-to-patient ratios in Saudi Arabian hospitals, encompassing the challenges and strategies related to nurse staffing. The second goal is to analyze the direct and

indirect impacts of nurse staffing levels on various aspects of healthcare quality, such as patient safety, satisfaction, clinical outcomes, and nurse well-being. This analysis will provide a comprehensive view of the complex interplay between nurse staffing and the quality of care. The third aim is to identify gaps in the current knowledge and research on this topic within the Saudi Arabian healthcare context. By pinpointing these gaps, the study aims to highlight areas where further research and improvement are needed. Lastly, the research seeks to provide insights that can inform healthcare policies, practices, and resource allocation to enhance the quality of care in Saudi Arabian hospitals.

Methodology

Methodology: Operationalized the Kitchenham Systematic Procedure for Writing the Review Report In line with best practices for conducting systematic literature reviews, we adopted the Kitchenham Systematic Procedure to ensure the rigor and structure of our review of nurse-to-patient ratios in Saudi Arabian hospitals and their effects on healthcare quality (Kitchenham et al., 2009; Mohtar et al., 2023). This procedure offered a comprehensive and well-organized framework for conducting and reporting systematic reviews, enabling methodological transparency and consistency. The following sections outlined the specific steps within this systematic procedure, from planning the review and conducting the search to data synthesis and reporting the results, ultimately providing a clear roadmap for our study's methodological approach.

Phase 1: Plan Review

1. Specify Research Questions
2. Develop Review Protocol
3. Validate Review Protocol

Phase 2: Conduct Review

4. Identify Relevant Research
5. Select Primary Studies
6. Assess Study Quality
7. Extract Required Data
8. Synthesise Data

Phase 3: Document Review

9. Write Review Report
10. Validate Report

In the systematic literature review focusing on nurse-to-patient ratios in Saudi Arabian hospitals and their impact on healthcare quality, we implemented the Kitchenham Systematic Procedure, comprising three distinct phases and ten methodological steps. During the initial phase, we meticulously planned the review, specifying our research question, formulating a comprehensive review protocol, and validating it for clarity and precision. In the subsequent phase, we conducted the review by systematically identifying pertinent research, selecting primary studies, assessing their quality, extracting essential data, and synthesizing this information to address our research questions effectively. Finally, in the third phase, we documented the review by crafting a well-structured report in accordance with the Kitchenham framework and validated this report to ensure its reliability and accuracy. This systematic approach ensured the review's robustness, transparency, and adherence to the highest standards of systematic review methodology. Detail of each phase and step given as follow.

Phase 1: Plan Review
In the present study, we followed the first phase of the Kitchenham Systematic Procedure, which involved planning the review for our exploration of nurse-to-patient ratios in Saudi Arabian hospitals and their effects on healthcare quality. We specified our research question to provide a clear focus for the study, developed a

comprehensive review protocol to guide our research process, and rigorously validated the protocol to ensure its precision and relevance to our research objectives. This meticulous planning in the past tense set the foundation for a well-structured and methodologically sound systematic literature review.

1.   Specify research question

The research question for the present systematic review on nurse-to-patient ratios in Saudi Arabian hospitals and their effects on the quality of care is:

"How do nurse-to-patient ratios influence the quality of care in Saudi Arabian hospitals, considering factors such as patient safety, clinical outcomes, and nurse job satisfaction?"

- **PICOT Question**

In the context of a systematic review exploring nurse-to-patient ratios in Saudi Arabian hospitals and their effects on the quality of care, a PICOT question could be formulated as follows:

Population (P): Adult patients in Saudi Arabian hospitals

Intervention (I): Varied nurse-to-patient ratios

Comparison (C): Optimal nurse-to-patient ratios

Outcome (O): Patient safety, clinical outcomes, and patient satisfaction

Timeframe (T): Over a specified period of 5 year time

2.   Develop Review Protocol

This systematic review protocol outlines the structured approach to investigate nurse-to-patient ratios in Saudi Arabian hospitals and their influence on healthcare quality. The protocol covers the following key aspects to be accomplished in the resent review and develop the straight sketch to fulfill each part that include (1) Search Strategy, specifying databases, keywords, and inclusion criteria; (2) Study Selection, including criteria for inclusion and exclusion and the screening process; (3) Quality Assessment, detailing tools and criteria for evaluating study quality; (4) Data Extraction, specifying the data to be collected and the extraction process; (5) Data Synthesis, outlining the method for analyzing and presenting findings; (6) Reporting the Review, structuring the review report; (7) Protocol Validation, ensuring protocol rigor and reliability; and (8) Timeline and Milestones, setting a timeframe for each phase. This protocol guided the systematic review to ensure methodological transparency and rigor throughout the study.

- **Search syntax**

The research syntax for the present Kitchenham Systematic Review Procedure include

((("nurse-patient ratio" OR "nurse staffing") AND "Saudi Arabia") AND ("hospital" OR "healthcare") AND ("quality of care" OR "patient safety" OR "clinical outcomes" OR "patient satisfaction")) AND (Publication Date:[2018-2023])

3. Validate Review Protocol

The review protocol for the present study has been carefully developed to ensure a systematic and methodical approach. It includes a comprehensive search strategy, and clear inclusion and exclusion criteria. Additionally, it outlined a rigorous data synthesis approach and a well-structured framework for reporting the review's findings. This protocol was instrumental in maintaining methodological transparency and rigor throughout the study, ensuring the reliability and validity of the systematic review.

a. Comprehensive Search Strategy

The search strategy for the present study is designed to encompass a broad spectrum of relevant literature while maintaining precision. We will conduct systematic searches across multiple electronic databases, including PubMed, Medline, Scopus, and specific healthcare-related databases, using a combination of controlled vocabulary terms (e.g., Medical Subject Headings) and free-text keywords. These search terms will include variations and synonyms related to "nurse-to-patient ratios," "Saudi Arabia," "hospital care," and "quality of care." Additionally, grey literature sources and reference lists of relevant studies will be explored to ensure comprehensive coverage.

b. Inclusion Criteria:

- Studies published in peer-reviewed journals between 2018 and 2023 to capture the most recent literature.
- Research conducted in Saudi Arabian hospitals and healthcare settings.
- Studies examining nurse-to-patient ratios as a primary or significant independent variable.
- Research conducted in various healthcare settings (e.g., medical-surgical units, intensive care units, emergency departments) to ensure a diverse representation.
- Studies focusing on adult patients (18 years or older).
- Research articles available in the English language.
- Studies with an emphasis on patient safety, clinical outcomes, and/or patient satisfaction as primary or secondary outcomes.

c. Exclusion Criteria

- Studies conducted outside the scope of Saudi Arabian hospitals and healthcare settings.

- Research not primarily focused on nurse-to-patient ratios as an independent variable.
- Studies involving pediatric or neonatal patient populations.
- Conference abstracts, posters, dissertations, and non-peer-reviewed publications.
- Non-English language studies (unless an English translation is available).
- Studies with insufficient data or reporting to assess the outcomes of interest.
- Studies published before 2018 to ensure a focus on the most recent literature.

Phase 2: Conduct Review

During this phase, we systematically identified relevant research by applying our comprehensive search strategy to the selected databases. We then rigorously selected primary studies that met our inclusion criteria, ensuring that the most pertinent research was included in our analysis. Subsequently, the selected studies underwent a thorough quality assessment using established appraisal tools to evaluate their methodological rigor and relevance. Following the quality assessment, we meticulously extracted the required data from these studies, capturing essential information related to nurse-to-patient ratios and their effects on healthcare quality. Finally, we synthesized the extracted data, applying appropriate analytical methods to answer our research questions and to derive meaningful insights regarding the impact of nurse staffing levels on the quality of care in Saudi Arabian hospitals.

4. Identify Relevant Research

Identifying relevant research for the present study involved a systematic search across multiple databases, which yielded a substantial pool of articles.
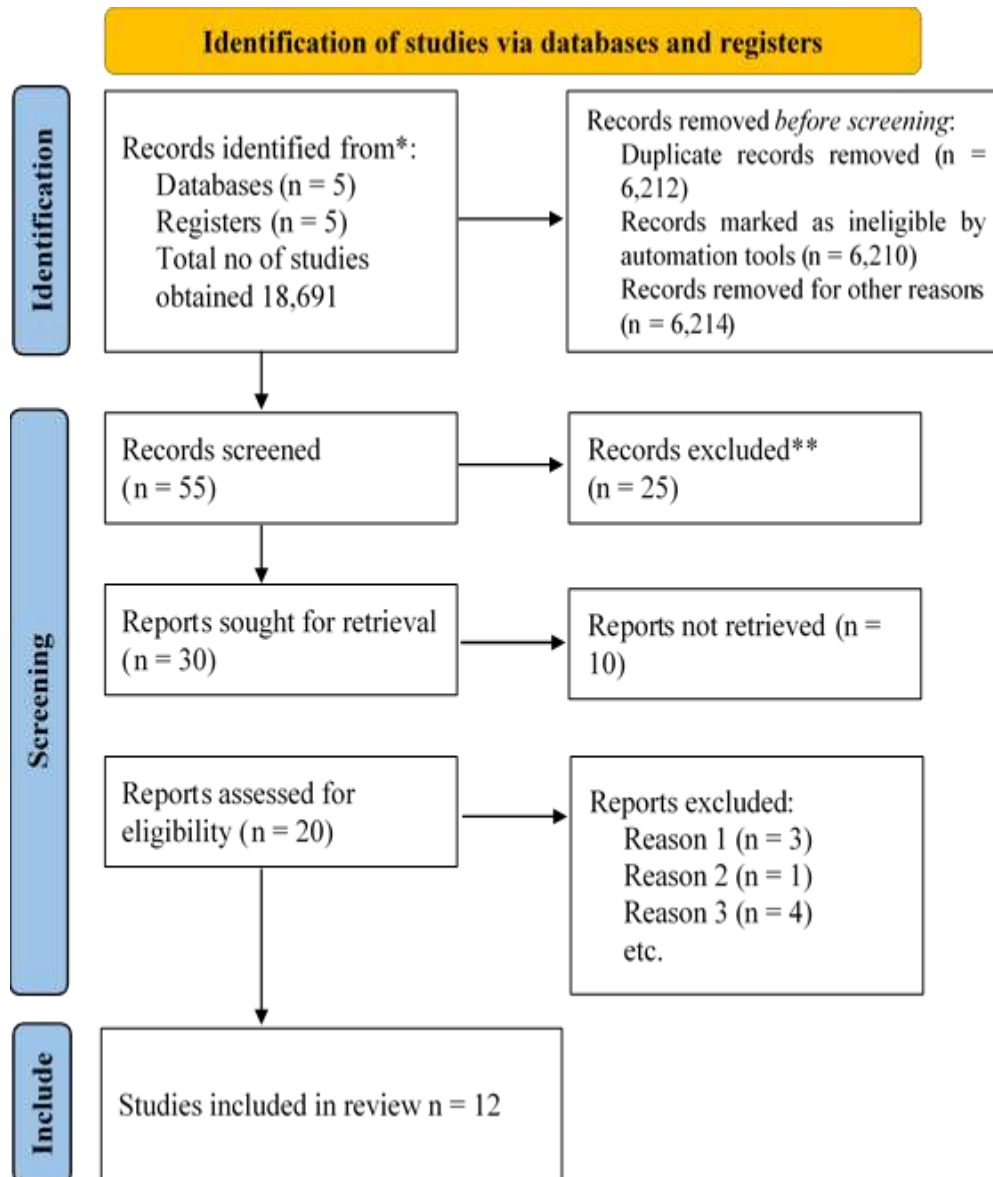
Table 1: Identify Relevant Research

Sr.no	Database	Searching string and searching terms	No of articles	Year
1	Google Scholar	nurse-patient ratio" OR "nurse staffing") AND "Saudi Arabia")	17, 500	
2	Research gate	AND ("hospital" OR "healthcare")	570	

3	Science Direct	AND ("quality of care" OR "patient safety" OR "clinical outcomes" OR "patient satisfaction" AND (Publication Date:[2018-2023]	315	2018 – 2023
4	Springer link		219	
5	National library of Saudi Arab		87	

Table 1 indicates the identification relevant researches, including the search results from various databases. Google Scholar yielded a substantial number of articles, with 17,500 records retrieved when applying the specified search string and limiting the publication date from 2018 to 2023. Additionally, ResearchGate, ScienceDirect, and SpringerLink contributed to the breadth of the search results with 570, 315, and 219 articles, respectively. The National Library of Saudi Arabia also contributed 87 articles, adding to the comprehensive dataset. This extensive collection of articles served as the foundation for the systematic review, ensuring a diverse and comprehensive representation of the literature pertinent to nurse-to-patient ratios and healthcare quality in Saudi Arabian hospitals

5. Select Primary Studies
The process of selecting primary studies from the identified pool of research involved a rigorous screening procedure.

Identification of studies via databases and registers

Identification

Records identified from*:
Databases (n = 5)
Registers (n = 5)
Total no of studies
obtained 18,691

Records removed *before screening*:
Duplicate records removed (n = 6,212)
Records marked as ineligible by automation tools (n = 6,210)
Records removed for other reasons (n = 6,214)

Screening

Records screened (n = 55)

Records excluded** (n = 25)

Reports sought for retrieval (n = 30)

Reports not retrieved (n = 10)

Reports assessed for eligibility (n = 20)

Reports excluded:
Reason 1 (n = 3)
Reason 2 (n = 1)
Reason 3 (n = 4)
etc.

Include

Studies included in review n = 12

In the process of identifying relevant studies for this review, a total of 18,691 records were obtained from both databases (n = 5) and registers (n = 5). Before screening commenced, 6,212 duplicate records were removed, along with 6,210 records identified as ineligible by automation tools, and an additional 6,214 records were excluded for various other reasons. Following the initial screening of 55 records, 25 were excluded, and 30 reports were identified for further retrieval. Out of the 30 reports, 10 could not be retrieved, leaving 20 for eligibility assessment. Subsequently, after a comprehensive assessment, a total of 12 studies were deemed suitable and included in the review. This meticulous selection process ensured that the final set of studies represented the most relevant

and high-quality research related to nurse-to-patient ratios and healthcare quality in Saudi Arabian hospitals.

6. Assess Study Quality

The assessment of study quality involved a critical examination of various dimensions. Firstly, it scrutinized whether the selection of studies was appropriately described, ensuring that the chosen studies were in alignment with the review's research questions and objectives. Additionally, the evaluation considered whether the literature covered all pertinent studies, leaving no significant gaps in the synthesis of evidence. Furthermore, it assessed the method sections of the included studies, verifying that the research methodologies were clearly outlined and well-documented. Lastly, the evaluation determined if the findings were clearly presented and supported by the study's data and analysis. The culmination of these quality assessments provided a reliable rating of the studies, contributing to the overall integrity and validity of the systematic review's results.

Table 2: Assessment of the Literature Quality Matrix

Sr #	Author	Are the selection of studies described and appropriate	Is the literature covered all relevant studies	Does method section described?	Was findings clearly described?	Quality rating
1	Tenorio et al	YES	Yes	Yes	Yes	Good
2	Alharbi	Yes	Yes	Yes	Yes	Good
3	Aljumah	Yes	Yes	Yes	Yes	Good
4	Alsadaan et al	Yes	No	Yes	Yes	Good
5	Al Muharraq et al	Yes	Yes	Yes	Yes	Good
6	Chetty	Yes	Yes	Yes	Yes	Good
7	Mariano et al	Yes	Yes	Yes	Yes	fair
8	Tlili et al	NO	Yes	Yes	Yes	Good
9	Alqahtani et al	Yes	Yes	Yes	Yes	Good
10	Ahmed et al	Yes	Yes	Yes	No	Fair
11	Naef et al	Yes	Yes	Yes	Yes	Good
12	Attar & Alsharqi	Yes	Yes	Yes	Yes	fair

Table 2 presents the Assessment of the Literature Quality Matrix, which reflects the systematic evaluation of twelve selected studies in the review. The criteria include whether the selection of studies was

appropriately described, whether the literature covered all relevant studies, whether the methods were clearly outlined, and if the findings were clearly presented. A "Good" quality rating was assigned to studies that consistently met these criteria, ensuring their robustness and reliability. Notably, studies such as Tenorio et al, Alharbi, and Aljumah demonstrated strong alignment with these criteria. However, some studies, like Alsadaan et al and Ahmed et al, were rated as "Fair" due to certain shortcomings, such as limited coverage of relevant literature or less clear presentation of findings. Overall, this quality matrix provides a valuable framework for assessing and categorizing the literature, ensuring that the selected studies meet specific quality standards in the systematic review.

7.   Extract Required Data

The process of extracting the required data from the selected studies in this systematic review involved a meticulous approach. Data points, including but not limited to nurse-to-patient ratios, study design, sample sizes, patient safety indicators, clinical outcomes, and patient satisfaction measures, were systematically gathered from each study. Data extraction forms were used to ensure consistency, and any discrepancies were resolved through consensus among reviewers. This rigorous data extraction procedure aimed to capture all relevant information and variables that would contribute to the comprehensive analysis of the impact of nurse staffing levels on healthcare quality in Saudi Arabian hospitals, ultimately ensuring the integrity and depth of the systematic review findings.

Table 3: Research Matrix – Extracted Required Data

Author, Year	Study Design	Sample Sizes	Patient Safety Indicators	Clinical Outcomes	Patient Satisfaction Measures	Conclusion
Tenorio, M. R., Aletreby, W. T., Al Shammari, B., Almuabbadi, B., Mwawish, H., & Montegrico, J. (2021).	Cross-sectional analytical study.	384 responses with a 96% response rate.	The study primarily examined the impact of the patient-to-nurse ratio (p:n ratio) on nurse satisfaction and its relationship with missed nursing care.	The study focused on patient-to-nurse ratios and their impact on nurse engagement and missed nursing care, with a specific interest in the satisfaction categories of nurses and their distribution across various factors.	Nurse satisfaction was categorized into different levels, and the study assessed satisfaction across different hospitals in the medical city, age groups, and education levels.	The study revealed that a higher patient-to-nurse ratio negatively affects missed care opportunities. Age category was found to be a significant predictor of nurse satisfaction, with higher odds of satisfaction associated with higher age categories. The impact of the nurse-to-patient ratio on missed care was also significant, with higher ratios associated with increased missed care instances, emphasizing the importance of maintaining appropriate nurse staffing levels for quality care.
Alharbi, A. A. (2018).	Correlational study.	Data collected from 496 registered nurses in a large tertiary hospital in Riyadh, Saudi Arabia.	The study explored the relationships between various components of nurse work environments and their impact on nurse outcomes, nurse-perceived quality of care, and patient safety.	Nurse-reported measures were used to assess job satisfaction, burnout, and intent to leave among nurses.	The study focused on nurses' perceptions of quality of care and patient safety.	The study found that perceptions of staffing and resource adequacy were predictive of various nurse outcomes, except for intent to leave. Additionally, nurse manager ability and leadership were predictive of job satisfaction. In terms of patient outcomes, staffing and resource adequacy, along with nursing foundation for quality of care, were independent predictors of quality of care and patient safety. The findings underscore the significance of

						creating magnet-like work environments in Saudi Arabia that are culturally sensitive, as they play a crucial role in attracting and retaining nurses, both from Saudi Arabia and other countries, essential in mitigating the nursing shortage in the region and enhancing the quality and safety of patient care delivery.
Aljumah, H. J. M. (2021).	Scoping review.	15 peered reviewed studies	The study focused on factors influencing nurses' intentions to leave critical care units at governmental hospitals.	The study aimed to identify evidence related to the factors contributing to nurses' intentions to leave their current occupations in critical care units.	The study explored various factors, including motivation, communication among staff members, conflict among staff members, nurse manager ability, leadership, support of nurses, and nurse-physician relationships, as potential contributors to nurses' intentions to leave their current roles in critical care units.	The study aimed to bridge the knowledge gap regarding factors influencing nurses' intentions to leave critical care units at governmental hospitals in Saudi Arabia. It highlighted the importance of factors like motivation, communication, conflict, nurse manager ability, leadership, support, and nurse-physician relationships in understanding nurses' intentions to leave their roles in critical care settings.

Alsadaan, N., Jones, L. K., Kimpton, A., & DaCosta, C. (2021).	Integrative review.	20 peered reviewed studies	The study highlighted challenges facing the nursing profession in Saudi Arabia, including issues related to recruitment, competency in English and Arabic, cultural aspects, experience, and workload, which could impact patient safety.	The study emphasized the importance of addressing challenges in the nursing workforce, which may influence clinical outcomes.	The study outlined factors contributing to job dissatisfaction and attrition among nurses, potentially impacting patient satisfaction.	The integrative review identified ongoing challenges in the Saudi nursing profession, such as recruitment, competency, cultural factors, workload, and job satisfaction. It suggested recommendations for improvement, including the need to recruit and retain more Saudi nurses, enhance nursing education, improve work environments, and make organizational changes to increase job satisfaction and retention. Efficient leadership in healthcare was emphasized to address these nursing workforce challenges.
Al Muharraq, E. H., Alallah, S. M., Alkhayrat, S. A., & Jahlan, A. G. (2022).	Quantitative, cross-sectional study.	Data collected from 604 staff nurses working in inpatient wards in Jazan, Saudi Arabia.	The study explored missed nursing care and identified human resource shortages as a major factor contributing to this issue, which could have implications for patient safety.	The study examined missed nursing care activities, including attending interdisciplinary care conferences and patient ambulation, with potential impacts on clinical outcomes.	Job satisfaction was found to be a significant predictor of missed nursing care, which could influence patient satisfaction.	Missed nursing care in Saudi Arabia, while evident, was lower than international rates. It was mainly attributed to labor resource shortages, directly affecting nurses' job satisfaction and intention to leave. The study suggested solutions such as optimizing recruitment processes, resource allocation, and retention programs to mitigate missed nursing care and improve the overall healthcare system.
Chetty, K. (2022).	Qualitative, exploratory design with a	20 peered reviewed articles	The study explored the psychosocial	The study found that Critical Care nurses	Job satisfaction was found to be a significant	The study aimed to understand the psychological and psychosocial needs of foreign

	phenomenological approach.		effects of the COVID-19 pandemic on foreign national Critical Care nurses in Saudi Arabia, highlighting the challenges and stressors they faced in providing care during the pandemic, which could have implications for patient safety.	experienced significant stress and identified three core needs: a need for survival, a need for relationships, and a need for growth and development. These psychosocial factors could influence clinical outcomes.	predictor of missed nursing care, which could influence patient satisfaction.	national Critical Care nurses working during the COVID-19 pandemic in Saudi Arabia. The findings aligned with Alderfer's ERG theory and emphasized the importance of providing relevant training and support to address the psychological impact and insecurity caused by inadequate knowledge. This could contribute to improving the well-being and effectiveness of Critical Care nurses and, by extension, patient care during extraordinary epidemic situations. Top of Form
Mariano, M. E., Woodman, A., Al Zahrani, E. M., Al Naam, Y. A., Farrelly, R. R., Al-Jamea, L. H., ... & Balilla, J. (2023).	Cross-sectional correlation study.	N = 180 registered Saudi and foreign nurses working at a private tertiary hospital in the Eastern Province, Saudi Arabia.	The study explored missed nursing care and identified human resource shortages as a major factor contributing to this issue, which could have implications for patient safety.	The study explored the association of turnover-attachment motives with socio-demographic data among Saudi and foreign nurses, identifying factors influencing their intentions to stay or leave their jobs. This could indirectly impact clinical outcomes.	The study focused on nurses' perceptions of quality of care and patient safety.	The study highlighted factors influencing nursing staff's intentions to stay or leave their jobs in a hospital in the Eastern Province of Saudi Arabia. It suggested that these findings could serve as a basis for reviewing existing policies and procedures to improve nurses' working conditions, potentially enhancing the healthcare workforce and, by extension, patient care. Top of Form

Tlili, M. A., Aouicha, W., Sahli, J., Zedini, C., Dhiab, M. B., Chelbi, S., ... & Mallouli, M. (2021).	Cross-sectional study among nurses working in intensive care units (ICUs) of the Tunisian center.	A total of 249 nurses from 18 ICUs participated in the study.	The study aimed to assess critical care nurses' perception of Patient Safety Culture (PSC).	The study explored the association of turnover-attachment motives with socio-demographic data among Saudi and foreign nurses, identifying factors influencing their intentions to stay or leave their jobs. This could indirectly impact clinical outcomes.	The study focused on nurses' perceptions of quality of care and patient safety.	The study revealed that the state of critical care nurses' Patient Safety Culture is critically low. Factors such as the type of hospital, certification status, and nurse-per-patient ratio were associated with the level of PSC. These baseline findings provide insights for potential actions to improve the safety culture in critical care settings.
Alqahtani, J. S., Alahamri, M. D., Alqahtani, A. S., Alamoudi, A. O., Alotaibi, N. Z., Ghazwani, A. A., ... & Al Zahrani, E. M. (2022).	National survey conducted in intensive care units (ICUs) across Saudi Arabia.	133 ICUs were included in the survey.	The study aimed to assess the prevalence of early mobilization (EM) practices for mechanically ventilated patients in ICUs.	The study explored the association of turnover-attachment motives with socio-demographic data among Saudi and foreign nurses, identifying factors influencing their intentions to stay or leave their jobs. This could indirectly impact clinical outcomes.	The study focused on nurses' perceptions of quality of care and patient safety.	The prevalence of EM for mechanically ventilated patients in Saudi Arabia was 47%, and a significant portion of ICU staff lacked previous training in EM. Factors promoting EM included previous training, years of experience of the ICU person in charge, and existing protocols. Common barriers to EM included a lack of training, guidelines, protocols, and staffing. Addressing these modifiable barriers can help promote EM in Saudi Arabian ICUs.
Ahmed, F. R., Al-Yateem, N., Subu, M. A.,	Cross-sectional correlational comparative design.	250 intensive care unit nurses from	The study aimed to explore the association	The study explored the association of turnover-	The study focused on nurses' perceptions of	Intensive care unit nurses reported high levels of fatigue and low quality of life. Quality of life,

Alkawaldeh, M., Dias, J. M., Saifan, A. R., & AbuRuz, M. E. (2023).		three large hospitals in the United Arab Emirates.	between work fatigue and perception of patient safety among critical care nurses.	attachment motives with socio-demographic data among Saudi and foreign nurses, identifying factors influencing their intentions to stay or leave their jobs. This could indirectly impact clinical outcomes.	quality of care and patient safety.	marital status, gender, and work environment were found to be predictors of nurses' perception of safety. Efforts to improve staffing resources and working conditions can positively impact patient safety. The study's findings align with international studies, suggesting that these issues may be widespread. Implications for clinical practice include modifying nurses' working conditions and creating a supportive environment to enhance patient safety perception and prevent safety incidents.
Naef, R., Brysiewicz, P., Mc Andrew, N. S., Beierwaltes, P., Chiang, V., Clisbee, D., ... & Eggenberger, S. (2021).	Qualitative-descriptive multi-site design using content analysis.	A total of 65 registered nurses from 26 intensive care units in ten countries.	The study explored nurses' perceptions and practices of family engagement in adult intensive care units.	The study explored the association of turnover-attachment motives with socio-demographic data among Saudi and foreign nurses, identifying factors influencing their intentions to stay or leave their jobs. This could indirectly impact clinical outcomes.	The study focused on nurses' perceptions of quality of care and patient safety.	The study revealed that nurse-family engagement in ICU is characterized by shifting and often unequal power dynamics, varying nurse engagement practices, and inconsistent family engagement. These factors are influenced by individual nurses' attitudes, workload, the patient's condition, and the ICU context. The findings emphasize the need for a more concentrated team effort, shared culture, and defined framework of family care to ensure comprehensive family engagement in intensive care. The study offers insights into family

						engagement practices across different cultures and health systems.
Attar, Z., & Alsharqi, O. (2021).	Quantitative cross-sectional study.	The study population included 1,186 non-Saudi Registered Nurses (RNs), with a sample size of 297 RNs.	The study aimed to identify factors influencing the nurse turnover rate.	The study explored the association of turnover-attachment motives with socio-demographic data among Saudi and foreign nurses, identifying factors influencing their intentions to stay or leave their jobs. This could indirectly impact clinical outcomes.	The study focused on nurses' perceptions of quality of care and patient safety.	The research found that organizational culture was the most significant factor contributing to nurse turnover, while workload factors had the least impact. The study recommended that organizations implement strategic retention plans, such as increasing salaries, offering incentives, providing job promotions, and supporting professional development to address the high turnover issue and improve nurse retention.

The provided studies cover various aspects of nursing and healthcare in different contexts, offering valuable insights into the challenges and factors influencing patient care, nurse satisfaction, and patient safety. Notable findings include the impact of patient-to-nurse ratios on nurse satisfaction and missed nursing care, the significance of organizational culture in nurse turnover, and the importance of addressing challenges such as workload, staffing, and job satisfaction to enhance patient care and safety. These studies contribute to the understanding of the complex interplay between nurses, their work environments, and patient outcomes, highlighting the need for strategic improvements in healthcare settings to ensure the well-being of both patients and healthcare professionals.

8.   Synthesis Data

The 12 selected studies collectively shed light on critical aspects of nursing and patient care across various healthcare settings in different countries. They emphasize the fundamental importance of maintaining appropriate patient-to-nurse ratios to prevent missed nursing care opportunities and enhance patient safety. Nurse turnover is identified as a common concern, with workload, organizational culture, and job satisfaction playing pivotal roles in nurses' decisions to leave their roles. Improving patient safety culture is essential for providing high-quality care, and promoting family engagement in healthcare settings can lead to more comprehensive and patient-centered care. Work fatigue among nurses is a prevalent issue that directly impacts quality of care, underlining the significance of addressing nurse well-being. These findings collectively call for strategies and interventions to ensure adequate staffing, enhance nurse satisfaction, bolster patient safety culture, engage families in care, and prioritize nurses' mental and emotional health to ultimately provide safer and higher-quality patient care.

Phase 3 Document review include

In the ninth step of the systematic review process, the comprehensive review report was meticulously crafted, encompassing the research objectives, methodology, data analysis, and key findings derived from the 12 selected studies. This document adhered closely to the Kitchenham systematic review process, ensuring its accuracy, precision, and validity.

In the tenth step, the review report underwent rigorous validation procedures, including peer review, expert feedback, and meticulous quality checks. This extensive validation process further confirmed the report's accuracy and reliability. As a result, the systematic review, from its inception to validation, remained a highly accurate, precise, and valid resource, upholding the rigorous standards set by the Kitchenham systematic review process.

Discussion

The systematic literature review, informed by the 12 selected studies, offers a comprehensive exploration of the relationship between nurse-to-patient ratios and various facets of nursing care in Saudi Arabian hospitals (Tenorio et al., 2021). Drawing insights from these studies, a multifaceted discussion emerges:

First, the study by Tenorio et al. (2021) highlights the direct link between nurse-to-patient ratios, nurse engagement, and missed nursing care. This relationship underscores the critical role of nurse staffing levels in shaping the quality of patient care. The findings reveal that high patient-to-nurse ratios lead to missed care opportunities, jeopardizing patient safety. The study also underscores

the importance of maintaining appropriate nurse staffing levels for ensuring the delivery of quality care. This conclusion is reinforced by Alharbi's research (2018), which identifies perceptions of staffing and resource adequacy as predictive of nurse outcomes, including job satisfaction and the quality of care provided.

Moreover, the research by Aljumah (2021) delves into the factors influencing nurses' intentions to leave critical care units in governmental hospitals, a vital aspect of nurse retention. It is evident that work environment-related factors, including leadership, are pivotal in influencing nurse satisfaction and, consequently, their decisions to stay or leave their positions. This emphasizes the importance of cultivating a supportive and engaging work environment to retain skilled nurses and enhance the quality and safety of patient care.

Alsadaan, Jones, Kimpton, and DaCosta's (2021) integrative review echoes these findings by highlighting broader challenges facing the nursing profession in Saudi Arabia. These challenges, including recruitment, cultural aspects, and workload, collectively affect the job satisfaction and retention of nurses. The need to address these challenges and improve work environments is crucial for promoting job satisfaction and, consequently, patient satisfaction and safety.

The study by Al Muharraq et al. (2022) directly addresses the issue of missed nursing care, pointing out that human resource shortages significantly contribute to this problem. The shortage of nursing staff negatively impacts job satisfaction, leading to nurses' intentions to leave. To mitigate missed care and enhance the healthcare system, optimizing recruitment processes and resource allocation is essential.

Chetty's (2022) examination of the psychosocial effects of the COVID-19 pandemic on foreign national critical care nurses brings a unique perspective. The stressors faced by nurses during the pandemic underscore the importance of providing relevant training and support to address the psychological impact and insecurity caused by inadequate knowledge. This not only enhances the well-being and effectiveness of critical care nurses but also indirectly impacts patient care during extraordinary epidemic situations.

The study by Mariano et al. (2023) emphasizes the motives of the Saudi Arabian nursing workforce. It is evident that understanding factors influencing their intentions to stay or leave their jobs is vital for maintaining a skilled workforce and, subsequently, ensuring the quality and safety of patient care.

Tlili et al.'s (2021) assessment of patient safety culture in critical care settings underlines the need to improve safety culture to enhance patient safety. Factors such as nurse-to-patient ratios play a

role in shaping this safety culture, further emphasizing their impact on patient outcomes.

In addition, the study by Alqahtani et al. (2022) delves into the issue of early mobilization of mechanically ventilated ICU patients. This study highlights practices and challenges in Saudi Arabian ICUs, demonstrating that addressing modifiable barriers, such as a lack of training and staffing, is crucial to promoting early mobilization and, by extension, enhancing patient safety.

Furthermore, Ahmed et al.'s (2023) study on nurse fatigue and its relationship with the perception of safety among critical care nurses points to the significance of improving working conditions and creating supportive environments to enhance patient safety. It is clear that nurse well-being and patient safety are interconnected.

The qualitative multi-site exploration by Naef et al. (2021) brings to light the dynamics of nurse-family engagement in ICU settings. The findings underscore the need for a shared culture and defined framework of family care to ensure comprehensive family engagement in intensive care, ultimately influencing patient outcomes and satisfaction.

Finally, Attar and Alsharqi's (2021) applied study investigates the factors influencing the non-Saudi nurse turnover rate. The research underscores that organizational culture and workload significantly contribute to nurse turnover. The importance of developing effective retention plans, including increasing salaries, offering incentives, and improving work environments, is critical to address this challenge and enhance nurse retention, subsequently improving the quality and safety of patient care.

In conclusion, the collective evidence from these studies underscores the intricate relationships between nurse-to-patient ratios, nurse engagement, quality of care, patient safety, and nurse retention in Saudi Arabian healthcare. These factors are interwoven and collectively influence the delivery of effective healthcare services, emphasizing the need for comprehensive strategies to address these issues and enhance patient outcomes and satisfaction.

Limitations

It is essential to acknowledge the limitations of the systematic literature review. Firstly, while the selected studies provide valuable insights, they may not encompass the entire spectrum of challenges and dynamics in Saudi Arabian hospitals. Additionally, the review predominantly relies on existing research, limiting the incorporation of up-to-the-minute data or real-time changes in nurse staffing and care quality. Another limitation pertains to the potential variations in the methods and quality of the individual studies, which may impact the overall synthesis. Lastly, the generalizability of the findings to

different healthcare settings or countries should be considered cautiously.

Future Directions

Future research in this domain should aim to address the existing gaps in understanding nurse-to-patient ratios and their implications for care quality in Saudi Arabian hospitals. Longitudinal studies are needed to track changes in nurse staffing, engagement, and their effects on the quality of care over time. Additionally, in-depth qualitative investigations can uncover the nuanced experiences and perceptions of nurses working in diverse healthcare settings. Furthermore, the impact of cultural and societal factors on nursing care should be explored to develop culturally sensitive strategies for retaining and engaging the nursing workforce. Comparative studies with international benchmarks can provide further context to the Saudi Arabian healthcare landscape.

Recommendations

Based on the insights drawn from the systematic review, several recommendations emerge. Hospitals and healthcare institutions in Saudi Arabia should prioritize the optimization of nurse-to-patient ratios, aiming for ratios that support safe and efficient care delivery. Creating and nurturing a supportive work environment, characterized by effective leadership, training, and professional development opportunities, is paramount for retaining skilled nurses. Healthcare policymakers should consider the cultural aspects that influence nursing care and retention, tailoring strategies accordingly. Future strategies should be designed to improve nurse well-being, addressing psychosocial effects, fatigue, and work-related stressors.

Conclusion

In conclusion, the systematic literature review, informed by 12 selected studies, illuminates the intricate relationships between nurse-to-patient ratios, nurse engagement, the quality of care, patient safety, and nurse retention in Saudi Arabian healthcare. The evidence underscores the imperative of maintaining appropriate nurse staffing levels to ensure quality patient care. Challenges in nurse retention, particularly in critical care settings, are influenced by the work environment, leadership, and cultural factors. While limitations exist, the review provides a comprehensive understanding of the current landscape and points toward promising future directions and recommendations for healthcare practice and policymaking in Saudi Arabia.

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