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Association between patient safety culture and missed nursing care among nurses at a tertiary care teaching hospital in Karachi, Pakistan

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Association between Patient Safety Culture and Missed Nursing Care among Nurses at a Tertiary Care Teaching Hospital in Karachi, Pakistan.

by

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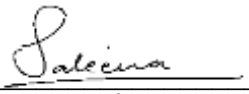

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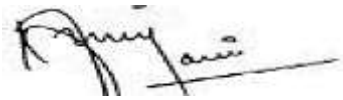

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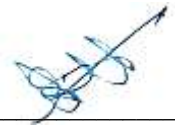

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Dedication

This thesis is dedicated to the memory of my late father, Mr. Sultanat Khan, who passed away shortly after I embarked on this academic journey. His absence has been a profound loss, yet his wisdom and guidance remain a guiding light in my life, illuminating my path even in his physical absence. His teachings and principles continue to inspire and influence me deeply.

To my beloved mother, the embodiment of endless love and selfless sacrifice. It is through your nurturing and resilience that I have been shaped into the person I am today. Your strength in the face of adversity is not just an inspiration but a foundation upon which I build my dreams and aspirations.

To my dear wife, who has been my rock throughout this journey, your unwavering support and understanding have made all the difference. Your sacrifices, especially living far from me while I pursued my studies, have been a testament to your love and commitment.

To my precious son, Muhammad Zarak Khan, even at the tender age of two, you bring immense joy and motivation into my life. Your innocence and laughter are my daily reminders of what truly matters.

To all my family members, especially my brothers and sisters whose encouragement and prayers have been my stronghold, I am eternally grateful. Your belief in me has been my greatest driving force. This achievement is not just mine, but ours. It is a tribute to your unwavering faith, boundless love, and the countless sacrifices you have all made. Thank you for being my guiding stars.

Acknowledgments

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understanding, encouragement, and shared experiences made this academic endeavor not only manageable but also enjoyable.

Lastly, I am grateful to all those individuals whom I might not have mentioned but who, in various ways, contributed to this thesis and supported me during this challenging yet rewarding academic pursuit.

Declaration

I declare with utmost sincerity that this thesis does not incorporate, without appropriate acknowledgment, any content that has been previously submitted for a degree or diploma at any academic institution. Additionally, considering the scope of my awareness, this work does not include any material that has been previously published or authored by someone else, except where duly referenced within the text.

The editorial support I received did not contribute to the content of my thesis, as it is the result of my independent research efforts.

Zaifullah Khan

November 15, 2023

List of Abbreviations

AHRQ	Agency for Healthcare Research and Quality
AKU	The Aga Khan University
AKUH	The Aga Khan University Hospital
CCU	Coronary Care Unit
ERC	Ethical Review Committee
HSOPSC	Hospital Survey on Patient Safety Culture
MISSCARE	Missed Nursing Care
MNC	Missed Nursing Care
NICU	Neonatal ICU
PICU	Paediatric ICU
PS	Patient Safety
PSC	Patient Safety Culture
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

Abstract

Background: This study seeks to investigate the relationship between Patient Safety Culture (PSC) and Missed Nursing Care (MNC) in a tertiary care teaching hospital in Karachi, Pakistan. It stands out for its focus on healthcare setting in a developing country, addressing a significant gap in existing literature.

Purpose: The aim is to assess PSC, determine the prevalence of MNC among nurses, investigate their correlation, and examine the impact of demographic factors, including identifying the most frequent missed nursing care and their underlying reasons, providing valuable insights for healthcare systems in developing countries.

Methods: A cross-sectional analytical approach was adopted, involving 291 nurses selected through stratified random sampling from various departments of the hospital. Data collection utilized the Hospital Survey on Patient Safety Culture (HSOPSC) Scale and the MISSCARE Survey, enabling a detailed evaluation of PSC and MNC.

Results: The findings indicate a generally positive perception of PSC among nurses and a lower frequency of MNC. Significant differences emerged across gender, education, and experience levels. Male nurses reported higher MNC rates, while higher education and experience positively correlated with better PSC. Challenges such as staffing shortages and high patient volumes were identified as key contributors to MNC. The study revealed a significant negative correlation between PSC and MNC suggesting that enhancing safety culture may reduce missed care instances.

Conclusion: This research contributes significantly to understanding PSC and nursing practices in Pakistan's healthcare context. It offers crucial insights for improving patient care and safety, laying a foundation for future research and informing policy in similar settings. The findings provide empirical evidence to aid healthcare management and policy decisions focused on elevating nursing care quality and patient safety.

Key Words: Patient Safety, Patient Safety Culture, Missed Nursing Care, Nurses, Hospital

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Chapter One: Introduction

This chapter is aimed to present the background of the study and includes an overview of the study titled "Association between Patient Safety Culture and Missed Nursing among Nurses at a Tertiary Care teaching hospital in Karachi, Pakistan." The chapter begins with a presentation of the background, followed by the purpose, study question, objectives and the significance of the study. It then proceeds towards the conclusion of the study, along with a summary.

Background of the Study

In under-developed and developing countries, inadequate medical care is responsible for approximately 134 million adverse events and a death rate of more than 2.5 million each year. Similarly, up to four out of ten people are injured while receiving primary care or outpatient medical treatment, and more than 80 percent of these injuries could have been prevented (Auraaen et al., 2018). Moreover, according to a study on medical errors, medical errors may be responsible for a significant portion of the more than 250,000 deaths that occur annually in the US, putting them at third place on the list of top causes of death in the nation (Anderson & Abrahamson, 2017).

On the other hand, the healthcare system in Pakistan is distinguished by its complexity as well as its incapacity to fully manage the healthcare demands of its population, which currently stands at more than 220 million inhabitants (Pakistan Bureau of Statistics, 2021). Patients continue to experience negative outcomes and less-than-ideal care because of the difficulty of providing care that is both high in quality and risk-free (Shah & Perveen, 2016).

Patient Safety (PS) and Its Importance

Patient safety is an issue that affects countries all over the world, regardless of their level of economic development (Asem et al., 2019). As per the 2019 report released by the World Health Organization, One of the top causes of mortality and morbidity on a global scale are adverse outcomes related to a care which is not safe (WHO, 2019).

Over the course of the past few years, there has been an increase in the overall awareness of the relevance of patient safety all around the world. As a direct consequence of this, there has been a considerable effort made to both increase the effectiveness of safety procedures and increase the standard of care (Wu & Busch, 2019).

The Importance of the Patient Safety Culture (PSC)

Within the context of the healthcare sector, the term "safety culture" refers to a wide range of practices, procedures, and behaviour patterns that encourage the prevention of errors, the enhancement of effective communication, and the creation of an environment that is free from risk (AHRQ, 2022).

Furthermore, according to Hayashi et al. (2020), the health and safety management of an organization may be summed up in its culture. This culture encompasses the organization's level of commitment, leadership style, and level of expertise in this sphere (Hayashi et al., 2020). Similarly, the Agency for Healthcare Research and Quality (AHRQ) claims that one of the most crucial elements in determining the success of patient safety activities is the patient safety culture of the organization. The concept of Patient Safety Culture (PSC) pertains to the degree to which the culture of an organization fosters and advances the safety of its patients (AHRQ, 2022). Thus, individuals and groups within an organization all have an influence on the culture of

patient safety through the values, views, attitudes, and skills that they uphold and the behaviours that they engage in (AHRQ, 2022)

Similarly, the findings of recent studies state that PSC encourages honest, trustworthy, and open communication among staff members and instils faith in the efficiency of preventative measures, which is connected with better Patient outcomes (Kakemam et al., 2021; Mardon et al., 2010; Vikan et al., 2023). Moreover, the formation of a positive PSC in healthcare institutions is vital for the continuous improvement of the quality of patient care (Hessels et al., 2019; Reis et al., 2018).

According to another study, fostering a favourable PSC in healthcare institutions can promote the involvement of nursing staff in patient safety practices and enable them to manage unexpected or complex situations efficiently during carrying out their regular nursing duties (Zeleníková et al., 2020). Moreover, a healthy safety culture creates an environment in the workplace that prompts nurses to immediately report and discuss episodes of missed care in order to solve issues that may grow into severe incidents if they are not addressed. In other words, a good safety culture fosters an environment that encourages nurses to report and discuss Existences of missed nursing care (Song et al., 2020).

Missed Nursing Care (MNC) and Its Implications

In the current environment of healthcare delivery around the world, the existence of missed nursing care has become a significant source of concern (Kalisch, Landstrom, & Williams, 2009). It refers to situations where the requirements for standard nursing care are disregarded or forgotten, which results in unmet patient needs, incomplete or imperfect care, or

the absence of clinical, administrative or emotional aspects of nursing care for a variety of reasons (Bragadóttir et al., 2017; Kim et al., 2018).

The phenomenon of missed nursing can be explained by several reasons, some of which include, but are not limited to, insufficient resources, high workload, inadequate staffing, and a demanding work environment for nurses (Kalisch, Landstrom, & Williams, 2009; Min et al., 2020; Tubbs-Cooley et al., 2019).

Furthermore, these kinds of occurrences lead to errors, complications, and a deterioration in the nursing care quality, which leads to unfavourable patient outcomes like dissatisfaction, an extended stay in hospital, and readmission (Bragadóttir et al., 2017; Kim et al., 2018). Consequently, it is possible that the identified gap in care supply has a negative impact, both on the results for patients and on the overall quality of healthcare.

Likewise, the existence of MNC in healthcare facilities is found to be associated to unfavourable outcomes for patients, these consequences include increased rates of hospital acquired infections, pneumonia, falls, medication errors, delayed discharge, increase in pain, and increasing levels of discomfort (Hessels et al., 2019). Additionally, hospitals and other healthcare facilities that do not have a PSC that is positive might make the problem even worse. Furthermore, the characteristics of an organization's culture that promote favourable patient safety include open communication, collaboration, and a commitment to the continuous improvement of quality. This kind of culture can help to reduce the likelihood of patients missing out on nursing care and improve the overall outcomes for those patients (Mardon et al., 2010).

The State of Research on Missed Nursing Care (MNC)

Although the Existence of MNC is a prevalent issue in healthcare organizations, there is limited research on studying the association between PSC and MNC among nurses (Hessels et al., 2018; Najafi et al., 2021). The possible reason can be that there is a lack of consistency in the implementation of common activities within hospitals and across countries with varying national healthcare delivery systems (Wakefield, 2014).

Furthermore, in surveys conducted among nurses, it has been observed that they tend to prioritize direct requirements of patient care, like medication administration. However, they seem to give a lower level of priority to intervention of patient care, such as the psychosocial needs, ambulation, patient education, and care planning (Ausserhofer et al., 2014; J. E. Ball et al., 2014). Likewise, the underlying factors that influence individuals' decisions on prioritizing tasks on a daily, hourly, and sometimes even on minute-to-minute basis, remain unclear. Thus, this seeming gap opens up a fascinating avenue for additional research and questioning to be conducted (Wakefield, 2014).

The current state of research on the association between patient safety culture and MNC is inconclusive. A favourable PSC is believed to exhibit a potential association with the Existence of MNC, but previous research has provided inconsistent results about this potential correlation. A positive safety culture has been linked in some research to a probable decrease in the number of nursing care opportunities that are missed, while other research has failed to find a significant association between the two (Ibrahim & Abohabieb, 2020).

Conclusively, there have been studies conducted on this particular topic in a variety of healthcare settings around the world; however, there has not been sufficient research conducted in the context of Pakistan.

Missed Nursing Care in Pakistani Hospitals

Pakistan, like many other developing countries, faces significant challenges in ensuring patient safety in healthcare settings (Shah & Perveen, 2016). MNC is a familiar issue in Pakistani hospitals, and it may be associated with negative patient outcomes, including increased morbidity and mortality (Ali et al., 2021).

Furthermore, the work environment for nurses in Pakistan is often challenging, with limited resources and high workload, which can contribute to MNC. (Ali et al., 2021; Khalid & Abbasi, 2018). Since the vast majority of research carried out on this subject has been carried out in developed nations, it is possible that the findings cannot be directly transferred to the unique issues faced by healthcare professionals in Pakistan.

Therefore, it is of utmost importance to investigate the association between MNC and PSC, particularly within the context of Pakistan's healthcare system. Hence, the findings of this research will provide important insights to the stakeholders that may be used to build targeted interventions and improve patient safety outcomes.

Aim of the Study

The aim of this study is to assess the patient safety culture among nurses and the missed nursing care in a tertiary care teaching hospital which is located in Karachi, Pakistan. Moreover, the study will examine the association between Patient Safety Culture and Missed Nursing Care among nurses and will also find out the variables that influences missed nursing care.

Research Question

"What is the association between patient safety culture and missed nursing care among staff nurses at a tertiary care teaching hospital in Karachi, Pakistan?"

Objectives of the Study

The Study's objective are as follows:

1. "To assess the level of patient safety culture among nurses at a tertiary care teaching hospital in Karachi, Pakistan."
2. "To estimate the proportion of missed nursing care among nurses at a tertiary care teaching hospital in Karachi, Pakistan."
3. "To find out the association between patient safety culture and missed nursing among nurses at a tertiary care teaching hospital in Karachi, Pakistan."

Research Hypothesis

Ho: "There is no association between patient safety culture and missed nursing care among nurses at a tertiary care teaching hospital in Karachi, Pakistan."

Ha: "There is an association between patient safety culture and missed nursing care among nurses at a tertiary care teaching hospital in Karachi, Pakistan."

Significance of the Study

The proposed study aims to investigate the relationship between patient safety culture and missed nursing care among nurses, holding great significance within the Pakistani context. By

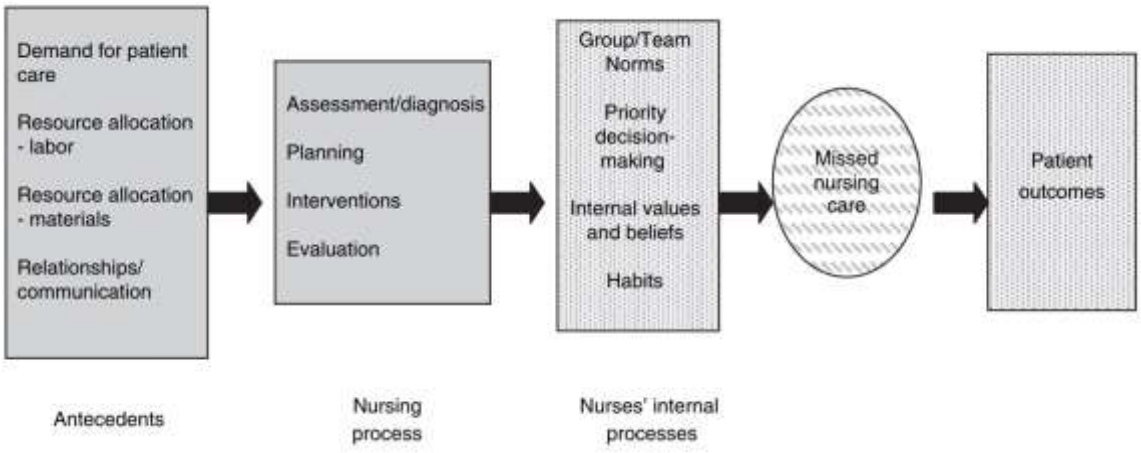
exploring this association, the study can provide invaluable insights into strategies that can enhance patient safety in hospitals across Pakistan.

A positive patient safety culture (PSC) has the potential to mitigate instances of MNC and improved outcome for patients. This can be accomplished by fostering open communication, promoting teamwork, and implementing continuous quality improvement measures in healthcare settings. Additionally, gaining an understanding of the factors which can impact MNC, such as staffing levels, work environment, and available resources, can help inform policies and interventions geared towards reducing such occurrences in Pakistan.

Furthermore, the proposed study can contribute to the existing body of literature on PSC and MNC, having a specific focus on developing countries. It is worth noting that prior research on this subject has predominantly been conducted in developed nations, and its applicability to the unique circumstances of Pakistan may not be straightforward. Hence, conducting this study within Pakistan can offer important insights into the distinctive challenges and possibilities for improving PSC and decreasing MNC in both Pakistan and other developing countries.

Conceptual Framework

Missed Nursing Care Model (Kalisch, Landstrom, & Hinshaw, 2009)



The Missed Nursing Care Model, developed by B.J. Kalisch, provides a crucial framework for understanding missed nursing care, defined as necessary patient care that is partially or completely omitted or delayed. Recognized as an error of omission, this concept is crucial yet often overlooked in patient safety discussions. Developed through an extensive 8-step analysis, the model involves defining the concept, its uses, and attributes, and exploring its causes and effects.

Key to the model is identifying factors that contribute to missed nursing care, such as hospital and unit characteristics, staff roles and demographics, perceptions of staffing adequacy, and team dynamics. These elements underscore the interplay between external and internal factors in nursing and highlight the global nature of missed nursing care. The model's impact is significant, linking missed care to adverse events like medication errors, patient falls, and infections, and suggesting prevention strategies focusing on staffing, work environment, and team collaboration.

The inclusion of B.J. Kalisch's Missed Nursing Care Model in this research study is integral for its comprehensive approach to understanding missed nursing care. The model important for examining the intersection of nursing practices and patient safety culture. It highlights factors such as staffing, work environment, and teamwork, crucial in the Pakistani healthcare context, and aligns with the study's objective of exploring their impact on patient safety and missed nursing care. Utilizing this globally recognized model ensures that the research is anchored in a robust, evidence-based framework, enhancing its academic validity and offering insights into potential interventions for improving nursing care and patient safety.

Summary

This chapter introduces the study titled "Association Between Patient Safety Culture and Missed Nursing Care at a Tertiary Care Hospital in Karachi, Pakistan." It is important to highlight that the current state of research regarding the relationship between PSC and MNC lacks consensus and provides inconsistent findings. Therefore, the study aims to evaluate patient safety culture and estimate the proportion of missed nursing care among staff nurses at a tertiary care teaching hospital in Karachi, Pakistan. The research hypothesis posits that a significant association exists between PSC and MNC.

The significance of this study lies in its implications for the healthcare context in Pakistan. It has the potential to offer valuable insights for improving patient safety outcomes and guiding efforts to reduce missed nursing care in Pakistani hospitals. Moreover, the study contributes to the existing literature by focusing on the specific circumstances of developing countries, such as Pakistan, thus broadening our understanding of PSC and MNC in these settings.

Chapter Two: Literature Review

This chapter aims to review the existing literature on Patient Safety Culture (PSC), Missed Nursing Care (MNC), and their association. Through a comprehensive synthesis of current research, this chapter aimed to provide valuable insights into the complex relationship between PSC and MNC. Next, the chapter concludes with a gap analysis and a summary.

Search Strategy

A thorough and systematic literature search was performed to explore relevant studies on the topic. For this purpose, the databases PubMed and Google Scholar were utilized to retrieve the necessary data. Next, the following keywords were used to search the literature and ensure comprehensive coverage of relevant studies. “Association” OR “Correlation” OR “Relationship” AND “Patient safety culture” AND “Missed Nursing Care” OR “Incomplete Nursing Care” OR “Nursing Care left undone” AND “Nurses” OR “Registered Nurses” OR “Staff Nurses”.

Eligibility Criteria

Literature addressing Patient safety culture, Missed Nursing Care, investigating their association and determinant factors, and published between 2013 and 2023 in English were included.

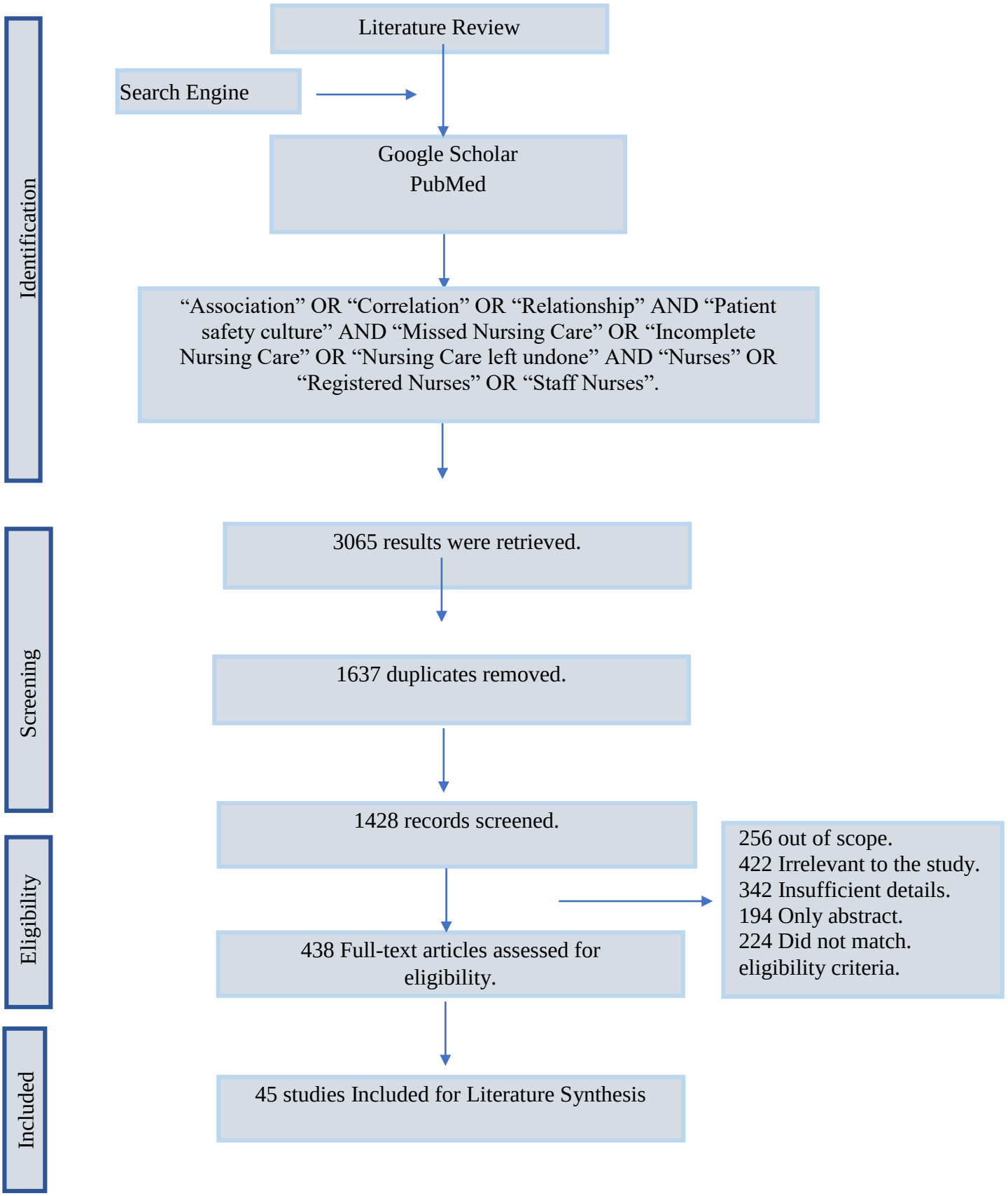
Data Extraction

The domains of the extraction from the selected articles were the title of the articles, publication year, country, journal names, and the key findings and outcomes.

Search Results

The search retrieved a total of 3065 results, including PubMed (n=2441) and Google Scholar (n=624) results. The results ' volume was reduced significantly after refining the search and applying time frame filters and Boolean Operators. In this respect, 438 articles' abstracts were analysed for full-text availability, eligibility and relevancy. Next, after a thorough analysis, 45 articles were selected to be included in the study, based on their findings relevant to the study. (Figure. 1)

Figure 1: Prisma Flow Diagram



It is to be noted that these studies were conducted in The United Kingdom, The United States, Brazil, Mexico, Italy, Cyprus, Australia, Iceland, Spain, Romania, Moldova, China, Korea, Malaysia, Saudi Arabia, Oman, Kuwait, Iran, Ethiopia, Gambia, Netherlands, Taiwan, Estonia, Germany, Lebanon, Turkey, Egypt and Pakistan. (Appendix 2, Table 1)

Patient Safety Culture (PSC)

The significance of Patient Safety Culture (PSC) in promoting effective patient safety initiatives is accentuated by the Agency for Healthcare Research and Quality (AHRQ). PSC refers to the extent to which the culture of an organization fosters and prioritizes the safety of patients, and it is influenced by the values, attitudes, skills, and behaviours of individuals and groups within the organization. Moreover, PSC constitutes a fundamental component within healthcare organizations, encompassing shared principles and norms among its members. The evaluation and improvement of PSC are pivotal in improving the quality as well as safety of healthcare services (AHRQ, 2022)

Several international studies have investigated patient safety culture and identified areas for improvement. Wagner et al. (2013) in a cross-sectional study, examining hospitals in the Netherlands, USA, and Taiwan found variations in various dimensions across these countries. Respondents from the USA generally had more positive PSC perceptions compared to those from the Netherlands and Taiwan (Wagner et al., 2013). Similarly, Sharp et al. (2019) in a cross-sectional study focusing on oncology nurses in The Netherlands, Estonia, Germany, and the United Kingdom also observed differences in the dimensions of PSC. Nurses in The United Kingdom and The Netherlands recorded a higher score than those in Estonia and Germany in various dimensions.

Consistent findings have been reported in multiple studies investigating PSC across diverse healthcare settings. The study conducted by Al-Mandhari et al. (2014)revealed that the index of "Organizational Learning and Continuous Improvement" was widely recognized in Oman, the United States, Taiwan, and Lebanon. On the other hand, the index of "Non-Punitive Response to Errors" turned out to be the least recognized among the four countries. In a study conducted by Kiaei et al. (2016) it was observed that three hospital settings in Moldova exhibited a lack of transparency in reporting and a fear of blame. Similarly, TEREANU et al. (2017) found that six Romanian hospitals exhibited low positive response rates in the areas of frequency of events reported, non-punitive response to errors and staffing. In their study, (Okuyama et al., 2019) discovered deficiencies in the Patient Safety Culture of Sao Paulo, Brazil. Notably, the "Non-punitive Response to Errors" dimension exhibited the lowest response rate. Likewise, Okuyama et al. (2019)) observed that personnel with greater experience, nurses, and employees with lower levels of education demonstrated a more favourable safety culture.

In a study conducted by Ramos and Calidgid (2018) the focus was on registered nurses employed in a public hospital in the Philippines. The study revealed that "organizational learning continuous enhancement" and "collaboration within units" were deemed significant aspects, whereas "Non-punitive Response to Errors" was identified as an area that needed improvement. In another Spanish study, the participants had a favourable perception of Patient Safety, highlighting “Effective Collaboration”, “Willingness of Colleagues to Assist One Another”, and “Support from Managers and Unit Heads” as strengths. On the other hand, the weaknesses identified included “Floating Professional Models”, “Pressure and Increased Work Pace”, and “The Loss of Crucial Patient Transfers and Shift Change Information” (Segura-García et al., 2023).

Similarly, at Sarawak General Hospital in Malaysia, a study identified areas for development in PSC, such as "Staffing," "Enhancing Transfer and Shift Processes". The study revealed the least favourable response rate to "Non-punitive Response to Error" suggesting a perception of potential penalties for medical errors (RJ et al., 2019). Consistent findings were observed in two separate studies conducted in Saudi Arabia. In one study, El-Jardali et al. (2014) identified strengths in PSC, including Continuous Improvement, Organizational Learning, and Teamwork, while areas requiring enhancement included "Staffing," "Non-punitive response to Error" and "Communication Openness". Similarly, Alquwez et al. (2018) found that nurses recognized Collaboration within Units and Organizational Learning as the hospital's strengths, but identified weaknesses in areas such as "Feedback and Communication about Errors" "Teamwork Across Units" as well as "Management Support for Patient Safety".

In the African continent, PSC in healthcare settings was investigated through cross-sectional studies conducted in Ethiopia and Ghana. In Ethiopian public hospitals, a study by Alquwez et al. (2018) found a significant deficiency in PSC, with most dimensions falling below expected levels. "Teamwork within Units" and "Organizational Learning" established the highest positive response rates, on the contrary "Staffing" had the lowest. Similarly, in Ghanaian hospitals, Akologo et al. (2019) identified strengths in unit-level collaboration and organizational learning but found areas for improvement in dimensions like "Non-punitive Response to Error" "Event Reporting Frequency" and "Staffing". Similar findings were observed in a cross-sectional study in a Turkish hospital by Top and Tekingündüz (2015), which revealed that four dimensions such as "Frequency of Events reported", "Communication Openness", "Hospital Handoffs and Transitions" and "Non-Punitive Response to Error" had a positive response rate of less than fifty percent, thus highlighting the need for improvement in these areas.

A study in Egypt investigated the PSC in two ICUs from the viewpoint of nurses. The component of "Organizational Learning" had the highest positive score, while the "Frequency of Incidents Reported" received the lowest score. Interestingly, there were no significant variations in scores amongst the paediatric and adult ICUs, excluding the "Non-punitive Response to Error" aspect, which was greater in the paediatric intensive care unit (PICU) than in the adult ICU (Salem et al., 2019).

Although previous literature has reported consistent findings, a cross-sectional conducted in Kuwait's public hospitals to evaluate the PSC and compare it to regional and international studies, differed from those reported in the aforementioned literature. The study found positive aspects in unit-based teamwork as follows: “Organizational Learning”, “Management's Commitment to Patient Safety” “Continuous Improvement” and “Error Reporting”. Conclusively, as compared to regional and international findings, Kuwaiti hospitals performed at or above the benchmark on several composites (Ali et al., 2018).

Similarly, In Iran, a cross-sectional study conducted in three central provinces to evaluate the PSC, revealed variations in the ratings for different dimensions between provinces. The average favourable response rate across the 12 areas of patient safety turned out to be 62.9%. "Organizational Learning" received the highest favourable responses, while "Handoffs & Transitions" received the lowest.(Kiaei et al., 2016).

Although the majority of the literature on PSC has been predominantly from America, Europe, Africa and the Middle East, multiple studies have also been conducted in different cities of Pakistan to assess the PSC in the country. One such study conducted in public sector hospitals in Lahore indicated that many nurses felt that reported errors were not adequately addressed in their wards, and their ability to ensure patient safety was impeded by heavy workloads. Nurses

working in high-turnover wards reported unfavourable patient safety standards and encountered difficulties in reporting errors. The study emphasized the need for the implementation of effective systems to enhance patient safety and improve error reporting. (Jafree et al., 2017). Likewise, at another Pakistani tertiary care hospital, overall positive perceptions of PSC were found among hospital personnel, with dimensions such as “communication and feedback regarding errors”, “continuous improvement”, “organizational learning” and “teamwork” receiving high scores (Ahmed et al., 2023). Moreover, a study conducted at a private tertiary hospital in Lahore, positive ratings were also observed for aspects like “continuous improvement”, “organizational learning” and “teamwork within units”, although lower ratings were seen in areas such as inter-unit teamwork, “communication and feedback regarding errors” and “management support for patient safety” (Hameed et al., 2021).

Similarly, A qualitative study comparing public and private hospitals highlighted the influence of individual and environmental factors on patient safety, with participants from public hospitals showing greater knowledge (Khan et al., 2020). Additionally, an assessment of PSC in hospitals revealed a positive perception among healthcare providers, with the dimension of organizational learning receiving the highest positive score, while the score for the frequency of event reporting was found to be the lowest. (Rahman et al., 2019).

The above studies have been conducted across different countries, providing insights into the PSC in various healthcare settings. These studies have highlighted both strengths and areas for improvement in PSC, emphasizing the importance of fostering a culture that promotes” Collaboration”, “Organizational Learning”, “Effective Communication”, “Non-punitive Response to Errors” and “Adequate Staffing”. Conclusively, understanding the current state of

PSC and identifying areas that require intervention are crucial steps towards enhancing patient safety and improving healthcare outcomes.

Missed Nursing Care (MNC)

The concept of missed nursing care (MNC), often called as "nursing care left undone," is a prevalent problem that affects healthcare system worldwide (Bragadóttir et al., 2017; Mandal & Seethalakshmi, 2019). MNC refers to situations where the requirements for standard nursing care are disregarded or forgotten, which results in unmet patient needs, incomplete or imperfect care, or the absence of emotional, clinical, or administrative components of nursing care due to various reasons (Bragadóttir et al., 2017; Kim et al., 2018). The potential ramifications of MNC cannot be overlooked, as it may lead to adverse patient outcomes, compromised patient safety, and compromised quality of care (Cresswell et al., 2017). It not only compromises patient safety, but also leads to patient disappointment with the quality of healthcare. In addition, it has a negative impact on nurses' job satisfaction, and thus places an enormous financial strain on the healthcare system (Sasso et al., 2017).

The phenomenon of MNC has been found to have significant financial implications, as evidenced by the increased healthcare costs associated with prolonged hospital stays and repeated hospitalizations required to address preventable adverse outcomes resulting from inadequate nursing care (Dall et al., 2009). The scarcity of resources caused by the global health cost crisis, coupled with the intricacies of nursing and insufficient understanding of hospital management, can result in significant instances of missed care and workarounds. (Kaplan & Porter, 2011; Krichbaum et al., 2007). A cross-sectional study carried out by the Royal College of Nursing in the UK revealed that there were 558 cases of care that were not completed by participants, which accounts for 32% of the total. Community staff nurses and district nursing

staff each reported one-third of the total number of cases of care that was reported as having been left undone in the most recent shift (Senek et al., 2020).

To investigate MNC and its relationship with organizational factors, a cross-sectional study was carried out across multiple hospitals in 12 European nations. The investigation revealed several nursing care tasks that are frequently disregarded, including creating or revising nursing care plans and care pathways, comforting and conversing with patients, and educating patients and their families. While nursing professionals with a better work environment in hospitals, reduced Patient-Nurse ratios as well as decreased non-nursing responsibilities have reported a lower frequency of MNC (Ausserhofer et al., 2014).

In a separate investigation carried out at a community hospital specializing in acute care, researchers sought to analyse the variables associated with instances of MNC. The study's results indicate that the occurrence of MNC is a commonly observed phenomenon. Additionally, the research suggests that MNC is negatively correlated with various factors, such as staffing and resource availability, job satisfaction, and the quality of the Physician-nurse relationship in the healthcare setting (Duffy et al., 2018). Similarly, a study in a hospital in Northeast Brazil aimed to explore the reasons behind the omission of nursing care revealed that the most commonly disregarded nursing activity was the scheduled ambulation of patients, which was recommended to be performed as advised or three times a day. The primary determinant attributed to this missing care was the unforeseen increase in patient influx and/or acuity in the ward. (Oliveira et al., 2022).

Similarly, a meta-analysis of various studies on missed nursing duties in the United States produced similar results. The findings suggest that there is a notable and consistent prevalence of MNC in hospitals, which is mainly impacted by factors such as staffing resources, equipment

and supplies, and interpersonal interaction. A positive correlation between increased staffing levels and a reduction in incidences of MNC was found. The findings suggest that hospitals that have achieved Magnet status and foster a culture of strong teamwork tend to experience lower rates of MNC. Conversely, it was also observed that increased occurrences of missed care are associated with decreased levels of staff satisfaction.

Additionally, instances of MNC were identified as a potential predictor for adverse events such as new infections, pressure ulcers and falls (Kalisch & Xie, 2014). Another US-based study, which yielded comparable findings, revealed that the commonly overlooked nursing care duties included following advised ambulation, administering medications within a 30-minute timeframe, and providing mouth care. The reasons cited as moderate or significant contributors to missed care encompassed factors such as unanticipated increases in volume of patients, high admissions and discharges, insufficient assistance, inadequate staffing, unavailability of necessary medications, and urgent circumstances (Winsett et al., 2016).

Moreover, almost similar results were seen in another study in Mexico which examined MNC and the factors contributing to it. The findings revealed that nursing care is not aligned with patient needs, as well as nursing care is delayed or omitted. Factors contributing to MNC, as identified by nursing staff, include human resources and material resources, while patients also emphasize human resources and communication (Moreno-Monsiváis et al., 2015). Similar results were found in another study in the same country which aimed to identify factors influencing MNC in hospitalized patients at a private hospital in Mexico. The main factors influencing nursing missed care identified were human resource factors followed by communication (Hernández-Cruz et al., 2017).

Human resources and in-adequate staffing were not only the main contributing factor in the US and Mexico but also in Korea. An investigation into the impact of inadequate nurse staffing on MNC in Korea found that nurses in adequate-staffing units exhibited significantly minimal levels of missed than those in inadequate-staffing units. These results indicate that augmenting the level of nursing staffing is associated with reduction in missed care, ultimately enhancing nursing surveillance and positively influencing the outcomes of the patient (Cho et al., 2015).

The same kind of findings were confirmed by another study, comparing MNC between The United States and South Korea, in concurrence with the previous findings. The results of the study indicate that Korean nurses exhibited comparatively lower levels of missed care in comparison to their American counterparts. However, both groups identified labour resource problems as a common cause of missed care. Basic nursing care tasks such mobilising the patient, feeding and mouth care were reported to be missed more frequently in South Korea and the United States alike (Lee & Kalisch, 2021).

Similar results regarding human resources were observed in a study examining English NHS hospitals for care left undone by nurses. The majority of nurses reported leaving care activities undone due to insufficient time. MNC was linked with an increased Patient-Nurse ratio, indicating that low staffing levels may jeopardize the quality of care and safety of patients (Jane E Ball et al., 2014). Similarly, a Study conducted in Iceland hospitals to determine the factors contributing to MNC revealed that MNC was associated with various factors, including hospital category and unit type, role and age of participants, inadequate staffing, and nursing teamwork (Bragadóttir et al., 2017).

An Italian study sought to examine the nature, extent and causes of MNC in the Italian medical care context. The findings revealed a significant occurrence of basic and clinically important nursing interventions being reported as missed. This suggests that the omission of these interventions could potentially result in adverse outcomes for patients in medical units (Palese et al., 2015). Yet another study investigating the missed care and its frequency in Australia, Italy and Cyprus found that specific variables directly predict the frequency of missed care, while other factors such as age, workplace type, highest qualifications and absenteeism rate contribute to missed care. Interestingly, gender was found to have not influenced missed care (Blackman et al., 2018).

In addition to developed countries, MNC is also prevalent in Asia, the Middle East, and other developing countries, as evidenced by various studies. One such study, carried out in Chinese hospitals, sought to determine the risk of MNC and the factors that contribute to it. The study found that basic care tasks were frequently reported as being missed, and human resource issues were the most common factors contributing to missed care. Factors such as gender, parental status, education level, job position, employment type, shift schedule, social support, and job satisfaction were found to influence nurses' perception of MNC (Du et al., 2020).

For instance, in the Middle East, a study conducted in Iranian hospitals to examine the existence and causes for MNC among nurses. The research findings indicate that a significant proportion of nurses (72%) reported experiencing at least one instance of MNC during their most recent work shift. Moreover, the primary reasons for missed care were attributed to issues related to human resources such nursing staffing levels, material resources and supplies, and communication challenges. Furthermore, the study identified several factors, including gender, age, patient load, patient discharge rate, and teamwork satisfaction, that were associated with

MNC (Chegini et al., 2020). Interestingly, a study conducted in Malaysia aimed to explore the MNC occurrence, factors, and its outcome revealed that the overall occurrence of MNC was relatively low, with nurses reporting a score of 1.88 on a scale ranging from 1.00 to 5.00. Conclusively, the study also identified different types of wards and human resources as influencing factors of the occurrence of MNC (Nahasaram et al., 2021).

According to the following studies, MNC is also prevalent in specialized units of the hospital. For instance, a comparative study investigated the perceptions of missed care in hematologic oncology units and medical, surgical units in the United States. The study identified that Patient's positioning every 2 hours, ambulation of the patient and care conference attendance as commonly perceived aspects of MNC. The results revealed that surgical units had a higher score as compared to medical and haematological units indicating that perceived incidence of MNC in a comprehensive cancer centre is comparable to that of other hospital settings (Villamin et al., 2019).

Likewise, in a study investigating the association between nurse workload in the NICU and MNC, it was found that there is a significant association between the two. Specifically, subjective workload ratings were found to have a notable impact. When analysing workload variables separately, it was observed that an increased infant-to-nurse ratio was consistently linked to higher odds of missed care in 7 out of 12 models (Tubbs-Cooley et al., 2019). Moreover, another study focusing on inpatient paediatric settings revealed that a significant proportion of paediatric nurses (over 50%) reported instances of missed care during their former shift, with an average of 1.5 essential activities of care being missed. Moreover, missed care was found to be more prevalent in unfavourable work environments compared to favourable ones. However, inpatient paediatric care settings with adequate nurse to patient ratios and a

professionally supportive work environment experienced fewer instances of missed care, ultimately leading to improved patient care quality (Lake et al., 2017).

Likewise, the association between MNC and work environment is consistently observed in multiple studies. For instance, research conducted by Lake et al. (2020) supports the notion that enhancing the work environment and increasing nurse staffing levels contribute to a decrease in MNC (Lake et al., 2020). Similarly, according to findings from a study carried out in 10 specialized hospitals in Mexico, nurses who worked in conducive work environments reported considerably fewer instances of missed care compared to their counterparts who worked in unconducive environments. Therefore, these results highlight the importance of fostering favourable work environments as a strategy to decrease instances of MNC and improve the standards of patient care (Zárate-Grajales et al., 2022).

Apart from all the studies globally, one such cross sectional study at a tertiary care public hospital in Pakistan revealed that hygiene care was the most neglected aspect of nursing care, with participants frequently missing basic medical needs of patients. The participants' ages and MNC were found to be significantly correlated. Furthermore 61% of nurses reported staff shortage as a determinant of missed care (Ali et al., 2021).

The Association of Missed Nursing Care (MNC) and Patient Safety Culture (PSC)

Several studies have explored the association of PSC with MNC, as seen in the following cross-sectional study conducted in multiple hospitals in the United States which revealed that hospitals with higher ratings of PSC reported lower instances of MNC. Additionally, the study identified a significant association between MNC and patient falls, a critical patient outcome. These results emphasize the importance of prioritizing actions to improve PSC as a means to

reduce MNC and enhance patient outcomes (Hessels et al., 2019). Moreover, another cross-sectional study conducted in Korea explored the association between MNC and its associated factors. The results of the study revealed that there is an inverse relationship between the perception of PSC and the incidence of MNC. Specifically, a positive perception of PSC was found to be associated with a reduced occurrence of MNC. The study suggests that fostering a positive PSC in hospital may help in reducing MNC. (Kim et al., 2018). Similarly, a study conducted in Egypt produced comparable results revealing a significant inverse relationship between the work environment and the prevalence of MNC. Additionally, the study revealed a significant direct association between the work environment and the culture of patient safety. The findings underscore the importance of a conducive workplace and a robust culture of patient safety in minimizing instances of MNC among nursing professionals. (Ibrahim & Abohabieb, 2020)

Gap Analysis

The preceding literature review has revealed several gaps in the existing research on PSC and MNC. To illustrate, previous studies primarily focused on countries such as the US, Europe, Euro Asia, the Middle East, and other developed regions. Moreover, the main emphasis of these studies was on assessing the prevalence and level of PSC and MNC, with only a limited number exploring the relationship between these two factors.

Likewise, in Pakistan, research on PSC has been scarce, with only a few studies investigating its level, and missed nursing has only been examined in a large public sector hospital through a single study. Notably, no study in Pakistan has ever investigated the association between PSC and MNC. These identified gaps present opportunities for future research to delve into specific healthcare settings, address geographic biases, explore

determinant factors, and examine the association between PSC and MNC. Hence, by addressing these gaps, this study aims to contribute to a more comprehensive understanding of PSC, MNC, and their interrelationship, ultimately leading to enhancements in patient safety and the provision of high-quality nursing care.

Summary

The literature review chapter focused on examining the existing research on Patient Safety culture (PSC) and missed Nursing Care (MNC), identifying several gaps that provide opportunities for future studies. The majority of the reviewed studies were conducted in developed countries such as the US, Europe and the Middle East, with limited representation from other regions. Most of these studies primarily measured the prevalence and level of PSC and MNC, while only a few explored their mutual association. Furthermore, the studies revealed that there is a prevalence of MNC in the majority of the regions and the variations were also noted in the PSC across different countries.

In the context of Pakistan, research on PSC was found to be lacking, with only a few studies investigating its level. Additionally, MNC was examined in only one study, specifically in a large public-sector hospital. Remarkably, no study in Pakistan has ever explored the relationship between PSC and MNC.

The identified gaps in the literature review highlight several areas for future investigation. Thus, researchers should focus on exploring specific healthcare settings within different regions, addressing potential geographic biases, and examining determinant factors that influence PSC and MNC. Lastly, there is a need to investigate the association between MNC and PSC in the Pakistani context.

Chapter Three: Methodology

This chapter offers a comprehensive and in-depth exposition of the research methodology employed by this research to explore the relationship between the PSC and instances of MNC among nurses working at a tertiary care teaching hospital located in Karachi, Pakistan. This chapter presents detailed information regarding the research setting, the target study population, the research site, sample selection, and the applied sampling strategy. Additionally, the validation and reliability of the data collection instrument used have been discussed, the data collection procedures have been elucidated, the plan for the data analysis has been outlined, and the ethical considerations inherent to this research have been meticulously addressed.

The Study Design

A cross-sectional analytical study with a correlational design was used to find out the association between patient safety culture and missed nursing among nurses at a tertiary care teaching hospital in Karachi, Pakistan. A cross-sectional study represents an observational research design, providing a snapshot of data collected from a population at a specific moment. In this type of study, researchers simultaneously measure the outcomes and exposures of the study subjects. Moreover, cross-sectional studies frequently employ surveys or questionnaires as data collection tools to gather participant's information. This approach allows researchers to collect a wide range of data efficiently and explore relationships between variables within the study population, making surveys and questionnaires valuable tools for cross-sectional research (Boehnke et al., 2016). Furthermore, analytical cross-sectional studies aim to propose associations between different parameters (Chaves et al., 2017),

The rationale for selecting this study design is multifaceted: Firstly, it enables the researcher to thoroughly examine, analyse, and interpret a specific phenomenon within a chosen sample at a specific point in time. Secondly, this temporal specificity is invaluable in gaining insights into the current status of the variables under investigation.

Moreover, the cross-sectional analytical design is well-suited for investigating associations among different variables. Furthermore, researchers can explore relationships, patterns, and connections among these variables within the same population, shedding light on potential causal links or influencing factors. Similarly, this study design proves especially useful when the objective is to gauge the prevalence of a particular condition or behaviour within a given population, assess the distribution of relevant risk factors, or identify areas meriting further in-depth research. (Polit & Beck, 2008).

The Study Settings

The study was carried out in all in-patient units and emergency rooms of the Aga Khan University Hospital (AKUH) in Karachi, Pakistan. It is a multidisciplinary tertiary care teaching hospital with over 550 in-patient beds. The Aga Khan University Hospital, Karachi, holds the prestigious accreditation of the Joint Commission International (JCI). It is not only an esteemed and well-established institution but also enjoys global recognition, boasting strong collaborative ties with other renowned university hospitals worldwide. Hence, these affiliations empower the hospital to consistently adopt cutting-edge protocols for treatment, medication, surgical procedures, diagnostics, and laboratory practices. Furthermore, the hospital is equipped with state-of-the-art technology and superior medical equipment, significantly impacting the healthcare outcomes of numerous patients seeking its services.

The Study Population

The study population encompassed all nurses employed at the Aga Khan University Hospital, located in Karachi, Pakistan.

The Eligibility Criteria

The following are the eligibility criteria used in the study:

Inclusion criteria

- Registered nurses working in the emergency room and all in-patient units
- Both male and female nurses

Exclusion Criteria

- Registered nurses not involved in direct care of the patient i.e., nursing supervisors, assistant head nurses, head nurses, nursing coordinators, nursing instructors and nursing managers.

The Sample Size

The total population of nurses at AKUH is 984 as of June 2023. So, considering 984 as the total study population, the single population proportion formula was used on open EPI software to calculate the initial sample size of 277. Moreover, the chosen parameters for this calculation were a 95% confidence interval, with a 5% margin of error. However, to account for potential attrition (nurses dropping out of the study) and non-response (nurses who may not participate), a 10% attrition and non-response rate was factored in. Lastly, to accommodate these particularities, the final sample size was adjusted to 305 to help ensure that there were enough respondents to maintain the desired statistical power and accuracy in the study.

The Sampling Technique

A Stratified random sampling method was used to select staff nurses from different departments of the Aga Khan University Hospital. Wards/working units were the strata, and the sample was selected randomly from each stratum using lottery method to get a good representative sample. Stratified sampling is a probability sampling technique employed in sample surveys. Its purpose is to enhance the sample's representativeness by categorising the study population into distinct strata (Subgroups) according to specific characteristics deemed relevant to the research. Following this, random samples are drawn independently from each stratum, ensuring a comprehensive representation of all relevant subgroups within the population. (Howell et al., 2020)

The primary advantage of this method is its capacity to mitigate sampling bias, which often occurs when researchers solely rely on simple random sampling. By dividing the population into strata, researchers can make more precise estimates for outcomes within each stratum and across different strata. This approach significantly bolsters the accuracy of research findings, allowing for a more robust and nuanced analysis that accounts for the diversity and variations present in the study population. (Howell et al., 2020)

Moreover, if researchers opt for simple random sampling, there is a higher likelihood that the minority population within the target sample would be underrepresented. This limitation arises from the inherent nature of simple random sampling, which selects samples without considering specific subgroups or characteristics within the larger population. Furthermore, it tends to provide a proportional representation of the entire population. However, when dealing with scenarios where it is crucial to ensure adequate representation of all population subgroups, especially minority groups, stratified random sampling emerges as a superior alternative. By

stratifying the population based on relevant characteristics and then drawing random samples from each stratum, researchers can effectively capture and include individuals from minority groups, thereby addressing the underrepresentation issue. Lastly, this approach helps rectify any imbalance in sample composition, yielding more comprehensive and accurate research outcomes (Elfil & Negida, 2017).

The Study Duration

The data collection for this study was conducted from 10th August to 10th October 2023 among nurses working at The Aga Khan University Hospital Karachi, Pakistan.

The Conceptual and Operational Definitions

The following definitions, both conceptual and operational, are employed in this study.

Patient Safety Culture

> Patient safety culture is the extent to which an organisation's culture supports and promotes patient safety. It refers to the values, beliefs, and norms that are shared by healthcare practitioners and other staff throughout the organisation that influence their actions and behaviours. PSC can be measured by determining the values, beliefs, norms, and behaviours related to patient safety that are rewarded, supported, expected, and accepted in an organization. (AHRQ, 2022)

Operational Definition

The patient safety culture is operationally defined as follows.

Poor PSC (<50%). This category represents an organisational culture where patient safety principles and practices are insufficiently supported and integrated and fall below 50%, as measured by established assessment tools or surveys.

Fair PSC (50% To 60%). This category indicates an organisational culture where patient safety principles and practices are moderately supported and range from 50% to 60% as measured by established assessment tools or surveys.

Good PSC (61% To 75%). This category signifies an organisational culture that demonstrates satisfactory support for patient safety principles and practices and range from 60% to 75%, as measured by established assessment tools or surveys.

Very Good PSC (76% To 85%). This category represents an organisational culture that goes beyond satisfactory and actively promotes patient ranging from 76% to 85%, as measured by established assessment tools or surveys.

Excellent PSC (above 85%): This category signifies an organisational culture that excels in supporting and promoting patient safety principles and practices exceeding 85% as measured by established assessment tools or surveys (Ibrahim & Abohabieb, 2020).

Missed Nursing Care.

"Missed nursing care is a subset of the category known as error of omission. It refers to needed nursing care that is delayed, partially completed, or not completed at all" (Kalisch, Landstrom, & Williams, 2009).

Operational Definition.

Missed nursing care is operationally defined as any instance in which needed nursing care, as determined by established standards and patient needs, is either delayed beyond an appropriate timeframe, incompletely performed, or not performed at all. This definition incorporates the following criteria for categorising the extent of MNC:

No Missing Care (≤ 20%). This category refers to situations where the percentage of MNC is equal to or less than 20% of the total care required. In these instances, most necessary nursing interventions and actions are carried out as planned, with minimal omissions or delays.

Low Missed Care (21-40%): This category represents situations where the percentage of MNC ranges from 21% to 40% of the total care required. In these cases, a low proportion of nursing interventions and actions may be delayed, partially completed, or not completed, indicating a low level of missed care.

Moderate Missed Care (41%-60%): This category encompasses situations where the percentage of MNC ranges from more than 40% to 60% of the total care required. In these instances, a substantial portion of nursing interventions and actions are not performed or are significantly delayed, indicating a notable level of missed care.

High Missed Care (> 60%): This category denotes situations where the percentage of MNC exceeds 60% of the total care required. In these cases, a significant majority of necessary nursing interventions and actions are not carried out or are excessively delayed, signifying a high level of missed care. (Ibrahim & Abohabieb, 2020).

Study Variables

The following study variables were used in the study:

The Independent Variables

1. Sociodemographic Factors

2. Patient Safety Culture

The Dependent Variable

Missed Nursing Care

The Data collection Tools

Two standardised questionnaires were used for the purpose of data collection.

Tool I - The Hospital Survey on Patient Safety Culture (HSOPSC) Scale

The 1st survey instrument employed in this study is the Hospital Survey on Patient Safety Culture (HSOPSC), which is developed by the Agency for Healthcare Research and Quality (AHRQ) for the purpose of evaluating the PSC within healthcare institutions. It has been validated in the English language and is commonly used to evaluate the PSC in healthcare organisations. The instrument comprises 32 items, systematically organised into 10 domains, each serving as a distinct assessment aspect. These 10 domains are given below:

• Domain 01 - Teamwork (consisting of 3 items)

• Domain 02 - Staffing and work pace (comprising 4 items)

• Domain 03 - Organisational learning (comprising 3 items)

• Domain 04 - Response to error (comprising 4 items)

• Domain 05 - Clinical managers' support for patient safety (consisting of 3 items)

• Domain 06 - Communication and feedback about error (comprising 3 items)

• Domain 07 - Communication openness (consisting of 4 items)

• Domain 08 – Reporting patient safety events (Consisting of 2 items)

• Domain 09 - Hospital management support for patient safety (comprising 3 items)

• Domain 10 - Handoffs and information exchange (consisting of 3 items)

These domains provide a structured framework for evaluating various facets of PSC, enabling a comprehensive analysis of the healthcare setting under investigation (AHRQ, 2022).

The Scoring System

A 5-point Likert scale was employed to measure the nurses' responses, allowing them to rate their agreement with various statements. On this scale, respondents had the following options: 1 for 'Strongly Disagree', 2 for 'Disagree', 3 for 'Neutral', 4 for 'Agree', and 5 for 'Strongly Agree'. However, it is important to note that two specific domains, namely 'Communication and Feedback about Error' and 'Communication Openness', utilised a slightly different scale, with responses ranging from 1 for 'Never' to 5 for 'Always'. Moreover, prior to computing total score items having negative worded questions were reverse coded.

In this rating system, higher scores signify a more favourable perception of the PSC within the healthcare setting. Subsequently, the total scores obtained from these responses were calculated and categorised into five distinct levels, as detailed in the table below. These levels serve to classify and interpret the overall assessment of PSC within the study context (Ibrahim & Abohabieb, 2020). For Regression analysis, the following cores were merged and coded into a Dichotomous variable of "Poor Patient Safety Culture" and "Fair to Excellent Patient Safety Culture".

Patient Safety Scoring

Percentage Score	Patient Safety Culture
Less than 50%	Poor
50%-60%	Fair
61%-75%	Good
76%-85%	Very Good
More than 85%	Excellent

Tool II - Missed nursing care scale (MISSCARE Survey)

The second questionnaire employed in this study was the MISSCARE Survey, developed in 2009 by Kalisch and Williams. This survey is widely recognised and utilised on a global scale to evaluate instances of MNC among nursing staff. More importantly, it has been employed in previous research conducted by Ali et al. (2021) in Pakistan, underlining its relevance in the local context.

The MISSCARE Survey consists of two distinct sections, each serving a specific purpose:

1. The first section comprised 22 items designed to capture the instances of MNC. These items encompassed various aspects of nursing care, such as tasks related to patient positioning or vital sign monitoring.

2. The second section is dedicated to understanding the reasons behind MNC. It contains 15 items to explore the factors contributing to care omissions, including issues like unbalanced patient assignments.

By utilising the MISSCARE Survey in this study, researchers can systematically assess the prevalence of MNC and gain insights into the underlying reasons behind such occurrences, thus, contributing to a more comprehensive understanding of nursing care delivery within the research context (Kalisch & Williams, 2009).

The Scoring System

The responses to the MISSCARE Survey were evaluated using a 5-point Likert scale, with respondents providing ratings ranging from 1 for 'Never' to 5 for 'Always'. Moreover, prior to computing total score items having negative worded question were reverse coded. The survey consisted of 22 items, and the cumulative scores obtained from these items were categorised into four distinct levels, determined by a predetermined cut-off point. This categorisation system allows for a meaningful interpretation of the extent of MNC within the study context, as detailed in the table provided (Ibrahim & Abohabieb, 2020). For Regression analysis, the following cores were merged and coded into a Dichotomous variable of "No to Low MissCare" and "Moderate to High Misscare".

Missed Nursing Care Scoring

Percentage Score	**Missed Nursing Care**
Less than 20%	No Missed Care
21%-40%	Low Missed Care

41-60%	Moderate Missed Care
More than 60%	High Missed Care

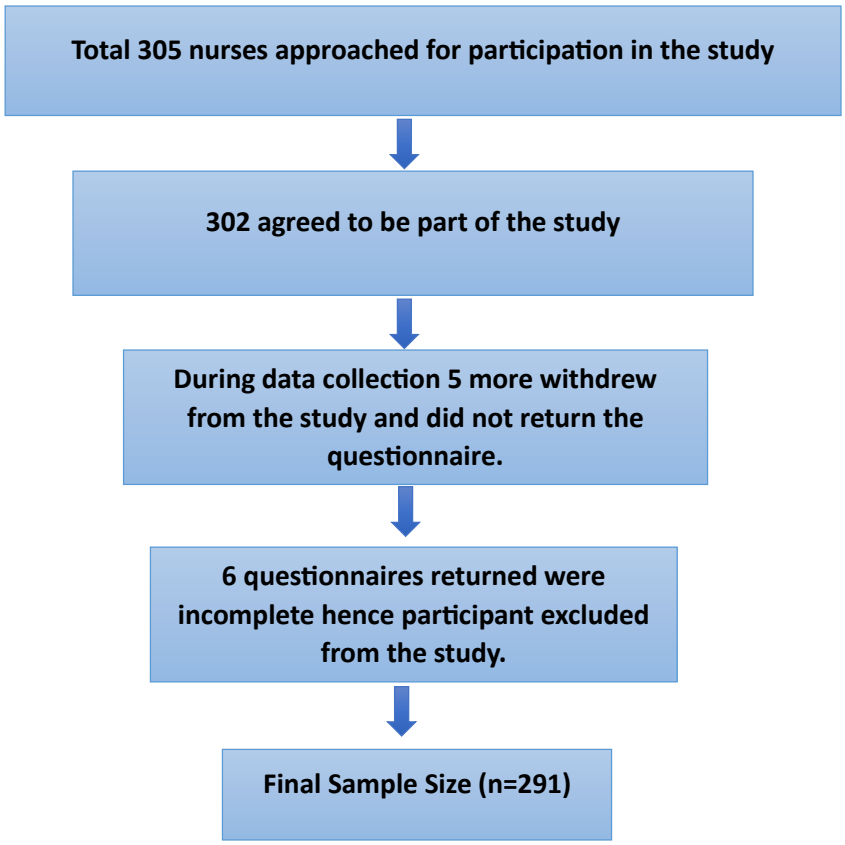
The Recruitment of Participants

Following the necessary approvals from the Ethics Review Committee (ERC) of the Aga Khan University and obtaining permission for data collection from the Chief Nursing Officer of the Aga Khan University Hospital, the researcher embarked on the data-gathering process.

Initially, the researcher procured a comprehensive list of all registered nurses actively employed in both the emergency room and all other in-patient units. Moreover, the recruitment of participants was accomplished through a meticulous stratified sampling technique. Subsequently, participants who met the predefined inclusion criteria were approached personally and invited to participate in the study. In addition, a thorough explanation of the research's purpose was provided to those who expressed interest and agreed to participate.

Furthermore, informed consent was diligently obtained from all eligible and willing participants. Before their consent, participants received a detailed explanation of the questionnaire's content, ensuring they were fully informed about the study's objectives and the nature of their involvement. Thus, this process was undertaken with the utmost diligence and respect for ethical considerations. (Figure. 2)

Figure 2: Participant Recruitment



The Data Collection Process

Data collection was carried out at the designated hospital after securing approval from the Ethics Review Committee (ERC) and obtaining the necessary permissions. Before their participation, informed consent was diligently sought from individuals who expressed their willingness to participate in the research. Moreover, a concise and clear explanation was provided to ensure participants fully comprehended the questionnaire's content.

Furthermore, to preserve the confidentiality and privacy of the participants, unique codes were assigned to each individual instead of using their names. This measure was implemented to ensure that sensitive information remained protected. In addition, to ensure the utmost privacy and confidentiality for the participants, a dedicated nursing lounge was assigned exclusively for this purpose. Moreover, a clear "Restricted Access" sign and a "Do Not Disturb" sign were conspicuously placed on the door, thus, underscoring the commitment to safeguarding participants' privacy. Moreover, the researcher executed the data collection process involving the distribution of two structured questionnaires to the nursing staff, following the procurement of informed consent.

The completion of these questionnaires typically required approximately 25-30 minutes. Subsequently, the researcher collected the completed questionnaires and conducted a meticulous review to ascertain their completeness and accuracy. This quality control step was essential to maintain the integrity and reliability of the gathered data. Out of the total questionnaires, 297 questionnaires were retrieved, However, among the 297 collected questionnaires, 6 were deemed incomplete due to missing information. Consequently, these incomplete questionnaires were excluded from the analysis due to their inadequacy. Therefore, the final count of questionnaires included in the analysis was 29. *(Figure 2)*

Data Management

The data management process was initiated by entering the collected data from hard copy forms into an Excel spreadsheet. Subsequently, all the data was transferred to Statistical Package for the Social Sciences (SPSS) version 29, where each participant was designated a unique identification number for coding and tracking. This meticulous approach ensured the creation of a comprehensive and organised record of all study participants. Furthermore, the data sets

underwent rigorous scrutiny to verify their consistency and completeness. In addition, to enhance data accuracy, the researcher engaged in a double-entry process involving inputting data twice and comparing the two sets to identify and rectify any missing values or inconsistencies. As an additional layer of security, physical copies of the data were securely stored and safeguarded with a double lock and keys.

On the other hand, electronic data resided within a password-protected file, accessible exclusively to the researcher, thesis supervisor, and committee members. More importantly, in compliance with the Aga Khan University's research policy and ethical standards, upon the study's conclusion, all electronic copies of the data will eventually be meticulously deleted, and hard copies will be securely discarded. This rigorous data management protocol has been established to uphold the principles of data confidentiality and privacy throughout the research process.

The Data Analysis

The data from the questionnaires underwent analysis using Statistical Package for the Social Sciences (SPSS) version 29, employing descriptive and inferential statistical techniques.

The Descriptive Statistics

Descriptive analysis was done for all independent variables and outcome variables. Standard deviation and mean were calculated for quantitative variables such as age, years of experience, etc. Moreover, frequency and proportion were computed for categorical variables such as Gender, Qualification and Working unit.

The Inferential Statistics

In this study, inferential statistics played a pivotal role in examining the association between PSC and MNC. Various statistical tests were employed to explore and quantify these associations, including chi-square tests and the regression analysis.

The chi-square test was utilized for investigating the relationship between patient safety culture (the independent variable) and missed nursing care (the dependent variable). Moreover, this statistical test is well-suited for examining associations between two categorical variables. It involves calculating chi-square scores to assess the strength and significance of the relationship (Polit & Beck, 2008)

In this analysis, a significance level of 0.05 ($p < 0.05$) was employed as the critical threshold for statistical significance. This threshold signifies that if the calculated p-value from the chi-square test or regression falls below 0.05, it provides grounds for the researcher to reject the null hypothesis and assert the existence of a statistically significant association between the variables under investigation.

The application of binary logistic regression is of utmost significance in this investigation, as it offers a refined and comprehensive understanding of the complex relationship between PSC and the occurrence of MNC (Das, 2021; Hosmer Jr et al., 2013).

For logistic regression the variables were coded as categorical dichotomous variables. Independent variable, Patient Safety culture was divided into categories and binary coded as "Poor Patient Safety Culture" and "Fair to excellent Patient Safety Culture" based on standardised percentage scores. Other Independent variables are Gender coded as "Male" and "Female", Age coded binary as "Less than 30 years" and "30 Years and more", Qualification coded as "Nursing Diploma" and "Nursing Degree", Experience coded as "5 years or less" and

"More than 5 years", Working units are coded as "Critical care Units" and "Wards", Working hours per week coded as "Less than 40 hours per week" and "more than 40 hours per week".

Moreover, the dependent variable was divided into dichotomous categories “No to Low Missed Nursing Care" and "Moderate to High Missed Nursing Care” based on standardised percentage score. Following this, a detailed examination begins with a focused univariate regression analysis, aiming to uncover associations among demographic variables, patient safety culture, and instances of MNC. This analysis was then extended into a sophisticated multivariate regression, exploring the combined impact of various factors (DeMaris et al., 2013).

The Study Rigors

The questionnaires utilised in this study have undergone prior validation in multiple countries when administered in the English language, and they have also been successfully employed in previous research conducted in Pakistan.

Before commencing the primary data collection phase, a pilot study was conducted involving 31 staff nurses. This group represented 10% of the total intended study sample (n=305) (Hertzog, 2008).

The primary objectives of this pilot study were to assess the practicality and clarity of the survey instruments, identify any potential challenges that might arise during data collection, and determine the approximate amount of time required for respondents to complete the questionnaires. The Cronbach's Alpha coefficient was computed to assess the internal reliability and consistency of the two survey instruments used in the study. The resulting coefficient values were 0.82 for the Hospital Survey of Patient Safety Culture (HOSPSC) tool and 0.81 for the MISSCARE (Missed Nursing Care) tool, suggesting a good level of internal consistency.

Additionally, during the pilot study, data collected from the 31 participants was analysed to calculate the "R" value. The "R" value, also known as the correlation coefficient is used to assess relationships between variables in research and can be a valuable tool for understanding associations in data. (Thabane et al., 2010).

The Ethical Considerations

In this study, a comprehensive approach was adopted to address and uphold various ethical considerations, ensuring that the research was conducted with the highest standards of integrity and respect for participants. The study received formal approval from the Ethics Review Committee (ERC) of AKU, demonstrating a strong commitment to ethical research practices. Additionally, specific permissions were obtained, including Permission for data collection from nurses at AKUH in Karachi, from the Chief Nursing Officer (CNO) of AKUH. This step was crucial for ensuring compliance with institutional regulations and ethical standards. The author also secured permission to use the MISSCARE Survey tool, further aligning the study with ethical norms.

The data collection process was initiated after receiving ERC approval, reflecting the study's strict adherence to ethical protocols. Several measures were implemented to safeguard participant rights and well-being. To maintain privacy and confidentiality, a dedicated nursing lounge was designated for data collection, marked clearly with ‘Restricted Access’ and ‘Do Not Disturb’ signs. Additionally, a coding system was employed to protect participant anonymity, ensuring that their identities remained confidential. Preceding to data collection, an informed consent was obtained from each participant to provide them with a comprehensive understanding of the study's purpose and their rights, which included signing written informed consent forms

voluntarily. Participants were also assured that their involvement was entirely voluntary and free from coercion, with the freedom to withdraw at any time.

Robust data security measures were integral to the study. Anonymity was maintained through numeric codes assigned to questionnaires. Physical data, such as hard copies, were securely stored in a locked cabinet accessible only to the researcher. Electronic data was safeguarded with electronically generated passwords, and access to sensitive information was limited to the primary investigator and committee members.

Upon the completion of the research, a systematic approach to data disposal will be undertaken. Hard-copy data would be securely shredded to prevent unauthorized access, while soft-copy data would be deleted. The disposal process would adhere to The Aga Khan University's policy, which mandates a seven-year retention period for data. The study results will be disseminated through publication in reputable national or international healthcare journals, promoting transparency and sharing valuable research findings. This comprehensive framework for ethical considerations, data security, and disposal underscores the study's rigorous adherence to highest ethical standards throughout the research process.

Summary of the Chapter

The methodology chapter of this research study outlines the investigation into the association between PSC and MNC among nurses at a tertiary care teaching hospital in Karachi, Pakistan. The study employed a cross-sectional analytical design. Moreover, choosing a cross-sectional study with a correlational design allowed for a snapshot of the situation and a simultaneous examination of various variables.The study population included nurses in the emergency room and in-patient units, with registered nurses directly involved in patient care

being included, while nursing interns and higher-ranking staff were excluded. Furthermore, a sample size of 305 nurses was determined, utilising stratified random sampling to ensure representation from various hospital departments. Two standardised questionnaires, the Hospital Survey on Patient Safety Culture (HSOPSC) Scale and the MISSCARE Survey, were used for data collection. Then data collection was conducted with informed consent, ensuring privacy and confidentiality. Data management involved thorough checks and unique participant identification numbers. Data analysis included descriptive statistics and inferential statistics, such as chi-square tests and regression analysis, to explore the PSC and MNC association.

Ethical considerations were upheld with ERC approval, informed consent, and secure data handling. Lastly, after the completion of the study, data copies would be securely disposed of as per the university's policy and research findings would be published in reputable healthcare journals.

Chapter Four: Results

This chapter explains the outcomes derived from the comprehensive analysis conducted on the study variables, aiming to distinguish the complex association between PSC and MNC. Commencing with an in-depth exploration of descriptive statistics pertaining to the study participants, the chapter seamlessly transitions into the examination of associations among socio-demographic characteristics, PSC, and MNC, employing the Chi-Square test. Following this, a methodical univariate regression analysis is undertaken to investigate the relationships between demographic characteristics, PSC, and MNC, progressing into a sophisticated multivariate regression analysis. The exploration is further enriched through the application of binary logistic regression to ascertain the nuanced association between patient safety culture and missed nursing care. Notably, the chapter culminates in the identification of the most frequently missed nursing care items and their respective reasons, contributing to a comprehensive understanding of the intricacies inherent in PSC and nursing care practices. The chapter concludes by identifying the most prevalent instances of MNC and delineating the associated reasons. This comprehensive analysis contributes to a nuanced comprehension of the complexities inherent in the dynamics between patient safety culture and nursing care practices. The results of the analysis are as follows:

Table 1: Demographic data of the study participants

Demographics	Category	Number (n)	Percentage
Gender	Male	117	40%
	Female	174	60%

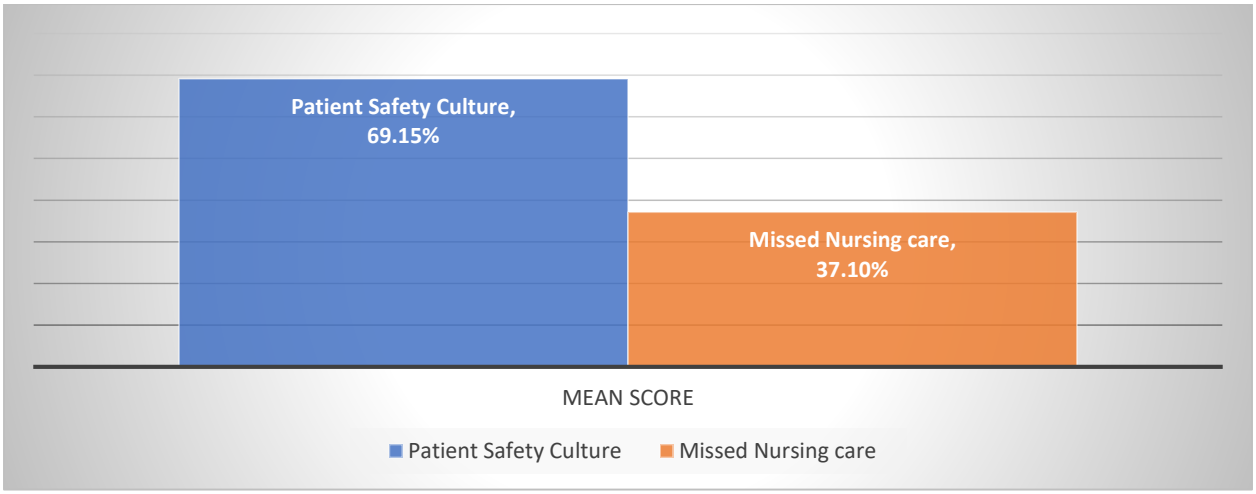
Age	< 30 Years	208	71%
	≥ 30 Years	83	29%
Qualification	Nursing Diploma	118	40%
	Nursing Degree (BScN, MSCN)	173	60%
Experience	< 05 Years	160	55%
	≥ 05 Years	131	45%
Working Hours	< 40 Hours	61	21%
	≥ 40 Hours	230	79%
Working Unit	Combined Medical/Surgical Unit	23	7.9%
	Medical Unit	41	14.1%
	Surgical Unit	29	10.0%
	Emergency Unit	63	21.6%
	Cardiology (Including CCU)	26	8.9%
	ICU (All Adult Types)	35	12.0%
	Obstetrics & Gynaecology	19	6.5%
	Oncology	30	8.6%
	Paediatrics	25	10.3%

Table 01 presents the demographic characteristics of the participants in the study. The sample comprised of 291 nurses. The participants were predominantly female, with females constituting 60% (n=174) of the sample, while males represented 40% (n=117). The age distribution among the participants showed a larger proportion of younger individuals, with those under 30 years of Age comprising 71% (n=208) of the sample. The remaining 29% (n=83) were 30 years or older. Regarding educational qualifications, 60% (n=173) of the participants held a nursing degree (BScN, MScN), while the remaining 40% (n=118) had a nursing diploma. The

experience levels of the participants were fairly balanced, with 55% (n=160) having less than 5 years of experience and 45% (n=131) having 5 years of experience or more. The majority of the participants worked full-time hours, with 79% (n=230) working 40 hours or more per week. Those working less than 40 hours per week constituted 21% (n=61) of the sample.

The participants were distributed across various working units as follows: Combined Medical/Surgical Unit (7.9%, n=23), Medical Unit (14.1%, n=41), Surgical Unit (10.0%, n=29), Emergency Unit (21.6%, n=63), Cardiology (including CCU) (8.9%, n=26), ICU (All Adult Types) (12.0%, n=35), Obstetrics & Gynaecology (6.5%, n=19), Oncology (8.6%, n=30), and Paediatrics (10.3%, n=25). During the analysis, all of the above working units were then divided into to 2 categories “Critical Care Unit” and “Wards” based on their level of care. Emergency Unit, ICU and CCU were merged into “Critical Care Units” while the remaining were merged into “Wards”.

Chart 1: Mean Score of PSC and MNC



The study results revealed a predominantly favourable perception of Patient Safety Culture (PSC) with a mean score of 69.15% (SD:16.68) indicating a good PSC score. Furthermore, the

study also revealed a comparatively lower incidence of Missed Nursing Care with a mean score of 37.10% (SD 13.40).

Table 2: Association of Demographic Variables with Patient Safety Culture and Missed Nursing Care

		Patient Safety Culture (PSC)			Missed Nursing Care (MNC)		
Category	**Number (%)**	**Poor PSC**	**Fair to Excellent PSC**	**p-Value**	**No to Low MNC**	**Moderate to High MNC**	**p-Value**
Gender							
Male	117 (40.2%)	33 (28.2%)	84 (71.8%)	0.590	63 (33.9%)	54 (51.4%)	0.004*
Female	174 (59.8%)	44 (25.3%)	130 (74.7%)		123 (66.1%)	51 (48.6%)	
Age							
≤ 30 years	208 (71.5%)	60 (28.8%)	148 (71.2%)	0.185	126 (67.7%)	82 (78.1%)	0.060
> 30 years	83 (28.5%)	17 (20.5%)	66 (79.5%)		60 (32.3%)	23 (21.9%)	
Qualification							
Nursing Diploma	118 40.5%	56 (47.5%)	62 (52.5%)	< 0.001	69 (37.1%)	49 (46.7%)	0.110
Nursing Degree	173 (59.5%)	21 (12.1%)	152 (87.9%)		117 (62.9%)	56 (53.3%)	
Experience							
≤ 05 Years	160 (55.0%)	57 (35.6%)	103 (40.5%)	< 0.001	103 (55.4%)	57(54.3%)	0.857
> 05 Years	131(45.0%)	20 (15.3%)	111 (15.3%)		83 (44.6%)	48 (45.7%)	
Working Hours per week							
< 40 Hours	61 (21.0%)	17 (27.9%)	44 (72.1%)	0.779	42 (22.6%)	19 (18.1%)	0.454
≥ 40 Hours	230 (79.0%)	60 (26.1%)	170 (73.9%)		144 (77.4%)	86 (81.9%)	
Working Unit							

Critical Care Units	124 (42.6%)	29 (23.4%)	95 (76.6%)	0.348	87 (70.2%)	37 29.8%	0.064
Wards	167 (57.4%)	48 (28.7%)	119 (71.3%)		99 (59.3%)	(68 40.7%)	

*Note: *p-value is significant at the level of 0.004*

The data presented in Table 02 offers a comprehensive analysis of the association of demographic variables with PSC and MNC by utilising Chi-Square test.

Firstly, the table highlights a notable relationship between gender and MNC, with a statistically significant p-value of 0.004. Specifically, 51.4% of male nurses reported moderate to high MNC, compared to 48.6% of female nurses. In contrast, the association between gender and PSC did not show statistical significance, with a p-value of 0.590, indicating that the perception of PSC is relatively consistent across genders.

Further analysis reveals significant differences in PSC and MNC based on qualifications and years of experience. Nurses with a nursing diploma showed a higher level of poor PSC (47.5%) compared to those with a nursing degree (12.1%), and this difference is statistically significant ($p < 0.001$). Similarly, nurses with less than or equal to 5 years of experience reported a higher level of poor PSC (35.6%) compared to those with more than 5 years of experience (15.3%), again with a significant p-value of < 0.001. However, the level of MNC did not show a significant difference with respect to experience ($p = 0.857$). Age and working hours per week did not show a significant association with either PSC or MNC, suggesting that these factors may not be critical determinants in the perception of PSC or the incidence of MNC.

Table 3: Association Between Patient Safety Culture and Missed Nursing Care

Variables			**Patient Safety Culture**		**p-Value**
		N (%)	Poor PSC	Fair to Excellent PSC	
Missed Nursing Care	No to Low Misscare	186 (63.9%)	34 (44.2%)	152 (71.0%)	< 0.001*
	Moderate to High Misscare	105 (36.1%)	43 (55.8%)	62 (29.0%)	

Note: p-value is significant at the level of less than 0.001*

Table No 03 presents a statistical analysis of the relationship between PSC and MNC utilising the Chi-Square test. The data is categorized into two groups based on the level of missed nursing care: 'No to Low Misscare' and 'Moderate to High Misscare.' The table shows that out of 291 cases, 186 (63.9%) had no to low MNC, with a higher proportion (71.0%) falling under the 'fair to excellent PSC' category. In contrast, 105 cases (36.1%) had moderate to high levels of missed care, with a majority (55.8%) associated with 'poor PSC.' The p-value below 0.001 suggests a strong statistical correlation between the PSC level and the incidences of MNC. This implies that higher levels of patient safety culture are correlated with lower instances of missed nursing care.

Table 4: Univariate regression analysis on demographics and Patient Safety Culture

Variable	**Category**	**N (%)**	**OR (CI)**	**p-value**
Gender	Male (Ref)	117 (40.2%)		
	Female	174 (59.8%)	1.161 (0.684 - 1.968)	0.580
Age	≤ 30 years (Ref)	208 (71.5%)		

	> 30 years	83 (28.5%)	1.574 (0.854 - 2.902)	0.146
Qualification	Nursing Diploma (Ref)	118 (40.5%)		
	Nursing Degree	173 (59.5%)	6.538 (3.65 - 11.70)	< 0.001*
Experience	≤ 05 Years (Ref)	160 (55.0%)		
	> 05 Years	131 (45.0%)	3.071 (1.72 - 5.46)	< 0.001**
Working Hours Per Week	< 40 Hours (Ref)	61 (21.0%)		
	≥ 40 Hours	230 (79.0%)	1.095 (.582 - 2.060)	0.779
Working Unit	Critical Care Units (Ref)	124 (42.61%)		0.306
	Wards	167 (57.39%)	0.757 (0.444 - 1.291)	

*Note: * p-value is significant at the level of less than 0.001*

*** p-value is significant at the level of less than 0.001*

Table 04 shows univariate regression analysis examining the relationship between demographic variables and Patient Safety Culture with the following results. First, Gender did not exhibit a statistically significant association with PSC, as indicated by a non-significant odds ratio (OR) of 1.161 (95% CI: 0.684 - 1.968; p = 0.580) for females compared to males. Age, when categorised as 30 years or younger versus older than 30 years, also failed to demonstrate a significant impact on PSC, with an OR of 1.574 (95% CI: 0.854 - 2.902; p = 0.146). However, qualification and experience yielded significant results, with nursing degree qualification

showing a substantial positive association (OR: 6.538; 95% CI: 3.65 - 11.70; $p < 0.001$), as well as experience exceeding 5 years (OR: 3.071; 95% CI: 1.72 - 5.46; $p < 0.001$). Working hours per week and working unit did not exhibit significant associations with PSC.

Table 5: Multivariate Regression on Demographics and Patient Safety Culture

Variable	**Category**	**N (%)**	**OR (CI)**	**p-value**
Qualification	Nursing Diploma (Ref)	118 (40.5%)		
	Nursing Degree	173 (59.5%)	5.834(3.229-10.542)	<0.001*
Experience	≤ 05 Years (Ref)	160 (55.0%)		
	> 05 Years	131 (45.0%)	2.449 (1.324-4.527)	0.004**

*Note: * p-value is significant at the level of less than 0.001*

*** p-value is significant at the level of 0.004*

Table No.05 shows a multivariate regression analysis assessing the impact of demographic variables on PSC; two variables emerged as significant predictors. First, nursing qualification demonstrated a statistically significant association with PSC, with nursing degree holders (OR: 5.834; 95% CI: 3.229 - 10.542; $p = 0.004$) having significantly higher odds of contributing to a positive Patient Safety Culture compared to those with a nursing diploma. Additionally, experience exceeding 5 years also exhibited a significant positive association (OR: 2.449; 95% CI: 1.324 - 4.527; $p = 0.004$) with PSC when compared to those with less than or equal to 5 years of experience.

Table 6: Univariate regression on demographics and Missed Nursing Care

Variable	Category	N (%)	OR (CI)	p-value
Gender	Male (Ref)	117 (40.2%)		
	Female	174 (59.8%)	.484 (.297-.788)	0.004*
Age	≤ 30 years (Ref)	208 (71.5%)		
	> 30 years	83 (28.5%)	.589 (.338-1.026)	0.062
Qualification	Nursing Diploma (Ref)	118 (40.5%)		
	Nursing Degree	173 (59.5%)	0.674 (0.415-1.095)	0.111
Experience	≤ 05 Years (Ref)	160 (55.0%)		
	> 05 Years	131 (45.0%)	1.045 (0.646-1.690)	0.857
Working Hours Per Week	< 40 Hours (Ref)	61 (21.0%)		
	≥ 40 Hours	230(79.0%)	1.320 (0.722-2.416)	0.368
Working Unit	Critical Care Units (Ref)	124 (42.61%)		
	Wards	167 (57.39%)	1.615 (0.986-2.645)	0.057

*Note: * p-value is significant at the level of 0.004*

In the above univariate regression analysis examining the relationship between demographic variables and Missed Nursing Care, several findings are noteworthy. Gender showed a statistically significant association, with females having a lower odds ratio (OR) of experiencing MNC compared to males (OR: 0.484; 95% CI: 0.297 - 0.788; p = 0.004). Age, qualification, experience, and working hours per week did not exhibit statistically significant associations with MNC, as indicated by non-significant p-values. However, the working unit, with a p-value approaching significance (p = 0.057), demonstrated a trend towards a higher likelihood of MNC inwards compared to critical care units.

Table 7: Multivariate regression on Demographics and Missed Nursing Care

Variable	**Category**	**N (%)**	**OR (CI)**	**p-value**
Gender	Male (Ref)	117 (40.2%)		
	Female	174 (59.8%)	0.484 (0.295 - 0.795)	0.004*
Working Unit	Critical Care Units (Ref)	124 (42.61%)		
	Wards	167 (57.39%)	0.584 (0.352 - 0.968)	0.037**
Age	≤ 30 years (Ref)	208 (71.5%)		
	> 30 years	83 (28.5%)	0.583 (0.331 - 1.028)	0.062

*Note: * p-value is significant at the level of 0.004*

*** p-value is significant at the level of 0.037*

As shown in Table 07 above, the influence of demographic factors (Gender and Age) and working units (critical care units and wards) on the occurrence of MNC was examined through a multivariate regression analysis. The results revealed a significant association between Gender

and MNC, with females demonstrating a lower likelihood of experiencing it (Odds Ratio = 0.484, 95% [CI]: 0.295 - 0.795, p = 0.004). Similarly, the working unit was found to have a significant impact, as individuals in the "Wards" had a reduced likelihood of MNC compared to those in "Critical Care Units" (Odds Ratio = 0.584, 95% CI: 0.352 - 0.968, p = 0.037). However, Age did not exhibit a statistically significant association with MNC, although there was a trend suggesting that individuals older than 30 years may be less likely to experience it (Odds Ratio = 0.583, 95% CI: 0.331 - 1.028, p = 0.062).

Table 8: Binary Logistic Regression on Patient Safety Culture and Missed Nursing Care

Variable	**Category**	**N (%)**	**OR (CI)**	**p-value**
Patient Safety Culture	Poor Patient Safety Culture (Ref)	77 (26.5%)		< 0.001*
	Fair to Excellent Safety Culture	214 (73.5%)	0.323 (0.188-0.552)	

*Note: * p-value is significant at the level of less than 0.001*

In the above binary regression analysis, the relationship between the occurrence of Missed Nursing Care and Patient Safety Culture is investigated. The results reveal a significant negative association between these two variables. When individuals in the category of "Fair to Excellent Safety Culture" were compared to those in the reference category of "Poor Patient Safety Culture," substantially lower odds of experiencing Missed Nursing Care were observed (Odds Ratio = 0.323, 95% CI: 0.188 - 0.552). This means that there is a likelihood of 67.7% reduction in the occurrence of missed nursing care in a "Fair to Excellent Safety Culture" as

compared to a "Poor Patient Safety Culture". The p-value being less than 0.001 indicates a high level of statistical significance for this finding. This result highlights a strong association between higher levels of perceived safety culture and a reduction in missed nursing care events.

Table 9: Descriptive Statistics Missed Nursing Care

Missed Nursing Care Item	Mean	Standard Deviation
1. “Ambulating patients 3 times daily or as physician ordered”	2.19	0.740
2. “Give emotional support for patients and/or their families”	2.02	0.941
3. “Give the food to patients while it is still warm”	1.95	0.946
4. “Skin/wound care as ordered”	1.79	0.857
5. “Teach patients about procedures, tests and other diagnostic steps”	1.78	0.905
6. “Response to call light within 5 minutes”	1.78	0.708
7. “Turn the patients every 2 hours as physicians' order”	1.72	0.844
8. “Assist patients for toileting within 5 min of request”	1.72	0.827
9. “Give medications within thirty minutes before or after the scheduled time”	1.71	0.710
10. “Patient bathing/skin care”	1.71	0.719
11. “Conduct reassessments according to patients' condition”	1.69	0.725
12. “Monitoring intake/output”	1.67	0.744

13. “Teach patient about his/her plans for care and when to call after discharge”	1.64	0.773
14. “Asses, and care IV/central line site according to hospital policy”	1.64	0.707
15. “Provide care for patients' mouth”	1.61	0.693
16. “Patient assessments performed each shift”	1.61	0.755
17. “Hand washing”	1.58	0.828
18. “Monitor glucose for patients as ordered”	1.57	0.657
19. “Assess medications' effectiveness”	1.54	0.660
20. “PRN medication requests acted on within 15 minutes”	1.54	0.847
21. “Document all necessary data completely”	1.50	0.789
22. “Assess vital signs as physicians' order”	1.45	0.604
Total	**37.42**	**16.979**

Table No 09 contains identifying patterns in missed nursing care revealing distinct areas of consistency and inconsistency. Ambulating patients three times daily or as per physician orders was the most frequently missed task, with the highest mean score of 2.19. This was closely followed by giving emotional support to patients and/or their families, which had a mean score of 2.02. Additionally, ensuring that food is given to patients while it is still warm also emerged as a frequently missed aspect of care, with a mean score of 1.95.

Conversely, some tasks were consistently performed with higher adherence. The assessment of vital signs as per physicians' orders was the least frequently missed task, indicated by the lowest mean score of 1.45. This was followed by documenting all necessary data completely, which had a mean score of 1.50, and assessing the effectiveness of medications given to patients, with a mean score of 1.54.

Table 10: Reasons for Missed Nursing Care

Reason for Missed Nursing Care	Number (n=291)	Percentage
1. “Unexpected increase patient volume and/or patients' illness”	214	73.52%
2. “Inadequate number of staff “	207	71.15%
3. “Unbalanced patient assignments”	194	66.64%
4. "Inadequate assistive personnel number (e.g., unit secretaries)"	193	66.32%
5. "Tension or communication breakdowns within the nursing team"	182	62.54%
6. "Urgent patient situations (e.g., a patient's condition worsening)"	179	61.48%
7. “Tension or communication breakdowns with the medical staff”	178	61.09%
8. "Nursing assistant did not communicate that care was not done"	173	59.45%
9. Other departments did not provide the care needed (e.g., physical therapy)	166	57.01%
10. "Lack of backup support from team members"	161	55.31%
11. "Inadequate handover from previous shift or sending unit"	151	51.88%
12. "Supplies/equipment not functioning properly when needed"	147	50.52%
13. Increase activities of patients' admission and discharge”	144	49.48%

14. "Supplies/equipment not available when needed"	144	49.48%
15. “Medications not available when needed”	134	45.96%

As shown in table 10, The reasons for missed nursing care were assessed among a sample of 291 respondents, with percentages indicating the prevalence of each factor. The top three reasons with the highest percentages were "Unexpected increase in patient volume and/or patients' illness" (73.52%), "Inadequate number of staff" (71.15%), and "Unbalanced patient assignments" (66.64%).On the other hand, the three reasons with the lowest percentages were "Medications not available when needed" (45.96%), "Supplies/equipment not available when needed" (49.48%), and "Inadequate assistive personnel number (e.g., unit secretaries)" (49.48%). These lower percentages suggest that issues related to medication availability, equipment, and unit secretaries are comparatively less prevalent.

Summary

This chapter presents a comprehensive analysis exploring the relationship between PSC and MNC care among nurses. It begins with descriptive statistics of the study participants, showing a predominance of female nurses, a larger proportion of younger nurses, and a majority holding nursing degrees and working full-time hours. The chapter employs various statistical methods, including Chi-Square tests, univariate and multivariate regression analyses, and binary logistic regression, to examine the associations among demographic characteristics, PSC, and MNC. The chapter initiates with a detailed statistical profile of the study's participants, revealing a dominance of female nurses, a younger age demographic, and a higher representation of nurses

with degrees working full-time. The analysis uncovers several key insights. It highlights a significant link between gender and MNC, with male nurses reporting higher instances of missed care. Furthermore, the study finds that nurses with a nursing diploma and those with less experience exhibit higher levels of poor patient safety culture. Conversely, nurses holding degrees and those with over five years of experience tend to positively influence patient safety culture. Another critical finding is the significant impact of the working unit on MNC, indicating a trend of higher missed care in wards compared to critical care units.

Towards the end of the chapter, the focus shifts to identifying the most frequently MNC items, such as ambulating patients and providing emotional support. Additionally, the chapter sheds light on the primary reasons for MNC, which include unexpected increases in patient volume, inadequate staff numbers, and unbalanced patient assignments. This comprehensive analysis contributes significantly to understanding the complex dynamics between patient safety culture and nursing care practices, providing valuable insights into areas requiring attention and improvement.

Chapter Five: Discussion

This discussion chapter represents a thorough discussion into the complex relationship between patient safety culture (PSC) and missed nursing care (MNC) within the nursing domain, particularly in the context of a developing country's healthcare system. By delving into the complex dynamics of PSC and MNC, the research has brought critical insights, shedding light on the pivotal role demographic characteristics play in shaping these aspects of healthcare. Further, it explores the strengths and limitations of the research followed by recommendations for future studies. Finally, this chapter ends with the conclusion.

Level of Patient Safety Culture

The present investigation highlights a predominantly favourable perception of Patient Safety Culture (PSC) within the examined hospital. Notably, a significant majority of the respondents rated the PSC from "Fair" to "Excellent." In contrast, a smaller fraction described it as poor. This finding is in concert with various international studies that have reported diverse PSC levels, reflecting the influence of regional healthcare practices and policies. For instance, research conducted in disparate geographical areas such as Asia, Europe, and the Middle East has demonstrated this variability (Kiaei et al., 2016; TEREANU et al., 2017)

Furthermore, this study's outcomes are consistent with those reported by Wagner et al. (2013) in the United States, where respondents generally exhibited more positive perceptions of PSC. This suggests a possibly more matured culture of patient safety in these regions. Similar trends were observed in the studies by El-Jardali et al. (2014) in Saudi Arabia and Segura-García et al. (2023) in Spain, both of which indicated an overall favorable view of patient safety.

However, this study's findings diverge from those reported in certain African nations. Specifically, research by Alquwez et al. (2018) and Akologo et al. (2019)in Ethiopia and Ghana, respectively, highlighted notable deficiencies in PSC in these countries. This disparity underscores the varied nature of PSC across different healthcare systems and cultural contexts.

Level of missed Nursing care

The current study discloses a comparatively lower incidence of Missed Nursing Care (MNC). The data indicates that majority of participants reported experiencing "No or Low Missed Nursing Care," while a smaller proportion reported "Moderate to High Missed Nursing Care." This result presents a notable contrast to findings from various international studies,

which have generally reported higher levels of MNC. Research across different healthcare settings globally has linked increased instances of MNC to a range of factors. These include staffing shortages, heightened patient volumes, and suboptimal patient safety cultures (Ali et al., 2021; Bragadóttir et al., 2017; Dall et al., 2009; Kalisch & Xie, 2014)

The lower level of MNC observed in the current study could be indicative of distinct healthcare environments, divergent staffing models, or variations in organizational culture. These factors might contribute to the reduced frequency of MNC, highlighting the importance of contextual influences on nursing care practices. This discrepancy underscores the necessity of considering local healthcare dynamics when assessing and addressing issues related to nursing care quality and patient safety.

Gender and Missed Nursing Care

The research indicates a notable correlation between gender and Missed Nursing Care (MNC), with male nurses experiencing more instances of missed care. This finding is critical, given the existing literature does not extensively focus on gender disparities in nursing practice, a trend that diverges from traditional perceptions that often overlook gender differences in nursing practice. The global literature, including studies like those by Kalisch and Xie (2014), Winsett et al. (2016), and (Cho et al., 2015) generally does not extensively explore gender as a primary factor in MNC. Studies like that of Okuyama et al. (2019)and others primarily focus on organizational and environmental factors influencing PSC and MNC, with less emphasis on gender-specific trends. The influence of gender on nursing practices may vary significantly across cultural and organizational contexts. Studies like those Oliveira et al. (2022) in Brazil and Lee and Kalisch (2021) comparing the United States and South Korea suggest that societal norms and workplace cultures can influence how gender roles play out in healthcare settings.

These findings suggest unique challenges faced by male nurses in Pakistan, potentially linked to cultural norms and workplace dynamics, which have been less explored in existing literature. This fresh perspective presented in the current study suggests that examining gender dynamics in nursing could be a promising new avenue for research in Pakistan as well as other countries.

Age and Experience in Patient Safety Culture

In the current study, younger nurses, and those with less experience reported poorer PSC. This trend aligns with findings from Brazil by Okuyama et al. (2019) and from Italy by TEREANU et al. (2017). The relationship between age and PSC is less direct but suggests that with age often comes experience, which can contribute to a more mature understanding of patient safety issues. The contrast between the perceptions of younger versus more seasoned nurses emphasizes the crucial role of experience in developing a robust understanding of patient safety, resonating with Al-Mandhari et al. (2014) findings in Oman on the positive impact of organizational learning and continuous improvement in diverse healthcare settings. The current study also aligns with a study in Iran by (Kiaei et al., 2016), indicating that younger, less experienced nurses may have different perceptions and practices related to patient safety. This is particularly relevant in the Pakistani context, where the nursing workforce is increasingly younger and may lack the experience that positively influences PSC. These observations indicate that less experienced nurses might benefit from targeted training and mentorship programs to enhance their contribution to PSC. Furthermore, Nurses with over five years of experience tend to positively influence PSC, aligning with the global understanding that experience enhances competence and confidence, thereby fostering a stronger safety culture. This parallel suggests

that strategies aimed at improving PSC should consider the pivotal role of experience in shaping safety perceptions and practices.

Educational Influence on Patient Safety Culture

The current study revealed a notable disparity in Patient Safety Culture (PSC) between nurses holding diplomas and those with degrees, with diploma holders reporting lower levels of PSC. This aligns with the widely recognized importance of higher education in fostering a solid patient safety culture. Supporting this finding are studies by Wagner et al. (2013) and Sharp et al. (2019) conducted in Europe, Taiwan, and the United States, which underscore the significance of educational achievement in developing a strong PSC. This pronounced difference suggests that diploma programs may not adequately cover patient safety topics, indicating a potential gap in their curriculum. It highlights the necessity for ongoing professional development and education, a point further emphasized by research from Ethiopia by Alquwez et al. (2018) and from Ghana by Akologo et al. (2019). These studies collectively suggest that enhancing the educational component of nursing programs, particularly in diploma courses, could be pivotal in cultivating a more effective patient safety culture. This underlines the need for continuous educational interventions and training to bridge the gap in knowledge and practice concerning patient safety, particularly for diploma-holding nurses.

Working Unit and Missed Nursing Care

This study unveils a notable trend of increased Missed Nursing Care (MNC) in ward settings compared to critical care units. This complements findings from Villamin et al. (2019), Lake et al. (2020) in The United States and Zárate-Grajales et al. (2022) in Mexico, which demonstrated varied perceptions of MNC in different hospital environments. Such observations

suggest that MNC is not evenly distributed across healthcare settings. Additional studies, like those by Segura-García et al. (2023) in Spain and RJ et al. (2019) in Malaysia, also spotlight differences in MNC across various workplace contexts. This variation calls for focused interventions and resources, especially in wards where MNC is more common. It also highlights the necessity for further research into the specific challenges encountered in different nursing environments and their impact on patient care. The higher incidence of MNC in wards compared to critical care units points towards distinct challenges in resource allocation and patient management in Pakistani context. This disparity necessitates specific strategies for wards, perhaps addressing issues such as patient overload and staffing constraints.

Frequently Missed Nursing Care

The study's detailed analysis of MNC items offers insights into specific areas of vulnerability. The most frequently missed tasks were ambulating patients and providing emotional support, while tasks like assessing vital signs were less frequently missed. This pattern aligns with findings by Winsett et al. (2016) in the United States and Oliveira et al. (2022) in Brazil, which reported similar trends in missed nursing tasks. These findings suggest a tendency to prioritize clinical tasks over more holistic aspects of patient care, a phenomenon noted in various studies, including those by Bragadóttir et al. (2017) in Iceland, Mandal and Seethalakshmi (2019), and Kalisch and Xie (2014) in the United States. Contrastingly, a study by Ali et al. (2021) in Karachi, Pakistan, indicated hygiene care as the most frequently neglected aspect, diverging from the current study's results. Nevertheless, these similarities and differences highlight universal challenges in patient care, underscoring the necessity for systematic changes to address these recurring issues. The frequent missing of tasks like ambulating patients and providing emotional support, coupled with the higher adherence to vital signs assessment paints

a picture of the areas where nursing care is most and least vulnerable. This observation is crucial for healthcare managers and policymakers in identifying specific areas for improvement.

Reasons for Missed Nursing Care

In this study, The primary reasons for MNC, such as unexpected patient volume and inadequate staffing mirror global trends. Research from Mexico by Moreno-Monsiváis et al. (2015) and Hernández-Cruz et al. (2017), and studies from the US and Korea by Winsett et al. (2016), Lee and Kalisch (2021), and Cho et al. (2015) confirm similar findings. Notably, in a Karachi-based public hospital in Pakistan, 61% of nurses identified staff shortage as a key factor contributing to MNC (Ali et al., 2021). This consistency across different geographic contexts underscores a widespread challenge in healthcare delivery, necessitating comprehensive strategies to mitigate these barriers to optimal care. These findings also highlight systemic issues prevalent in Pakistani healthcare systems, such as staffing shortages, poor patient assignment models and workload management, that contribute to MNC.

Association Between Patient Safety Culture and Missed Nursing Care

This study also reveals a significant negative association between Patient Safety Culture (PSC) and Missed Nursing Care (MNC). Nurses in the 'Fair to Excellent PSC' category showed a substantial reduction in the occurrence of MNC compared to those in the 'Poor PSC', indicating that a strong safety culture significantly reduces instances of missed care. This result aligns with other studies which have shown a significant relationship between PSC and MNC. For instance, Hessels et al. (2019) in the United States found that higher ratings of PSC corresponded to lower instances of MNC. Similarly, the study by Kim et al. (2018) in Korea highlighted an inverse relationship, indicating that a positive perception of PSC was associated with reduced

occurrences of MNC. The association between PSC and MNC often translates into tangible patient outcomes. For example, the study by Ibrahim and Abohabieb (2020) in Egypt showed a direct association between the work environment and the culture of patient safety, which in turn influenced the prevalence of MNC among nursing professionals.

Strengths of the Study

1. **Novelty and Foundation for Future Research**: This unique study in Pakistan, exploring the relationship between PSC and MNC not only fills a gap in existing literature but also lays a solid foundation for subsequent studies and longitudinal research. This aspect underscores its potential as a base for future inquiries and healthcare improvements within the country.

2. **Robust Methodology and Sampling Techniques**: The strength of the study is further enhanced by its robust methodology, including the use of validated and reliable instruments, and a well-executed sampling strategy. The quantitative analytical design, along with the use of proportionate stratified sampling and validated tools, ensures accurate, reliable, and representative data collection. The pilot study conducted for tool assessment further adds to the reliability of the research instruments, reinforcing the study's methodological rigor.

3. **Adequate Sample Size and Representativeness**: The study's sample size of 291 nurses is apt for a cross-sectional study in single setting, providing a comprehensive and diverse participant pool. This adequacy in sample size, coupled with the representative nature of the sampling, allows for meaningful and statistically significant conclusions, and facilitates detailed subgroup analysis.

4. **Impact on Healthcare: Evidence-Based Strategies and Policy Implications:** This study significantly impacts Pakistan's healthcare sector with its practical and policy implications. Leveraging a rigorous, evidence-based approach, it provides key insights to guide healthcare organizations and policymakers in formulating strategies to improve PSC and reduce missed nursing care. The study's robust findings offer a foundation for informed healthcare decision-making, shaping interventions and policies that can enhance nursing care quality and patient safety, not just in the studied hospital but across similar settings nationwide. Its dual role in offering practical solutions and bolstering evidence-based healthcare decisions highlights its importance in advancing healthcare practices and outcomes.

Limitation of the Study

1. **Methodological and Design Consideration:** The study's cross-sectional approach, although it yields significant insights, is constrained in its ability to identify causative factors or to track the progression of relationships between patient safety culture and missed nursing care over time. This limitation reduces the study to a moment-in-time observation, underscoring the necessity for longitudinal or experimental methodologies to investigate the causal connections and progressive shifts.

2. **Generalizability and Setting Constraints:** The study's findings, derived from a single hospital in Karachi, Pakistan, confront limitations in generalizability. The results may not fully represent the broader nursing population in Pakistan or other healthcare settings, given the variability in healthcare practices, patient demographics, and organizational cultures across different hospitals and regions. This single-hospital setting potentially

limits the external validity of the findings, as different hospitals have distinct characteristics and operational environments.

3. **Self-administered questionnaire and Recall Bias:** The reliance on self-reported data from nurses might introduce response bias, as participants may give socially desirable answers impacting the data's accuracy and reliability. The potential recall bias related to nurses remembering reasons for missed care further complicates the accuracy of the findings, underlining the need for cautious interpretation when applying these results to different contexts or settings.

Conclusion

The current study "Association Between Patient Safety Culture and Missed Nursing Care among Nurses at a Tertiary Care Hospital in Karachi, Pakistan" represents a significant stride in the relatively uncharted domain of patient safety culture (PSC) and missed nursing care (MNC) within the Pakistani healthcare context. This pioneering research has made notable contributions by illuminating several key areas vital for healthcare stakeholders in the country.

At its core, the study reveals a substantial proportion of nursing professionals perceiving a fair to excellent patient safety culture, yet concurrently with a lower level of MNC in the Pakistani context. This unique dynamic suggests particular characteristics inherent in the country's healthcare system, which may differentiate it from patterns observed in other global settings. The revelation not only adds to the existing body of knowledge but also opens avenues for deeper exploration into the specific aspects that contribute to this trend.

Furthermore, the research sheds light on significant gender-based disparities in MNC, with male nurses reporting higher instances of missed care. This novel finding in the context of

Pakistan invites further exploration into the role gender plays in nursing practice within the country, a trend that diverges from traditional perceptions often overlooking gender differences in nursing practice. Coupled with this is the impact of educational background and work experience on PSC and MNC. The study reveals that educational attainment and the accumulation of professional experience play crucial roles in shaping perspectives and practices related to patient safety and nursing care. This insight provides a strong case for targeted educational interventions and emphasizes the importance of experience in fostering a robust patient safety culture.

Moreover, the study brings into focus the cultural and organizational contexts within Pakistan that may shape PSC and MNC. The variations in MNC across different nursing environments, such as wards and critical care units, underscore the need for targeted strategies to address the unique challenges of these settings. This finding is crucial as it points toward the necessity of tailored approaches and resource allocation to enhance nursing care and patient safety in different healthcare environments.

The prominence of factors such as unexpected patient volume and inadequate staffing as primary reasons for MNC underscores systemic issues in the Pakistani healthcare system. These challenges, mirrored in global healthcare trends, necessitate multi-faceted approaches including policy changes, resource allocation, and process optimization to ensure the delivery of optimal nursing care.

Furthermore, the study's demonstration of a significant negative association between PSC and MNC reinforces the importance of cultivating a robust patient safety culture. This finding aligns with global research and emphasizes the need for continual emphasis on PSC within

healthcare institutions. It suggests that enhancing the patient safety culture can be a pivotal strategy in reducing instances of MNC.

While the study's strengths lie in its comprehensive approach, the use of validated instruments, and a substantial sample size, the cross-sectional design and focus on a single hospital limit its generalizability. This limitation highlights the necessity for further research across diverse healthcare settings in Pakistan to obtain a more comprehensive understanding of PSC and MNC across the country's healthcare landscape.

Recommendations

1. **Further Research in Diverse Healthcare Settings in Pakistan**: Given the study's limitation in generalizability due to its focus on a single hospital, it is recommended that similar studies be conducted across various healthcare settings in Pakistan. Additionally, undertake qualitative studies to gain deeper insights into the experiences and perceptions of nurses regarding Patient Safety Culture (PSC) and Missed Nursing Care (MNC), focusing on barriers and facilitators in their work environment. Conduct longitudinal research to track changes in MNC over time, understanding how interventions and policy changes impact MNC in Pakistani healthcare settings. This will offer a more comprehensive understanding of the patient safety culture and MNC throughout Pakistan's healthcare landscape.

2. **Targeted Educational Programs and Initiatives**: Develop and implement specialized educational interventions that focus on PSC and MNC, tailored to different career stages of nursing professionals. Simultaneously, conduct gender-specific research and develop

training programs to address the identified disparities in MNC between male and female nurses.

3. **Strengthening Patient Safety Culture and Addressing Systemic Challenges**: Healthcare institutions should focus on enhancing PSC through regular training, awareness programs, and policy adjustments. Concurrently, address systemic issues like unexpected patient volume and staffing shortages through policy changes, resource reallocation, and process optimization.

4. **Dynamic and Safe Staffing Model Adjusted for Patient Acuity and Volume:**

   It is recommended to develop and implement staffing standards that are not only quantitatively adequate but also qualitatively aligned with the goal of fostering a strong patient safety culture and reducing missed nursing care incidents. Healthcare institutions should adopt a standardized, safe and adaptive staffing model guided by Patient Safety Culture (PSC) metrics and Missed Nursing Care (MNC) data to ensure staffing levels are responsive to patient needs and conducive to minimizing missed nursing care, thus upholding patient safety and care quality.

5. **Incorporate the concepts of PSC and MNC into Nursing Curriculum:** Nursing education programs should integrate comprehensive PSC and MNC training into their curricula to foster a foundational understanding of its principles among future nurses emphasizing its critical role in patient care outcomes. This should include education on the global challenges of healthcare delivery, particularly in developing countries, where resources may be more constrained. Introduce simulation-based learning experiences that focus on the identification, prevention, and management of MNC situations. Through

these exercises, students can gain hands-on experience in prioritizing care, managing workloads effectively under staff constraints, and making critical decisions that minimize the risk of MNC.

6. **Context-Specific Strategies for Diverse Nursing Environments and Experience Utilization**: Develop tailored approaches for enhancing nursing care and patient safety in various settings, such as wards and critical care units. Additionally, leverage the experience of seasoned nurses through mentorship programs and knowledge-sharing platforms, recognizing the impact of professional experience on PSC and MNC.

7. **National Policy Frameworks and Stakeholder Collaboration**: Utilize the study's findings to inform national healthcare policies and guidelines. This involves a collaborative approach with healthcare providers, policymakers, and other stakeholders to develop strategies addressing the challenges identified in PSC and MNC.

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Appendix A: Permission letter from Chief Nursing Officer (CNO), AKUH

آغا خان یونیورسٹی
THE AGA KHAN UNIVERSITY

May 18, 2023

To,
Ms. Khairunnisa Hooda
Chief Nursing Officer,
Aga Khan University Hospital, Karachi.

Subject: Permission for Data Collection

Dear Ms. Hooda,

I am Zaifullah Khan, student of Master of Science in Nursing (MScN) at the Aga Khan University School of Nursing and Midwifery (AKU-SONAM), Karachi Pakistan. I am conducting a research study as a requirement of the master program, under the supervision of Dr. Saleema Gulzar, Associate Professor and Director, Research & Innovation at AKU-SONAM. We hereby seek permission from you for data collection from nurses at AKUH.

The title of the study is ***"Association between patient safety culture and missed nursing care among nurses at a Tertiary Care Teaching Hospital in Karachi, Pakistan."***

Study Purpose: The purpose of this study is to assess the patient safety culture among nursing staff and the missed nursing care in Aga Khan University Hospital in Karachi, Pakistan. Moreover, the study will examine the relationship between patient safety culture and missed nursing care among nursing staff and will also explore the factors that contribute to missed nursing care among nursing staff.

Procedure of data collection: Study population will be all the nurses working at AKUH. The data collection process will be conducted through structured questionnaires. After obtaining informed consent from the participants, the questionnaires will be distributed to the nursing staff and they will be given instructions on how to complete the questionnaires. The researcher will collect the completed questionnaires and check for completeness and accuracy.

Risk factor and benefit: This study is only for academic purpose and no potential harm anticipated to the participants for their participation. Moreover, there will be no monetary compensation in response to participation.

Ethical Consideration: Data collection will begin after approval from the Ethical Review Committee of AKUH. The proposed study will consider all the possible ethical consideration, which includes anonymity, confidentiality, informed consent, and institution's permission. Findings of the study will be disseminated without identifying information of the participants and name of the institution.

Title of the Research Study

"Association between patient safety culture and missed nursing care among nurses at a Tertiary Care Teaching Hospital in Karachi, Pakistan."

Primary Investigator
Zaifullah Khan
MScN Student,
AKU-SONAM Pakistan

Thesis Supervisor
Dr. Saleema Gulzar
Associate Professor and Director,
Research & Innovation, AKU-SONAM Pakistan.

I, Khairunnisa Hooda, Chief Nursing Officer, The Aga Khan University Hospital, Karachi, accepts to access participants' data and collect required information after seeking their informed consent in the above study.

Signature

MAY 18, 2023

Date

Appendix B: Approval from Ethics Review Committee (ERC) AKU.

آغا خان یونیورسٹی
THE AGA KHAN UNIVERSITY

31-Jul-2023

Dr. SALEEMA GULZAR
Department of School of Nursing and Midwifery
Aga Khan University
Karachi

Dear Dr. SALEEMA GULZAR,

2023-8846-25893, SALEEMA GULZAR: Association between patient safety culture and missed nursing care among nurses at a tertiary care teaching hospital in Karachi, Pakistan

Thank you for submitting your application for ethical approval regarding the above mentioned study.

Your study was reviewed and discussed in ERC meeting. There were no major ethical issues. The study was given an approval for a period of one year with effect from 31-Jul-2023. For further extension a request must be submitted along with the annual report.

List of document(s) approved with this submission.

Submission Document Name	Submission Document Date	Submission Document Version
Zaif CITI Certificate		
GCP-certificate Saleema Gulzar		
Permission Letter AKUH	19-May-2023	01
Zaifullah Consent form V.02	15-Jun-2023	02
Permission MISSCARE Tool -B.Kalisch	15-Jun-2023	01
SOPS-Hospital-Survey V.03	25-Jul-2023	03
MIISSCARE Tool V.03	25-Jul-2023	03
Zaifullah Proposal ERC V.03	25-Jul-2023	03
Zaif ERC Response Sheet 1	25-Jul-2023	01

Any changes in the protocol or extension in the period of study should be notified to the Committee for prior approval. All informed consents should be retained for future reference.

Please ensure that all the national and institutional requirements are met.

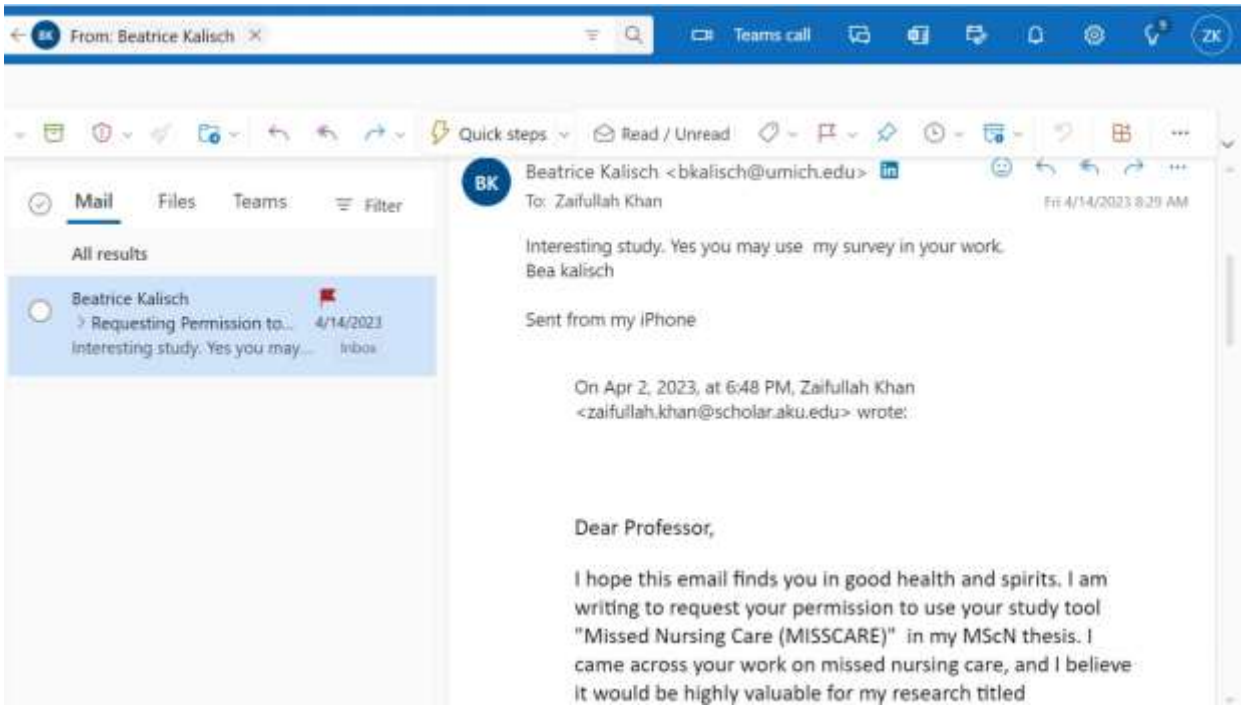
Thank you.

Sincerely,

Dr. Saniya Sabzwari

Chairperson
Ethics Review Committee

Appendix C: Permission to use study too MISSCARE Survey



Appendix D: Consent Form

The Aga Khan University

Informed Consent Form

Title of study:

"Association between patient safety culture and missed nursing care among nurses at a Tertiary Care Teaching Hospital in Karachi, Pakistan."

Principal investigator: Dr. Saleema Gulzar

Co. Investigator: Mr. Zaifullah Khan

1. Introduction

I am Zaifullah Khan, a student of Master of Science in Nursing (MScN) at Aga Khan University School of Nursing and Midwifery Karachi. I am conducting a research study to investigate the association between patient safety culture and missed nursing care. This study is supervised by Dr. Saleema Gulzar Associate Professor, Director, Research & Innovation, AKU-SONAM, Karachi Pakistan. I would like to invite you to participate in this research study.

2. Purpose of research study

The purpose of this study is to assess the patient safety culture among nursing staff and the missed nursing care at a tertiary care teaching hospital in Karachi, Pakistan. Moreover, the study will examine the relationship between patient safety culture and missed nursing care among nursing staff and will also explore the factors that contribute to missed nursing care among nursing staff.

3. Procedure: In this study, you will be asked to fill out research questionnaires. For this purpose, 2 structured questionnaires will be used to record your responses.

1st questionnaire (HSOPSC) is for assessing Patient safety culture and the 2nd questionnaire (MISSCARE) is to assess missed nursing care. Completing both questionnaires will take approximately 20-30 minutes approximately. After the completion of the questionnaires, your participation will be considered complete in this research study.

4. Possible risks or benefits

There is no risk involved in this study except for your valuable time. You will not get any monetary incentive for participating in the study. Your participation in this study may

withdrawing from the study. You have to inform the researcher if you wish to withdraw from the study at any point of time, upon withdrawal your consent will be considered void and your data will be discarded safely.

8. Available Sources of Information

Appendix E: Study tool 1: Hospital Survey on Patient Safety Culture (HSOPSC)

Questionnaire 01: Hospital Survey on Patient Safety Culture

Form No: A-_____(To be filled by the investigator)

Study Title: *"Association between Patient Safety Culture and Missed Nursing Care among Nurses at a Tertiary Care Teaching Hospital in Karachi, Pakistan"*

Instructions

This survey asks for your opinions about patient safety issues, medical errors, and event reporting in your hospital and will take about 10-15 minutes to complete. If a question does not apply to you or your hospital or you don't know the answer, please select "Does Not Apply or Don't Know."

- ***"Patient safety"*** *is defined as the avoidance and prevention of patient injuries or adverse events resulting from the processes of healthcare delivery.*
- ***A "patient safety event"*** *is defined as any type of healthcare-related error, mistake, or incident, regardless of whether or not it results in patient harm.*

Demographic Data

Gender:_____ Age:_____

Qualification (Select 1 option only): 1. Diploma ☐ 2. BScN ☐ 3. MScN ☐

Total Experience:

☐ a) Less than 1 year ☐ b) 1 to 5 years ☐ c) 6 to 10 years ☐ d) 11 or more years

Your Unit/Work Area

Select ONE answer.

☐ 1. Many different hospital units, No specific unit

Medical/Surgical Units

☐ 2. Combined Medical/Surgical Unit
☐ 3. Medical Unit
☐ 4. Surgical Unit

Patient Care Units

☐ 5. Emergency Department
☐ 6. Cardiology (Including CCU)
☐ 8. ICU (all adult types)
☐ 9. Obstetrics & Gynaecology
☐ 10. Oncology
☐ 11. Paediatrics (including NICU, PICU)

☐ **Other, please specify:** _____

SECTION A: Your Unit/Work Area

How much do you agree or disagree with the following statements about your unit/work area?

Think about your unit/work area:	Strongly Disagree ▼	Disagree ▼	Neither Agree nor Disagree ▼	Agree ▼	Strongly Agree ▼	Does Not Apply or Don't Know ▼
1. In this unit, we work together as an effective team	☐1	☐2	☐3	☐4	☐5	☐9
2. In this unit, we have enough staff to handle the workload	☐1	☐2	☐3	☐4	☐5	☐9
3. Staff in this unit work longer hours than is best for patient care	☐1	☐2	☐3	☐4	☐5	☐9
4. This unit regularly reviews work processes to determine if changes are needed to improve patient safety	☐1	☐2	☐3	☐4	☐5	☐9
5. This unit relies too much on temporary, float, or PRN staff	☐1	☐2	☐3	☐4	☐5	☐9
6. In this unit, staff feel like their mistakes are held against them	☐1	☐2	☐3	☐4	☐5	☐9
7. When an event is reported in this unit, it feels like the person is being written up, not the problem	☐1	☐2	☐3	☐4	☐5	☐9
8. During busy times, staff in this unit help each other	☐1	☐2	☐3	☐4	☐5	☐9
9. There is a problem with disrespectful behavior by those working in this unit	☐1	☐2	☐3	☐4	☐5	☐9
10. When staff make errors, this unit focuses on learning rather than blaming individuals	☐1	☐2	☐3	☐4	☐5	☐9
11. The work pace in this unit is so rushed that it negatively affects patient safety	☐1	☐2	☐3	☐4	☐5	☐9
12. In this unit, changes to improve patient safety are evaluated to see how well they worked	☐1	☐2	☐3	☐4	☐5	☐9
13. In this unit, there is a lack of support for staff involved in patient safety errors	☐1	☐2	☐3	☐4	☐5	☐9
14. This unit lets the same patient safety problems keep happening	☐1	☐2	☐3	☐4	☐5	☐9

SECTION B: Your Supervisor, Manager, or Clinical Leader

How much do you agree or disagree with the following statements about your immediate supervisor, manager, or clinical leader?

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Does Not Apply or Don't Know
1. My supervisor, manager, or clinical leader seriously considers staff suggestions for improving patient safety	☐1	☐2	☐3	☐4	☐5	☐9
2. My supervisor, manager, or clinical leader wants us to work faster during busy times, even if it means taking shortcuts	☐1	☐2	☐3	☐4	☐5	☐9
3. My supervisor, manager, or clinical leader takes action to address patient safety concerns that are brought to their attention	☐1	☐2	☐3	☐4	☐5	☐9

SECTION C: Communication

How often do the following things happen in your unit/work area?

Think about your unit/work area:	Never	Rarely	Some-times	Most of the time	Always	Does Not Apply or Don't Know
1. We are informed about errors that happen in this unit	☐1	☐2	☐3	☐4	☐5	☐9
2. When errors happen in this unit, we discuss ways to prevent them from happening again	☐1	☐2	☐3	☐4	☐5	☐9
3. In this unit, we are informed about changes that are made based on event reports	☐1	☐2	☐3	☐4	☐5	☐9
4. In this unit, staff speak up if they see something that may negatively affect patient care	☐1	☐2	☐3	☐4	☐5	☐9
5. When staff in this unit see someone with more authority doing something unsafe for patients, they speak up	☐1	☐2	☐3	☐4	☐5	☐9
6. When staff in this unit speak up, those with more authority are open to their patient safety concerns	☐1	☐2	☐3	☐4	☐5	☐9
7. In this unit, staff are afraid to ask questions when something does not seem right	☐1	☐2	☐3	☐4	☐5	☐9

SECTION D: Reporting Patient Safety Events

Think about your unit/work area:	Never	Rarely	Some-times	Most of the time	Always	Does Not Apply or Don't Know
1. When a mistake is caught and corrected before reaching the patient, how often is this reported?	☐1	☐2	☐3	☐4	☐5	☐9
2. When a mistake reaches the patient and could have harmed the patient, but did not, how often is this reported?	☐1	☐2	☐3	☐4	☐5	☐9

3. In the past 12 months, how many patient safety events have you reported?

- ☐a. None
- ☐b. 1 to 2
- ☐c. 3 to 5
- ☐d. 6 to 10
- ☐e. 11 or more

SECTION E: Patient Safety Rating

1. **How would you rate your unit/work area on patient safety?**

Poor	Fair	Good	Very Good	Excellent
☐1	☐2	☐3	☐4	☐5

SECTION F: Your Hospital

How much do you agree or disagree with the following statements about your hospital?

Think about your hospital:	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Does Not Apply or Don't Know
1. The actions of hospital management show that patient safety is a top priority	☐1	☐2	☐3	☐4	☐5	☐9
2. Hospital management provides adequate resources to improve patient safety	☐1	☐2	☐3	☐4	☐5	☐9
3. Hospital management seems interested in patient safety only after an adverse event happens	☐1	☐2	☐3	☐4	☐5	☐9
4. When transferring patients from one unit to another, important information is often left out.	☐1	☐2	☐3	☐4	☐5	☐9
5. During shift changes, important patient care information is often left out	☐1	☐2	☐3	☐4	☐5	☐9
6. During shift changes, there is adequate time to exchange all key patient care information	☐1	☐2	☐3	☐4	☐5	☐9

1. **How long have you worked in this hospital?**

   ☐a. Less than 1 year
   ☐b. 1 to 5 years
   ☐c. 6 to 10 years
   ☐d. 11 or more years

2. **In this hospital, how long have you worked in your current unit/work area?**

   ☐a. Less than 1 year
   ☐b. 1 to 5 years
   ☐c. 6 to 10 years
   ☐d. 11 or more years

3. **Typically, how many hours per week do you work in this hospital?**

   ☐a. Less than 30 hours per week
   ☐b. 30 to 40 hours per week
   ☐c. More than 40 hours per week

Appendix F: Study Tool 2: MISSCARE Survey

Questionnaire 02

Missed Nursing Care (MISSCARE) SCALE

(Kalisch & Williams, 2009)

Form No: B-_____(To be filled by the investigator)

Study Title: *"Association between Patient Safety Culture and Missed Nursing Care among Nurses at a Tertiary Care Teaching Hospital in Karachi, Pakistan"*

Demographic Data

Gender:_____ Age:_____

Qualification (Select 1 option only): 1. Diploma ☐ 2. BScN ☐ 3. MScN ☐

Total Experience:

☐ a) Less than 1 year ☐ b) 1 to 5 years ☐ c) 6 to 10 years ☐ d) 11 or more years

Your Unit/Work Area

Select ONE answer.

Multiple Units, No specific unit

☐ 1. Many different hospital units, No specific unit

Medical/Surgical Units

☐ 2. Combined Medical/Surgical Unit
☐ 3. Medical Unit
☐ 4. Surgical Unit

Patient Care Units

☐ 5. Emergency Department
☐ 6. Cardiology (Including CCU)
☐ 8. ICU (all adult types)
☐ 9. Obstetrics & Gynaecology
☐ 10. Oncology
☐ 11. Paediatrics (including NICU, PICU)

☐ **Other, please specify:** ☐

Section A: Missed Nursing Care

Nurses frequently encounter multiple demands on their time, requiring them to reset priorities, and not accomplish all the care needed by their patients. To the best of your knowledge, how frequently are the following elements of nursing care MISSED by the nursing staff (including you) on your unit? Check only one box for each item.

- Check only one box for each item.

#	Questions	Never Missed	Rarely Missed	Occasionally Missed	Frequently missed	Always Missed
1						

Section B: **Reason for Missed Nursing Care.**

To the best of your knowledge, please select the reasons for missed nursing care from the following options. You can check more than one box if applicable.

	Reason for Missed Nursing Care	Mark ✓
1.	Unexpected increase patient volume and/or patients' illness	

Appendix G: Literature Review Data Extraction Table

#	Authors	Year	Country	Aim	Sample	Method	Findings
1.	María Teresa Segura-García	2023	Spain	The aim of this analysis was to evaluate the culture of patient safety among the healthcare professionals and identify the factors that contribute to this perception, including its strengths and weaknesses.	1763	Cross Sectional	The participants demonstrated a strong perception of patient safety, with several strengths identified. Notably, efficient teamwork, mutual support among colleagues, and the support provided by managers and unit heads were prominent. However, certain weaknesses were also observed. These included the utilization of floating professional templates, a perception of work pressure and a fast-paced environment, and the occurrence of information loss during patient transfers between units and shift changes.
2.	RR Ramos, CC Calidgid	2018	Philippines	The purpose of this assessment was to evaluate the patient safety culture specifically among nurses working at a government hospital in the Philippines.	292	Cross Sectional	Teamwork within Units received the highest positive rating (91.50%), followed by Organizational Learning - Continuous Improvement (86.89%). However, Nonpunitive Response to Error had the lowest positive rating (17.65%). These ratings highlight the strengths and areas for improvement in the patient safety culture among nurses at the government hospital in the Philippines. Enhancing the nonpunitive response to errors is essential for creating a safer healthcare environment.
3.	A Al-Mandhari, I Al-Zakwani, M Al-Kindi	2014	Oman	The objective of this assessment was to examine the response rates of safety culture surveys in Oman,	398	Cross Sectional	There were no significant differences in the average positive response rates between Oman and the United States (58% vs. 61%; p=0.666), Taiwan (58%

				the United States, Taiwan, and Lebanon.			vs. 64%; p=0.386), or Lebanon (58% vs. 61%; p=0.666).
4.	AK RJ, ZH Chin, P Sharlyn, B Priscilla	2019	Malaysia	The purpose of this assessment was to evaluate the views and perceptions of healthcare professionals regarding the patient safety culture specifically at Sarawak General Hospital (SGH).	500	Cross Sectional	The study concluded that the patient safety culture at Sarawak General Hospital (SGH) is deemed satisfactory or adequate.
5.	Alemayehu B. Mekonnen Andrew J. McLachlan, Jo-anne E. Brien, Desalew Mekonnen & Zenahebezu Abay	2017	Ethiopia	The objective of this assessment was to evaluate the views and perceptions of healthcare professionals regarding the patient safety culture specifically in public hospitals in Ethiopia.	480	Cross Sectional	The study revealed a significant deficiency in patient safety culture within Ethiopian public hospitals. Interestingly, nurses scored higher on the overall patient safety scale compared to other healthcare professions (P = 0.03). This indicates that there may be variations in the perception and implementation of patient safety practices among different healthcare professionals in the Ethiopian public hospital setting.
6.	Julia Hiromi Hori OkuyamaTaís Freire GalvãoMarcia Terezinha Lonardoni CrozattiMarcus Tolentino Silva	2019	Brazil	The aim of this assessment was to measure the patient safety culture within a Brazilian hospital.	324	Cross Sectional	The survey findings revealed weaknesses in the patient safety culture of the Brazilian hospital, as indicated by unfavourable response percentages below 50% in 09 out of the 12 aspects measured. This suggests that improvements are needed in these areas to enhance patient safety practices and foster a stronger culture of safety within the hospital.

7.	Marwa Salem, John Labib, Ahmed Mahmoud, and Silvia Shalaby	2019	Egypt	The study was conducted in two ICUs at Egypt's University Hospital with the objective of examining the patient safety culture features from the nurses' perspective.	60	Cross Sectional	Out of the 60 nurses, 47.5% considered the overall patient safety grade to be satisfactory. Among all respondents, the dimension of 'Organizational learning' had the highest average percent positive patient safety dimension score at 51%, while the dimension of 'Frequency of incidents reported' had the lowest score at 6%. These findings highlight the variation in perceptions of patient safety culture among nurses in the two ICUs at Egypt's University Hospital, with particular attention needed to improve incident reporting practices
8.	Mehmet Top Sabahattin Tekingündüz	2015	Turkey	The purpose of this assessment was to evaluate the perceptions of nurses regarding the patient safety culture specifically in a Turkish hospital.	200	Cross Sectional	The study results indicated that nurses responded most positively to the aspects of hospital management encouragement for patient safety and supervisor/manager expectation and actions that promote patient safety. These findings suggest that nurses in the Turkish hospital perceive strong support and emphasis on patient safety from hospital management and their supervisors/managers.
9.	Alexander Akologo,Aaron Asibi Abuosi,Emmanuel Anongeba Anaba	2019	Ghana	The study was conducted in three selected hospitals in Ghana with the objective of investigating the perception of healthcare personnel regarding patient safety culture.	406	Cross Sectional	The findings of the study indicated that two out of the twelve patient safety culture aspects had a high favourable response percentage of 70% among healthcare personnel. These aspects were unit-level collaboration, with a response rate of 81.5%, and organizational learning, with a response rate of 73.1%. The study also identified areas for improvement in

							dimensions such as "Non-punitive Response to Error," "Event Reporting Frequency," and "Staffing." These findings suggest that there is a need to enhance the non-punitive approach towards errors, encourage more frequent reporting of incidents, and address staffing concerns to further improve the patient safety culture among healthcare personnel in the studied hospitals in Ghana.
10.	Fadi El-Jardali , Farheen Sheikh, Nereo A Garcia, Diana Jamal & Ayman Abdo	2014	Saudi Arabia	The study was conducted in a large hospital in Riyadh, Saudi Arabia, with the aim of exploring the association between patient safety culture predictors and outcomes. The study also took into consideration respondent characteristics and facility size to analyze their potential impact on the results.	3000	Cross Sectional	The study identified areas of strength in the patient safety culture of the large hospital in Riyadh, Saudi Arabia. These areas included Organizational Learning and Continuous Improvement, as well as Teamwork within units. On the other hand, the study highlighted areas that require improvement, namely hospital non-punitive response to error, staffing, and Communication Openness. Addressing these areas of improvement can contribute to enhancing the overall patient safety culture within the hospital.
11.	C. Wagner M. Smits, J. Sorra, C.C. Huang	2013	USA, Netherlands, Taiwan	The objective of this examination was to assess the similarities and differences in hospital patient safety culture among three countries: the	210,387	Cross Sectional	The study findings indicate that in all three countries (the Netherlands, the USA, and Taiwan), most hospitals scored high in the aspect of teamwork within units, reflecting a strong sense of collaboration. However, the area with significant potential for improvement in all three

				Netherlands, the USA, and Taiwan.			countries is Handoffs and transitions, highlighting the need to enhance the safety practices during patient transfers. Differences were observed between the countries on various dimensions. These include Non-punitive response to error, Feedback and communication about error, Communication openness, Management support for patient safety, and Organizational learning—continuous improvement. These variations suggest that each country may have distinct strengths and weaknesses in their patient safety culture. Overall, respondents from the USA expressed a more positive perception of safety culture in their hospitals compared to Dutch and Taiwanese respondents. This implies that the US healthcare system may have implemented practices or initiatives that contribute to a more favourable safety culture.
12.	Hayfaa Ali, Samaa Zenhom Ibrahem, Buthaina Al Mudaf, Talal Al Fadalah, Diana Jamal & Fadi El-Jardali	2018	Kuwait	The aim of this study was to evaluate the patient safety culture in public hospitals in Kuwait and compare the results with regional and international studies that	12,092	Cross Sectional	The results of the assessment demonstrated a noteworthy association between patient safety outcomes and composites in Kuwaiti public hospitals. In comparison to regional and international studies that utilized the same measurement tool, the benchmarking analysis indicated that Kuwaiti hospitals perform at or above the established benchmarks on several composites. This suggests that

				employed the same measurement tool.			the patient safety culture in Kuwaiti public hospitals is relatively strong and comparable to or exceeds the performance of other similar healthcare settings.
13.	Lena Sharp, Kristi Rannus, Anna Olofsson, Daniel Kelly, Wendy H. Oldenmenger	2018	Estonia, Germany, the Netherlands, and the United Kingdom.	The objective of this exploration was to examine the differences in the perceived patient safety culture among cancer nurses working in Estonia, Germany, the Netherlands, and the United Kingdom. The study aims to gain insights into the variations in patient safety culture across these countries and identify any unique characteristics or challenges specific to each country's healthcare system.	393	Cross Sectional	The findings indicate that the United Kingdom scored higher than Estonia and Germany in terms of perceived patient safety culture among cancer nurses. The overall patient safety grade across all four countries had a mean score of 61.3. Among the various dimensions assessed, "Teamwork within units" received the highest rating, while "Staffing" received the lowest rating in all four countries. These results highlight the importance of teamwork in promoting patient safety and suggest a need to address staffing concerns to further enhance patient safety culture in these countries.
14.	Nahed Alquwez, Jonas Preposi Cruz	2018	Saudi Arabia	This study aimed to assess the patient safety culture within three general hospitals in Saudi Arabia and to identify areas of strength and areas for improvement in the patient safety culture within these hospitals.	351	Cross Sectional	Nurses in the assessment recognized Collaboration within Units and Organizational Learning as the hospital's strengths, indicating a positive perception of teamwork and continuous improvement. However, they also identified weaknesses in areas such as "Feedback and Communication about Errors," "Teamwork Across Units," and "Management Support for Patient Safety." These findings suggest the need for improvement in providing effective feedback and

							communication channels regarding errors, enhancing teamwork across different units, and strengthening management support for patient safety initiatives.
15.	Mohammad Zakaria, Kiaei; Amir, Ziaee; Rafat, Mohebbifar; Hamideh, Khoshtarkib; Hamideh, Elnaz Ghanati; Azadeh, Ahmadzadeh; Saeideh, Teymoori; Omid, Khosravizadeh; Masoumeh, Zieaeeha.	2016	Iran	The study assessed the patient safety culture in three central provinces of Iran, aiming to understand the current state and identify areas for improvement.	522	Cross Sectional	The study identified variations in the ratings for different dimensions of patient safety culture among the provinces. The average favourable reaction across the 12 areas of patient safety was 62.9%. Among these areas, 'Organizational learning' received the most favourable responses at 71.18%, while 'Handoffs & Transitions' received the least favourable responses at 54.49%. These findings highlight the need to focus on improving handoffs and transitions to enhance patient safety culture in the studied provinces.
16.	Carmen tereanu Giuseppe sampi Etro Francesco Sarna Taro	2017	Moldova	The study aimed to assess the patient safety culture (PSC) in Moldavian hospital settings, specifically focusing on identifying areas that require immediate attention.	929	Cross Sectional	he study findings suggest that addressing staffing concerns is crucial for ensuring safe care in the Moldavian hospital settings. The reluctance of staff to openly report unpleasant occurrences and handle errors may stem from a lack of awareness about the potential for learning from these experiences and a fear of blame or punitive measures.
17.	C Tereanu, Ms Ghelase, G Sampietro	2017	Romania	The study aimed to assess the patient safety culture among healthcare staff in Romania.	1184	Cross Sectional	The study revealed high overall perceptions of safety (80%) and positive feedback and communication about errors (75%) among healthcare staff in Romania. However, there were areas that received lower positive response rates (PPRs), including

							Staffing (39%), Frequency of Events Reported (59%), and Non-punitive Response to Errors (61%). Additionally, nurses showed significantly higher PPRs compared to doctors. These findings highlight the need to address issues related to staffing, event reporting, and non-punitive response to errors in order to improve the patient safety culture in Romanian healthcare settings.
18.	Kenan Gözlü1 Sıdıka Kaya	2016	Turkey	The evaluation aimed to assess the patient safety culture perceived by nurses in a JCI-accredited hospital in Turkey and compare it with AHRQ data.	70	Cross Sectional	'Teamwork within units' received the most favourable responses, while staffing had the least favourable responses among nurses in the evaluation. Additionally, 78% of nurses rated patient safety as excellent or acceptable, and 53% did not report any incidents in the past 12 months.
19.	MCN Oliveira, HDCS Leite, VCA Lopes Revista da Escola de	2022	Brazil	The investigation aimed to explore the reasons associated with the omission of nursing care in a university hospital in Brazil.	227	Cross Sectional	The study findings revealed that the most frequently omitted nursing care activity in the university hospital in Brazil was walking patients three times a day or as prescribed. The primary reason reported for this care omission was the unexpected increase in patient volume and/or severity within the unit. These findings suggest that the hospital's capacity to provide adequate nursing care may be strained during periods of high patient demand or acuity, leading to the omission of certain care activities.
20.	Alvisa Palese, Elisa Ambrosi, Letizia	2015	Italy	This study aimed to identify the extent, nature, and	314	Cross Sectional	The study findings indicated a substantial amount of basic and clinically relevant nursing

	Prosperi, Annamaria Guarnier, Paolo Barelli, Paola Zambiasi, Elisabetta Allegrini, Letizia			reasons for missed nursing care (MNC) in the Italian medical care setting. It also explored the factors influencing the occurrence of MNC.			interventions being perceived as missed in the medical unit. This suggests that essential aspects of patient care were not consistently provided, potentially leading to adverse consequences for patients. Missed nursing interventions can range from routine activities such as medication administration, vital signs monitoring, and patient mobilization to more complex tasks involving patient education, wound care, and symptom management. These omissions have the potential to compromise patient safety, delay recovery, and contribute to suboptimal patient outcomes.
21.	Beatrice J. Kalisch, Boqin Xie	2014	United States	This study presented a synthesis of several studies conducted on the topic of missed nursing care.	4086	Cross-Sectional/ Qualitative	The findings indicate that there is a significant prevalence of missed nursing care that is consistent across various healthcare facilities. The root causes of this phenomenon are attributed to inadequate staffing resources, insufficient material resources, and ineffective communication. There appears to be a negative correlation between staffing levels and missed nursing care, whereby an increase in staffing levels is associated with a decrease in missed nursing care. The attainment of Magnet status and increased levels of teamwork have been found to be correlated with a reduction in instances of missed nursing care. Conversely, a higher incidence of missed care

							has been linked to decreased levels of staff satisfaction.
22.	Helga Bragadóttir, Beatrice J. Kalisch, Gudný Bergthora Tryggvadóttir	2017	Iceland	The paper aimed to identify the contributing factors of missed nursing care in hospitals in Iceland.	864	Cross Sectional	The study identified several factors associated with missed nursing care in Icelandic hospitals, including the type of hospital and unit, age and role of the participants, staffing adequacy, and nursing teamwork.
23.	Eileen T. Lake, Hayley D. Germack, Molly Kreider Viscardi	2016	United States	The study aimed to investigate the prevalence of missed nursing care in hospitals across the United States and assess its impact on patient care experiences.	15320	Cross Sectional	The study revealed that missed nursing care is a prevalent issue and exhibits significant variation among hospitals in the United States. On average, nurses reported failing to perform 2.7 out of 12 required care activities per shift. Furthermore, 73.4% of nurses reported at least one instance of missed care during their last shift. The most commonly overlooked activities were comforting or communicating with patients and care planning.
24.	Amanda J. Hessels, Linda Flynn, Jeannie P. Cimiotti	2015	United States	The objective of the study was to investigate the relationship between the nursing practice environment and missed nursing care in acute care hospitals.	7000	Cross Sectional	The study revealed that inadequate staffing and insufficient resources were the primary practice environment factors strongly correlated with occurrences of missed nursing care events.
25.	Heather L. Tubbs-Cooley, Constance A. Mara	2019	United States	The aim of the study was to evaluate the association between NICU nurse workload	136	Cross Sectional	The study findings indicated a significant association between the workload of NICU nurses and missed nursing care. Notably, subjective workload ratings emerged as particularly significant in this relationship.

				and missed nursing care			
26.	Ian Blackman, Evridiki Papastavrou, Alvisa Palese	2018	Australia, Cyprus and Italy	The study aimed to measure and model the beliefs of nurses from Australia, Cyprus, and Italy regarding missed care and its frequency.	1896	Cross Sectional	The results of the study indicate that certain variables have a direct influence on the frequency of missed care, while others, including age, highest qualifications, absenteeism rate, and workplace type, contribute to explaining the overall scores of missed care. Interestingly, gender was found to have no influence on missed care.
27.	Eileen T. Lake, Pamela B. de Cordova, Sharon Barton	2017	United States	The objective of the study was to describe the frequency and patterns of missed nursing care in inpatient paediatric settings and examine whether missed nursing care is associated with unfavourable work environments and high nurse workloads.	2187	Cross Sectional	The study's findings revealed that over half of the paediatric nurses surveyed had missed care during their previous shift, with an average of 1.5 necessary care activities being missed. It was observed that missed care was more prevalent in poor work environments compared to better work environments. Additionally, nurses working in inpatient paediatric care settings with fewer patients and a professionally supportive work environment reported lower rates of missed care, thereby enhancing the quality of patient care.
28.	Christopher R. Friese, Beatrice J. Kalisch Kyung Hee Lee	2013	United States	The study aimed to investigate the frequency of missed nursing care in inpatient oncology units and identify the factors associated with missed care.	352	Cross Sectional	The study revealed that in inpatient oncology units, the most frequently missed nursing care activities were ambulation, care conference attendance, and mouth care. Comparatively, oncology units had lower rates of missed care compared to non-oncology units. The study also found that higher patient

							assignments were associated with an increase in reported missed care. These findings suggest that missed care is a prevalent issue in both inpatient oncology and non-oncology units, and suboptimal staffing levels contribute to the occurrence of missed care.
29.	Rebecca P. Winsett, Kendra Rottet1, Abby Schmitt	2016	United States	The study aimed to evaluate the self-reported occurrence of missed nursing care and identify the reasons behind missed care as reported by nurses in medical surgical units.	168	Cross Sectional	The paper highlights the most commonly missed nursing care tasks in medical surgical units, including ambulation as ordered, medications given within a specific time frame, and mouth care. Nurses identified several reasons for the occurrence of missed care, such as unexpected increases in patient volume or acuity, heavy admissions and discharges, inadequate assistance or staffing, unavailability of medications when needed, and urgent situations requiring immediate attention. These factors contribute to the challenges in delivering timely and comprehensive nursing care in the medical surgical setting.
30.	Duffy, Joanne R. Culp, Stacey Padrutt, Tom ADN	2018	United States	The study aimed to assess the factors associated with missed nursing care in an acute care community hospital.	138	Cross Sectional	The study revealed that missed nursing care is prevalent and linked to various factors. The findings indicated that inadequate staffing levels and insufficient resources are strongly associated with missed nursing care. Additionally, nurses' satisfaction with their current position and the quality of nurse-

							physician relationships were negatively correlated with missed care. The study also highlighted that missed nursing care was more common in medical-surgical and telemetry units compared to specialty units.
31.	María Guadalupe Moreno-Monsiváis1, Catalina Moreno-Rodríguez, María Guadalupe Interial-Guzmán	2015	Mexico	The study aimed to identify instances of missed nursing care in hospitalized patients and explore the factors associated with it, as perceived by both nursing staff and patients.	160	Cross Sectional	The findings indicate that there is a misalignment between nursing care and patient needs, resulting in care that is either omitted or delayed. The nursing staff identified factors such as human resources (staffing levels) and material resources (availability of necessary supplies) as contributing to missed nursing care. Similarly, patients also highlighted the importance of human resources (adequate number of nursing staff) and effective communication in preventing instances of missed care.
32.	Sung-Hyun Cho, Y.-S. Kim2, K.N. Yeon	2015	Korea	The study aimed to compare the occurrence of missed nursing care between high-staffing units and low-staffing units in order to assess the impact of nurse staffing levels on missed care.	232	Cross Sectional	The study's results indicate that there is a significant difference in the occurrence of missed nursing care between high-staffing units and low-staffing units. Nurses in high-staffing units reported a lower mean score of missed care compared to those in low-staffing units. These findings suggest that increasing nurse staffing levels can contribute to a reduction in missed care incidents
33.	Raúl Hernández-Cruz, María Guadalupe Moreno-Monsiváis,	2017	Mexico	The study aimed to identify the factors influencing missed nursing care in hospitalized patients.	71	Cross Sectional	The primary factor identified as contributing to missed nursing care was human resource-related factors, such as inadequate staffing levels and insufficient numbers of healthcare

	Sofía Cheverría-Rivera						professionals. These factors directly impacted the ability of nurses to provide all necessary care to patients. Additionally, communication-related issues were also found to be influential in missed care.
34.	Eileen T. Lake, Kathryn A. Riman1, Douglas M. Sloane	2020	United States	The study aimed to examine the relationship between changes in the hospital work environment, nurse staffing, and missed nursing care over a period of 10 years.	38,585	Panel Study	The findings revealed that improvements in the work environment and nurse staffing were associated with a reduction in missed nursing care. Moreover, the majority of hospitals showed positive changes in the work environment, such as increased resources and support, and improved nurse staffing levels. These improvements were reflected in a decrease in missed care, indicating that creating a favourable work environment and ensuring adequate staffing can positively impact patient care outcomes.
35.	Villamin, Colleen, Anderson, Jacqueline Fellman, Bryan Urbauer, Diana Brassil, Kelly	2019	Unites States	The study aimed to assess healthcare professionals' perceptions of missed care in medical, surgical, and hematologic oncology units after the implementation of a new patient care delivery system.	580	Cross Sectional	The study identified ambulation, turning every 2 hours, and care conference attendance as commonly perceived elements of missed nursing care in medical, surgical, and hematologic oncology units following the implementation of a new patient care delivery system. The results also indicate that the level of perceived missed care in a comprehensive cancer centre is similar to that in other hospital settings.
36.	Yuanyuan Yang Xiaohong Wang	2020	China	The study aimed to identify the risk of missed nursing care (MNC) and the	6158	Cross Sectional	The results of the study indicated that missed nursing care was frequently observed in basic care tasks, particularly those involving

	Yuli Zang			contributing factors in Chinese hospitals.			informal caregivers or during surge periods with a sudden increase in workload. The most commonly missed nursing care items were related to essential basic care activities.
37.	Rosa A. Zárate-Grajales, Luis A. Benítez-Chavira, Sandra Hernández-Corral, Edson Serván-Mori, Gustavo Nigenda, Jorge A. Amaya-Aguilar, Ma. Guadalupe Interial-Gúzman	2022	Mexico	The study aimed to examine the relationship between the work environment and missed nursing care in highly specialized hospitals in Mexico.	510	Cross Sectional	The study found a significant relationship between the work environment and missed nursing care in highly specialized hospitals in Mexico. Nurses working in conducive work environments reported lower levels of missed care compared to those in non-conducive environments.
38.	Zahra Chegini, Tohid Jafari-Koshki, Marzieh Kheiri3	2020	Iran	The study aimed to investigate the prevalence of missed nursing care among nurses in Iranian hospitals and explore the reasons behind it, as well as identify the factors associated with missed care.	215	Cross Sectional	The study found that missed nursing care was prevalent among nurses in Iranian hospitals, with a significant percentage reporting at least one missed care item during their last shift. The most commonly missed care activities were associated with patient discharge planning, teaching, emotional support, and interdisciplinary care conferences. Factors such as human resources, material resources, and communication challenges were identified as the main reasons for missed care. Furthermore, the study revealed that factors like sex, age, patient workload, patient discharge rate, and satisfaction with teamwork were

							linked to the occurrence of missed nursing care.
39.	Eunjoo Lee, Beatrice Kalisch	2021	United States, Korea	The study aimed to compare the types and reasons for missed nursing care in South Korea and the United States.	1188	Cross Sectional	The study found that Korean nurses reported a lower level of missed nursing care compared to their American counterparts. However, both groups of nurses identified labor resource problems as a common reason for missed care. This suggests that staffing and resource issues play a significant role in contributing to missed nursing care in both South Korea and the United States.
40.	Sri Theyshaini Nahasaram, Vimala Ramoo, Wan Ling Lee	2021	Malaysia	The study aimed to investigate the occurrence, factors, and outcomes of missed nursing care as perceived by Malaysian nurses.	364	Cross Sectional	The study findings indicate that the overall occurrence of missed nursing care among Malaysian nurses was relatively low, as evidenced by a score of 1.88 on a scale ranging from 1.00 to 5.00. This suggests that nurses reported a relatively low frequency of missed care activities in their daily practice. Additionally, the study identified different types of wards and human resources as factors that influence the occurrence of missed nursing care.
41.	Jane Ball, Trevor Murrells, Anne Marie Rafferty	2014	England	The study aimed to investigate the extent of care left undone by nurses in English NHS hospitals and explore its association with staffing levels, nurse ratings of care quality, and patient safety.	2917	Cross Sectional	The study found that a majority of nurses reported leaving care activities undone due to time constraints. This was particularly associated with higher patient-to-nurse ratios, indicating that low staffing levels contributed to missed care. Additionally, the study revealed that missed care was linked to lower nurse ratings of care quality and patient safety. These findings suggest that inadequate staffing levels may

							compromise the quality and safety of patient care.
42.	Mehar Ali, Khalida Naz Memon, Shanti Chouhan, Sindhu Almas and Heeralal	2021	Pakistan	The study aimed to evaluate the occurrence of missed nursing care and identify its determinants at a tertiary care hospital.	163	Cross Sectional	The study found that hygiene care was the most commonly neglected aspect of nursing care, with a considerable number of participants frequently missing basic medical needs of patients. Age was identified as a significant factor associated with missed nursing care, suggesting that older nurses may be more prone to experiencing such issues. Additionally, the majority of nurses reported staff shortage as a key determinant of missed care, highlighting the impact of inadequate staffing levels on the delivery of comprehensive nursing services.
43.	Ibrahim Abdullatif Ibrahim, Eltahra Elsayed abo Habieb	2020	Egypt	The study aimed to examine the connections between work environment, patient safety culture, and missed nursing care among staff nurses.	136	Cross Sectional	The study revealed that the work environment and patient safety culture had significant associations with missed nursing care among staff nurses. While the work environment was positively correlated with patient safety culture, both factors were negatively correlated with missed nursing care. These findings emphasize the importance of a positive work environment and a patient safety culture in minimizing the occurrence of missed nursing care.
44.	Kyoung-Ja Kim Moon Sook Yoo Eun Ji Seo	2018	Korea	The study aimed to investigate the impact of the nurse work environment and patient safety culture on the	186	Cross Sectional	The study revealed that missed nursing care was significantly correlated with clinical career, nursing work environment, and patient safety culture. Factors such as staffing and resource

				occurrence of missed nursing care in South Korean hospitals.			adequacy, nurse manager ability, leadership and support of nurses, clinical career, and perceptions of patient safety culture within the unit were identified as influential contributors to missed nursing care.
45.	Amanda J. Hessels, Mani Paliwal, Susan H. Weaver	2019	United States	The study aimed to examine the relationship between patient safety culture, missed nursing care, and adverse patient events in hospitals.	311	Cross Sectional	The study found that missed nursing care occurred at an occasional level across all units. The dimensions of patient safety culture were identified as significant factors influencing missed nursing care, quality of care concerns, and vascular access device events. Furthermore, missed care was associated with falls, highlighting the impact of missed nursing care on patient outcomes. These findings emphasize the importance of addressing patient safety culture and ensuring adequate nursing care to enhance patient safety and improve the overall quality of care.