Effectiveness of a Page-Flip Training Module to Improve Critical Nurses' Emergency Preparedness and Quality of Care During Hajj

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Abstract

Background: Hajj is a major annual event attended by millions and puts a significant strain on the health system, especially critical care nurses caring for trauma, heat-related illness, infection control and emergencies. Gaps in preparedness, workload, stress, communication and unmet nursing needs can impact emergency preparedness and quality of care.

Aim: The aim of this study was to assess the impact of a Page-Flip Training Module on critical care nurses' emergency preparedness and quality of care during Hajj.

Methods: The study adopted a systematic review method to review studies published from 2020 to 2026. A search of literature was conducted in PubMed, Scopus, ScienceDirect, CINAHL, Web of Science and Google Scholar using keywords: Hajj, critical care nurses, emergency preparedness, digital learning, simulation training, ICT-based training, and quality of care. The literature selection process used PRISMA guidelines and a quality assessment tool was used to assess the studies' quality. Moreover, a research matrix was created to gather information about each study, including their findings and significance.

Results: The reviewed literature has moderate levels of preparedness gaps among nurses during Hajj due to lack of practical training, role ambiguity, workload, stress, communication, and staffing issues. There is evidence that training programs, simulation exercises, flipped learning, ICT-based learning, and psychological support enhance nurses' preparedness, confidence, decision-making, response time, adherence to protocol and quality of care.

Conclusion: The Page-Flip Training Module could be a valid, convenient, and tailored educational strategy for enhancing critical care nurses' emergency readiness and quality of care during Hajj.

Keywords: Hajj, critical care nurses, emergency preparedness, Page-Flip Training Module, quality of care, digital learning.

Introduction

The yearly Hajj pilgrimage is one of the largest recurrent mass gatherings of millions of pilgrims within a short time frame and small geographic area (Al Zahrani et al., 2023). This mass gathering raises the risk of trauma, heat stress, cardiovascular crises, infectious disease spread and deterioration that requires critical care (Hamdi & Al Thobaity, 2025). Thus, Hajj-related health care systems are operating in surge-demand mode where the influx of patients (λ) can outpace the typical capacity of health-care services (μ), resulting in operational challenges when $\lambda > \mu$. In this context, critical care nurses play a pivotal role in triage, stabilization, monitoring, escalation of care and coordination of emergency care. Emerging research shows nurses caring for Hajj pilgrims commonly experience operational complexities, crowding delays, language and communication challenges, and require better disaster preparedness and response strategies (JICRCR, 2024). Given the role of nursing care in impacting timeliness, safety and continuity, improving nurse readiness for Hajj continues to be a priority (Hamdi & Al Thobaity, 2023).

Hajj critical care requires skills beyond traditional nursing care, including enhanced situational awareness, decision-making and cultural communication (Labrague & Hammad, 2023). Nurses must juggle managing hypovolemia, respiratory issues, myocardial infarction, falls and heat exhaustion, while communicating with multilingual patients and in rapidly evolving crowd situations. Emergency preparedness (EP) can be defined as $EP = f(K + S + C + R)$, where K = knowledge, S = skills, C = confidence and R = resilience. Studies from both Saudi Arabia and the wider world has demonstrated nurses' effectiveness in emergency and disaster settings is enhanced by training, practice and protocols. However, the evidence also reveals that knowledge, experience and a uniform curriculum of preparedness training remains lacking for professionals who work in mass gatherings like Hajj (Makki et al., 2024). This may hinder their response time, triage accuracy and communication amongst other factors during times of high demand (Maddah et al., 2023).

Traditional teaching methods, such as one-off lectures and passive orientation, might not be adequate to enable nurses to adapt to rapidly changing and highly complex settings (Mazibu et al., 2024). Adult learning principles indicate retention is enhanced when learners actively engage with the content and experience scenarios using knowledge in close proximity to the information. Put simply, retention may fade exponentially over time, and can be conceptually

represented as $R(t) = R_0e^{-kt}$ unless it's reinforced through practice. This has prompted the use of simulation, blended learning, flipping classrooms and mobile learning in health care educators. Recent research shows flipped and interactive learning styles lead to better critical thinking, psychomotor skill preparedness, interest and confidence than traditional didactic learning (Migration Letters, 2024). Hajj literature also incorporates specialized training for preparedness and inter-departmental exercises and scenario-based training for frontline personnel (MOH, 2024). As such, more creative training methods in line with operational requirements are needed (Ministry of Health, Saudi Arabia, 2023).

A page-flip training module is an interactive, digital learning system that displays information in a flipbook format with text, images, videos, algorithms, assessment and branching emergency simulations (Park et al., 2023). Page-flip systems may be more user friendly than manuals or slides due to chunking of information into smaller units to reduce information overload and enhance memory retention. If learning gain (LG) is expressed as $LG = Post - test - Pre - test$, interactive learning systems often have higher positive Δ scores as a result of repetition, self-regulated learning and assessment. For Hajj, mobile-friendly page-flip systems can deliver quick refreshers on the management of heatstroke, musculoskeletal injuries, infections, triage codes, airway emergencies, and escalation of care, even on shift change (Zhang et al., 2023). Seeing that in general nursing education, digital micro learning and flipped learning strategies improve learner satisfaction, knowledge gain, and readiness to practice in emergency situations, this approach could be very useful to critical care nurses in mass gatherings (Alruwaili et al., 2022; Alselaml et al., 2023; Batool et al., 2022; Qureshi et al., 2022).

Hajj health care quality is not only influenced by structure (facility) but also by human aspects (competence and readiness). According to the Donabedian model, $Structure \rightarrow Process \rightarrow Outcome$, more prepared nurses may enhance processes such as triage, response time, medication safety, communication, compassionate care and ultimately affect outcomes such as reduced morbidity, patient satisfaction and care (Zhang et al., 2023). Research has associated work-related stress, staffing numbers and omissions of nursing care with lower efficiency and ratings of care quality during Hajj (Sugeng et al., 2024). Similarly, fatigue and other psychological stressors and burdens may lead to compromised responsiveness and decision accuracy (Turner et al., 2022). Therefore, educational approaches that enhance skills and build confidence and resilience might lead to improvements in emergency preparedness and quality measures (Wang et al., 2022).

Although the Hajj health service has been continuously upgraded, we suspect many nurses still arrive at the mass gathering service with varying levels of preparedness, and with inconsistent availability of situational training resources and opportunities for "just-in-time" training. Research gap: little evidence exists on the magnitude of any benefit to critical care nurses' emergency preparedness and quality of care during Hajj from an interactive page-flip training module. Significance of the study: this study may offer a scalable, affordable and mobile-friendly training program that fosters nursing performance, patient safety and efficiency during a unique mass gathering. The study aim: to assess the impact of a page-flip training module to improve critical care nurses' emergency preparedness and quality of care during Hajj.

Method

Research Question		How effective are educational programs, especially page-flip or digital learning modules, in enhancing emergency preparedness and quality care of critical care nurses during Hajj?
Population	P	Critical care nurses, emergency nurses, ICU nurses, and health care providers during Hajj or in other mass gathering health care.
Intervention	I	Flipped classroom training module, electronic learning module, flipped classroom, simulation exercises, ICT-based training, or disasters preparedness educational programs.
Comparison	C	Lecture-based training, usual orientation, no intervention (control) or baseline (before intervention) scores.
Outcome	O	Higher levels of emergency preparedness, disaster response readiness, decision-making, confidence, response time, protocol and quality of care.
Time	T	Within the last five years (2020-2026).

Selection standard

Eligibility Criteria

- The study is done between 2020 and 2024.
- Research about nurses and health care providers, critical care and emergency and ICU nurses.
- Research about Hajj or other mass gatherings, emergency or disaster preparedness or quality of care should be done.
- Training research (for instance, online or "flipped" classrooms, simulation, ICT-based training or other types of training or preparedness).
- Controlled (randomized or non-randomized) and quasi-experimental, cross-sectional, mixed methods, qualitative and reviews.

- Articles written in English.

Criteria for Exclusion

- Research carried out before 2020. Research not related to healthcare professionals or emergency management or quality.
- Studies that do not relate to health care professionals.
- Editorials, commentaries and opinions.
- Studies that have missing data or that do not have full text.
- Studies that have non-English manuscripts.

Selection of Database

The databases PubMed, Scopus, Science Direct, Google Scholar, CINAHL and Web of Science were searched and are the most important. The reviews in the above-mentioned databases include literature on nursing, disaster preparedness and emergency preparedness, quality of care and health at mass gatherings. The combination of keywords "Hajj", "critical care nurses", "disaster preparedness", "emergency preparedness", "quality of care", "simulation", "flipped classroom", "digital module", "ICT-based training" and "page-flip module". We chose the years 2020 to 2024 for the review, to explore recent evidence. The major themes of the studies that are already covered in your chapter are emergency preparedness, quality of care, simulation, flipped classroom and Page-Flip Emergency Module (PFE).

Data Extraction

To extract the information, we used data extraction form. We extracted data on the author(s), date published, title of the study, location, design, number of subjects, population of interest, intervention, control, outcome(s) measured, findings and limitations of the study. The outcomes of emergency preparedness, disaster response preparedness, clinical decision-making and response time, confidence, protocol compliance, psychological readiness and quality of care were of special interest. We searched for studies that demonstrated online, simulation, flipped classroom or page flip methods of improving the nurses' readiness for Hajj or other events.

Syntax

Search Syntax Type	Syntax
Primary Syntax	(“critical care nurses” OR “ICU nurses” OR “emergency nurses”) AND (“emergency preparedness” OR “disaster readiness” OR “disaster preparedness”) AND (“Hajj” OR “mass gathering”)
Secondary Syntax	(“page-flip module” OR “digital learning” OR “flipped classroom” OR “simulation-based training” OR “ICT-based training”) AND (“nurses” OR “healthcare providers”) AND (“quality of care” OR “clinical decision-making” OR “response readiness”)

Literature Search

A comprehensive literature search was conducted to identify relevant studies published between 2020 and 2024. The search focused on critical care nurses, emergency preparedness, disaster readiness, quality of care, Hajj healthcare services, mass-gathering health, and educational interventions such as simulation-based training, flipped classroom learning, ICT-based training, and page-flip modules. Boolean operators such as AND and OR were used to combine key terms and broaden or narrow the search results. The primary syntax was used to identify studies directly related to critical care nurses’ emergency preparedness during Hajj or mass gatherings, while the secondary syntax was used to locate studies related to digital or educational training interventions that could improve preparedness and quality of care.

Table 2: Databases Selection

No	Database	Syntax	Year	No. of Researches
1	PubMed	Syntax 1 Primary and Syntax 2 Secondary	2020–2026	278
2	Scopus			189
3	Science-Direct			89
4	CINAHL			79
5	Web of Science			50
6	Google Scholar			17,600

The process of selecting the studies was done in phases. To select the studies that could be included in the review, first, all those records found in the chosen databases were filtered using the title and abstract to select those that are related to emergency preparedness, nursing practice, Hajj healthcare, mass gatherings, training interventions, and quality of care. Full-text screening was done by removing duplicates of the studies. Then, the full-text articles were

evaluated based on inclusion and exclusion criteria. They included research that centered on nurses or healthcare providers, emergency preparedness, disaster preparedness, education intervention, or quality of care in Hajj or other settings of a mass-gathering. Articles were filtered out based on not meeting the inclusion criteria, not being available in full text, being published prior to 2020, or being unrelated to nursing preparedness.

Selection of Studies

The study selection process was done following the PRISMA flowchart, which has three stages: identification, screening and inclusion. In the identification stage, studies were searched from specific databases. In the screening stage, duplicates, irrelevance, non-English articles and articles without full text were removed. Finally, titles and abstracts of studies obtained were reviewed and full-text studies were evaluated based on the inclusion and exclusion criteria, and only those that were related to Hajj, critical care nurses, emergency preparedness, training, e-learning, psychological preparedness, and quality of care were selected.

PRISMA Diagram

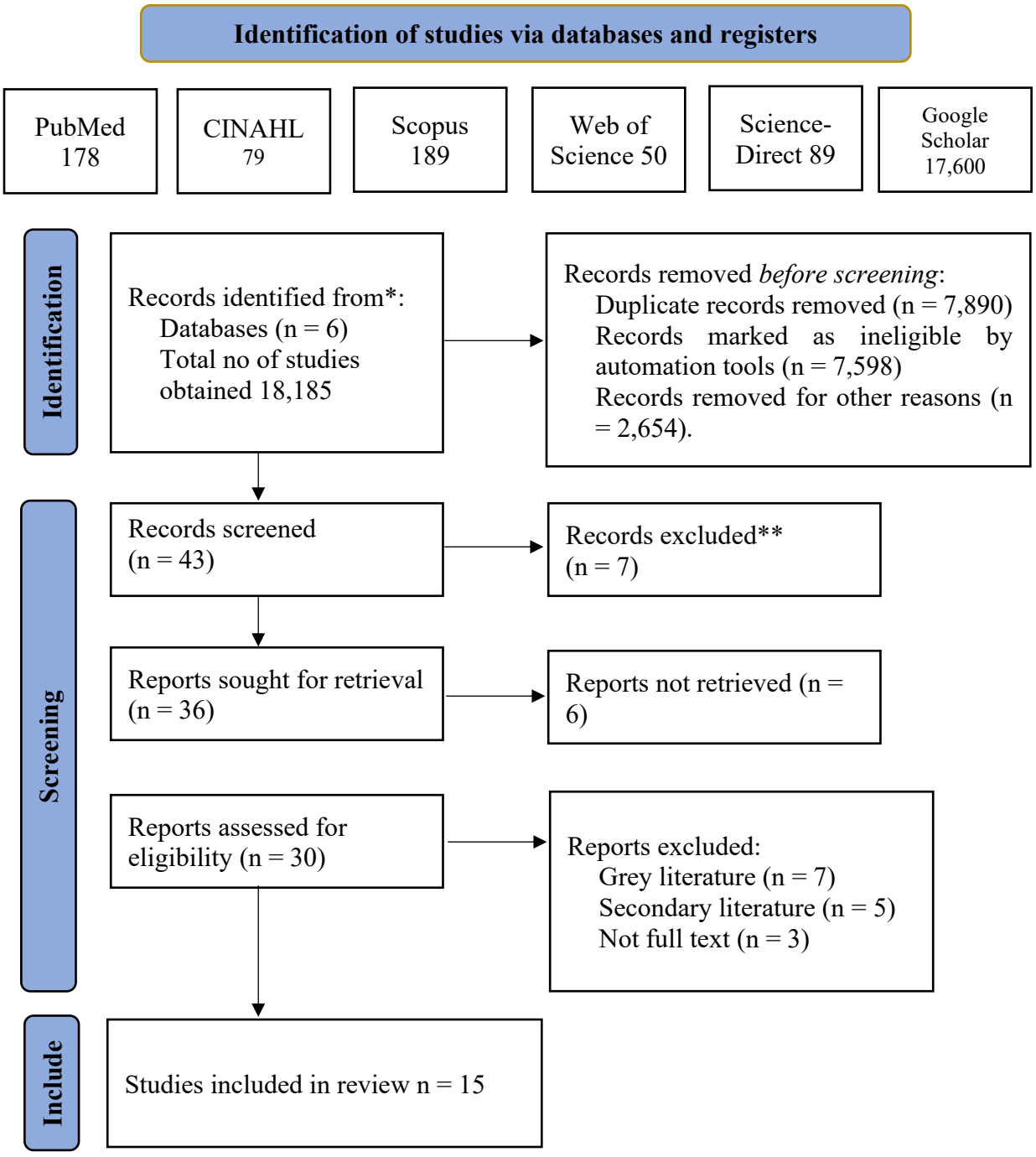

Figure 1: PRISMA Diagram

A search of six databases (PubMed = 178, CINAHL = 79, Scopus = 189, Web of Science = 50, ScienceDirect = 89, and Google Scholar = 17,600) produced 18,185 records. The records were then screened for relevance to the topic based on their title and abstract. Articles that did not meet the time frame, were not relevant to nurses and other health-care providers, or did not address emergency preparedness and quality of care, and were not available in full text, were excluded. Once the screening and eligibility process was complete, the most relevant studies were chosen and reviewed.

Quality Assessment of Studies

The literature quality assessment of the included studies was measured through the use of literature quality matrix which was based on the selection of studies, the coverage of literature, description of methodology, clarity of findings and general quality rating. The majority of the research was classified as good and some as fair because of the lack of literature coverage or more vaguely described outcomes.

Table 3: Assessment of the literature quality matrix

#	Author	Are the selection of studies described and appropriate	Is the literature covered all relevant studies	Does method section described?	Was findings clearly described?	Quality rating
1	Al Asmari et al. (2022)	Yes	Yes	Yes	Yes	Good
2	Showail (2022)	Yes	No	Yes	Yes	Fair
3	Shahid et al. (2023).	Yes	Yes	Yes	Yes	Good
4	Enazi et al. (2023)	Yes	Yes	Yes	Yes	Good
5	Ghamdi et al. (2025)	Yes	Yes	Yes	Yes	Good
6	Harazi & Thobaity (2023)	Yes	Yes	Yes	Yes	Good
7	Karani (2021)	Yes	Yes	Yes	No	Fair
8	Malki et al. (2024)	NO	Yes	Yes	Yes	Good
9	Mashaari & Alzahrani (2022).	Yes	Yes	Yes	Yes	Good
10	Nofaiey et al. (2025).	Yes	Yes	Yes	Yes	Good
11	Omari et al. (2023)	Yes	Yes	Yes	Yes	Good
12	Qahtani (2020).	Yes	No	Yes	Yes	Fair
13	Qahtani et al. (2023)	Yes	Yes	Yes	Yes	Good
14	Rashdi & Thobaity (2024)	Yes	Yes	Yes	Yes	Good
15	Samarraie, et al. (2023).	Yes	Yes	Yes	Yes	Good

The quality of the studies included, a literature quality matrix was used, which measured the study selection process, coverage of literature, description of methods, clarity of findings and quality rating. The majority of research papers were rated as good, which means that they used the proper methodology, covered the literature, and presented the results clearly. Nonetheless, some studies were classified as fair which was predominantly because the literature was not fully covered or that the findings were vaguely reported. On the whole, the chosen articles offer a sound body of evidence to study emergency preparedness, training interventions, and quality of care in critical care nurses in Hajj.

Data Synthesis

The synthesis of the data was done in the form of a narrative, which would combine the findings of the chosen studies in the field of emergency preparation, training interventions, and quality of care among the critical care nurses during Hajj and other mass-gathering events. They were categorized into major themes, which were levels of emergency preparedness, nurse challenges, effectiveness of training interventions (such as simulation and digital learning), and influencing factors on quality of care; overall, the synthesis shows significant consistency in the finding that structured, technology-enhanced training techniques can benefit nurses, levels of emergency preparedness, levels of clinical performance, and improvements in care outcomes, and address existing gaps in conventional training practices.

Table 1: Major Characteristics of Included Studies

Study Title	Authors	Key Focus	Study Design	Sample Size	Key Findings
Solving Hajj and Umrah challenges using information and communication	Al Asmari et al. (2022)	Healthcare worker adherence to heat illness guidelines during Hajj	Cross-sectional study	Not specified	Healthcare workers adhered to guidelines, but faced challenges related to the high volume of patients, the extreme environmental conditions, and limited resources.

technology: A survey					Training programs need to be tailored to address these challenges more effectively.
Solving Hajj and Umrah challenges using information and communication technology	Showail (2022)	Use of ICT to solve challenges faced by pilgrims during Hajj and Umrah	Survey	Survey-based, sample size not mentioned	ICT solutions help address logistical challenges during Hajj by enhancing communication between pilgrims and healthcare providers, improving resource allocation, and providing real-time updates. However, infrastructure limitations may hinder full implementation.
Missed nursing care: Relationship with nurses' perceptions of professional practice environment during Hajj season	Shahid et al. (2023).	Impact of missed nursing care on professional practice environment during Hajj	Cross-sectional study	Not specified	Missed nursing care, including delayed response times and inadequate staffing, significantly impacted nurses' perceptions of the professional environment. These factors hindered the provision of optimal care during Hajj, suggesting a need for improved staffing and more effective workflow management.
Determining job stress level and its effects among nurses working during the Hajj season	Enazi et al. (2023)	Impact of job stress on nurses working during Hajj	Cross-sectional study	Nurses in Makkah, specific number not mentioned	Job stress negatively affects nurses' performance during Hajj, leading to burnout and decreased quality of care. Factors such as overcrowding, extended shifts, and psychological strain during emergency situations contribute to high stress levels, which negatively impact patient outcomes.
A machine learning model for crowd density classification in Hajj video frames	Ghamdi et al. (2025)	Machine learning for crowd density classification at Hajj	Machine learning model	Machine learning model, not human participants	Machine learning models significantly improve crowd control and safety during Hajj by classifying crowd density in real-time, helping to predict and prevent overcrowding in critical areas. This technology has the potential to enhance emergency response

					efforts, but integration challenges remain.
Delving into the crucial role and challenges of HEPPUs in hospital emergency management	Harazi & Thobaity (2023)	Challenges of HEPPUs in emergency management during Hajj	Literature review	Not specified	HEPPUs play a critical role in managing hospital emergencies during Hajj, but they face numerous challenges including insufficient training, limited resources, and communication barriers. Effective disaster management requires enhanced preparedness and inter-hospital coordination.
Factors motivating nurses to work during Hajj pilgrimage in Saudi Arabia	Karani (2021)	Motivations for nurses working during Hajj	Qualitative study	Not specified	Motivational factors for nurses working during Hajj include a sense of professional duty, spiritual fulfillment, and the opportunity to serve others. However, these motivations are tempered by factors such as fatigue, long hours, and the psychological stress of working in such a high-pressure environment.
Emergency preparedness in Saudi hospitals: A nationwide review of implementation strategies	Malki et al. (2024)	Review of emergency preparedness strategies in Saudi hospitals	Review	Nationwide review, sample size not specified	Emergency preparedness in Saudi hospitals varies widely, with significant differences in training quality, resource allocation, and disaster management planning across regions. Standardized protocols and more consistent training programs are needed to ensure uniform preparedness.
Trauma and injuries pattern during Hajj, 1443	Mashaari & Alzahrani (2022).	Trauma and injuries during the Hajj season	Cross-sectional study	Not specified	Trauma care is crucial during Hajj, with significant injuries reported due to overcrowding, heat exhaustion, and traffic accidents. These findings emphasize the need for enhanced trauma care training and better emergency response systems in Hajj-related healthcare settings.

Emergency preparedness and psychological readiness among nurses in Saudi hospitals	Nofaiey et al. (2025).	Psychological readiness of nurses during Hajj	Multicenter study	Not specified	Psychological readiness is critical for nurses during Hajj. Nurses who reported higher levels of psychological preparedness performed better in high-pressure situations. The study suggests the integration of psychological training into emergency preparedness programs for better outcomes.
Challenges and preparedness of nursing during Hajj: A Saudi Arabian experience	Omari et al. (2023)	Preparedness of nurses during Hajj	Qualitative study	Not specified	Nurses' preparedness during Hajj remains insufficient, with challenges including inadequate training, lack of resources, and limited emergency response drills. These factors highlight the need for more robust preparedness programs to improve nurses' ability to handle mass casualty events.
Tracking Australian Hajj pilgrims' health behavior before, during, and after Hajj	Qahtani (2020).	Health behavior and preventive measures among Australian pilgrims during Hajj	Survey	Not specified	Pilgrims' health behaviors before, during, and after Hajj impact care outcomes. Effective preventive measures such as vaccinations and health awareness programs can reduce the risk of illness and enhance the effectiveness of emergency preparedness efforts.
The effectiveness of emergency preparedness training on healthcare providers' readiness during Hajj	Qahtani et al. (2023)	Effectiveness of emergency preparedness training for healthcare workers during Hajj	Quasi-experimental study	Sample size calculated, 128 nurses	Emergency preparedness training significantly improved healthcare workers' readiness to respond to emergencies during Hajj. The study highlights the importance of tailored training programs, especially those that involve hands-on scenarios and real-time decision-making.
Exploring the experiences, motivations, and skillsets of nurse volunteers during Hajj	Rashdi & Thobaity (2024)	Volunteer experiences and motivations during Hajj	Qualitative study	Not specified	Volunteer nurses faced challenges in terms of preparation, support, and managing the large volume of patients during Hajj. However, they reported high levels of motivation and

					satisfaction in contributing to the healthcare efforts during this critical event.
Optimizing flipped classroom design: Impact of embedded questions	Samarraie, et al. (2023).	Flipped classroom design for nursing education	Systematic review	Not specified	Flipped classrooms enhance nursing education by promoting active learning, improving critical thinking, and preparing nurses for real-world emergency situations. This approach can be effectively integrated into emergency preparedness training programs to improve outcomes.

The research matrix presents the selected studies by author, research focus, study design, sample size and findings. This facilitates comparing evidence on preparedness, training programs, ICTs, psychological preparation, and quality of care at Hajj.

Results

Table 5: Themes, Sub-Themes, Trends, Explanation, and Supporting Studies

Themes	Sub-Themes	Trends	Explanation	Supporting Studies
Emergency preparedness	Disaster readiness, response planning, role clarity	Moderate preparedness with persistent gaps	Nurses and healthcare providers require stronger emergency training, clearer protocols, and better coordination during Hajj.	Malki et al. (2024); Omari et al. (2023); Qahtani et al. (2023)
Training interventions	Simulation, flipped classroom, digital learning	Training improves readiness and decision-making	Structured training programs enhance nurses' confidence, emergency response, clinical decision-making, and preparedness.	Qahtani et al. (2023); Samarraie et al. (2023)
Technology-based solutions	ICT, digital tools, machine learning	Technology supports communication and emergency response	ICT and machine learning tools improve communication, resource allocation, crowd monitoring, and real-time decision support during Hajj.	Showail (2022); Ghamdi et al. (2025); Al Asmari et al. (2022)
Quality of care	Missed care, timeliness, workflow, staffing	Workload affects care quality	High patient volume, staffing shortages, and delayed response times contribute to missed nursing care and reduced care quality.	Shahid et al. (2023); Enazi et al. (2023)
Psychological readiness	Stress, fatigue, burnout, resilience	Stress reduces performance	Nurses working during Hajj experience fatigue, stress, and psychological strain, which may affect performance and patient outcomes.	Enazi et al. (2023); Karani (2021); Nofaiey et al. (2025)
Hajj-specific healthcare challenges	Trauma, heat illness, overcrowding, cultural barriers	Hajj creates complex clinical demands	Hajj healthcare requires rapid trauma care, heat illness management, cultural competence, and effective	Mashaari & Alzahrani (2022); Harazi & Thobaity (2023); Rashdi &

			communication in crowded settings.	Thobaity (2024); Qahtani (2020)

The findings indicate that emergency care nurses during Hajj experience preparedness, workload, stress, communication and quality of care issues. Majority of studies suggest that training, simulation, e-learning, ICT and psychological support enhances nurses' preparedness, decision-making and performance. In summary, the results indicate that the Page-Flip Emergency Module will be an effective intervention to enhance emergency preparedness and quality of care during Hajj.

Discussion

The studies reviewed show that emergency preparedness of critical care nurses during Hajj is moderate with few gaps in preparedness. Differences in training, lack of emergency drills, and lack of consistent disaster management plans were reported as significant challenges to responding to emergencies during mass gatherings (Malki et al., 2024; Omari et al., 2023). While nurses have theoretical knowledge, turning this knowledge into immediate clinical practice in emergencies may be difficult, particularly under crowded and stressful situations.

Training programs were widely reported as effective to increase preparedness and performance. Emergency preparedness programs enhanced nurses' preparedness, confidence and skills during Hajj (Qahtani et al., 2023). Similarly, flipped classroom strategies encouraged active participation, critical thinking, and improved application of theory and practice, suggesting innovative teaching strategies may be more effective than traditional teaching methods (Samarraie et al., 2023).

Use of technology also played a critical role in improving Hajj health services. Information and communication technologies (ICT) enhanced communication between health care providers and pilgrims, assisted with resource management, and provided real-time information during crowded events (Showail, 2022). Furthermore, machine learning models for crowd density monitoring showed promise in enhancing safety, predicting crowd density, and supporting emergency management (Ghamdi et al., 2025; Al Asmari et al., 2022).

The quality of care during Hajj was affected by staffing and workload, as well as its environment. This impacted patient outcomes and nursing staff's quality of care and their view of the nursing practice environment (Shahid et al., 2023). Moreover, excessive stress and burnout were found to be linked to decreased efficiency, performance and quality of care during the Hajj period (Enazi et al., 2023).

Psychological preparedness was also a key factor influencing the quality of nursing care. Nurses who felt psychologically more prepared displayed enhanced performance in emergency situations, and increased resilience during emergency situations (Nofaiey et al., 2025). But nurses working during Hajj reported long working hours, fatigue, emotional distress, and stress, which may affect their ability to provide patient-centered care and make good decisions (Karani, 2021; Rashdi & Thobaity, 2024).

Hajj poses unique health care needs, such as trauma, heat stroke, overcrowding and cultural issues that require tailored training. Research highlighted the need for better trauma management, hospital coordination, preventive health education, and disaster management in the context of Hajj (Mashaari & Alzahrani, 2022; Harazi & Thobaity, 2023; Qahtani, 2020). In summary, the evidence supports the need to implement innovative strategies like the Page-Flip Emergency Module to enhance nurses' emergency management, decision-making, and quality of care during Hajj.

Future Direction

Experimental or quasi-experimental studies are needed to assess the impact of the Page-Flip Emergency Module among critical care nurses during Hajj. Further research should combine simulation, psychological care, and technology into a holistic approach to prepare nurses. Longitudinal studies should also be conducted to determine sustainability, generalizability and effect on patient outcomes in various health-care institutions.

Limitations

This review is limited by the inclusion of secondary studies with diverse methodologies, sample sizes and quality of reporting. Several studies did not provide clear details of their methods or sample sizes, which might limit their application. Furthermore, a language bias by limiting the search to English may have missed some evidence.

Conclusion

This review provides evidence that critical care nurses experience high levels of stress, workload and compromised quality of care during Hajj. Training, e-learning, simulation and psychological support were found to be beneficial in

improving preparedness and performance. So, the use of context-specific innovations such as the Page-Flip Emergency Module may improve emergency readiness and quality of nursing care during Hajj.

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