# Mitigating Strategies for Nurses' Emotional Exhaust based on Technology-Based Assessment: A Systematic Review

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**ABSTRACT**

**Background:** Most nurses report experiencing emotional exhaustion due to high job demands, a condition that not only affects individuals but also impacts the overall healthcare system. The utilization of health information systems offers significant potential in detecting, measuring, and managing emotional exhaustion among healthcare professionals through comprehensive data analysis, thus improving individual well-being and the quality of healthcare services.

**Purpose:** The objective of this systematic review is to explore indicators of emotional exhaustion and strategies to address it.

**Methods:** This review was developed based on the Joanna Briggs Institute (JBI) methodology and presented according to PRISMA. Three databases, PubMed, ScienceDirect, and ProQuest, were used as sources to search for studies in English. The research obtained with the criteria of discussing health information systems and emotional exhaustion, original research, full text, and published between 2019-2024. Out of 1,782 identified articles, 15 articles were selected for in-depth analysis.

**Results:** Through this systematic review, it was found that HIS can be used to measure emotional exhaustion through behavioural, performance, and organizational dimensions. These indicators can be identified through the analysis of data stored in HIS. In addition, HIS can also support mitigation efforts through increased work efficiency, employee health management, and organizational support.

**Conclusion:** Detecting the condition of emotional exhaustion and understanding how to mitigate it are competencies required to support the smooth and quality delivery of nursing care.

**Keywords:** emotional exhaustion, evaluation, health information systems, nursing

## BACKGROUND

Emotional exhaustion is a condition arising from people-oriented work (Lee et al., 2020) and can be triggered by changes in working conditions (Weber et al., 2019). Excessive workloads and unmet rest needs also contribute to emotional exhaustion (Weber et al., 2019). Healthcare professionals, particularly nurses, experience high rates of emotional exhaustion due to the demanding nature of their work; more than 95% of them report this problem, according to survey studies conducted in select workplaces and healthcare systems in the United States (Gardner et al., 2019). In fact, more than 500,000 healthcare workers experience emotional exhaustion, impacting the quality of care, based on estimates reported in studies conducted within specific national contexts (e.g., the United States) (Tawfik et al., 2021). Indicators of emotional exhaustion in nurses include absenteeism, high turnover rates, decreased motivation, reduced job engagement, and diminished well-being (Gardner et al., 2019; Weber et al., 2019).

The consequences of emotional exhaustion are multifaceted, affecting individuals, organizations, and patients. For individuals, emotional exhaustion can lead to physical and mental health problems, depression, substance abuse, and increased risk of cardiovascular disease (Lee et al., 2020; Peccoralo et al., 2021; Weber et al., 2019). Organizations may experience decreased well-being, reduced quality of care (Kroth et al., 2019; Moy et al., 2020), lower patient satisfaction (Gardner et al., 2019) and non-adherence to standard operating procedures (Moy et al., 2020). Patients may suffer from medical errors, nursing care deficiencies, and poorer health outcomes (Moy et al., 2020; Murphy et al., 2019).

To prevent more serious consequences, emotional exhaustion should be assessed promptly (Lee et al., 2020). Recognizing their emotional state allows individuals to adapt and develop coping mechanisms, enhancing their resilience and personal growth (Weber et al., 2019). Organizations can benefit from using this information to measure and address staff burnout (Gardner et al., 2019). However, detecting emotional exhaustion can be challenging due to high workloads and difficulties in scheduling assessments (Fiol-DeRoque et al., 2021; Gardner et al., 2019).

Health information systems offer a promising solution to this challenge. By providing comprehensive data visualization, these systems can effectively identify correlations between specific factors and the development of emotional exhaustion (Gardner et al., 2019). Data from computerized documentation of healthcare services can be analysed to uncover these correlations. While existing literature extensively covers the evaluation and implementation of health information systems, their impact, and implementation barriers (Tawfik et al., 2021; Weber et al., 2019; Zhang et al., 2019), there is a notable gap in research exploring the specific role of these systems in assessing emotional exhaustion. This gap underscores the need for further investigation into the potential of health information systems to measure and manage emotional exhaustion among healthcare professionals.

## OBJECTIVE

The purpose of this systematic review is to explore indicators of emotional exhaustion among healthcare professionals and identify effective strategies to address it, utilizing health information systems.

## METHODS

This systematic review conducted a comprehensive screening to identify articles discussing the role of health information systems in evaluating emotional exhaustion. Articles were sourced from ScienceDirect, ProQuest, and PubMed. The search process utilized the

keywords "health information systems," "emotional exhaustion," "nursing," and "evaluation" combined with the Boolean operator "AND" to retrieve articles aligned with the research objectives. The article search was based on predetermined inclusion criteria, including studies published within the last five years (2019-2024), studies that examined health information systems in relation to emotional exhaustion, full-text articles, and original research. This systematic search aimed to identify the contributions of health information systems to emotional exhaustion. The exclusion criterion was that articles were not in English. A total of 1,782 articles were retrieved from the three databases. After screening based on the inclusion and exclusion criteria, 15 articles were selected for in-depth analysis. The article screening process followed the PRISMA methodology, as illustrated in Figure 1.

## RESULTS

Results of the systematic review following the PRISMA selection process indicated that the inclusion criteria focused on the use of health information systems in hospitals to evaluate emotional exhaustion among healthcare professionals and identify mitigation strategies, published between 2019 and 2024. The included studies were primarily original research, comprising comparative studies (26%, 4/15), mixed methods (0.07%, 1/15), quantitative studies (53%, 8/15), and qualitative studies (13%, 2/15). A majority of the research on health information systems was centred in the Americas (80%, 12/15), followed by Europe (13%, 2/15), while Asia had a relatively lower contribution (0.07%, 1/15). The findings from several articles suggest that health information systems can aid in evaluating emotional exhaustion among healthcare professionals.

Based on the analysis of 15 research articles, it was found that the majority of health information systems implemented in healthcare settings that could contribute to emotional exhaustion were mHealth (0.07%, 1/15), Convolutional neural networks in Microsoft Excel (CNN) (0.07%, 1/15), electronic health records (EHR) (73%, 11/15), smartphones (0.07%, 1/15), and Information and Communication Technology (ICT) (0.07%, 1/15). The information systems used in healthcare services can significantly contribute to a comprehensive evaluation of emotional exhaustion experienced by healthcare professionals. The evaluation of emotional exhaustion among healthcare professionals can be facilitated by leveraging health information systems such as mHealth, Convolutional Neural Networks in Microsoft Excel (CNN), Electronic Health Records (EHR), smartphones, and Information and Communication Technology (ICT). Parameters for evaluating emotional exhaustion can be categorized into three dimensions are behavioural, performance, and organizational (Table 2).

Behavioural dimension parameters include avoiding the use of information systems, lack of innovation in mHealth communication, repeated errors, inconsistencies between documentation and actions, insufficient ability to analyse follow-up actions, inefficient and difficult-to-understand communication messages, decreased response to incoming messages, decreased participation in patient data input, and non-adherence to system usage guidelines (Fiol-DeRoque et al., 2021; Kroth et al., 2019; Lee et al., 2020; Weber et al., 2019). Performance dimension parameters are include incomplete data entry, deteriorating patient clinical outcomes, brief documentation, a backlog of data entry processes, data input errors, inconsistent system filling with the workflow, changing duration of system use, slow system navigation processes, data duplication, and errors in accessing patient data (Kroth et al., 2019; Moy et al., 2020; Murphy et al., 2019; Peccoralo et al., 2021; Rathert et al., 2019; Zheng et al., 2020). Organizational dimension parameters can be observed from data on healthcare worker turnover, absenteeism, high job turnover, the amount of incentives received, smooth coordination among professionals, accurate and timely documentation processes, and patient

complaints through the patient EHR portal (Gardner et al., 2019; Moy et al., 2020; Rathert et al., 2019; Weber et al., 2019; Zhang et al., 2019).

Emotional exhaustion experienced by healthcare professionals can be mitigated through three categories of strategies: employee health and stress management, work efficiency, and organizational support (Table 3). Employee health and stress management can be achieved by setting work boundaries, taking time off for vacation or rest, exercising, relaxation training, providing treatment for exhaustion based on characteristics and causes, and identifying the causes of emotional exhaustion (Gardner et al., 2019; Kroth et al., 2019; Weber et al., 2019). Mitigation through work efficiency can be achieved by reducing documentation burden, implementing automatic speech recognition systems for documentation, adding administrative staff, gaining a deeper understanding of tasks, communicating and interacting with others, performing team-based care, and ensuring adequate resources (Kroth et al., 2019; Murphy et al., 2019; Peccoralo et al., 2021; Zheng et al., 2020). Organizational support mitigation can be achieved by creating and implementing psychological interventions, providing a guidebook to address problems, ensuring resource availability, creating and implementing psychological interventions, adding staff, and performing team-based care (Murphy et al., 2019; Peccoralo et al., 2021; Saag et al., 2019; Weber et al., 2019).

**Table 1.** Conclusion of selected journals (n=15)

| Author and Year | Year | Region | Methode | Focus | Type of information systems |
|---|---|---|---|---|---|
| Fiol-DE Roque et al | 2021 | Spain | Randomized control trial | Evaluating the effectiveness of mHealth interventions to reduce mental health problems in healthcare workers | mHealth |
| Lee et al | 2020 | Taiwan | Comparative | Developing and building an application to detect and classify burnout | Convulsion neural networks in Microsoft excel (CNN) |
| Kroth et al | 2019 | California | Survey | Determining the design and use of EHRs related to clinical stress and fatigue | EHR (electronic health record) |
| Tawfik et al | 2021 | Michigan | Observational cross-sectional | Measuring and evaluating worker frustration with technology | EHR (electronic health record) |
| Weber et al | 2019 | Europe | Longitudinal randomized controlled trial | Validating mobile health interventions to | Smartphone |

| Author and Year | Year | Region | Methode | Focus | Type of information systems |
|---|---|---|---|---|---|
| | | | | prevent and manage stress | |
| Saag et al | 2019 | New York | Comparison | Length of EHR use | EHR (electronic health record) |
| Gardner et al | 2019 | Rhode Island | Survey | Measuring healthcare worker stress related to the use of health information technology | EHR (electronic health record) |
| Murphy et al | 2019 | Texas | Mixed methods | Identifying strategies to improve EHR inbox design and workflow | EHR (electronic health record) |
| Zhang et al | 2019 | Northwestern | Qualitative | Evaluating patient-reported outcomes integrated into EHRs aligned with clinical workflows and individual needs | EHR (electronic health record) |
| Rathert et al | 2019 | United States | Qualitative phenomenology | Experiences of using EHRs | EHR (electronic health record) |
| Zheng et al | 2020 | California | Quantitative | Studying EHR workflow and implementation solutions to improve health system performance | EHR (electronic health record) |
| Melnick et al | 2020 | United States | Quantitative | Describing and providing benchmarks for EHRs | EHR (electronic health record) |
| Fischer et al | 2021 | United States | Quantitative | Developing an instrument to measure stress due to digital technology in the workplace | Information and communication technology (ICT) |

| Author and Year | Year | Region | Methode | Focus | Type of information systems |
|---|---|---|---|---|---|
| Peccoralo et al | 2021 | New York | Cross-sectional | Determining EHR usage time thresholds and workload to prevent fatigue | EHR (electronic health record) |
| Moy et al | 2020 | United States | Observational | Evaluating healthcare worker workflows using EHRs | EHR (electronic health record) |

**Table 2.** Indicators of Emotional Exhaustion Based on Information Systems

| Dimension | Parameters for Evaluating Emotional Exhaustion with HIS | References |
|---|---|---|
| Behavioral Dimension | Leaving or choosing not to use the information system in documentation<br>Lack of innovation in mHealth communication<br>Repeated errors<br>Inconsistency between documentation and actions<br>Insufficient ability to analyze follow-up actions<br>Inefficient and difficult-to-understand communication messages<br>Decreased response to incoming messages<br>Decreased participation in patient data input<br>Non-adherence to system usage guidelines | (Fiol-DeRoque et al., 2021; Kroth et al., 2019; Lee et al., 2020; Weber et al., 2019) |
| Performance Dimension | Incomplete data entry<br>Deteriorating patient clinical outcomes<br>Brief documentation<br>Backlog of data entry processes<br>Data input errors<br>Inconsistent system filling with the workflow<br>Changing duration of system use<br>Slow system navigation processes<br>Data duplication<br>Errors in accessing patient data | (Kroth et al., 2019; Moy et al., 2020; Murphy et al., 2019; Peccoralo et al., 2021; Rathert et al., 2019; Zheng et al., 2020) |
| | Healthcare worker turnover | |

| Dimension | Parameters for Evaluating Emotional Exhaustion with HIS | References |
|---|---|---|
| Organizational Dimension | Absenteeism<br>High job turnover<br>Number of incentives received<br>Smooth coordination among professionals<br>Accurate and timely documentation processes<br>Patient complaints through the patient EHR portal | (Gardner et al., 2019; Moy et al., 2020; Rathert et al., 2019; Weber et al., 2019; Zhang et al., 2019) |

**Table 3.** Mitigating Emotional Exhaustion

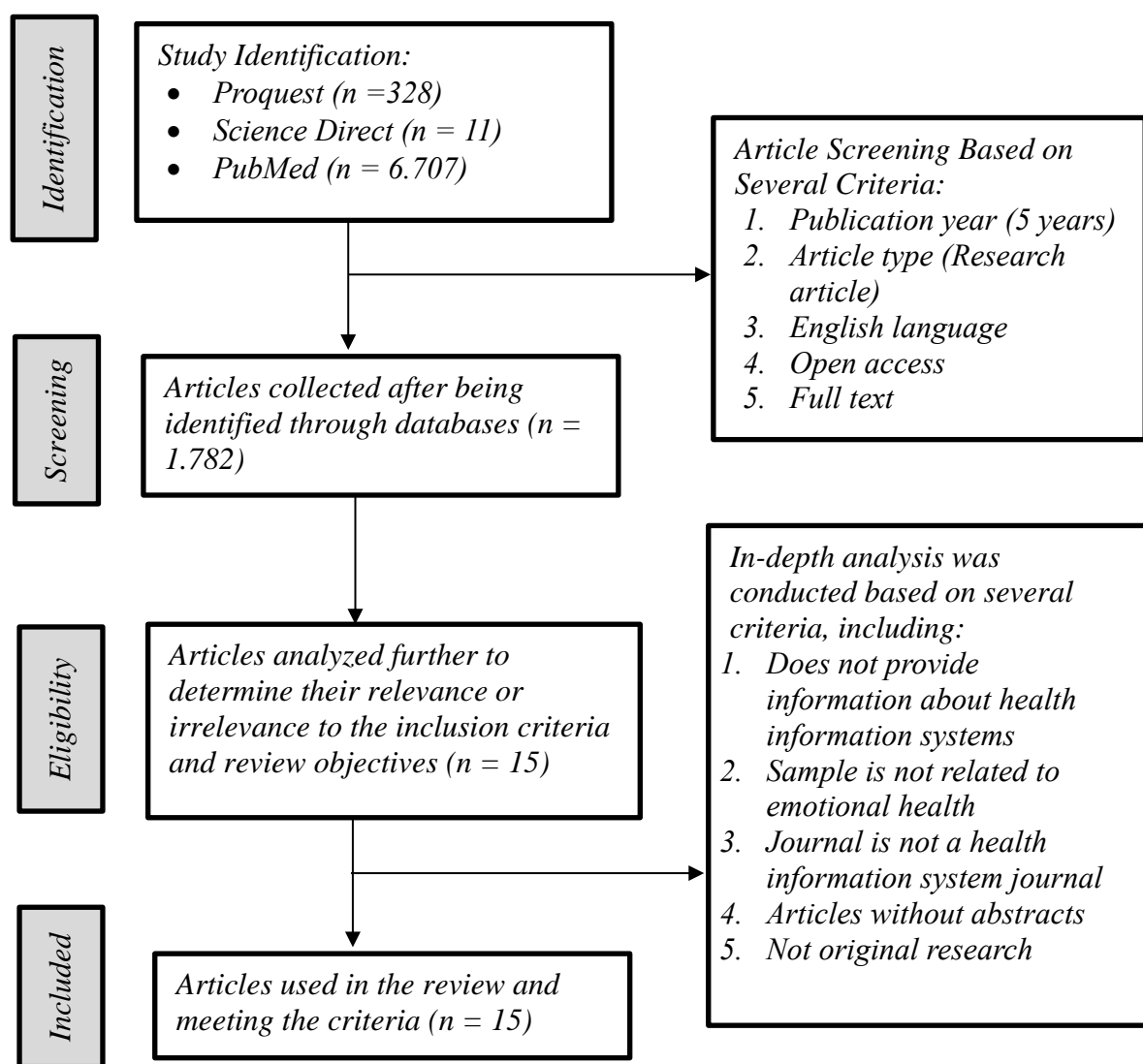| Category | Mitigation Strategies for Emotional Exhaustion | References |
|---|---|---|
| Employee Health Management | Setting work boundaries<br>Taking time off for vacations or breaks<br>Exercise<br>Relaxation training<br>Providing treatment for exhaustion based on characteristics and causes<br>Identifying the causes of emotional exhaustion | (Gardner et al., 2019; Kroth et al., 2019; Weber et al., 2019) |
| Work Efficiency | Reducing documentation burden<br>Implementing automatic speech recognition systems for documentation<br>Adding administrative staff<br>Gaining a deeper understanding of tasks<br>Communicating and interacting with others<br>Performing team-based care<br>Adequate resources | (Kroth et al., 2019; Murphy et al., 2019; Peccoralo et al., 2021; Zheng et al., 2020) |
| Organizational Support | Availability of a guidebook to address problems<br>Availability of resources<br>Creating and implementing psychological interventions<br>Adding staff<br>Performing team-based care | (Murphy et al., 2019; Peccoralo et al., 2021; Saag et al., 2019; Weber et al., 2019) |

*Figure 1: PRISMA Diagram of Article Screening Process*

## DISCUSSION

Emotional exhaustion is a condition that arises as a result of work that involves interacting with others (Lee et al., 2020) and can also be triggered by changes in working conditions (Weber et al., 2019). This condition can also occur as a result of excessive workload and unmet needs for rest (Weber et al., 2019). The evaluation of emotional exhaustion in healthcare professionals can be assisted by utilizing health information systems such as mHealth, Convolutional neural networks in Microsoft Excel (CNN), electronic health records (EHR), smartphones, and information and communication technology (ICT). Parameters that can be used to evaluate emotional exhaustion are divided into three dimensions: behavioral dimension, performance dimension, and organizational dimension (Table 2).

**Behavioral Dimension**

Emotional exhaustion experienced by healthcare professionals can be identified through the evaluation of changes in behavior. These behavioral changes can manifest as alterations in behaviors aimed at self-improvement or changes in patient care behaviors (Babapour et al., 2022). Changes in behavior aimed at self-improvement can be observed

through actions such as abandoning or choosing not to use information systems for documentation, a lack of innovation in mHealth communication, repeated errors, inefficient and difficult-to-understand communication messages, and non-adherence to system usage guidelines (Fiol-DeRoque et al., 2021; Kroth et al., 2019; Lee et al., 2020; Weber et al., 2019). Changes in patient care behaviors can be seen in the inconsistency between documentation and actions, a lack of ability to analyze follow-up actions, decreased response to incoming messages, and decreased participation in patient data input (Fiol-DeRoque et al., 2021; Kroth et al., 2019; Lee et al., 2020; Weber et al., 2019). These negative behavioral changes among healthcare professionals can result in a decline in the quality of care provided to patients (Babapour et al., 2022).

**Performance Dimension**

Healthcare professionals are tasked with directly dealing with human lives, thus requiring the highest quality of performance (Babapour et al., 2022). Emotional exhaustion can lead to a decline in the quality of healthcare professionals' performance (Babapour et al., 2022). A decline in the quality of healthcare professionals' performance can be observed in the completeness of patient data entry, deteriorating patient clinical outcomes, brief and incomplete documentation, a backlog of data entry processes, patient data input errors, inconsistent system filling with the workflow, changing duration of system use, slow system navigation processes, data duplication, and errors in accessing patient data (Kroth et al., 2019; Moy et al., 2020; Murphy et al., 2019; Peccoralo et al., 2021; Rathert et al., 2019; Zheng et al., 2020).

**Organizational Dimension**

Nurses' participation in hospital activities contributes to the organization's internal governance (Alharbi et al., 2020). Individuals who can control their emotional state are described as being able to actively contribute to the organization (Lartey et al., 2021). A decrease in nurses' participation in the organization's internal governance is related to emotional exhaustion (Alharbi et al., 2020). The decline in emotional exhaustion in the organizational dimension can be illustrated by data on healthcare worker turnover, nurse absenteeism, job transfers, the amount of incentives received, smooth coordination among professionals, accurate and timely documentation (after providing patient care), and patient complaints on the electronic health record portal (Gardner et al., 2019; Moy et al., 2020; Rathert et al., 2019; Weber et al., 2019; Zhang et al., 2019).

**Mitigating Emotional Exhaustion**

Addressing emotional exhaustion among nurses aims to facilitate the availability of resources and reduce job demands (Gabriel & Aguinis, 2022). By doing so, it is expected to improve the quality of performance and enhance the quality of patient care. This can be achieved through employee health management, work efficiency, and organizational support.

**Employee Health Management**

Employee health management is an effort to balance the need for productivity in work with the maintenance of employees' physical and mental health, thereby improving performance and job satisfaction (Gabriel & Aguinis, 2022). Implementing this strategy to develop a comprehensive health program is done to maintain and maximize the mental health of nurses, especially in relation to emotional (Yang et al., 2021), thereby improving performance quality and enhancing the quality of care (Mabona et al., 2022). Employee health management can be done by setting work limits, providing time for leave or rest, exercising, providing training to practice relaxation, identifying the causes of fatigue, and providing treatment for emotional exhaustion according to the characteristics and causes (Gardner et al., 2019; Kroth et al., 2019; Weber et al., 2019).

**Work efficiency**

Work efficiency is defined as the maximization of resource utilization to accomplish

tasks (Permarupan et al., 2020). This can be achieved through the implementation of policies by policymakers (Permarupan et al., 2020). The utilization of health information systems can enhance work efficiency by decreasing documentation workload, adopting automatic speech recognition for electronic documentation, increasing administrative personnel, providing healthcare professionals with a clearer understanding of their primary roles and responsibilities, fostering inter-collegial communication, and implementing team-based care supported by sufficient resources (Kroth et al., 2019; Murphy et al., 2019; Peccoralo et al., 2021; Zheng et al., 2020).

### Organizational support

Organizational support, which acts as a motivator (Lartey et al., 2021), directly contributes to reducing emotional exhaustion among healthcare workers (Qian et al., 2024). By providing support, organizations can enhance healthcare workers' self-confidence, motivating them to excel in their roles (Qian et al., 2024). Furthermore, organizational support can improve healthcare workers' overall well-being and mental health (Schneider et al., 2022). It aids nurses in managing the emotional demands associated with their work, thereby mitigating emotional exhaustion (Lartey et al., 2021). To reduce emotional exhaustion, organizations can provide necessary resources, foster open communication, develop relevant policies, establish professional teams, offer training, and provide ongoing moral and psychological support (Qian et al., 2024). Additionally, strategies such as developing guidelines for addressing challenges and implementing team-based care can be effective (Murphy et al., 2019; Peccoralo et al., 2021; Saag et al., 2019; Weber et al., 2019).

### CONCLUSION

A systematic review of 15 research articles demonstrates that health information systems (HIS) such as electronic health records (EHR), mHealth, and others can serve as effective tools for evaluating emotional exhaustion in nurses. This systematic review identifies three primary dimensions of emotional exhaustion that can be measured through HIS: behavioural, performance, and organizational dimensions. The behavioural dimension reflects changes in nurses' attitudes and actions in response to exhaustion, such as decreased motivation, errors in work, and non-adherence to procedures. The performance dimension indicates a decline in work quality as reflected by data inaccuracies, delays in completing tasks, and decreased productivity. Meanwhile, the organizational dimension relates to the impact of exhaustion on organizational dynamics, such as increased turnover, absenteeism, and decreased job satisfaction.

The results of this systematic review also highlight the importance of mitigating emotional exhaustion. Several strategies can be implemented, including employee health management, improving work efficiency, and organizational support. Employee health management focuses on efforts to maintain the physical and mental well-being of nurses, such as relaxation programs and stress management training. Improving work efficiency aims to lighten the workload of nurses through the optimal use of HIS and more effective task allocation. Meanwhile, organizational support includes providing adequate resources, developing policies that support the well-being of nurses, and creating a positive and supportive work environment. Detecting the condition of emotional exhaustion and understanding how to mitigate it are competencies required to support the smooth and quality delivery of nursing care.

### CONFLICTS OF INTEREST

This study did not receive any specific grants from funding agencies. All authors have approved the publication of this article in its present form. The publication costs of this article

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