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Nurse stress and patient safety in the ICU: physician-led observational mixedmethods study

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ABSTRACT

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Dr Manju Mathew; dr.tresamaria@gmail.com **Introduction** Nurses working in intensive care settings are required to maintain constant vigilance, yet they often experience high stress and burnout, which can compromise the quality of patient care.

Objectives To identify stress and burnout among intensive care nurses, contributing risk factors and impact on patient safety, while providing an opportunity for nurses to discuss their work-related challenges.

Methods Setting: Observational mixed-methods study done in intensive care unit (ICU), tertiary teaching hospital, Kerala, India in July 2024.

Participants: Thirty nurses in the ICU (all females, mostly aged 25–35 years, >5 years of work experience) completed standardised questionnaires on stress levels, workload, burnout and work satisfaction. From this group, six nurses underwent structured interviews. Purposive sampling was done to capture diverse experience and roles. Reported patient safety incident data were collected. Severity of stress, workload, burnout and work satisfaction were classified into high or low levels based on predefined cut-off scores.

Results 86.7% reported moderate to high levels of combined outcomes of workload, stress or burnout, with 46.7% experiencing high levels of stress. Four major themes were identified in the qualitative analysis: stress, attitudes, patient safety and nurses' unmet demands and aspirations. Positive attitudes identified were passion, motivation and empathy. Key stressors included work overload, inadequate staffing, logistics, team and management support. Coping strategy was familycentred. A perceived need for a non-punitive, learningoriented environment was identified for fostering patient safety culture. Nurses' demands included facility safety, managerial support and better resources, both man and machine.

Conclusions Despite the specific challenges faced by ICU nurses in developing countries, they upheld positive values. Institutional leadership's commitment to implement patient safety culture and improve nurses' work environment is important. Future research should involve larger multicentre interventional studies.

INTRODUCTION

Patient safety is the cornerstone of effective healthcare, and intensive care unit (ICU) nurses play a crucial role by providing continuous care and maintaining detailed documentation.^{1–3} High stress in these

WHAT IS ALREADY KNOWN ON THIS TOPIC?

⇒ High stress levels among nurses, especially in critical care settings, cause burnout and nurse performance, which, in turn, negatively impact patient safety. Previous studies have identified stressors such as high workload, limited resources, blame and punitive culture, inadequate managerial support and poor teamwork. However, a deeper analysis is required to tailor interventions to specific cultural contexts.

WHAT THIS STUDY ADDS?

⇒ There is some evidence to show that cultural and organisational factors influence nurse stress, but specific challenges faced by nurses from developing nations are underexplored. This study identified key stressors affecting ICU nurses at the study centre in India, including inadequate staffing, non-nursing responsibilities, lack of equipment, cultural attitude to nurses and aggression from patients and their relatives.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY?

⇒ The study emphasises the importance of organisational support and strong leadership commitment to fostering a patient safety culture, along with interventions tailored to the unique challenges faced by nurses in developing countries. Future research could focus on these interventions and their effectiveness.

environments leads to burnout and affects both mental and physical health. This could significantly impact nurse performance and patient safety.⁴⁻⁶ The ICU is a highly demanding specialty with multiple stressors, ranging from direct job-related pressures to emotional, psychological and environmental challenges. The specialised expertise required to care for critically ill patients with complex and unpredictable needs, combined with high patient acuity and workload, demands constant attention, quick decision-making and often leaves nurses with inadequate time to rest and recover, ultimately impacting their well-being. Additionally, the ICU setting is characterised by high noise levels, complex machinery and frequent interruptions, which can result in cognitive overload and hinder nurses' ability to focus on patient safety. Emotional and psychological stressors, such as facing life-and-death situations and managing interactions with families of critically ill patients, can lead to compassion fatigue and burnout, potentially compromising the quality of care. Systemic issues, including inadequate staffing, lack of clear communication and support from administration, further contribute to ICU stress, affecting job satisfaction, overall performance and patient safety.^{4–6}

The interactions between work environment and employee health, known as work-health interfaces, in turn, impact patient care.⁷ Employees' attitudes, beliefs, practices and competencies shape a culture of safety within organisations.⁸ Patient safety culture is characterised by transparent communication, mutual trust, consistency and a shared vision for risk mitigation.⁹ Leadership commitment to employee well-being is crucial for nurturing this culture.¹⁰

Despite extensive research on stress in healthcare delivery, the unique impact of stressors on nurses within specific cultural and organisational contexts, like in India, is underexplored. Nurses often face a lack of recognition and undervaluation, fostering a negative work environment in some countries. Cultural perceptions of nursing as a subordinate role, lower pay and less support led to dissatisfaction. In Indian culture, nurses have traditionally been seen as docile and performing 'unclean work', which fosters 'racial groupism' against nurses.¹¹ Remnants of these attitudes persist in hospitals, where nurses' voices are ignored.¹²

Occupational stress, burnout and deficient coping strategies can lead to patient harm particularly in ICU, where the stakes are highest.^{13 14} Burnout is a syndrome of mental and physical exhaustion rooted in professional demands, leading to reduced motivation, irritability, fatigue, depression and impaired coping abilities.¹⁵ It is prevalent among healthcare professionals. Severe burnout is characterised by emotional exhaustion, depersonalisation and diminished personal accomplishment. Emotional exhaustion depletes energy and interest in work, while depersonalisation manifests as impassive attitudes and thoughts and fosters detachment as a coping mechanism against emotional exhaustion. Reduced personal accomplishment reflects feelings of diminished competence and undermines confidence and achievement at work.

Emotional exhaustion leads to reduced decisionmaking capacity. Emotional detachment diminishes the quality of compassionate care. This results in high risk of errors such as incorrect medication administration, delayed responses, missed critical signs, impaired communication and care breakdowns. The consequences of such errors or neglect could result in harm to patients, sometimes, severe.^{13 14} Screening for identification of stress and burnout among nurses using standardised tools is essential for leaders to compare their organisation to established benchmarks and implement effective action plans.

The objectives of this study were to identify stress and burnout among ICU nurses as well as the risk factors contributing to these issues and their impact on patient safety. Additionally, it aims to gain a comprehensive understanding of ICU nurses' perspectives, attitudes and personal experiences related to their work environment while offering them an opportunity to discuss their work situation and challenges.

METHODS

Patient or public involvement statement

It was not appropriate or possible to involve patients or the public in the design, or conduct, or reporting or dissemination plans of our research.

Study design, setting and participants

This mixed methods observational study was carried out at the ICU of a tertiary teaching hospital in Kerala, India in July 2024. Out of the 34 nurses working in the 15-bed ICU, 30 completed a standardised structured questionnaire. Four nurses were on long leave and did not participate in the study. In-depth interviews were conducted with six nurses selected from this group. Purposive selection was done by the investigator to involve nurses with varied work experience, roles and responsibilities in the ICU, to ensure a broad range of experiences and perspectives. The study received approval from the institutional ethics committee.

Data collection

Quantitative

Quantitative data included the results of a standardised and structured questionnaire and patient safety incidents reported in the previous year.

Structured questionnaire

The questionnaire used in the study was developed by the research team, which included a doctor with expertise in research and ICU workflow. Based on the informal feedback from ICU nurses, a literature review was conducted to gather relevant data. Nursing research has identified several common stress factors, such as high-pressure ICU work environment, dealing with end-of-life care, conflict with colleagues or leadership, lack of support or recognition, heavy workloads and uncertainty due to insufficient training or perceived lack of competence in handling work situations.^{16–24}

The standardised tools included in the questionnaire were:

- The Brief Nursing Stress Scale (BNSS), a concise version of the Nursing Stress Scale Instrument developed by Gray-Toft in 1981.
- ▶ The Single Item Burnout Assessment.
- ► The Michigan Organizational Assessment Questionnaire.²⁵⁻²⁸

These tools, addressing stress, workload, burnout and job satisfaction, were consolidated into a single questionnaire divided into sections. (online supplemental appendix 1). We included the sections on stress and workload from the BNSS. Cut-off scores were defined for high and low levels of each component. These thresholds are based on existing literature, including validated studies that used these questionnaires in similar populations. Before implementation, the questionnaire was validated by the ICU nursing team for relevance, clarity and accurate reflection of their experiences.

Patient safety incident reports for the previous year (August 2023 to July 2024) were collected. Table 3.

Qualitative structured interview

Despite efforts to create a comfortable and nonthreatening interview environment, we acknowledge that certain factors may have limited the nurses' ability to express themselves fully.

Interviewer: An experienced ICU physician and researcher (one of the investigators) conducted all interviews. To clarify the working relationship, the interviewer had no supervisory role over the nurses, who were overseen by the nursing administration, including the chief nursing officer and other nurse leaders, in accordance with the prevailing system in the region. System-related defects and nurses' concerns were often unaddressed, despite feedback from ICU staff. The interviewer, who had supported nurses' concerns over the past six years at the institution, had built strong rapport and trust, and was well aware of the challenges ICU nurses faced based on their feedback. For these reasons, the investigators believe that the nurses trusted the interviewer and spoke candidly during the interviews. The chances of them confiding to an unfamiliar interviewer were less likely. At the conclusion of the interviews, nurses expressed gratitude for highlighting their issues, reinforcing this belief. They felt that physician advocacy through research could bring attention to their concerns. Although anonymity and confidentiality were assured, some nurses may still have hesitated due to concerns about possible repercussions.

Interviewees: In-depth interviews were conducted with six nurses selected from the group who completed the quantitative questionnaire. Purposive sampling was conducted to maximise the relevance and depth of data collection, which is critical for qualitative exploration. Participation was voluntary, and the six interviewees were selected based on their convenience, willingness to participate and availability during shift hours. In addition, ICU nurses with varying years of experience working in critical care settings, either in the study hospital or elsewhere, and with different designations (head nurse, team leaders, bedside assigned nurses) were selected to capture a wide range of perspectives. This sample of ICU nurses had different roles, responsibilities and shift patterns. The sample consisted solely of female nurses from various age groups, as the ICU had only female nurse employees. Interview conduct: The nurses were interviewed for an hour at their convenience after taking informed consent. They were informed beforehand that the interview was being audio recorded. The interview was initiated with questions meant to put them at ease before potentially difficult ones. Open-ended questions were asked in a private and comfortable setting to ensure confidentiality and encourage open discussion. The interviews and participants' consent were audio-recorded. Any new topics raised by the interviewees during the conversation was encouraged and explored further by the interviewer.

Data collection instrument: A semistructured questionnaire was created to guide the interviews based on literature search and investigator's ICU work experience, encompassing four main areas: work experience, physical environment and health, motivation and passion for working in the ICU, and emotional stress and patient safety. Questions were designed to elicit reflective responses on nurses' experiences and perceptions (online supplemental appendix 2).

Reliability and validity

Data were collected by a single investigator using smartphone audio recording to ensure reliability and validity. Trustworthiness was maintained to the best of the ability of the investigator, to uphold objectivity and validity. Efforts were made to establish credibility with respondents. To accurately interpret participant responses, cultural factors, social dynamics and relevant phenomena influencing patient safety and interactions between nurses, patients and interdisciplinary team were examined. Recognising cultural norms was crucial for meaningful qualitative analysis.

Data analysis

Qualitative

Two investigators independently transcribed and coded the interview data from audio recordings, verbatim. English is the official language used in educational and professional settings in the state. The interview was conducted using both English and Malayalam to ensure clarity of ideas. Vernacular responses were translated into English.

A thematic analysis approach was followed, involving both deductive and inductive coding. The interview guide provided structure, but the interviewer ensured flexibility, allowing nurses to share experiences beyond the predefined questions.

Thematic analysis process

Thematic analysis followed Braun and Clarke's six-phase framework:

- 1. *Familiarisation with data*—researchers thoroughly read all interview transcripts multiple times to identify patterns.
- 2. *Generating initial codes*—recurring concepts related to stress, burnout, coping mechanisms and patient safety were systematically coded manually. Symbolic

meanings attributed by critical care nurses to social interactions and workplace dynamics were documented. Nurses interpret social interactions differently based on their experience and personal perspective. Seemingly small interactions can symbolise larger issues like communication breakdowns, inadequate support, hierarchical power dynamics, ultimately impacting patient care quality, eg, a dismissive tone from a colleague could represent a lack of respect for concerns.

- 3. Identifying themes
- 4. Reviewing themes
- 5. Each theme was clearly *named and defined* to capture its essence.
- 6. *Constructing the narrative*—a detailed report was developed, incorporating direct participant quotes to enhance authenticity and depth.

Rigour was ensured through triangulation, peer debriefing, member checking and reflexivity.

- Validation and data saturation—a subset of nurses validated the findings, resulting in minor refinements. Data saturation was achieved after six interviews, with no new insights emerging after the third.
- Accuracy and cross-checking—interview recordings and transcripts were thoroughly reviewed and crosschecked to prevent misinterpretation. Ambiguous responses were clarified during interviews.
- Peer debriefing—two qualitative research experts conducted coding and theme generation independently.
- Member checking—after initial analysis, findings were shared with a subset of nurses for validation.
- Reflexivity —investigators actively examined their assumptions and personal experiences to minimise bias. This, along with peer debriefing ensured objective interpretations.

Theoretical background

- 1. *Coding approach:* we used a combination of deductive and inductive coding, guided by the Job Demand-Resources (JD-R) model and Kolb's Experiential Learning Theory. The JD-R model helped identify job demands (eg, workload, stress) and resources (eg, support, coping strategies) influencing burnout and job satisfaction. Kolb's model provided insight into how nurses reflected on their experiences and applied learning in practice.
- 2. *Theme development:* analysis ensured themes were closely linked to theoretical constructs. Stress-related themes were categorised based on workload and support (JD-R model), while coping mechanisms were analysed through Kolb's reflective learning framework.
- 3. *Linking qualitative and quantitative data*:Triangulation of qualitative themes with quantitative data strengthened the conclusions, ensuring that the findings were grounded in both theoretical and empirical evidence.

Ensuring consensus

To minimise bias, we adopted team-based coding where two researchers independently coded the interviews before finalising themes through discussion. Consensus meetings resolved discrepancies to ensure themes accurately reflected the data without bias. All discrepancies were settled by consensus, achieving 100% inter-rater agreement.

Quantitative

Descriptive statistics used median, range and frequencies, percentages. Data from the questionnaires were entered into an MS Excel file and analysed using SPSS V.25 software. The analysis included individual and combined outcomes of stress, burnout and workload. A binary scoring system (eg, high/low or yes/no) was used even when there were more than two response options to simplify analysis, enhance reliability and ensure comparability with previous research or standardised tests. When only one option is correct, collapsing responses into binary categories aids in clear categorisation and dichotomous decision-making. Patient safety incidents were also included in the analysis.

Ethics

Institutional ethics approval and written informed consent was obtained prior to questionnaire completion and interviews. Strict protocols were followed to ensure the secure storage and management of all sensitive information. Access to these files was strictly limited to authorised research team members. Data confidentiality was maintained throughout the study and anonymisation was ensured by replacing personal details with unique identification codes. Participants were assured that their responses would be used solely for research purposes. Sensitive data including recordings and transcriptions will be securely retained for 5 years, as per ethical guidelines, and subsequently deleted or destroyed permanently. No external collaborators were involved in data sharing, and no personally identifiable information was included in any publications or presentations.

RESULTS

Context

This study was conducted in the ICU of a tertiary care teaching hospital in Kerala, India, a state with a high proportion of medical professionals and a significant trend of nurse migration abroad. The ICU staff includes registered nurses with a qualified BSc degree in nursing (4-year programme) or a Diploma in General Nursing and Midwifery (3-year programme). Nurses undergo regular training. Previously staffed with 60 nurses working in three shifts, this 15-bed ICU now operates with only 34 nurses. The medical team consists of three intensivists and nine in-house trainees available 24/7.

▶ Patient intake: the multidisciplinary ICU admits an average of 60 patients per bed annually with a

Table 1 Participant characteristics

| Variables | Quantitative data n=30 | Qualitative data n=6 | |
|-------------------------|---------------------------|-------------------------|--|
| Work location | ICU | ICU | |
| Age (years) | | | |
| 25–35 | 26 | 5 | |
| 35–45 | 4 | 1 | |
| Work experience (years) | | | |
| <5 | 5 | 1 | |
| 5–10 | 22 | 4 | |
| >10 | 3 | 1 | |
| Designation | | | |
| Nurse in charge | 1 | 1 | |
| Shift team leaders | 8 | 2 | |
| Other nurses | 21 | 3 | |
| | | -1- | |

ICU, intensive care unit; n, number of participants.

bed occupancy rate of 75%–80%, covering medical, surgical, trauma and obstetric emergencies.

- ▶ ICU design and layout: the ICU has a central workstation with 3 computer terminals and 11 cubicles around it for patient beds. Apart from this, there are four individual differential pressure rooms for isolation with a common computer area. Each patient bed has multipara monitors, wall suction and mechanical ventilation facilities.
- ▶ Nurse-to-bed ratio: the ICU is staffed with a nurseto-bed ratio of 1:1 for intubated and ventilated patients, and 1:2 for non-ventilated patients. This is the situation in most of the hospitals in the region.
- Nursing tasks: nurses in this ICU are responsible for patient monitoring and nursing care, medication indenting and administration, sending laboratory samples and following up reports, dealing with relatives, documentation, assisting physicians with procedures, maintaining inventory, audits, etc.
- Interdisciplinary ICU support services: the ICU has access to services such as chest X-ray, electrocardiography, portable echocardiography, ultrasonography, physiotherapy, regular training sessions, administrative support, etc.

A total of 30 nurses participated in the study. Table 1 presents the demographic characteristics of the participants, who had diverse ICU work experiences with varying designations. Most of them were in the age group 25–35 years and had 5–10 years of experience.

Among the three main components of the questionnaire, 46.7% of participants reported high levels of stress and burnout. The median score of each variable was calculated (table 2). All but one nurse reported high workload. Work satisfaction rates were mixed. When considering the combined outcome of the negative components, 76.7% of the participants reported moderate to high levels of stress, burnout and workload (figure 1).
 Table 2
 Frequency distribution of ICU nurses with stress, workload, burnout and work satisfaction and median category-wise scores

| Variables | n (%) | Median score (range) | |
|---|-----------|---|--|
| Stress Q1–Q6 | | | |
| High | 14 (46.7) | 16 (10–23) | |
| Low | 16 (53.3) | | |
| Total | 30 (100) | | |
| Workload Q7–Q8 | | | |
| Yes | 29 (96.7) | 4 (3–6) | |
| No | 1 (3.3) | | |
| Total | 30 (100) | | |
| Burnout Q9 | | | |
| Yes | 14 (46.7) | 24 (12–37) | |
| No | 16 (53.3) | | |
| Total | 30 (100) | | |
| Work satisfaction Q10 | | | |
| Yes | 15 (50) | 13.5 (3- 18) | |
| No | 15 (50) | | |
| Total | 30 (100) | | |
| | | Mean score of stress, workload, burnout: 45.5 (27- 62) | |
| When only one option was correct, responses were collapsed into binary categories for simplicity and comparability. | | | |

binary categories for simplicity and comparability. Cut-off for lowest and highest scores for Stress: 6, 24 Workload: 2, 6.

Burnout: low: 14–33, medium: 34–53, high: 54–72. Work satisfaction: low: 3, moderate: 9–12, high: 18. n, number of participants; Q, question.

Patient safety-related incidents reported from the ICU in the previous 1 year are shown in table 3. The researchers believe that near misses and adverse events without harm go unreported due to fear of repercussions, a concern acknowledged by a few nurses during interviews.

From the qualitative interview data, four major themes were identified: 'occupational stress', 'attitude to work', 'patient safety' and 'needs, demands and professional aspirations'. Subthemes were developed under themes (figure 2).

THEMES AND SUBTHEMES Theme 1: occupational stress

The theme was defined as the human response to a perceived difficult situation either emotional, mental or physical challenges related to their occupation. Participants reported various stressors that caused emotional, mental and physical stress, impacting their focus and commitment to work. Sources of stress included anxiety regarding punishments and penalties, higher expectations from management, work overload exceeding the shift duration, poor logistic



10% experienced high levels of combined negative outcome



support and lack of control over uncomfortable ICU conditions, such as cold temperature. Recent challenges included inadequately experienced staff due to rapid turnover, largely caused by the migration abroad and the inability to match the demand.

Subthemes

Subtheme 1: emotional stress

Participants reported experiencing significant mental stress due to various reasons. A participant with prior experience handling responsibilities felt considerably stressed out in this job, and said,

 I am not able to relax or do any work at home. I have developed high blood pressure recently.

One nurse found it difficult to attend to the needs of her young family, especially after night shifts. Four participants were able to relax at home with their families.

Furthermore, all of them found the death of young patients, emotionally unsettling, but were resilient enough to carry on with their work.

Table 3Adverse events reported from ICU (August 2023 toJuly 2024)

| Patient safety incidents | n |
|--|---|
| Endotracheal self-extubation | 3 |
| Central venous catheter pulled out | 1 |
| Medication error | 1 |
| Total patient-related incidents reported from ICU | 5 |
| ICU, intensive care unit: N, number of participants. | |



Figure 2 Qualitative analysis: themes, subthemes, codes.

 Yes, patients' death affects us, especially if the patient is young.

Subtheme 2: physical stress

Participants reported that physically challenging tasks without adequate staff or equipment assistance have led to various health ailments. Work-related ailments reported included back pain, hernia and hypertension.

For providing routine back care, we used to help each other. But these days, I must do it alone. There is a lack of teamwork, mostly because everyone is in a hurry to complete their tasks. 6

 ICU-specific procedures like prone ventilation, providing back care, positioning and mobilising the patients can be physically challenging, especially if they are overweight.

Family commitments after work without adequate rest and recuperation further burden the nurses. Infections acquired from the ICU during viral outbreaks drain their energy and add to their woes.

Four out of the five participants who had night shifts commented:

 Night AC is too cold... not only for us but for patients also. We can't control the temperature.

Two participants found the noise levels in the ICU uncomfortable. On a positive note, participants observed that the new shift schedule was convenient.

Subtheme 3: coping strategies

The predominant coping strategy for stress was centred around the participants' families with no option offered at the workplace. However, rather than discussing workplace problems with family or friends, most participants preferred to completely avoid thinking about workplace tensions when they were at home. As three participants shared:

 Once I go home after the shift, I don't think about work. I leave everything here.

Participants with additional responsibilities found it particularly difficult to destress, after work. In general, all participants seemed satisfied with the support from doctors. One participant described incidents of doctors giving corrections during rounds, causing embarrassment and hurt.

► ICU doctors are supportive. We have the freedom to tell them what we feel.

This might sound contrary to the statement that *There is a lack of teamwork*, which was in the context of teamwork among nurses.

Theme 2: patient safety culture

A prominent theme that emerged was a perceived deficiency in patient safety culture. We defined 'patient safety culture' as one where adverse events are utilised as learning opportunities to improve existing systems, rather than for blame. An overwhelming feeling of helplessness and inadequate support from both the hospital and nursing administration was perceived. There was general discontent that nurses' hard work and commitment go unappreciated, with an unfair emphasis on corrections and penalties. Nurses felt that the institutional leadership should listen to and act on their feedback.

Participants expressed their concerns as follows:

For small faults, we are made to feel stressed out and penalised; the nurse administration does not try to understand our problems or support us.

In addition, nurses expressed uncertainty about the safety of patients in the current situation.

 In the current situation, we cannot say for sure that patient safety is never compromised. Inadequately experienced nursing and ancillary staff and increased work demands resulted in incidents like delays in drug and blood procurement and administration. In addition, the current work scenario requires nurses to leave the patients' bedside frequently, primarily due to the lack of secretarial staff and a limited number of computer systems available in the ICU. Consequently, most participants reported accidents such as self-extubation and pulling out of central venous catheters and near misses, indicating compromised patient safety.

Quotes:

Calling bell or phone is constantly ringing. Since there is no support staff to attend to it, we must leave the patient's bedside to do that. Again, if and when we have to attend to two patients in a shift, it becomes hard to provide adequate care and medications on time.

Theme 3: attitude to work

In this theme, we have included all the values upheld by the nurses and their beliefs, while they go about with their nursing care. They possessed several positive values essential for patient safety, including empathy towards patients' suffering, passion and motivation to work in the ICU. The primary motivation identified was the opportunity for learning.

Quotes:

- Yes, delirious patients hurt us at times, but it's okay; it's part of the disease of the patient.
- ...Enjoys ICU work, particularly the learning opportunities we get.

Theme 4: nurses' unmet needs, demands and aspirations

Subthemes under this were nurses' needs and demands regarding workload, managerial support, facility safety and career aspirations.

Subtheme 1: nurse' workload

Work overload in the ICU is currently due to inadequate staffing both nurses and ancillary staff, such as nursing assistants and secretaries coupled with poor logistics. The only non-nursing staff dedicated to working in the ICU is a nursing assistant during daytime hours. At other times, non-nursing support was sourced from the general hospital pool and was not readily available. Nurses' work exceeds the shift time, often by half to 1 hour. Additional untrained temporary staff does not help the situation much as the ICU nurses have to supervise and cover up for their deficiencies also, in between patient care.

Quotes:

- Staffing has been reduced to half in recent years. Most days the file documentation is pending even after the shift.
- We have work other than nursing care and documentation. We must call the lab for reports, follow up on bill payments, and explain the process to the patient's relatives. In the evening shift, if the nursing assistant is unavailable, we end up doing their work also.

It should be noted that, previously, increased workload was identified as a stressor which negatively impacted team dynamics amonf nurses. These findings once again underscore the same message loud and clear, the need for improved resources.

Subtheme 2: facility safety

Experiencing aggression and verbal abuse from patients and relatives often leaves nurses vulnerable and emotionally unsettled.

- Three of the participants' quotes reflect these concerns:
- ► And whatever the patient's relatives say, we have to listen. Sometimes, what they say is hurtful.

Delayed security assistance in such situations often puts both nurses and patients at risk of harm. Prompt and functioning security measures are of extreme significance in the ICU. Intermittent failure of communication systems, software and electronic devices further compromises the workflow. Additionally, uncomfortable external conditions like extremes of temperature and humidity also affect performance. Nurses were satisfied with the availability of protective gear and infection control supplies.

Subtheme 3: managerial support

A perceived need for more appreciative and supportive hospital and nursing management was found. Since the nurses deliver final patient care in the ICU, management should make efforts to address their voices and concerns regarding their needs, safety and satisfaction. Three of the senior participants expressed their feelings about the need for support from the leadership.

Management has to support us so that we can ensure good quality of care and patient safety. Currently they don't seem to understand our problems.

Furthermore, the existing nurse sick leave policy requires them to visit the hospital outpatient department to obtain a physician's certification, leaving very little time to rest.

Subtheme 4: professional aspirations

A few participants expressed their aspirations:

 I wanted to pursue an MSc (Masters' degree) after completing my BSc but had to work due to family commitments.

Nurses thought that migrating abroad could reduce occupational stress and quality of life. Unless the hospital takes steps to achieve this cause, it will be hard to retain skilled nurses.

Finally, the nurses expressed gratitude and relief.

► Thank you for listening to us and for this opportunity to speak out our thoughts and feelings.

These findings highlight the stress experienced by the nurses and its causes. It demonstrates the ICU nurses' health status and its impact on patient safety.

DISCUSSION

This study provided a deep understanding of ICU nurses' attitudes, beliefs and challenges through interviews at the study centre in India. Nurses from different roles offered diverse views on work conditions and stressors. Most interviews showed consistent responses, except for one. The inconsistent account was analysed within its social context,

concluding that it was likely influenced by fear of potential repercussions. The survey of 30 ICU nurses revealed moderate to high levels of stress and burnout, supported by interview findings. Despite these challenges, nurses expressed job satisfaction and a strong commitment to patient safety, driven by empathy, passion, motivation and the learning opportunities their roles provided.

The study discovered several areas needing improvement to foster better patient safety. The study explored the specific stressors faced by ICU nurses in a developing country context and the perceived impact on nurse and patient safety. The findings of this study align with prior research on stress and burnout among ICU nurses. Sanlıtürk, in 2021, found that 20% of ICU nurses experienced high levels of stress, while 63% reported moderate stress levels.¹⁷ The primary causes were heavy workload and limited resources, which are consistent with this study's findings. Other reported stressors included dissatisfaction with the unit, working over 40 hours a week, caring for three or more patients per nurse, prolonged fatigue, deteriorating patient conditions, inadequate salary, team disharmony and negative work environments. Also, nurses had limited critical care experience, feared contracting infections and were worried about infecting their families. These issues have also emerged in this study.

Additionally, Dejours' theory about the gap between job expectations and reality contributing to stress was reflected in this study.¹⁸ The nurses' expression of concern for patient safety reflects the dissatisfaction they have about their performance ability. This difference in expectations and perceived unsatisfactory performance along with emotional exhaustion suggests signs of burnout.¹⁵

Nurses often manage stress by compartmentalising work and personal lives, relying on family support, detachment and resilience as reported by Oliveira *et al.*²⁹ However, these methods are not always effective. Notably, this study also revealed the need for workplace coping strategies. Along with stress alleviation strategies, appreciation of their work and listening to their feedback will help maintain the mental well-being of nurses and foster a patient safety culture in the organisation.

ICU nursing is both physically and mentally demanding. Unlike developed countries, many developing nations lack essential equipment for patient mobilisation, leading to physical health problems for nurses. The study advocates for better equipment to help reduce work-related health issues. Nakweenda et al and Esin et al highlighted similar challenges ICU nurses face in developing countries, including staff shortages and environmental stressors.^{30 31} Nakweenda's study in Namibia found that shortages in staff resulted in a higher nurse-to-patient ratio, often leading to delayed or incomplete care. Environmental factors, such as uncomfortable ambient temperatures, due to improper air conditioning control, and noise, further complicated nurses' work conditions and patients' comfort at night as described by Esin *et al*³¹

Unlike Shaw and Morrison's study, which reported the availability of well-being pages on hospital social media platforms for nurses to voice concerns, this study found no such efforts.²³ Nurses expressed concerns about a negative organisation culture, a lack of appreciation and support from the administration and a flawed sick leave policy. Teamwork, peer support and management backing are essential for creating psychologically safe environments where staff can express vulnerabilities and build resilience.^{8 9} Despite these challenges, the nurses in this study remained dedicated to patient safety and continuous learning.

Effect of stress and burnout on patient safety

Adverse events in healthcare are frequently linked to factors such as ineffective teamwork, inefficient organisational processes and the physical and psychological burden on healthcare professionals.³² ³³ Inadequate resources such as computer systems forcing nurses to leave patients' bedside, coupled with inadequate ancillary staff, compromised ICU patient safety as shown by serious adverse events. A systematic review of 21 studies found a strong association between burnout and declining patient safety, with physicians and nurses being the most affected.³⁴ High workload, extended working hours and poor interpersonal relationships contribute significantly to burnout, ultimately impacting patient care. Studies suggest that patient safety failures often arise from human factors such as inadequate communication, lack of teamwork and the psychological strain on healthcare workers.³⁵

Burnout—characterised by emotional exhaustion, depersonalisation and reduced personal accomplishment—remains a significant threat to patient safety, leading to increased medical errors, hospital infections and adverse outcomes.¹⁵ Nurses, respiratory therapists and day shift workers with five or more years of service report the highest levels of burnout. Regression analyses confirmed that independent variables such as emotional exhaustion and depersonalisation are important predictors of reduced job satisfaction, increased turnover intentions, and more frequent patient and family complaints.³⁶

In a study on healthcare-associated infections, one-third of surveyed nurses experienced burnout, correlating with increased infection rates and higher patient mortality.³⁷ Time pressure was found to increase exhaustion and negatively impact patient safety, particularly among highly burned-out nurses.^{21 22} Additionally, exposure to workplace aggression from patients or their families exacerbates emotional distress, diminishing focus on patient safety.^{33 36 38} While burnout did not directly affect error-reporting behaviour, it was associated with a reluctance to report errors that did not lead to adverse events.³⁶ Burnout is linked to lower 'perceived patient safety' and nurses experiencing moderate to severe burnout reported concerns about 'near misses' and medication errors.^{36 39 40}

Effect of workload on patient safety

Shaw and Morrison noted that excessive workload contributed to a lack of cooperation and team spirit, as seen in this study.^{23 33} Furthermore, both new staff recruitment and turnover were identified as stressors in that study. Staffing adequacy was identified as a crucial factor, directly influencing emotional exhaustion and job satisfaction among nurses. A structured nursing care model with clear definition of responsibilities allowed autonomy and work satisfaction. However, high nurse–patient ratios, insufficient ancillary staff and the presence of untrained personnel in critical care settings, compromise ICU safety, leading to increased adverse events.

Addressing burnout and its consequences

While personal resilience plays a role in managing burnout, workplace conditions are equally critical.²⁴ Combating burnout requires a dual approach: improving individual coping mechanisms while also implementing systemic changes to alleviate workplace stressors. Wellstructured nursing care workflows have been shown to enhance efficiency, mitigate burnout and improve patient outcomes. Key interventions on systemic factors to improve nurse well-being include optimising staffing, strengthening leadership support and fostering a positive work culture. At an individual level, providing continuous training and psychological and emotional support enhances nurse well-being and ensures patient safety.

Cultural factors and patient safety

The role of cultural and social factors in shaping attitudes towards patient safety is important to be considered during interpretation of interviews. Similarly, cultural emphasis on quality plays a key role in quality outcomes. Sensitivity to cultural norms and practices that may influence their experiences and social interactions is important in qualitative research. Different cultures may have different expectations regarding the level of disclosure and decision-making in healthcare interactions. Cultural beliefs about health and illness can influence how people perceive symptoms, seek care and adhere to treatment plans. The role of family and community in providing support and decision-making can vary across cultures. Understanding the social dynamics and phenomena allows for more accurate understanding of the multifactorial issues addressed through this research.⁴¹

Strengths of the study

This study provides fresh insights into the challenges faced by ICU nurses in developing countries with different cultural and societal expectations, along with resource constraints. Nurses experienced higher workloads, more stress and lower pay, often at the expense of their health and safety in these countries. The study is unique in that it was conducted by doctors focused on nurses' welfare, giving it a distinctive perspective in critical care research. The nurses were candid in their responses, appreciating the opportunity to share their feelings. The use of qualitative interviews offered a nuanced understanding of the stressors and coping mechanisms among ICU nurses.

Limitations of the study

This single-centre study was performed on a small sample of 30 ICU nurses. The interviewees were selected by the investigator, potentially introducing bias. Nevertheless, the interviews broadened our perspective of the workplace issues of ICU nurses. We acknowledge that the study would have been more comprehensive if it involved physicians' perspectives also. The study's scope on patient safety was limited by inadequate data on reported incidents, particularly near misses and adverse events, which did not lead to harm, restricting further exploration. Perceived patient harm was revealed in the interviews, although specific questions on this topic in the quantitative questionnaire were limited.

Implications of the study

This study found that stressors such as work overload, environmental discomfort and logistical challenges affected nursing care, demanding improved resources, streamlined systems and processes, and a positive work culture to prevent adverse events, near misses and delayed care. The implementation of effective coping mechanisms and robust support systems for ICU nurses is required. Ultimately, nurse well-being is of utmost importance for patient safety in the ICU.

Recommendations

To prevent the significant nurse attrition and turnover affecting patient safety in Kerala, hospitals and healthcare management must foster trust, care, open communication and a patient safety culture that appreciates frontline workers and values their opinions. Screening and evaluation using standardised tools can help leadership identify areas of organisational strength and weakness, enabling data-driven decisions, targeted actions for development, and the use adverse events as learning opportunities. The Kazak model, which promotes a psychologically safe space, and a sense of belonging is recommended.⁴² Testing-targeted interventions to reduce nurse turnover in ICUs is also necessary.⁴³

CONCLUSION

This study underscores the fact that improved working conditions including manpower, machines and logistics, and a shift towards a more supportive organisational culture are necessary to enhance nurse performance and ensure patient safety. Standardised tools could help in screening and identification of factors that undermine patient safety and quality of care. Institutional leadership commitment is required to promote patient safety culture. Future research should involve larger studies across various ICUs with different cultural contexts.

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