

Core Competencies in Disaster Response among Emergency Nurses in Aceh, Indonesia: A Cross-Sectional Study

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ABSTRACT

OBJECTIVE: To identify the core competencies among emergency nurses in disaster response of two hospitals for critical thinking, technical, communication, specific diagnostic, and general diagnostic skills.

METHODOLOGY: A descriptive comparative using a cross-sectional study design was conducted. The population comprises all nurses working in the emergency department (EDs) at two public hospitals: provincial and district hospitals. A total sampling technique was conducted to collect data from 88 nurses. The data was collected using the Nurses Perception of Disaster Core Competencies Scale (NPDCC) questionnaire and analyzed using the Mann-Whitney U-test.

RESULTS: Results showed significant differences in the core competencies of emergency nurses in the disaster response in provincial and district hospitals. The sub-scale of the study indicated particularly in critical thinking (mean rank 49.86 and 27.60, $p=0.000$), technical (mean rank = 49.22 and 28.41, $p=0.003$), and communication skills (mean rank = 46.82 and 31.43, $p=0.035$) in both hospitals. However, there were no significant differences in specific diagnostic skills (mean rank = 44.72 and 34.07, $p=0.177$) and general diagnostic skills (mean rank = 46.65 and 31.64, $p=0.081$) among EDs nurses of both hospitals.

CONCLUSION: This study found a significant difference in the core competencies among emergency nurses in the disaster response in both hospitals. Enhancing the competencies of nurses in disaster response, especially in special and general diagnostic skills, is crucial and can be achieved through regular emergency and disaster education training programs. Future training or policy changes are required to improve core competencies among emergency nurses in both hospitals.

KEYWORDS: Core competencies, nurses, emergency, disaster, response, hospital

INTRODUCTION

Disasters may cause severe disruption of the functioning of a community and livelihoods leading to human casualties, environmental damage, material, economic, environmental, property loss, and psychological impacts¹⁻³. Disasters caused physical, psychological, psychosocial, and spiritual impacts on survivors^{3,4}.

Indonesia is prone to various disasters due to its location and natural hazards. In 2021, there were 135 disasters, including 56 floods, 38 forest and land fires, 29 tornadoes, six landslides, and six flood and landslide disasters. To minimize and manage the disaster's several impacts, nurses as a frontliner-health workers in a disaster must manage limited resources, coordinate care, determine necessary changes in standards of care, make appropriate referrals and triage, assess, control, and evaluate

infections. These skills are essential for quickly responding to emergencies and disaster situations⁵. Disaster response refers to direct action during a disaster to save lives, meet victims' needs, and mitigate long-term health impacts⁶. In this phase, nurses provide first aid, offer patient care, isolate survivors at risk of transmitting diseases, help distribute aid to refugees, provide psychological care, and deliver specialized care to vulnerable populations⁷. For effective disaster response, the nurses must be able to cope with the first response to disaster. However, several studies mentioned that nurses do not possess adequate competencies in response to disasters⁸, hospital nurses are not competent due to the unexpected nature of such occurrences, even though they have attended pre-deployment emergency and disaster training¹.

As professional health workers, nurses core competencies include critical thinking, specific diagnostic, general diagnostic, technical, and communication skills. Critical thinking enables nurses to evaluate disaster-related information. Specific diagnostic skills refer to the ability to diagnose medical conditions related to a disaster. In contrast, general diagnostic skills involve determining diagnoses related to patients' medical conditions and understanding clinical changes^{9,10}.

The factors influencing these disaster core competencies include disaster-related experience and

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knowledge, education, training, and ability to adapt to disaster situations. Disaster-related experience greatly impacts nursing core competencies, followed by disaster-related knowledge¹¹. Disaster competency training for emergency nurses is important to possess specialized knowledge and skills to respond effectively to disasters such as earthquakes¹². A study reported that nurses have less competence regarding their disaster response abilities¹³.

This study compares the core competencies among EDs nurses in the disaster response at provincial and district hospitals, as affected hospital areas of disaster during two decades. The hospitals, as referral hospitals are significant in providing emergency care and disaster response. Both hospitals also contributed in caring the tsunami patients in 2004, and the care of COVID-19 patients during the pandemic 2019.

METHODOLOGY

Study Design

The study used a descriptive with cross-sectional design.

Population and Sample

The population consisted of all executive nurses in the EDs, 44 nurses in the provincial hospital and 35 nurses in the district hospital. A total sampling technique was employed to include all eligible nurses working in the EDs of both hospitals. The criteria for inclusion of the sampling comprised all registered nurses working in the EDs at two public hospitals, excluding those on leave or part-time.

Instrument

Data were collected using the "Nurse Perception of Disaster Core Competencies Scale (NPDC)", a validated instrument consisting of 45 items across five dimensions: critical thinking skills, specific diagnostic skills, general diagnostic skills, technical skills, and communication skills. Responses were scored on a 5-point scale ("very poor" = 1 to "excellent" = 5), with minimum and maximum ratings ranging from 45 to 225. The reliability of the instrument was measured by Cronbach alpha of 0.96. The highest score indicates a better perception of core competencies towards disaster situations. Data collection was administered during scheduled shifts to ensure maximum participation. All participants provided written informed consent before participation in the study.

Data Analysis

Data were analyzed using the Mann-Whitney U-test to compare the core competencies between nurses at the two hospitals

Ethical Statement

This study has obtained ethical approval from the ethics committee of the Faculty of Nursing, Universitas Syiah Kuala, under the approval number 233/ETIK-RSUDZA/2023.

RESULTS

Overall, nurses at the provincial hospital demonstrated higher competencies across all assessed areas, indicating a potential link between education level, clinical experience, and training attended in emergency and disaster (see Table I, II, III).

Table I presents the socio-demographic distribution of nurses in EDs involved in this study shows the length of work of nurses at both hospitals was predominantly ≥ 2 years (90.9% at the provincial hospital and 60% at the district hospital). Regarding gender, more than half of the nurses at the provincial hospital were male; at the district hospital, it was the opposite. Regarding the highest educational attainment, most nurses at the provincial hospital were nurse professionals (54.5%), while most at the district hospital held a Nursing Diploma (77.1%). In terms of disaster training, most nurses at both hospitals had participated in BTCLS training (84.1% at the provincial hospital and 57.1% at the district hospital).

Table I: Socio-demographic Distribution of the EDs Nurses (n=88)

Demographic Data	Provincial hospital		District hospital	
	f	%	f	%
Length of work (year)				
<2	4	9.1	14	40
≥ 2	40	90.9	21	60
Gender:				
Male	24	54.5	17	48.6
Female	2	45.5	18	51.4
Education attainment:				
Diploma	17	38.6	27	77.1
Nurse profession	24	54.5	8	22.9
Master of Nursing	3	6.8	-	-
Disaster Training:				
None	5	11.4	12	34.3
BTCLS	36	84.1	29	57.1
Others (wound care, ATCLS)	2	4.5	3	8.6

Table II, shows the mean rank of core competencies for nurses in disaster response was 48.31 for the provincial hospital and 29.56 for the district hospital. The statistical tests indicated a significant difference in the core competency scores of nurses during the disaster response phase at both hospitals ($p=0.000$).

Table II: Nurses' Core Competency Scores in the Disaster Response in the EDs (n= 88)

Variable	Mean rank	n	p-value
Provincial hospital	48.31	44	0.000
District hospital	29.56	35	

Table III illustrates significant differences in critical thinking, specific diagnostic, general diagnostic, technical, and communication skills between the EDs nurses in the two hospitals ($p<0.05$).

Table III: Critical Thinking Skills Scores of Nurses in the EDs (n=88)

Variable	Provincial hospital (n=44)	District hospital (n=35)	p-value
	Mean Rank	Mean Rank	
Critical thinking skills	49.86	27.60	0.000
Specific diagnostic skills	44.72	34.07	0.177
General diagnostic skills	46.65	31.64	0.081
Technical skills	49.22	28.41	0.003
Communication skills	46.82	31.43	0.035

DISCUSSION

Disaster response competency refers to the concrete actions taken by nurses during a disaster to save as many lives as possible, meet the primary needs of victims, and reduce long-term health impacts. Nurses play a critical role in this phase by providing physical and mental care services. Therefore, nurses must possess adequate competencies in disaster response⁵. Competencies include a level of performance demonstrating the effective application of knowledge, skills, and judgment gained through work experience, education, mentoring, and training. Disaster nursing competencies are used to describe general nursing practice, specialized roles in disaster nursing, and specialty practice⁵.

The results of this study found that has a significant difference in the core competencies among emergency nurses in the disaster response in both hospitals (mean rank = 48.31 and 29.56, p-value of 0.000). However, there was no significant differences in specific diagnostic skills (mean rank = 44.72 and 34.07, p=0.177) and general diagnostic skills (mean rank = 46.65 and 31.64, p-value of 0.081) among EDs nurses of both hospitals. **Table II** statistical analysis revealed a significant difference in core competency scores between nurses at the provincial hospital (mean rank = 48.31) and the district hospital (mean rank = 29.56), with a p-value of 0.001. The socio-demographic data of respondents likely influenced these results. For instance, the majority of nurses (90.9%) at the provincial hospital had more than two years of experience, compared to 60% at the district hospital (**see Table I**). The length of time a nurse spends in an emergency department significantly impacts their competency level. A previous study finding, demonstrating that clinical experience as an emergency nurse influences disaster preparedness competency scores. Longer work experience in the emergency department can enhance disaster response capabilities¹⁴.

The study also found that most EDs nurses at the provincial hospital hold a nurse profession degree (54.5%), while most nurses at the district hospital have a diploma (77.1%). These findings align with a previous study reported that nurses with a higher

education demonstrated significantly better competencies than diploma nurses⁹. Other studies have also emphasized the crucial role of continuing education programs and higher academic degrees in preparing and enhancing the competencies of nurses in disaster risk management^{15,16}.

In addition to educational attainment, nurses' clinical experience may be related to the core competencies of nurses at the two hospitals. EDs nurses have handled emergency cases and disaster victims over the past decade in the province. This finding aligns with a previous study, which reported that adequate clinical experience, particularly in triage, first aid, wound care, IV lines, and airway management, positively correlates with nurses' disaster response competency¹⁷. Another study also found a relationship between skills, disaster preparedness, and disaster knowledge. Factors such as the availability of disaster management courses in the curriculum, educational level of nurses, working in the EDs, participation in disaster management training, and nurses aged ≤40 years contribute significantly to higher disaster knowledge and skills. However, factors like gender, marital status, hospital type, and disaster experience are not significantly related to disaster preparedness¹⁸. Disaster nursing competencies correlate with age, nursing career, compassion satisfaction, and secondary traumatic stress. Compassion satisfaction, prior disaster nursing education, and previous participation in disaster nursing care are predictors of disaster nursing competencies¹⁹. Another study found that clinical experience, previous disaster training, educational attainment (master's degree), and working in the ICU or EDs resulted in higher disaster response readiness than those with a bachelor's degrees in other units or specialties²⁰.

Provincial hospitals, as referral and teaching hospitals with excellent resources and adequate diagnostic facilities, play a crucial role in supporting better disaster response competencies in nurses. Their role is particularly significant compared to district hospitals, which serve as district referral hospitals and often have limited nursing resources and diagnostic support facilities. This difference in resources is one of the factors that could be related to nurses' core competencies in disaster response, in addition to several other factors. This finding is supported by a previous study indicated that higher accredited hospitals are the highest referral health care centers (tertiary care). These hospitals offer comprehensive healthcare services, including general medicine, sub-specialist, and specialist medicine, and are regulated by the government²¹.

It is crucial to note that critical thinking skills play a pivotal role in enhancing nurses' readiness to deal with emergencies, including disaster response conditions. These skills, which can be learned and are beneficial for all aspects of life²², are particularly essential in nursing practice. They enable nurses to

make logical decisions to carry out their professional duties²³. Nurses' critical thinking abilities may increase with experience and age²⁴. This is align with a previous study reported a significant relationship between nurses' clinical experience in EDs and their level of preparedness in responding to disaster survivors¹⁴.

This study found differences in nurses' core competencies in disaster response, as shown by the work experience of ≥ 2 years for nurses in provincial and district hospitals, at 90.9% and 60%, respectively. Provincial hospitals demonstrated higher nurse competency, with a mean rank score compared to district hospitals. This finding suggests that nurses in provincial hospitals tend to have longer clinical experience, which positively impacts the development of their core competencies in disaster response. The study also highlights the potential indicators for measuring nurses' competency and experience levels, including length of service and clinical experience in the EDs at both hospitals.

During disasters, nurses need skills in complex medical diagnosis, including rapid and accurate evaluation of patients⁹. In assessing mass casualties, nurses focus on health history, thoroughly assess various health aspects, and consider the victim's psychological response. This approach provides a quick and comprehensive guide to assessing the health conditions of disaster victims¹⁰. Nurses with ≥ 2 years of EDs experience and specialized training in trauma and cardiac life support, and wound care are better equipped to assess physical and psychological changes in disaster survivors.

Moreover, the socio-demographic data supporting this study's results highlight the role of gender in disaster response. In the emergency wards of provincial hospitals, where most respondents were men (54.5%), male nurses exhibit different competency levels than female nurses. Previous studies have reported that male nurses have better knowledge than female nurses, particularly in responding to emergencies and disasters²⁵. Their physical strength, endurance, and readiness to handle pressure make them more adaptable to heavy and intensive tasks in the field, explaining their higher interest in developing knowledge in disaster nursing¹².

Most nurses at both hospitals have a good understanding of general diagnostic skill competencies, including first aid, airway, breathing, circulation, pain assessment, Glasgow coma scale assessment, vital sign measurement, wound assessment, and care. These competencies can be acquired through emergency/disaster education and training programs, clinical experience, and formal and non-formal education. Most nurses had sufficient airway and respiratory management knowledge. However, there is variation in knowledge on specific cases²⁶.

The socio-demographic data also relate to the study results, as the average age of nurses in this study was

33 years, a productive age. A study supported that nurses of productive age are more likely to be exposed to the information and competencies required in clinical work, enhancing their general diagnostic abilities²⁷. These results also align with a study shows that age significantly correlates with the level of knowledge. The health professionals' age significantly influenced their knowledge level, with health professionals over 30 years old having twice the knowledge about disaster/emergency preparedness compared to their younger counterparts²⁸. Furthermore, both hospitals serve as referral healthcare centers at the district and provincial levels.

Nurses must also have basic knowledge of disaster crisis management, including basic technical skills for handling mass casualty incidents. These essential skills include administering drug vaccinations, managing drug side effects, performing therapeutic interventions, handling isolation and decontamination in CBRNE (Chemical, Biological, Radiological, Nuclear, and Explosives) situations, self-protection, fluid/nutrition therapy, preparing victims for safe transfers, using emergency communication tools, and managing information¹⁰.

Evidence shows that the frequency of patient visits to provincial hospitals' emergency wards is higher than that of district hospitals, necessitating stronger technical skills among nurses to provide appropriate care and make sound decisions. The interdisciplinary care teams, consisting of nurses, general practitioners, specialists, consultants, and health students, face challenges in developing these technical skills.

The differences in healthcare facilities available at these two hospitals reflect disparities in specialized diagnostic equipment. As a referral and teaching hospital, the provincial hospital is well-equipped with advanced diagnostic tools such as ultrasonography, CT scans, and MRI. In contrast, the district hospital lacks sufficient facilities to support specialized diagnostics, which may contribute to the differences in the technical competencies of nurses between the two hospitals.

Emergency and disaster training enhances preparedness for effectively responding to disasters. Most nurses in provincial and district hospitals have participated in BTCLS training, with attendance rates of 84.1% and 57.1%, respectively. This finding aligns with a study noting that disaster-related training should be integrated into continuing education programs to help nurses improve their disaster preparedness in hospital settings. Therefore, disaster management training is essential to ensure nurses are ready to respond to natural and non-natural disasters²⁴.

The study results also indicate that most nurses in the EDs of the provincial hospital are graduates of a nursing profession program (54.5%), while most nurses in the district hospital hold a diploma (77.1%).

This difference in educational attainment is reflected in the nurses' competency levels, with those holding higher degrees demonstrating more advanced competencies. This finding is consistent with previous research, which has shown that nurses with a bachelor's degree tend to have higher abilities than those with a diploma⁹. Similarly, a study reported that the nurses who received emergency education and training felt better prepared to respond to disaster situations²⁹.

Communication is a crucial competency in disaster response. As frontline healthcare workers, nurses must be capable of providing clear, accurate information that patients and their families easily understand, and they must be able to collaborate effectively with other healthcare teams. Effective communication is vital to successful care and health services during disasters. In mass casualty incidents or disasters, communication techniques must be adapted to the emergency conditions and tailored to the needs of patients, families, communities, and healthcare providers¹⁰.

This study identified differences in communication skills between nurses in the EDs of the provincial and district hospitals. The educational level of the nurses contributed significantly to these differences, with the provincial hospital being staffed primarily by nurses with professional degrees (54.5%), while the district hospital was predominantly staffed by diploma holders (77.1%). These educational disparities likely influence the nurses' knowledge structures and communication skills in their respective healthcare facilities.

The communication skills tended to decline as nurses aged, particularly those with more than 10 years of clinical experience⁹. Also, supported by a previous study that a significant differences in nurses' competency scores in disaster risk management, influenced by factors such as education attainment, age, clinical experience, employment status, participation in training courses related to disaster risk management, and work experience during disasters³⁰.

The finding of this study highlights the practical implications for nursing practice, education, and disaster response protocols are crucial for emergency nurses. For example, in this study the identified gaps in specific diagnostic skills underscore and targeted training programs for emergency nurses such as the development of continuous education programs or interdisciplinary training for emergency departments are needed.

CONCLUSION

The study results indicate that a significant differences in the core competencies among emergency nurses in the disaster response at the provincial and district hospitals, particularly in critical thinking, technical, and communication skills. Clinical experience, educational attainment, participation in emergency and disaster training, and the availability of general and medical diagnostic facilities at both hospitals have played a crucial role in these findings. Therefore, disaster

education and training programs related to nurse competency in disaster response have become critical components that nurses and hospital stakeholders must prioritize. The finding of this study suggests specific areas for future research, particularly explore the long-term impacts of disaster training on nurses' competencies and patient outcome.

Limitation

This study is limited by the sample size from the two hospitals, particularly the number of nurses working in the EDs. Additionally, nurses have limited clinical experience regarding disaster response core competencies in managing disaster victims over the past three years, including earthquakes, tsunamis, tornadoes, floods, and landslides. Consequently, this research relies primarily on self-reporting.

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Data Sharing Statement: The corresponding author can provide the data proving the findings of this study on request. Privacy or ethical restrictions bound us from sharing the data publicly.

AUTHOR CONTRIBUTION

Husna C: Wrote the protocol, performed the data analysis, and wrote the initial manuscript and the critical review of the manuscript.

Safahira A: Conducted the data collection and analyzed data.

Amalia R: Contributed to the data analysis and critical review of the manuscript.

Fithria F: Contributed to critical review of the manuscript.

All authors have approved the final version of the article.

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