Alarm Fatigue and Moral Distress among Critical Care Nurses: A Concept Paper

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ABSTRACT

Alarm fatigue and moral distress are significant challenges for ICU nurses, affecting their well-being, performance, and patient safety. Alarm fatigue results from frequent false or non-actionable alarms, leading to desensitization, delayed responses, and increased stress, while moral distress arises when systemic or situational constraints prevent nurses from acting according to their ethical values, causing frustration, emotional exhaustion, and burnout. This study explores these issues among Malaysian ICU nurses, focusing on the unique challenges posed by resource limitations, cultural diversity, and organizational factors. Findings reveal that alarm fatigue compromises efficiency and patient outcomes, while moral distress undermines emotional resilience and job satisfaction. To address these issues, the study proposes interventions such as optimizing alarm systems with advanced technologies, refining alarm thresholds, and training nurses in alarm management. Additionally, it highlights the importance of psychological support, ethical decision-making frameworks, and collaborative environments to alleviate moral distress and promote resilience. By implementing these strategies, healthcare institutions can create supportive ICU settings that enhance nurse well-being, reduce burnout, and improve patient care, contributing to sustainable improvements in the broader healthcare system.

Keywords: Alarm Fatigue, Moral Competence, Moral Distress, ICU Nursing, Patient Safety

INTRODUCTION

Nurses working in intensive care units (ICUs) have a critical role in healthcare. They provide life-saving care to patients who are often in the most fragile states, to those requiring continuous monitoring and interventions. The demands of this role are immense, as ICU nurses must maintain high levels of attention, make fast and accurate clinical decisions, and at the same time manage complex medical situations (Cvach, 2012' Razieh et al., 2018). Their responsibilities often include interpreting data from advanced medical equipment, administering timely treatments, and coordinating care among multidisciplinary teams. These responsibilities, while essential, expose nurses to significant physical, emotional, and cognitive strain, particularly in high-pressure environments where the margin for error is minimal (Donkers et al., 2021; Saeedi et al., 2019; Wynne et al., 2021).

One of the major challenges ICU nurses faces is the overwhelming number of alarms from monitoring equipment and medical devices (Abou Hashish, 2017; Silverman et al., 2022). These alarms are essential for alerting staff to potential patient problems, such as changes in heart rate, oxygen saturation, or blood pressure. However, studies show that 72%–99% of these alarms are false or clinically insignificant (Cvach, 2012; Gazarian et al., 2019). This high rate of false alarms creates a phenomenon known as alarm fatigue**,** where nurses become desensitized to the alarms or delay their responses. Alarm fatigue not only undermines the safety of patients (Oliveira et al., 2018), as critical alarms may be missed, but also adds to the mental load of nurses, causing stress, frustration, and exhaustion (Sendelbach & Funk, 2013; Fujita & Choi, 2020).

The effects of alarm fatigue are not limited to individual nurses. At an institutional level, it compromises the overall safety culture of the ICU (Oliveira et al., 2018). Delayed responses to alarms can result in medical errors, reduced team efficiency, and diminished trust between healthcare providers and patients (Dos Santos et al., 2018; Lu et al., 2024). Additionally, the constant noise from alarms creates a chaotic environment, increasing the cognitive load on nurses and interfering with their ability to focus on essential tasks (Cvach, 2012; Oliveira et al., 2018). Alarm fatigue has become so pervasive that regulatory bodies, such as The Joint Commission, have identified it as a significant patient safety concern, recommending comprehensive alarm management strategies (The Joint Commission, 2013).

In addition to alarm fatigue, ICU nurses frequently experience moral distress. Moral distress occurs when nurses are unable to act according to their ethical beliefs due to external constraints, such as institutional policies, lack of resources, or conflicting priorities (Mealer & Moss, 2016; Oliveira et al., 2018). For example, during end-of-life care, nurses may feel torn between following hospital protocols, which might prioritize life-sustaining treatments, and their professional judgment, which may suggest focusing on comfort and dignity for the patient (Riedel et al., 2022). Such situations place nurses in ethical dilemmas that challenge their professional and personal values (Martins et al., 2020; Morley et al., 2019).

The impact of moral distress on nurses is profound. It often leads to emotional exhaustion, feelings of powerlessness, and frustration (Morley et al., 2019). Over time, these feelings can contribute to burnout, characterized by a loss of passion for work and increased intentions to leave the profession (Donkers et al., 2021). Studies have shown that moral distress is particularly acute in ICU settings, where nurses frequently encounter ethically complex situations, such as resource allocation, decisions about life-sustaining treatments, and balancing patient autonomy with family wishes (Borhani et al., 2015; Silverman et al., 2022). The psychological toll of moral distress not only affects nurses' well-being but also has implications for patient care, as it can reduce nurses' engagement, focus, and overall job performance (Larson et al., 2017; Lemmo et al., 2022).

Although these challenges are well-documented in global studies, there is a lack of research on how ICU nurses in Malaysia experience alarm fatigue and moral distress. The healthcare context in Malaysia may present unique challenges, such as variations in resources, cultural expectations, and healthcare policies. For instance, Malaysian nurses often work in resource-constrained environments where the availability of advanced alarm systems and ethical support frameworks may be limited. Additionally, cultural factors, such as hierarchical decision-making and societal norms about authority, may influence how nurses navigate ethical dilemmas and respond to alarms. These factors highlight the need for localized research to understand and address the specific experiences of Malaysian ICU nurses. Our study could improve knowledge of how cultural variations affect moral discomfort and alarm fatigue, providing insights into the interplay between systemic, cultural, and individual factors in shaping these phenomena (Rohani et al., 2020; Kim et al., 2023; Alasad et al., 2015).

This study aims to fill this research gap by exploring how alarm fatigue and moral distress manifest in the Malaysian ICU setting. Through in-depth qualitative analysis, the study seeks to identify the causes, effects, and coping strategies related to these challenges. The findings will inform interventions to improve nurses' working conditions, enhance patient safety, and support the mental health and well-being of critical care nurses. By addressing these issues, the study aims to contribute to the development of policies and practices that foster a supportive and sustainable ICU environment.

Objectives

The study has three main objectives:

1. To explore the experiences of ICU nurses in Malaysia with alarm fatigue and moral distress.
2. To identify the factors contributing to these challenges and how they impact nurses' performance and well-being.
3. To propose evidence-based recommendations for improving nurses' working conditions, reducing alarm fatigue and moral distress, and enhancing patient care.

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LITERATURE REVIEW

Alarm Fatigue: An Overwhelming Sensory Burden

Alarm fatigue results from the excessive frequency of false or non-actionable alarms, leading to desensitization among nurses, delayed responses, and compromised patient safety (Sendelbach & Funk, 2013; Oliveira et al., 2018; Silverman et al., 2022). The problem is exacerbated in Malaysian nurses by resource limitations and staffing shortages, which overwhelm nurses with alerts and heighten stress levels (Zakaria et al., 2022). Interventions like refining alarm thresholds, integrating advanced monitoring systems, and providing training on alarm prioritization are essential to mitigating this issue (Cvach, 2012; Silverman et al., 2022). Studies suggest that reducing non-essential alarms can improve response times and decrease the cognitive load on nurses (Gazarian et al., 2019).

Moral Distress: The Emotional Toll of Ethical Dilemmas

Moral distress occurs when external constraints prevent nurses from acting according to their ethical values, often leading to frustration, emotional exhaustion, and burnout (Tollefsen et al., 2021; Sannino et al., 2019; Silverman et al., 2022). In Malaysian ICUs, cultural and systemic factors such as hierarchical decision-making and limited ethical support compound these challenges (Donkers et al., 2021; Saeedi et al., 2019). Psychological support, including counselling and structured peer debriefing sessions, is critical for addressing the emotional burden of moral distress (Nikbakht Nasrabadi et al., 2021; Silverman et al., 2022). Empowering nurses through ethical decision-making frameworks and fostering open communication in multidisciplinary teams can alleviate moral distress while enhancing collaboration and trust (Rushton, 2016).

The Malaysian Context: Challenges and Opportunities

Malaysia's resource-constrained healthcare system adds complexity to managing alarm fatigue and moral distress. Limited staff-to-patient ratios and high-acuity cases intensify workload pressures (Zakaria et al., 2022). However, these challenges also present opportunities for contextually relevant interventions, such as incorporating cultural values into ethical training and promoting teamwork to enhance resilience and efficiency (Larson et al., 2017; Silverman et al., 2022).

Toward Actionable Solutions

Optimizing alarm systems with advanced technologies and implementing comprehensive alarm management protocols can significantly reduce stress and improve patient safety (Oliveira et al., 2018; Silverman et al., 2022). Similarly, integrating training on ethical decision-making and creating platforms for ethical discourse are critical to empowering nurses in addressing moral distress collaboratively (Abdullah et al., 2020; Nikbakht Nasrabadi et al., 2021). Support systems like counselling and peer groups can further enhance emotional well-being and resilience (Oliveira et al., 2018; O'Connell, 2015).

Creating an Environment for Excellence

By addressing alarm fatigue and moral distress, healthcare systems can foster ICUs where nurses perform optimally, patients receive high-quality care, and burnout is minimized (Asadi et al., 2022). These systemic improvements not only enhance nurse satisfaction and retention but also contribute to better patient outcomes and workforce stability (Nikbakht Nasrabadi et al., 2021; Asadi et al., 2022), underscoring the importance of prioritizing caregivers' well-being as a cornerstone of exceptional care (The Joint Commission, 2013).

Scope of the Research

This study focuses on addressing alarm fatigue and moral distress among ICU nurses within the Malaysian healthcare system. It examines the prevalence, underlying causes, and impacts of these challenges on nurses' performance, mental health, and patient care outcomes. The research aims to explore the unique cultural, systemic, and operational factors contributing to these phenomena in Malaysian ICUs, such as resource limitations, staffing ratios, and communication barriers in a multicultural environment. Through qualitative

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and quantitative methodologies, the study seeks to gather comprehensive data on nurses' experiences, institutional practices, and existing support mechanisms.

Furthermore, the research scope includes evaluating the effectiveness of interventions such as alarm system optimization, training in ethical decision-making, and psychological support. The study has a limited scope, it may benefit from a wider perspective that includes comparisons with other nations or areas, even though its primary focus is Malaysian intensive care unit nurses. We hope that this could improve knowledge of how cultural variations affect moral discomfort and alarm fatigue. By providing evidence-based recommendations, the study aims to inform policy changes and promote sustainable improvements in ICU environments, ultimately ensuring a supportive workplace for nurses and better care for patients.

Significance of Addressing Alarm Fatigue and Moral Distress

The consequences of alarm fatigue and moral distress extend beyond individual nurses to affect team dynamics and patient outcomes (Au-Yeung et al., 2021). High alarm frequencies can create a chaotic work environment, undermining teamwork and communication (Asadi et al., 2022). Furthermore, moral distress often leads to emotional exhaustion, which has been linked to increased turnover rates among ICU nurses (Tollefsen et al., 2021). This turnover disrupts continuity of care and increases recruitment costs for healthcare institutions. By addressing these challenges, this study aims to contribute to sustainable improvements in ICU care. A focus on training and support can empower nurses, enabling them to perform optimally despite high-stress conditions. Additionally, by fostering collaboration and empathy within teams, hospitals can create a more resilient workforce capable of delivering compassionate care to critically ill patients.

Hence, the anticipated outcomes of this study are not just academic but profoundly practical. By uncovering the nuances of alarm fatigue and moral distress among Malaysian ICU nurses, this research seeks to inspire systemic changes that enhance nurse satisfaction, reduce burnout, and ultimately improve patient outcomes. The importance of such work cannot be overstated in the context of modern healthcare, where the well-being of caregivers directly influences the quality of care provided.

Implications for the Broader Healthcare System

The implications of this research extend beyond individual nurses to the broader healthcare system. Addressing alarm fatigue and moral distress can reduce nurse burnout and turnover rates, enhancing workforce stability and continuity of care. Furthermore, a well-supported nursing workforce contributes to improved patient outcomes, fostering trust and confidence in the healthcare system.

By identifying and addressing the root causes of these challenges, our study seeks to inspire systemic improvements that benefit nurses, patients, and healthcare institutions alike. Ultimately, creating a supportive ICU environment where nurses can thrive is not just an investment in their well-being but a cornerstone of delivering high-quality patient care.

The Dual Challenges of Alarm Fatigue and Moral Distress

Alarm fatigue occurs when nurses are exposed to an overwhelming number of alarms, many of which are false or non-actionable (Au-Yeung et al., 2021). This desensitization can lead to delayed responses, missed critical alerts, and increased stress. Studies have shown that alarm fatigue not only diminishes the effectiveness of nurses but also poses significant risks to patient safety (Cvach, 2012; Oliveira et al., 2018; Soleimani et al., 2019). On the other hand, moral distress arises when nurses face ethical dilemmas or are unable to act in ways aligned with their professional values due to systemic or situational constraints. This emotional burden often leads to feelings of helplessness, frustration, and burnout, further exacerbating the challenges within ICUs (Tollefsen et al., 2021).

Exploring the Malaysian Healthcare Context

In Malaysia, ICUs are characterized by high patient acuity, limited resources, and rapidly evolving healthcare demands. These factors intensify the prevalence of alarm fatigue and moral distress among nurses. By studying

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these challenges within this specific context, the research aims to uncover unique cultural and systemic factors that may influence the experiences of Malaysian ICU nurses. This understanding is crucial for designing interventions that are not only effective but also culturally and contextually appropriate.

Proposed Interventions and Systemic Improvements

The study advocates for targeted interventions to address alarm fatigue, including the optimization of alarm systems and comprehensive training for nurses. Alarm management strategies, such as refining alarm thresholds and employing advanced monitoring technologies, can reduce the frequency of false alarms and improve nurses' response accuracy (Soleimani et al., 2019; Claudio et al., 2021). Training programs that equip nurses with skills to prioritize and respond effectively to alarms can further enhance their efficiency and confidence.

To alleviate moral distress, the research emphasizes the importance of providing psychological support and fostering ethical resilience (Dos Santos et al., 2018). Initiatives such as regular debriefing sessions, peer support groups, and access to counselling services can help nurses process their experiences and mitigate emotional exhaustion. Additionally, interdisciplinary discussions and ethical decision-making frameworks can empower nurses to navigate complex situations collaboratively, promoting a culture of support and understanding (Claudio et al., 2021).

THEORETICAL FRAMEWORK

The study is guided by Nathaniel's Theory of Moral Reckoning in Nursing (2004), which provides a framework for understanding how nurses deal with ethical challenges in their practice. The theory identifies three stages of moral reckoning:

1. **Stage of Ease**: This is the stage where nurses feel confident and comfortable because their actions align with their professional and personal values. However, factors like frequent false alarms and strict institutional policies can disrupt this ease, leading to stress and frustration (Nathaniel, 2004).
2. **Stage of Resolution**: In this stage, nurses face moral dilemmas and are forced to make difficult decisions. For example, they might struggle to prioritize attending to a critical alarm versus continuing an important patient procedure. Such situations create internal conflicts and contribute to moral distress (Donkers et al., 2021).
3. **Stage of Reflection**: After resolving a dilemma, nurses reflect on their decisions and actions. If they feel their actions did not align with their ethical principles, they may experience feelings of guilt, regret, or moral residue, which can affect their mental health (Riedel et al., 2022).

METHODOLOGY

The study will adopt a qualitative phenomenological approach**,** which is effective for exploring the lived experiences of individuals (Reiners, 2012). In our study, to explore the Malaysian critical care nurses' experience in dealing with alarm fatigue and moral distress.

Participants

The study will involve ICU nurses from government hospitals in Klang Valley with at least six months of experience. Participants will be selected using purposive sampling to ensure a diverse range of ages, genders, educational backgrounds, and work experiences (Creswell & Poth, 2018).

Data Collection

Qualitative phase

In-depth, semi-structured interviews will be conducted to gather rich, detailed information about nurses' experiences with alarm fatigue and moral distress. Interviews will be recorded, transcribed, and anonymized to

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protect participants' identities. Ensuring a rigorous methodology, including triangulation or member checking, could mitigate this risk, enhancing the credibility and trustworthiness of the findings (Creswell & Poth, 2018; Lincoln & Guba, 1985).

Questions will include

1. "What is your experience with alarm fatigue in your daily work?"
2. "Can you share a time when you faced a moral challenge and how you handled it?"

Quantitative phase

The quantitative phase of this study involves the use of structured surveys and validated scales to measure the prevalence and intensity of alarm fatigue and moral distress among ICU nurses in Malaysia. Standardized instruments, such as the Alarm Fatigue Questionnaire (AFQ) and the Moral Distress Scale-Revised (MDS-R), will be employed to collect data from a representative sample of nurses. These tools provide a systematic way to quantify the challenges faced by nurses and identify patterns or correlations with demographic or institutional variables. While qualitative insights are valuable, quantitative data could support the findings by offering quantifiable proof of nurses' alarm weariness and moral distress levels. This mixed-methods approach aims to ensure a comprehensive understanding of the phenomena, combining numerical evidence with detailed personal narratives.

Data Analysis

Qualitative analysis

The interviews will be analysed using the Colaizzi method, a rigorous process for identifying themes and patterns in qualitative data. This method ensures the findings are grounded in participants' actual experiences (Creswell & Poth, 2018). Consider applying techniques like member checking, which involves verifying results with participants, or triangulation, which involves utilizing various data sources, to minimize potential biases and increase trustworthiness. These additional steps will further enhance the credibility and reliabilit y of the analysis by ensuring that the interpretations accurately reflect the participants' perspectives and are supported by diverse evidence.

Quantitative analysis

Quantitative data analysis will involve both descriptive and inferential statistical techniques to thoroughly examine the findings derived from the structured surveys and validated scales utilized in the study. Descriptive statistics, including measures of central tendency (mean, median) and variability (standard deviation, range), will be employed to summarize key data points, such as the levels of alarm fatigue and moral distress among ICU nurses. These metrics will provide an overall picture of the prevalence and intensity of these phenomena within the studied population. Inferential statistical methods will include t-tests and ANOVA to assess significant differences across demographic groups, such as nurses' years of experience, educational background, unit type, and shift schedules. Additionally, Chi-square tests may be used to analyse categorical variables, such as the frequency of alarm desensitization or ethical dilemmas faced. To further explore underlying relationships in our study, regression analyses will investigate potential predictors and moderators of alarm fatigue and moral distress, such as staffing ratios, patient acuity levels, and access to institutional support systems.

By triangulating data from both qualitative and quantitative phases, the study aims to produce actionable conclusions that inform policy and intervention strategies for mitigating alarm fatigue and moral distress among Malaysian critical care nurses.

Ethical Considerations

This study will seek approval from Centre of Research and Innovation, Open University Malaysia, Ethical Approval of Ministry of Health, Medical Research and Ethical Committee, Directors of Nursing, and Nursing Manager of the hospital. We anticipate the consequences of the interview may trigger unnecessary stress to the Critical Care nurses when sharing their recalled experiences of ethical dilemma on alarm fatigue and moral distress. If the need arises, we will refer the distress participants to the psychologist identified for further counselling session.

Anticipated Outcomes and Importance

Alarm fatigue and moral distress are critical challenges in intensive care units (ICUs) worldwide, with profound implications for nurse well-being and patient care. This study focuses on ICU nurses in Malaysia, aiming to generate actionable insights and solutions that address these pressing issues.The Effective Implementation of The Suggested Interventions in Malaysian Healthcare Settings, Including Potential Obstacles to Change and Methods for Overcoming Them, May Be Considered to Be the Subject of Future Research. Involving Stakeholders Such as Patients, Legislators, And Hospital Managers in The Discussion About Ethical Behaviour and Alarm Management Could Create a More Encouraging Situation for Nurses.

New Insights

Our research will explore the specific ways alarm fatigue and moral distress impact ICU nurses in the Malaysian context. Alarm fatigue, described as "the desensitization to frequent or non-actionable alarms," can lead to delayed responses or missed critical alerts (Cvach, 2012). Meanwhile, moral distress, defined as the psychological discomfort arising from constrained ethical decision-making, can compromise nurses' emotional health and job satisfaction (Jameton, 1984). By analysing these phenomena in depth, the study aims to highlight their interconnected effects on nurse performance and well-being.

Practical Solutions

Practicality is paramount in addressing these challenges. The study will propose evidence-based interventions, including enhanced training programs on ethical decision-making and alarm management systems. For example, training nurses to interpret alarm data critically and to prioritize actionable alerts can mitigate alarm fatigue (Sendelbach & Funk, 2013). Moreover, establishing structured psychological support systems, such as counselling and peer support groups, can help nurses navigate moral distress effectively (Soleimani et al., 2019; Lemo et al., 2022).

POLICY RECOMMENDATIONS

The findings of our study will inform hospital policies aimed at improving ICU environments. These policies may involve technological upgrades to alarm systems, ensuring they are both reliable and less intrusive. Collaborative strategies, such as interdisciplinary team discussions, can also address ethical dilemmas, fostering a supportive culture that prioritizes nurses' well-being (Rushton, 2016). Such measures are vital for reducing nurse burnout and retaining skilled professionals, which are essential for delivering high-quality patient care.

CONCLUSION

In conclusion, alarm fatigue and moral distress are pressing issues that profoundly affect the performance, mental well-being, and effectiveness of ICU nurses, as well as the safety and quality of patient care. By investigating these challenges within the Malaysian healthcare context, our study aims to uncover critical insights into their causes and consequences while offering practical solutions tailored to local needs. Addressing these challenges is essential to fostering a supportive ICU environment that enables nurses to perform optimally and ensures patients receive the highest standard of care. The findings of this research have the potential to inform systemic improvements, from optimizing alarm systems to promoting ethical resilience,

ultimately benefiting not only nurses but also the broader healthcare system by enhancing workforce stability, reducing burnout, and improving patient outcomes.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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