Triage Decision-Making Competencies among Nurses in Disaster Response: A Study from Hospitals Disaster Affected Areas

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Abstract

Aims: This study aimed to compare triage decision-making skills among nurses at general hospitals (GH) and maternal and child hospitals (MCH) in Banda Aceh, Indonesia.

Methods: This comparative study used a cross-sectional design. A total sampling technique was used involving all nurses in General Hospital (GH) and Maternal and Child Hospital, comprising 169 nurses with the totally sample in GH and MCH hospitals were 104 and 65 respondents respectively. The sample inclusion criteria were as follows: last education minimum diploma, at least six months of work experience, and working in emergency departments and intensive care. The exclusion criteria were nurses who left or study assignments during the study period. The questionnaire used was the Triage Decision-Making Inventory (TDMI), which consists of three sub-items: cognitive ability, experience, and intuition, totaling 27 items measured on a six-point Likert scale.

Results: Data were analyzed using the Mann-Whitney U-test. The results revealed a significant difference in triage decision-making competencies among nurses in disaster response between GH and MCH hospitals, with the mean and SD (136.98±12.47, 122.66±12.43, p=0.001), respectively. For each variable of the study, there was no significant difference in the cognitive abilities (p=0.180) and experience of nurses (p=0.562) between nurses in GH and MCH hospitals. However, there was a significant difference in nurses' intuitions (p=0.001).

Conclusion: The differences in triage decision-making skills between nurses in GH and MCH hospitals are related to their perceptions of intuition, clinical experience, and cognitive ability in caring for emergency cases in both hospitals. The cognitive abilities and clinical experience of nurses in caring for patients, particularly in emergency/health crisis/disasters, may help them in triage decision-making. Therefore, it is important for hospitals to have an effective triage information system and nurses with adequate knowledge and skills in triage.

Keywords: competency, decision-making, disaster, nurses, triage

Introduction

Indonesia is an archipelagic country with a high risk for natural disasters. It is located on three tectonic plates: Australian, Pacific, and Eurasian, with over 128 active volcanoes and approximately 150 rivers throughout its territory (Husna, Firdaus, et al., 2022). Disasters can cause fatalities, property loss, disruption of socioeconomic stability, environmental damage, and psychological impacts (Husna et al., 2011; Ortiz-barrios et al., 2022). Disasters can lead to decreased self-care abilities, injuries, wounds, and severe psychological impact (Husna, Miranda, et al., 2022). Data from the Disaster Information and Communication Data Center recorded 5.400 disaster incidents in Indonesia in 2023, including land fires, extreme weather, floods, landslides, earthquakes, and droughts. This resulted in the death toll, number of refugees, property losses, and damage to public facilities (Badan Nasional Penanggulangan Bencana, 2020). The frequency and impact of devastating disasters are gradually increasing worldwide (Yucesan et al., 2020).

Preparing hospital human resources for disasters is crucial (Yucesan et al., 2020). Health professionals, including nurses, are vital assets that play an important role in responding to emergencies during disasters. Nurses are at the forefront of caring for injured victims and providing necessary medical care to them (Azizpour et al., 2022). Therefore, nurses must have adequate competence in responding to disasters. According to the International Council of Nursing, one required competency for nurses is the ability to carry out disaster triage. This is the process of determining the priority of intervention by distinguishing patients who require immediate life-saving care from those who need medical attention but can safely wait for prompt and appropriate treatment (Ghazali et al., 2020).

During disaster response, triage decision-making is often applied under time pressure and with limited information. Triage decision making is also the first clinical decision made when caring for patients. It positively affects patient care outcomes (Ghazali et al., 2020), an essential skill for nurses who provide direct patient care in both acute care and community settings. In addition, proper decision making could result in cost reduction, effective use of human resources, and improved quality of care (Soola et al., 2022). The effectiveness and accuracy of triage decision making are related to cognitive abilities, working experience, and nursing intuition (Smith, 2012).

Disaster decision-making capability depends on two conditions: the level of preparedness (e.g., standardized instruments and strategies to utilize existing data sources) and the nature and dynamic circumstances of the incidents (Bosmans et al., 2022). Disasters often test the limited resources and support available to health care workers, including nurses. Due to the limited resources of nurses during disasters, it is important to evaluate their ability to cope with such situations. This study aimed to evaluate and compare nurses' triage decision-making ability during the disaster response between general hospitals (GH) and maternal and child hospitals (MCH). Both hospitals provided care services for general cases such as children, mothers, adults, and elderly patients in various cases. However, the number of adult patients with various cases of GH is greater than that of MCH, which is dominated by child and maternal diseases but also takes care of adult and elderly cases. Both hospitals have services for emergency departments (ED) and intensive care for treatment of all age aggregates of patient cases, particularly in responding to emergency situations, health crises, and disasters. These two hospitals were referral hospitals during disasters, and

they were severely damaged during the 2004 tsunami and several disasters in the last decade in Banda Aceh, Indonesia.

Occupying areas with high vulnerability to disasters and health crises in recent decades, as well as the limited competency of nurses in responding to disasters, requires hospitals to prepare healthcare providers, including nurses, to have sufficient competency in effective triage decision-making skills.

Methods
Design, population and sample
This comparative study employed a cross-sectional design using a total sampling technique of 169 nurses from specific wards in both hospitals. The two hospitals have served for all services, including ED and intensive care (intensive care unit/ICU, intensive cardiac care unit/ICCU, neonatal intensive care unit/NICU, and pediatric intensive care unit/PICU), unless ICCU in MCH is not available in this ward. The two hospitals provided patient care in both routine care and health crises or disaster situations. The total sampling in GH was 104 respondents (ED=39, ICU=24, ICCU=15, NICU=11, and PICU=15), and that in MCH was 65 respondents (ED=22, ICU=10, NICU=13, and PICU=20). The sample inclusion criteria included the sample were as follows: minimum educational qualification of a diploma, at least six months of work experience, and nurses who worked in the ED and ICU. The exclusion criteria were nurses who left or study assignments during the study period. All the respondents involved in the study were given a research information sheet and signed a written informed consent form.

Instrument
Data were collected using the Triage Decision-Making Inventory (TDMI) questionnaire. The TDMI originally consisted of 37 items and four subscales (cognitive characteristics, critical thinking, experience, and intuition), which were then modified into 27 items with three subscales (cognitive abilities, experience, and intuition) measured on a six-point Likert scale (Smith, 2012). The subscales of critical thinking and cognitive characteristics were combined and labeled as cognitive ability.

The TDMI questionnaire was back-translated into the Indonesian version by three experts from the Faculty of Health, Brawijaya University, Indonesia. Validity testing was conducted on 40 Emergency Department nurses in hospitals in West Nusa Tenggara, and the validity value obtained was more than 0.3120, showing that each questionnaire item was declared valid (Ismail et al., 2023). The questionnaire was declared to have validity and reliability tests of 0.312 and 0.759, respectively.

Data analysis
Statistical analyses were performed using Statistical Package for the Social Sciences (SPPS) version 24. Bivariate analysis of the data was performed using the Mann-Whitney U-test with CI 95% and alpha=0.05.

Ethical Consideration
The study was approved by the Ethics Committee of the Nursing Research Faculty of Nursing, Universitas Syiah Kuala, Banda Aceh, Indonesia (No. 112083270924).

Results

The General Hospital and Maternal and Child Hospital as referral hospitals have served to take care of all aggregates and cases of disease in terms of routine care, health crisis, or disaster. Both hospitals have experienced caring for disaster survivors, including the tsunami disaster of 2004, and are used as referral and education hospitals for health and medical students in Banda Aceh. In addition, both hospitals received special attention from the Aceh government in terms of providing support facilities for services and developing human resources.

Table 1. Sociodemographic Data of Respondents (n=169)

Demographic Data	GH (n=104)	MCH (n=65)
	n (%)	n (%)
1. Age (year) (M±SD)	33.32±5.30	36.72±5.99
2. Length of working experience (year) (M±SD)	6.39±4.81	9.54±5.58
3. Gender		
Male	31(29.8)	16(24.6)
Female	73(70.2)	49(75.4)
4. Last education		
Diploma	70(67.3)	34(52.3)
Bachelor	34(32.7)	31(47.7)
5. Attended emergency/ disaster training		
Yes	75(72.1)	44(67.7)
No	29(27.9)	21(32.3)

The study results are shows that the average age of respondents in General Hospital (GH) and Maternal and Child Hospital (MCH) was 33.32 ± 5.30 and 36.72 ± 5.99, respectively. The average length of working experience among respondents in GH and MCH was 6.39 ± 4.81 and 9.54 ± 5.58 years, respectively. Most respondents were women (70.2% and 75.4% in the GH and MCH groups, respectively). Regarding the most recent education, most respondents in both hospitals held diplomas (67.3% and 52.3%). Additionally, 72.1% of the respondents in GH and 67.7% in MCH attended emergency/disaster training (Table 1).

The results of the study showed that the mean score experiences of GH and MCH were relatively similar, the mean score intuition of GH was higher than that of MCH, and the mean score triage decision-making of GH was higher than that of MCH. There was a significant difference in the triage decision-making ability among nurses in both hospitals (M±SD=136.98±12.47 and 122.66±12.43, respectively). The study also indicated no significant difference between nurses' cognitive ability and experience in triage decision making (p=0.180 and p=0.562). However, there was a significant difference in nurses' intuition regarding triage decision making (p=0.001) in both hospitals. The results generally revealed a significant difference in nurses' triage decision-making ability in disaster response (p=0.001) between hospitals. GH has higher scores in intuition and triage decision making than MCH (Table 2).

Table 2. Differences Mean Score in Sub-Variables Triage Decision-Making Competencies among Nurses (n=169)

Variable	Hospital	n	M±SD	Mean Rank	Min	Max	p-value
Cognitive abilities	GH	104	71.96±6.39	88.93	56	84	0.180
	MCH	65	69.68±5.99	78.72	53	84	
Experience	GH	104	30.91±2.90	86.63	24	36	0.562
	MCH	65	30.32±4.45	82.39	12	36	
Intuition	GH	104	34.11±12.47	109.40	17	42	0.001
	MCH	65	22.66±12.43	45.95	7	42	
Triage decision-making	GH	104	136.98±12.47	102.52	108	162	
	MCH	65	122.66±12.43	56.96	98	147	0.001

Discussion

Triage decision making is the first form of clinical decision making when caring for disaster survivors. Nurses should be able to act promptly and efficiently. In prioritizing patient urgency for accurate triage category decision making, nurses must understand the factors influencing decision making. Triage decision-making is influenced by cognitive ability, experience, and intuition (Smith 2012). They were measured using the Triage Decision-Making Inventory (TDMI) questionnaire, and the total score determined nurses' triage decision-making ability. Triage decision-making competencies are important skills for nurses in responding to disasters. A previous study reported a significant relationship between nurses' knowledge and skills, and triage decision-making skills in hospitals. Nurses with higher knowledge and skills in triage had better triage decision-making abilities. It is important for nurses to have adequate knowledge and skills in triage to respond effectively to disasters (Handayani et al. 2023). Sufficient knowledge about triage, especially involved in training on performing triage and the development of triage guidelines, will encourage better skill performance in conducting triage in emergency care and especially during disasters, thus influencing the success of triage decision-making skills.

Other study also reported that triage decision-making skills related to several factors such as work experience, workload and nurses' competence, and educational level, and the status of having an emergency care certificate, the training of healthcare to perform

triage and the development of triage guidelines in emergency departments are related to triage decision-making skills (Aktaş & Alemdar, 2017). This study found that the lower average score of MCH nurses was related to two factors: the difference in nurses' understanding of the concept of intuition and the difference in the total number of cases who served to find health services between the two hospitals. The variety of patients admitted to the hospital affects the use of intuition. MCH is dominated by maternity and children's cases, whereas GH is dominated by a variety of disease cases, from children to adults. The more complex the case, the more developed the nurses' intuitions. This finding aligns with a study conducted in China, which reported triage decision-making ability with a mean and standard deviation of 166.50±28.90 (Yang et al., 2023), lower than that reported in a study of hospitals in Turkiye, where triage decision-making ability was 172.89±18.00 (Aktaş & Alemdar, 2017). The average intuition in hospitals in China had the lowest score for triage decision-making. The results of the study may also be influenced by sociodemographic data, as most respondents were emergency nurses with less than one year of clinical experience. Generally, intuition is more developed in nurses with more than one year of clinical experience.

Regarding the sub-variable of cognitive ability, this study found no significant difference between nurses at GH and MCH (p=0.180). This finding could be influenced by age, in which the average age of respondents at GH and MCH was 33.32 years and 36.72 years, in terms of productive age. This study found that age (p=0.043), clinical experience (p=0.001), length of work (p=0.049), and intuition (p=0.001) were significantly associated with cognitive ability among nurses in these hospitals. In adulthood and productive age, nurses can improve their ability to obtain formal and informal information based on educational media and training related to triage and triage decision-making in disasters. Likewise with clinical experience and length of work as a nurse, both GH and MCH hospitals have a mean score of work experience that is almost similar, namely 6.39 ± 4.81 and 9.54 ± 5.58, respectively, where in terms of clinical experience they already have qualified competencies related to triage and triage decision-making skills.

The results of this study are in line with those a of previous study, which mentioned that the productive age starts from to 15-64 years. People with a productive age generally have better knowledge and insight, and have higher responsibility for the tasks given (Febianti et al., 2023). This finding agrees with a previous study reporting a significant relationship between age and the cognitive ability of nurses; nurses' skills and accuracy in triaging increase with age (Soola et al., 2022). Regarding demographic data, more than 70% of the respondents at GH and MCH were female. Although the majority of nurses in both hospitals were female, the mean score for cognitive ability showed that the values of both were not significantly different. The results of this study also proved that the gender of nurses was not significantly related to cognitive ability in triage decision-making skills (p=0.273), and that clinical experience was not significantly related to gender (p=0.680). However, previous studies have reported that the average triage decision-making of male nurses is higher than that of females (Yang et al., 2023).

Cognitive ability can also be in the form of an optimal understanding or knowledge of the patient's emergency condition and skills in triaging. Nurses can obtain this knowledge and skill through learning and training (Soola et al., 2022). Thus, it is

important to consider the visual presentation of triage tools and accurate physiological parameters to facilitate triage decision-making when categorizing patients in a disaster triage (Davidson et al., 2024). In this study, most nurses at GH and MCH attended emergency or disaster training (72.1% and 67.7%, respectively), resulting in similar cognitive abilities among the nurses at the two hospitals. Attending emergency/disaster training, especially related to triage decision-making skills, can improve nurses' disaster response competence. This competence plays an important role in conducting appropriate interventions in acute and critical conditions and in determining other actions, such as first aid and victim management. The results of this study are supported by a previous study, which mentioned that general emergency life support training is related to triage decision-making. The regression test showed that skills and education were the factors that most influenced triage decision-making skills (Rahmanto et al., 2021). Another study reported that respondents who attended training had higher average cognitive abilities than those who did not (Ghazali et al. 2020).

Regarding nurses' experience in triage decision making, no significant difference was found between nurses at GH and MCH (p=0.562). This finding could be influenced by data on working experience. The average working experience of nurses at GH and MCH was 6.39 years and 9.54 years, respectively, showing that most respondents from both hospitals have good experience. A previous study revealed that nurses with three or more years of work experience had better triage knowledge and skills than those with less than three years of work experience (Malak et al., 2022). Experience provides a good opportunity for nurses to reflect and validate their knowledge in real situations, thereby improving their knowledge and skills, including in triage decision-making (McHugh & Lake, 2010).

Triage action training can improve triage competency among nurses. Clear guidance on standards, guidelines, resources, and flows improves nurses' accuracy in triaging during mass casualties or disasters (Hinds et al. 2025). The timing of mass casualty triage and the activation of operational parameters of care are also critical to triage success. These parameters may include patient condition, mobilization of emergency care equipment, emergency supply support, and capacity assessment in the emergency department (Chia et al., 2024). Previous research has found that experience is an important predictor of nurses' decision making (Soola et al., 2022). Performance, patient, and manpower factors can also influence nurses' ability to perform triage in emergency departments (Ainiyah et al., 2015).

Lastly, intuition also plays a crucial role in triage decision-making skills during disasters. Intuition is the process of making judgments without analysis, reasoning, or hunches, as well as the inner feelings that nurses believe in and rely on in carrying out nursing care practices, including triage decision making (Rosciano et al., 2016). Nursing intuition can be obtained from experience (Wilson et al. 2023). The more experience a nurse has, the more frequently they will use their intuition in triage decision making, especially in similar cases using their previous experience (Soola et al., 2022). Nurses rely on experience and intuition in triage decision making (Blakeman et al., 2024). These results are consistent with previous studies reporting that nurses rely on experience, intuition, and hunches in triage decision making. However, this study found no significant differences in intuition between nurses at GH and MCH. Nurses at the MCH had a lower mean intuition rank than those at the GH did. However, the average clinical experience of the nurses at both hospitals was very good (> 6 years).

Researchers have argued that this difference in intuition is partly due to the differences in nurses' perceptions of intuition. Few studies have discussed the concept of intuition within the scope of health professionals. No single definition truly explains intuition. The definition of intuition is limited to judgment without rationale, reasoning, inner feelings, or hunches (Alba, 2018). This study found that differences in the perception and understanding of intuition among nurses were due to several conditions. This is in accordance with research reporting that triage implementation is influenced by nurses' performance, patient-related factors, and staff-related factors. Increasing work motivation and optimizing the clarity of nurses' job descriptions may improve the quality of nursing services (Ainiyah et al., 2015).

In addition to differences in understanding of intuition, differences in nurses' intuition may also be caused by hospital circumstances. Although GH and MCH are equal types of hospitals, the focus on patient services in these two hospitals is slightly different. GH focuses on general services, whereas MCH focuses specifically on maternity, infants, and children's health services. Although MCH currently has a general ward, most patients are mothers, infants, or children. In contrast, GH serves patients of various ages and groups ranging from infants, children, adolescents, and adults to the elderly. Regarding the number of beds, GH has more beds (339), which is around triple that of MCH (109). The variation in emergency cases in these two hospitals is different, where GH receives general patients with various medical conditions and more complex cases, which in turn may develop a sharper nurse intuition compared to MCH with more specific emergency cases. In addition, another study reported that an effective triage information system can help nurses in triage decision-making.

Therefore, it is important for hospitals to have effective triage training to improve the skills of nurses and medical officer assistants as well as the accuracy of triage decision-making across time (Ghazali et al., 2020). Understanding clinical performance, critical analysis of clinical decision-making processes, defining factors related to nurses' triage decision-making, and using appropriate learning strategies are several factors for developing novices' expertise in triage decision-making (Yuliandari, 2019).

Limitations
Several factors that may affect the results of the study, such as personal experience among nurses in disaster triage, did not assess hospital readiness and available facilities to support triage decision-making skills in these hospitals. Further studies related to sociodemographic factors through triage decision-making in disaster response are emphasized.

Contribution To Global Nursing Practice
The results of this study are useful as evidence and scientific literacy for nursing research, especially in relation to hospital-based disaster triage decision-making. Improving nurses' competence in triage decision-making skills can be implemented through education programs, emergency and disaster training, exposure to clinical experience, and support for facilities and resources that support triage skills are highly emphasized.

Conclusion
Triage decision making is a primary skill required by nurses in the disaster response phase, particularly in hospital settings. In disaster response, nurses are the frontline

health workers in responding to patients effectively, and their competence in carrying out triage decision-making skills is required. Triage decision-making is the first contact intervention in clinical decision-making when caring for disaster survivors, and nurses must be able to act promptly and efficiently. Effective triage decision-making affects effective disaster victim handling. Triage decision making consists of cognitive abilities, experiences, and intuition.

The results of this study proved that sociodemographic data such as age, gender, clinical experience, length of work, and attendance in emergency and disaster training are several factors that are interrelated with these results. The study results also found that cognitive ability and experience had no significant difference in triage decision-making in both hospitals. The intuitive variables were significantly different. This conclusion indicates a significant difference in triage decision-making skills between nurses at GH and MCH. This difference is associated with variations in perceptions regarding intuition, differences in hospital types, and the range of cases managed in the two hospitals.

Author's Contribution

CH and HS wrote the protocol and monitored the data collection. HS and AY collected the data and contributed to the data analysis. CH and HS performed the data analysis and wrote the initial manuscript. AY contributed to critical review of the manuscript. All the authors approved the final version of the manuscript.

Conflict of Interest
The authors declare no conflicts of interest.

Acknowledgments

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