

EXPLORING THE EFFECT OF NURSE STAFFING RATIOS ON PATIENT OUTCOMES IN AN EMERGENCY SETTING: A QUALITATIVE ANALYSIS IN A PRIVATE TERTIARY CARE HOSPITAL, KARACHI, PAKISTAN

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Abstract

Introduction:

Optimal care provision is the major concern among the healthcare leaders globally often influenced by inadequate staffing levels and linked with negative patient outcomes. Nurses in tertiary care settings face several challenges during their heavy shifts, which impact their ability to provide comprehensive care. Hence, optimal patient-nurse ratios are fundamental for providing optimum quality healthcare, but this remains underexplored in the Pakistani healthcare context. Therefore, our study aimed to explore nurses' experiences and perceptions and possible solutions to mitigate such challenges.

Methodology:

A Qualitative Exploratory Descriptive Design utilizing semi-structured in-depth face to face interviews, guided by Donabedian's conceptual model, was used to inquire this study. Through purposeful sampling, 13 participants were selected from the tertiary care hospital in Karachi. Furthermore, it employed thematic analysis to identify patterns and insights related to staffing ratios and patient outcomes.

Findings:

The finding revealed that insufficient staffing has a detrimental impact on patient outcomes, which in turn raises stress levels, lowers nurses' wellbeing, and increase nurse turnover.

Conclusion:

The findings emphasize the critical importance of adequate staffing, which is crucial for enhancing quality care and improving effective patient outcomes. Moreover, the study also identified gaps, including the need for retaining experienced staff, investment in career-enhancing opportunities for nurses, and adoption of evidence-based staffing models along with self-scheduling of working hours, which could significantly enhance nurses' work-life balance.

INTRODUCTION

The unpredictable and fast-paced nature of emergency care environments, a detailed analysis of the numerous factors influencing patient outcomes is necessary, and nurse staffing ratios stand out as a key component of this complex network. The standard of healthcare is influenced by several factors, including hospital features and management practices, and most directly by healthcare providers [1]. It is concerning that Pakistan's healthcare industry is facing an enormous shortage of nurses, which is decreasing the standards of quality care, increasing the disease burden, and negatively degrading the economic growth of the country. [2]. Studies conducted in LMICs have pointed out that improving access to high-quality healthcare is crucial to eliminating healthcare disparities and enhancing patient-related clinical outcomes [3]. Recognizing this as a critical insight, Pakistan must prioritize the strengthening of its institutions and addressing societal structures that promote healthcare inequities. This study expands on findings from LMICs and applies them to the healthcare system in Pakistan, where comparable disparities exist. By drawing attention to these common issues, it emphasizes the necessity of context-specific changes to provide equitable, efficient, and better nursing care in Pakistan. Studies have found an association between staffing and mortality and argued that the mortality ratio was lowest in hospitals with good work environments [5,6,7]. Numerous systematic evaluations and studies conducted in more than 20 LMICs have confirmed that adequate staffing showed better clinical outcomes, quality of care, and nurse well-being. It is also linked with higher patient satisfaction, reduced incidence of adverse events such as medication errors and falls, and improved mortality and morbidity ratios [4,8,9,10]. On the other hand, understaffing causes burnout, job dissatisfaction, and high turnover rates [6,8,9]. These situations contribute to compromised patient care, extended wait times, and treatment delays. Moreover, understaffing is linked to heightened stress and fatigue among nurses, which further aggravates the risk of errors

and negatively impacts patient clinical outcomes. Thus, approaches such as enhancing workforce planning, using technology for better resource allocation, and encouraging a supportive work environment are suggestive of addressing staffing challenges to improve patient outcomes.

Methodology

Study Design and Setting

The study was conducted in the emergency department of a private tertiary care setting in Karachi, Pakistan, using the Qualitative Exploratory Descriptive design to explore nurses' perceptions and experiences of working in an inadequately staffed nursing environment.

Participants

The researcher herself visited the study setting and recruited the participants through purposeful sampling. The inclusion criteria include full-time employees (either bedside nurses or administrative positions), with working experience of more than 6 months in the emergency department of a selected tertiary care hospital, nurses holding a valid PNC license to practice, and nurses who were willing to participate and provide informed consent were the part of the study. Conversely, the exclusion criteria encompassed nurses working in other departments, retired RNs, those on extended leave, and those who were reluctant to participate were excluded.

Study Guide and Data Collection

After a rigorous literature review, a self-developed semi-structured interview guide was developed to guide the research objective. The study commenced after the approval from the Ethics Review Committee (ERC) and subsequent approval from the Chief Nursing Officer (CNO) and the departmental Head of the tertiary care hospital. Before conducting the study, two pilot interviews, representing 10% of the total sample size, were conducted to assess the clarity and relevance of the questions. For those willing to participate, the researcher conducted Audio-recorded one-on-one in-depth interviews using a semi-structured interview guide. Field notes were

also taken and the process spanned a duration of eight weeks, with data saturation achieved by the 11th interview; however, two additional interviews were carried out to ensure that no new information was being introduced, resulting in a final sample of 13 interviews. Member checking was done to ensure that the researcher's voice doesn't predominate over the participant's voice, thereby, reducing the researcher bias. Some participants were also asked to verify their shared data, but no differences were found in their given data.

Data Analysis

To extract significant themes and patterns from the data, the researcher employed a Creswell's qualitative analysis approach, which involves organizing, transcription, coding, describing, interpreting, and representation of the data. Manual coding was performed, with codes being merged to construct categories, ultimately leading to the formation of themes. Generated themes were: "Compromised Patient Safety", "Workload-

Driven Risks", "Inconsistent Organizational Support" and "Proposed Solutions". (Table 2)

Ethical consideration

Before data collection, the ethical approval was obtained from the Ethics Review Committee at the Aga Khan University, Karachi (ERC # 2024-9768-29018). Written informed consent was taken, with strict confidentiality measures were maintained. Participants have the autonomy to withdraw at any stage of the study including at any point in time when they feel uncomfortable sharing views or experiences. To ensure participant privacy, unique code numbers were assigned, the collected data (soft) was password protected, and hard data was kept confidential and secured, accessible only to the primary researcher, thesis supervisor, and committee members.

Results

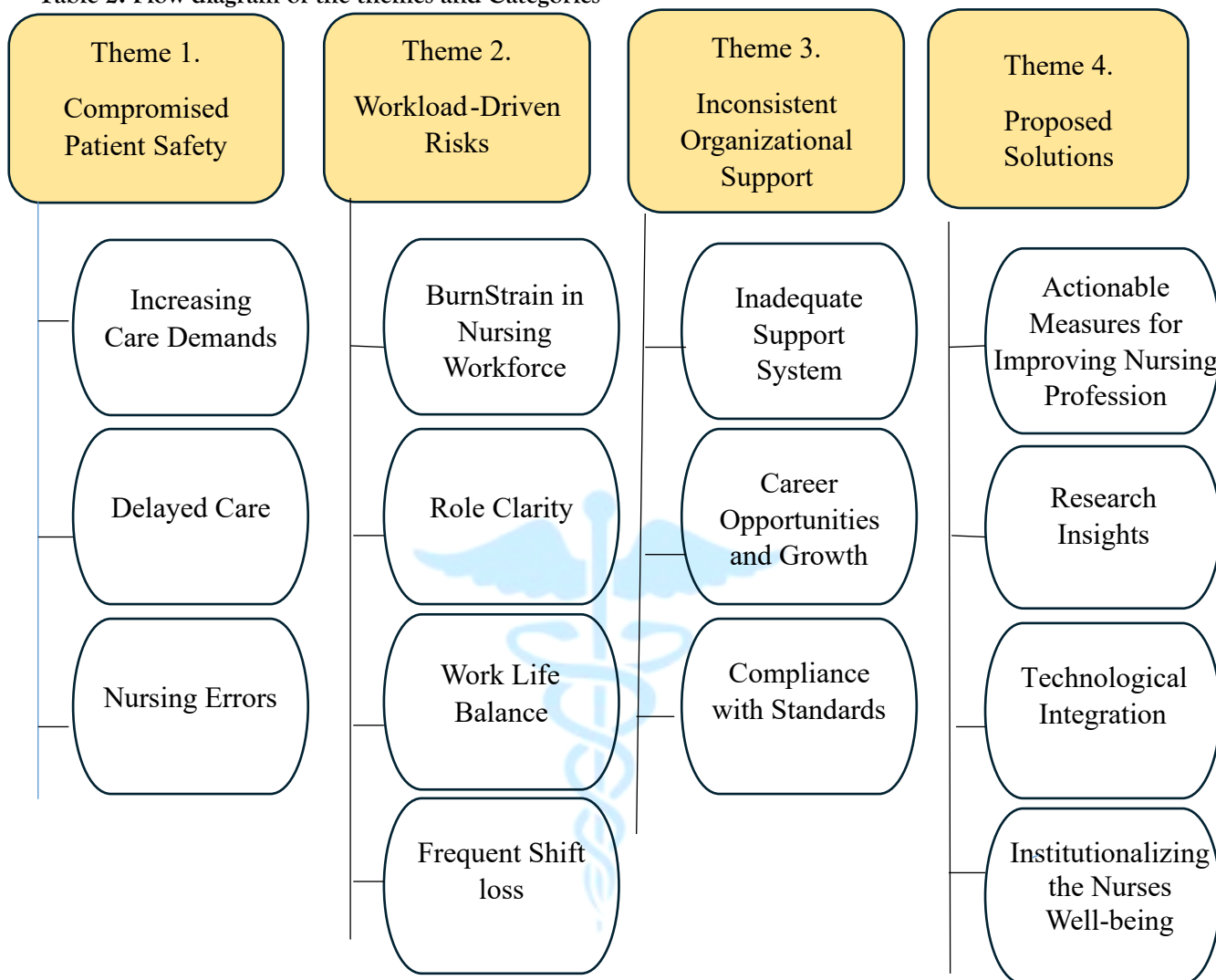
The research participants included 13 registered nurses, eight females and five males working at the emergency department of a tertiary care setting, with none refusing or withdrawing. (Table 1)

Table 1: Analysis of the Demographic Profile of the Participants (n=13)

Characteristics	Frequency(n)	Percentage (%)
Age (Y)		
25-30	n=10	(77%)
31-35	n=3	(23%)
Gender		
Male	n=5	(39%)
Female	n=8	(61%)
Marital Status		
Married	n=7	(54%)
Unmarried	n=6	(46%)

Professional Qualification General Nursing Diploma Post RN BSCN BSCN MSCN	n=0 n=1 n=9 n=3	(0%) (8%) (70%) (22%)
length of employment at the emergency setting < 5 years >5- 10 years	n=11 n=2	(85%) (15%)
Length of employment at other departments < 5 years >5- 10 years	n=9 n=4	(70%) (30%)
Total Nursing Experience <5 years >5- < 10 years >10- < 20 years	n=7 n=4 n=2	(54%) (30%) (16%)
Designation Staff Nurse Nursing Instructor Nurse Manager Other (HN & AHN)	n=10 n=0 n=1 n=2	(76%) (0%) (8%) (16%)

Table 2: Flow diagram of the themes and Categories



Theme 1: Compromised Patient Safety

Category 1.1: Increasing Care Demands: This category discusses the challenges posed by an aging population, rising patient expectations, evolving health paradigms, increasing reliance on technology and the growing prevalence of multimorbidity, which hinders patient care by overwhelming care providers. The following verbatim was recorded:

I have encountered patients who were all geriatric population, and had multiple complaints, which made

it very tough for me to prioritize their needs (Code P-02).

People are more aware of their health conditions because of advancements in technology. You Google and get a whole treatment list. People want higher standards of care and more personalized treatment, but we don't have adequate staff, which hinders our care provision (Code P-06).

Category 1.2: Delayed Care: This category addresses how factors such as inadequate staffing, high patient acuity, task overload, and the

unavailability of female staff contribute to delays in providing timely care. The following narrative highlighted the findings as:

When the patient was sent to another area, they were replaced with another new patient, a 75-year-old female with a 4th-degree bedsore. She was not letting me go, as I was the only female RN in my area. This was the time when I was so stuck and exhausted. Due to this, my other patients had to suffer (Code P04).

Work is so much that sometimes you're not able to go to the patient. Reducing paperwork could also help us focus more on the patient's care (Code P-10).

Category 1.3: Nursing Errors: It examines the factors contributing to nursing errors, highlighting how heavy workloads and multitasking demands often lead to lapses in focus and decision-making. The shared narratives were:

They forced me to work double shifts. It affects my concentration and causes errors in me (Code P-08)

Mistakenly, I gave the wrong dose to my patient when I was assigned to the Resuscitation area because I was so overburdened. I had 10 patients at that time (Code P-10)

Theme 2: Workload-Driven Risks

Category 2.1: BurnStrain in Nursing Workforce:

It examines the impact of the traumatic nature of the Emergency Department (ED), including the emotional and physical toll it takes on nurses. It highlights how double shifts and job dissatisfaction contribute to burnout and fatigue, further exacerbating stress and reducing the ability to provide effective patient care. The narratives were:

The problem is with the work environment. When your colleagues are suffering from the same trauma and the same stress, they are not able to support you. Instead, you get that negative vibe from them as well, which just adds to your stress. This can lead to burnout, compassion fatigue, and even show physical symptoms (Code P-01). Double shifting decreases your working capacity and physical stamina. It drains you, leaving you with no energy. Your cognitive function decreases, and your physical functioning is affected (Code P-04).

Category 2.2: Role Clarity: It emphasizes that when ED nurses are clear about their roles and responsibilities, they can perform their duties with confidence and compassion. This will avoid confusion, and the roles will not overlap with other health care providers. Participant shared:

You have to run for every task in the ED. Towards the distribution, the soil & clean utility, for the linen, for the central sterile services department (CSSD), and transfers. Everything you have to manage (Code P-02). With less staff you're putting a lot of pressure on that one staff and she is going to do mistake because she is having a lot of work on her head. She deals with a lot of people with different mindsets and takes care of the multiple patients all together (Code P-11).

Category 2.3: Work Life Balance: Excessive workloads and lack of personal time led to mental exhaustion, decreased productivity, and compromised well-being, ultimately contributing to nurse burnout. Verbatim shared by one of the participants as:

My job satisfaction is going low nowadays because I feel physically, mentally tired and drained. You have to deal with more patients in a day or which is creating a lot of pressure. You don't have time for your wellbeing (Code P-04).

Staffing shortage is a major issue. Every other day we do double shifts because we don't have someone to release us from our busy shifts. I have missed so many family events because of this issue (Code P07).

Category 2.4: Frequent Shift Loss: It explores that when nurses frequently miss shifts due to illness or other factors, they are unable to provide consistent care, leading to reduced monitoring of patients.

People usually inform sick and casuals in night, and when we ask the reason, majority verbalized the same dialogue as we did double in last shift, and it went so busy that's why we are not feeling well and can't join duty. It becomes hard to arrange duty and run the entire shift when you just have 5-6 RNs remaining (Code P-02).

My head and joints are aching, but I'm still made to do a double shift. There's no one to listen to and help you out, you just have to go with it because that's what we're

supposed to do. I am unable to monitor my patients closely (Code P-09).

Theme 3: Inconsistent Organizational Support

Category 3.1: Inadequate Support System: It explores how factors such as poor teamwork, inadequate motivation, inappropriate leadership behavior, and lack of a supportive environment contribute to an unsupportive work atmosphere. One of the junior RN shared:

I feel confident when I'm having a senior RN in my area who is going to help me in the difficult tasks, and we work as one team; whatever happens, we'll do it together (Code P-11).

I was new to the area, nothing was making sense to me, but my fellow RN and HCA guided and helped me so well and then after that, my shift went smoothly (Code P-01).

Category 3.2: Career Opportunities and Growth:

It highlights how the absence of clear career pathways and limited growth opportunities leads to decreased job engagement and dissatisfaction among nurses. Additionally, low salaries contribute to reduced morale, making retention difficult. One RN spoke:

I have been in ED for the last couple of years, but I don't see any clear role pathways to specialize further (Code P-03).

Many nurses are going abroad for better career opportunities, but I can't go because of family reasons. And the salary that the institution is giving is not satisfying. It's very hard to stay motivated (Code P-06)

Category 3.3: Compliance with Standards:

It focuses on how the pressure of managing multiple patients and working in underpaid, overburdened conditions hinders nurses' ability to meet quality standards. A participant, in a role as a TL, remarked:

I know institution is working so hard to be compliant with quality standards, but here nurses are underpaid and overburdened. Long tiring shifts create physical and mental weariness which further decrease their capacity to adhere to standards (Code P011).

Time is very less, and to complete tasks on time, many of us choose shortcuts, but deep inside we know it's affecting our quality standards (Code P-05).

Theme 4: Proposed Solutions

Category 4.1: Actionable Measures for Improving Nursing Profession: Participants presented different recommendations & solutions to improve nursing working conditions. According to some participants:

When junior nurses join the ED, they should have a simulation-based orientation before coming to the real scenario. They should teach how to handle complex situations, not only the patient, but also how to deal with their attendants, doctors, and other team members. (Code P-13).

Implementing a flexible staffing model might help with needed adjustments. For instance, using a staffing model, when more nurses are allocated to shifts with higher patient volume, equity is ensured. Like more at night or less in the morning (Code P-03)

Category 4.2: Research Insights: It emphasizes the importance of integrating recent research into nursing practice to improve patient care. It also highlights the role of an RN bank, a reserve of registered nurses, which helps to address staffing shortages, ensures adequate coverage, and improves patient care quality. Participant mentioned:

Leadership can implement a call nurses' approach so you have a bank of nurses at the back and the TL can call them anytime when they feel that the unit is understaffed or in crisis. Through this, the quality rises, and the nurses will get good compensation in return (Code P08).

Nurses should be involved in integrated approaches while addressing staffing challenges. It should include the team that involves designing and implementing staffing solutions like stakeholders, higher leadership, and HR, in which nurses can raise their concerns and voices so that their needs & concerns can be answered (Code P-08).

Category 4.3: Technological Integration: It discusses how the incorporation of modern technology can improve nursing efficiency and

patient care. Thought was shared by one of the participants in the following way:

I think implementing an EHR system in a hospital streamlines documentation and reduces paperwork. Everything will be electronic, from signing medication to documenting nursing notes. (Code P-01).

Integration of advanced patient monitoring technology, like wearable gadgets and tracking devices that continuously monitor real-time patient vitals and other metrics. This data can be viewed and tracked. So, no treatment delays occur, and the patient gets a better overall experience (Code P04).

Category 4.4: Institutionalizing the Nurses Well-being: It highlights self-made strategies implemented by the ED head to improve workflow and staff engagement. These initiatives are designed to address both operational efficiency and staff well-being. A leader shared,

We have started the transfer team system in which we have TTI that we call as transfer team in charges that are dealing with the old all sorts of the transfers, so there is a relief for the assigned staff because she's now not responsible to shift patient to another unit so here this workload has been divided (Code P10).

Currently institution as a whole is doing nothing for nurses' wellbeing because of several reasons, but I know that nurses' wellbeing is getting affected a lot. Every day 4-5 nurses are doing double, and their impression is depicted in their work. All I do for my staff is appreciate them by giving them small souvenirs or greeting them with a smile, which portrays that my staff means something to me (Code P-06).

Discussion

This study concluded that managing staffing ratios is important as low nurse staffing results in an increasing rate of adverse events and compromised patient safety. Nurses have also highlighted that poor resources in an organization lead to neglected care, near misses, or cause actual errors in medication administration, and many other potential threats. These results are consistent with the existing literature, that high nurse-to-patient ratios often result in reduced patient safety, high mortality rates, lower patient satisfaction, and a higher rate of adverse events like

medication errors, falls, pressure ulcers, critical incidents, infections, and readmissions due to the inability of nurses to provide thorough assessments and interventions [7,8]. Findings are also congruent with a study involving 303 ER nurses from various emergency units in Central Philippines, showing that nurses' workload is becoming more intense day by day, impacting patient safety and quality care [9]. Due to this excessive workload, nurses frequently have to make time-saving adjustments, lowering care quality and completeness. This can involve not taking care of patients and their families' psychosocial needs or failing to give proper patient education or basic hygienic responsibilities [10]. A survey conducted in the LMIC setting aligns with the same finding that after COVID-19, professionals are leaving the country for better benefits, but it is creating a burden on remaining staff with excessive workload and patient responsibilities. This emphasizes the importance of stabilizing healthcare; otherwise, patients and nurses will be at risk. It also necessitates the adoption of new roles and the acquisition of new competencies by healthcare providers [11]. Research showed that higher rates of ED utilization are associated with older people's increased susceptibility to acute health emergencies, comorbidities, and chronic illnesses. The ED has been greatly influenced by this shift in the population, as nurses are now expected to take care of the patients with more complicated medical demands [12]. These changes include demographics, deteriorating health conditions, involvement of new technology, and increasing demands for personalized care delivery. Furthermore, the constantly changing nature of healthcare delivery methods also places an additional obligation on nurses, which makes it difficult for nurses to prioritize their patients' complex needs [10]. Nurses reported a feeling of exhaustion when they were unable to respond to patient needs holistically. They point out that due to high patient volume and workload, it has been hard for them to provide personalized and quality care, which makes them frustrated, and it impacts their mental and physical well-being. In line with

this finding,[13], revealed that in addition to experiencing higher ratios of substance abuse, tensed relationships, and suicidal ideations, burnout professionals also strongly feel that their care is of decrease quality, and patients appear to be less happy with their services, which can negatively affect patient outcomes. When nurses feel continuous guilt or are unable to provide optimum quality care, it will contribute to a decreased sense of professional fulfillment and, in the long run, it will lead to feelings of helplessness and increase the likelihood of turnover as nurses seek better working conditions elsewhere. In the present study, the participants highlighted several challenges that include extended shifts with minimum wages, limited or no time for adequate rest, compassionate fatigue, lack of professional fulfillment, fairness among colleagues, and work-life imbalance. Similarly, these findings matched with other researchers which support that negative job characteristics, such as a high workload, low staffing levels, long shifts, limited authority over work, rigid schedules, time constraints, high psychological and job demands, less pay, role conflict, low autonomy, poor support from supervisors or leaders, lack of team dynamics, and job insecurity, have been repeatedly linked to nursing burnout [13, 15, 16].

In this study, nurses also reported that when they do double shifts with heavy workloads associated with other factors, their energy gets drained, which impairs their decision-making capacity, and their work-life balance gets compromised. This negatively influences their perceptions of job satisfaction and nurses' decision-making skills, ultimately affecting the quality they deliver. All these elements contribute to burnout, which increases the likelihood of turnover and the desire to leave the job and profession, resulting in the lack of workers on the floor, which further leads to increased burden, absenteeism, and higher incidences. Improving hospital nurses' work environments is crucial since job turnover and burnout are major contributors to the shortage of nurses, which is expected to reach 260,000 by 2025 [17]. Individuals under study also proclaimed to have suffered from problems

including backaches, lack of sleep, and even fractures due to falls because of rushing to finish tasks within the tight time frame. Further voiced that they frequently neglected their health due to meeting deadlines, which resulted in careless actions that raised the possibility of injury. These results are congruent with a study carried out in Malaysia concluded that as compared to other health professions, nurses were shown to have a six-fold greater prevalence of backache, musculoskeletal injuries, and ongoing headaches, which would raise their rate of job absenteeism, and cost of occupational disability. Moreover, because of this illness, nurses may quit their occupations due to excessive physical and mental stressors, which have a profound negative psychological impact and lower workers' quality of life [6, 18]. It also shared that overworked nurses often struggle to find time for exercise, provide compassionate care to those in need, make sound decisions, engage in religious practices, get adequate sleep, nurture their social lives, and take care of their families [19, 20]. These issues highlight the need for a support system for nurses that helps them maintain a healthy work-life balance.

In many parts of the world, recommended staffing levels are prevalent. In California, the nurse-to-patient ratio in the emergency department is 1:4 or less [18]. In New York, it's 1:2 [21], in the UK and Kenya, the ratio for ED is 1:3 [22, 23], in the USA, 1:2 for ICUs/ED and 1:5 for medical/surgical units, in Tasmania, ratios vary from 1:2- 1:4, and in Australia, the ratio for acute medical units and trauma units is 1:4 [7]. Nonetheless, research has indicated that a 1:4 nurse-to-patient ratio is optimal for improving patient outcomes, depending upon patient acuity, healthcare setting, allocated resources, and regulatory guidelines. [18, 24, 25]. Keeping the shortage in mind and impaired patient outcomes, the institution has implemented the model of Float Pool Nurses (FPNs), which allows them to work flexible hours with competitive salary packages. This initiative helps them in maintaining their clinical competencies while ensuring self-well-being without being a full-timer.

Enhancing nurses' well-being will require multifaceted, all-encompassing strategies that address their physical, mental, social, and moral health as well as the establishment of ethical, safe, and supportive settings. It is necessary to address occupational health hazards, workplace violence, stress and mental health issues, moral suffering, burnout, compassion fatigue, bullying, and incivility through improvements that change workplace policies and cultures to support nurses' well-being and ensure their capacity to provide high-quality care for individuals, families, and communities [27].

Implications and Recommendations

Research

- Implementation of the Electronic Health Records (EHR), Telehealth services, and advanced patient monitoring technology like wearable gadgets and tracking devices that continuously monitor real-time patient vitals and other metrics. This system enables the whole team through a central system to quickly access, promptly respond to patients' needs, update patient records online, track medical histories, and manage treatment plans more efficiently [28].

Practice and Policy

- Gender balance, adequate hiring of nurses based on patient acuity and departmental demands to ensure safe nurse-to-patient ratios[30].
- Implementation of a well-structured simulation-based orientation program for junior nurses not only helps them to transition smoothly into their advanced roles but also teaches them how to tackle scenarios in real time.
- By introducing evidence-based staffing models, self-scheduling of working hours, part-time options, and shift swap opportunities, nurses can accommodate personal needs and family commitments, which significantly enhances work-life balance [30, 31].

Education

- Nurses should participate in stress management programs that incorporate mindfulness, relaxation techniques, and coping

mechanisms to effectively handle occupational stress.

- Recognizing and rewarding hard work through appreciation programs, offering career-enhancing options to nurses, such as certification programs, leadership programs, and continuing education, offering fair and competitive wages, along with comprehensive benefits, coupled with fostering a supportive and positive work environment, boosts morale [32].

The Conclusion

This investigation highlights the vital role of optimum nurse staffing ratios in preserving patient safety, mitigating errors, nurses' well-being, quality treatment, and enhancing job contentment. The thematic findings of this study revealed that to establish a safer and more effective healthcare environment, there is a need for higher staffing, acuity-based nurse-to-patient ratios, and robust administrative support. This study distinctively contributes to the Pakistani setting by addressing the issues and challenges the local healthcare system is facing and suggesting context-specific tactics to enhance nursing practices and improve care delivery.

Author contributions

KK is the author who conceived this study and took IDIS. All four authors, KK, SG, BI, ZA, have significantly contributed to this study starting from the drafting to the analysis of the data findings and finally to the writing of this manuscript.

Conflict of Interest Statement

The authors reported no competing interests.

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