Development and Validation of a Competency Tool for Emergency and Disaster Management for Nurses

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ABSTRACT

The study focused on constructing a tool to assess nurses' competencies in emergency and disaster management, particularly in areas of assessment and intervention. The process included the development and validation of a competency's checklist. The study adopted a descriptive and methodological approach, conducted in three phases: (1) Literature Review and Initial Tool Development: A workshop was held involving five experts to draft the tool, (2) Validation: The tool underwent face and content validation through the participation of emergency nurses, ward managers, and nurse managers selected via snowball sampling. Seven and eight experts reviewed and finalized the tool during this phase. Content suggestions were analyzed, and the Content Validation Index (CVI) was calculated to assess item representativeness, and (3) Pilot Testing: Thirty participants were involved in testing the tool's usability and effectiveness.

The experts included nurses with specialized training, significant work experience as emergency room nurses, and extensive knowledge of the topic. The resulting competencies checklist provides a robust foundation for evaluating emergency and disaster management skills. A total of 240 nurses participated in the study, regardless of their age, sex, highest educational attainment, hospital position, length of experience, or the number of trainings and seminars attended.

In conclusion, the study successfully developed and validated an assessment tool, emphasizing its uniqueness and utility in guiding educators and researchers in fostering practical growth in emergency and disaster management competency.

Keywords: Nursing; disaster; assessment and intervention; emergency management.

INTRODUCTION

Creating a tool for constructing and validating emergency and disaster management competency for nurses involves several key steps to ensure that the tool is effective in assessing the essential knowledge, skills, and attitudes necessary for handling emergency situations.

Nursing competency refers to the ability to apply precise skills and logical reasoning to deliver care that meets the needs of patients. Competencies are defined as the expected levels of performance that encompass knowledge, skills, abilities, and judgment. Competent nurses are essential for ensuring safe and high-quality healthcare services. A high level of competency aligns with achieving and maintaining a culture of safety (Zaitoun et al., 2023).

Competent performance means meeting the expected standards of practice (Emergency Nurses Association, 2011). Emergency nursing, a specialty within the nursing profession, focuses on providing care in urgent and critical situations. Disaster nursing involves recognizing and addressing the physical and emotional needs of disaster victims. Competency scales, which are tools for effectively assessing nursing competency, play a vital role in maintaining and enhancing professional skills (Meretoja et al., 2020).

Emergency preparedness has become increasingly critical in mitigating the potentially devastating effects of disasters on human life and health. Nursing professionals, as frontline healthcare workers, play a pivotal role in

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disaster response and preparedness (Nowak, Fitzpatrick, Schmidt, & Kuntz; Frable, Qureshi, & Strong, 2008; Steed, Howe, Pruitt, & Sherrill, 2004; DeRanieri, 2015). According to Steed et al. (2004), educating frontline healthcare workers, including nurses, is essential to effectively address disaster situations.

Disaster nursing is defined as the "systematic utilization of nursing knowledge and skills in disasters" (Kalanlar, 2018), emphasizing the importance of minimizing health damages and eliminating life-threatening risks. However, existing literature highlights a concerning gap in nurses' basic knowledge and skills related to emergency and disaster preparedness (Waller, 2017). Addressing this gap through targeted education and training is vital for enhancing nurses' readiness and capacity to respond effectively to emergencies.

Over the past few decades, nurses' awareness of disaster preparedness has increased, yet significant gaps remain. Many nurses are still not mentally or educationally equipped to manage emergencies effectively. With future predictions pointing to larger and more frequent disasters, the need for enhanced awareness and preparation is critical. Continuous training and regular updates to nurses' skills and knowledge are essential to address this issue (Kalanlar, 2018).

As one of the largest groups of healthcare providers involved in all stages of disaster management, nurses must be fully aware of risks and hazards, plan their training accordingly (Stoto et al., 2018; Sultan et al., 2020), and develop the knowledge, competencies, and skills necessary to adapt and respond effectively during disasters (Said & Chiang, 2020).

Research highlights this ongoing challenge. A self-assessment of nurses in rural Texas revealed that fewer than 10% of participants felt confident in their disaster preparedness knowledge and skills (Jacobson et al., 2010). Similarly, a study of emergency department nurses in New Jersey found that many were uncertain about their roles in disaster response and were generally unprepared for emergencies (Whetzel, Walker-Cillo, Chan, & Trivett, 2013). In Jordan, 65% of nurses rated their disaster preparedness as weak, underscoring the global nature of this issue (Al Khalaileh et al., 2011).

Various tools have been developed to measure competency; however, many of these tools and methods lack rigor (Mrayyan, 2023). Moreover, no specific tool exists that comprehensively captures nurses' competencies in both emergency and disaster management.

An extensive review of the literature revealed a gap: no single tool addresses both emergency (assessment and intervention) and disaster management competencies. This gap prompted the researchers to develop a unified tool designed to evaluate these critical areas of nursing competency.

METHOD

This descriptive, methodological study focused on the development and validation of a tool to assess nurses' competencies in emergency and disaster management, serving as the foundation for a training program for nurses.

The study was conducted in three phases: (1) *Literature Review and Framework Development.* The first phase involved an extensive literature review to synthesize and analyze existing studies on the topic. Following this, a consultation and discussion were held with a pool of five experts from Mariano Marcos Memorial Hospital and Medical Center to construct a competency framework. The experts were recruited using the "snowball technique," which involves identifying participants with relevant characteristics through referrals. *Inclusion criteria for experts:* (a) registered nurses with at least five years of clinical experience, including emergency room nursing, (b) possession of a master's degree, (c) supervisory or managerial positions in emergency care, lastly, (d) significant length of service in the emergency nursing field.

The data collected were categorized and quantified for content analysis. The experts evaluated each item in the framework to ensure it accurately represented the domain of interest. Importantly, these expert judges were not part of the study's subsequent phases.

(2) Content Validation. The constructed competency framework was validated to assess its relevance and

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accuracy in evaluating emergency and disaster management competencies. Experts reviewed the framework, and the Content Validation Index (CVI) was calculated to measure agreement on the representativeness of each item. A minimum CVI of 0.80 was set as the acceptable threshold for each item. Based on the analysis, a revised version of the competency framework was created. *(3) Data Collection and Revision*. Data collection from experts occurred between January and June 2024. Feedback from this phase informed the creation of the final version of the competency framework.

This rigorous process ensured the development of a robust tool for assessing nurses' competencies, providing a foundation for targeted training programs aimed at enhancing their preparedness for emergencies and disasters.

Content validity is primarily evaluated through expert judgment (individuals with extensive knowledge about the study) and target population judges (emergency room nurses) who perform face validity. These assessments are quantified using formalized scaling and statistical methods, such as the Content Validity Ratio (CVR) for consensus measurement and the Content Validity Index (CVI) for proportional agreement. This study utilized the CVI as a key metric to assess content validity. Content validity evaluates the extent to which a measurement instrument accurately represents the specific content domain it is designed to measure (Polit & Beck, 2021). It examines whether the items included in the tool are relevant and representative of the construct or variable being assessed. *Measures of Content Validity*

Item-Level Content Validity Index (I-CVI). The I-CVI is calculated by dividing the number of expert raters who rate an item as "3" (Quite Relevant) or "4" (Highly Relevant) on a 4-point scale by the total number of raters (Polit & Beck, 2021). Response Scale for I-CVI: 1: Not Relevant, 2: Somewhat Relevant, 3: Quite Relevant, 4: Highly Relevant. According to Lynn (1986), an I-CVI value of 0.78 or higher is considered acceptable, regardless of the number of expert raters. Items meeting this threshold are deemed to have achieved an adequate level of content validity and are retained in the instrument. Scale-Level Content Validity Index (S-CVI). The S-CVI measures the overall content validity of the scale and can be calculated using two methods: S-CVI/Ave: The average I-CVI across all items in the scale. An acceptable value is generally 0.90 or higher (Polit & Beck, 2021). S-CVI/UA: The proportion of items rated as "3" or "4" by all experts. An acceptable value is generally 0.80 or higher. Summary of Acceptable Content Validity Thresholds. I-CVI: ≥ 0.78, S-CVI/Ave: ≥ 0.90, S-CVI/UA: ≥ 0.80

By meeting these thresholds, a measurement instrument can be considered to have strong content validity, ensuring that its items accurately and comprehensively represent the intended content domain.

RESULTS AND DISCUSSION

To ensure that the items generated for the tool effectively measure the intended domain, emergency room nurses from various hospitals validated its content. These expert evaluators assessed the relevance and clarity of the items within the domain. *Importance of Pre-Testing in Scale Development.* Pre-testing is a critical step in scale development, as it ensures that items are relevant and understandable to the target population before the survey's actual distribution. This process reduces the risk of misinterpretation and measurement error by identifying poorly constructed items and refining them. Moreover, pre-testing minimizes the cognitive burden on participants, enhancing their ability to provide authentic and meaningful responses (Carpenter, 2018).

By conducting pre-testing, researchers can confirm that the items reflect their intended meaning and allow participants to respond in ways that align with their real experiences. It also provides an opportunity for target population members to contribute valuable insights, ensuring the survey resonates with their context. *Field Pre-Testing*. In this study, a field pre-test was conducted using the survey items. The revised survey was administered to thirty (30) nurses from five hospitals in Metro Vigan, Ilocos Sur. This step aimed to assess the tool's validity and reliability. After collecting the completed questionnaires, responses were tabulated and sent to a statistician for analysis. *Components of Pre-Testing*. Pre-testing involves two key components: *(1) Content Representation:* Evaluating whether the items adequately reflect the domain of interest. *(2) Measurement Accuracy:* Determining whether participants' responses to the items yield valid and reliable measurements. (3) *Reliability Assessment.* Reliability refers to the consistency of measurements when the instrument is applied under identical conditions. Standard methods for assessing reliability include: *Cronbach's Alpha:* This statistic

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measures the internal consistency of scale items, indicating the degree to which items correlate with the overall scale score. An alpha coefficient of **0.70** is generally considered acceptable for reliability. *Test–Retest Reliability:* Measures the stability of responses over time under similar conditions.

In this study, the tool achieved a *Cronbach's Alpha of 0.953*, indicating excellent internal consistency. This result demonstrates that the questionnaire's content was well-constructed and accepted by participants.

Emergency nurses, based on their education and experience, are expected to perform at varying competency levels, from novice to expert (National Emergency Nurses Association, 2012). This study's rigorous pre-testing and validation process confirmed the tool's high reliability and content validity, ensuring it effectively measures the competencies required for emergency and disaster management.

Table 1: Demographic Profile of Experts and the Characterization of sharing in different phases in validation of the tool

Variables	**Characterization of experts sharing in the first phase f (%)**
Number of Participants	5 (100%)
Sex	
Male	2 (40 %)
Female	3 (60 %)
Length of Service	
1-5 years	1 (20 %)
6-10 years	3 (60 %)
11 years and more	1 (20 %)
Professional Qualifications	
Nursing	5 (100 %)
Highest Educational Attainment	
Master's Degree	4 (20 %)
BSN	1 (20 %)
Position in the Hospital	
Nurse Manager	1 (20 %)
Supervisory	2 (40 %)
Head Nurse	1 (20 %)
Staff Nurse	1 (20 %)
Clinical Area of Exposure	
Emergency Room	3 (60 %)
Medical Ward	1 (20 %)
Pediatric Ward	1 (20 %)

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The Table 1, Demographic Profile of Experts and the Characterization of sharing in different phases in validation of the tool

The table displays the characteristics of the nurses involved in the study, with a focus on the variables reflecting their profile at each phase of the validation process. These variables include sex, length of service, professional qualifications, highest educational attainment, hospital position, and clinical area of exposure. Additionally, it indicates the number of nurses who contributed their insights and knowledge to the development of the tool.

In the first phase of the study, experts participated in the working group and contributed to subsequent phases through the Delphi technique. The suggestions provided by the experts were analyzed for content, and it was determined that there was a consensus on the content presented. This led to the development of the competency framework tables, which are shown below. Agreement among the experts on the representativeness of the items in the tables was measured using the Content Validity Index (CVI).

In the third phase, certain items from the initial analysis showed a CVI below 0.80. The comments and suggestions from the experts were considered, and adjustments were made accordingly. The revised material was then returned to the participants, resulting in CVI values of ≥85% for all items in the final analysis.

Table 2: Emergency Management Competency

Item	**Rater 1**	**Rater 2**	**Rater 3**	**Rater 4**	**Rater 5**	**Number of Raters Who Agreed (≥3)**	**I-CVI[1]**	**Computed I-CVI**
EA1	4	4	4	3	4	5	5/5 = 1	1
EA2	4	4	4	4	3	5	5/5 = 1	1
EA3	4	4	2	4	3	4	4/5 = 0.8	0.8
EA4	4	4	2	4	3	4	4/5 = 0.8	0.8
EA5	4	3	4	4	3	4	5/5 = 1	1
EI1	4	4	4	4	4	5	5/5 = 1	1
EI2	4	4	3	3	2	4	4/5 = 0.8	0.8
EI3	4	3	4	4	4	5	5/5 = 1	1
EI4	4	3	4	4	4	5	5/5 = 1	1
EI5	4	3	4	3	3	5	5/5 = 1	1
						Sum of Item-Level I-CVIs		**8.6**
						CVI/Ave[2]: 8.6/20 = **0.86**		
	7/10 = **0.70**					**S-CVI/UA[3]:**		

In the table 2 & 3, it describes the pool of experts five (5) rates on the items that measures the emergency competencies specifically in the assessment and intervention and also the disaster management competency.

The response scale for I-CVI is as follows: 1 – Not Relevant; 2 – Somewhat Relevant; 3 – Quite Relevant; and 4 – Highly Relevant. The likert scale mentioned was used by the raters (nurses) to validate the items on the tool.

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Table 3: Disaster Management Competency

Item	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Number of Raters Who Agreed (≥3)	I-CVI[1]	Computed I-CVI
DM1	3	3	4	3	3	5	5/5 = 1	1
DM2	3	3	4	3	3	5	5/5 = 1	1
DM3	3	3	4	2	3	4	4/5 = 0.8	0.8
DM4	3	3	4	3	3	5	5/5 = 1	1
DM5	3	3	3	2	3	4	4/5 = 0.8	0.8
DM6	3	3	4	3	3	5	5/5 = 1	1
DM7	3	3	4	3	3	5	5/5 = 1	1
DM8	3	3	3	3	3	5	5/5 = 1	1
DM9	3	3	3	4	4	5	5/5 = 1	1
DM10	4	3	3	3	4	5	5/5 = 1	1
DM11	4	3	3	2	4	4	4/5 = 0.8	0.8
DM12	3	3	3	3	4	5	5/5 = 1	1
DM13	3	3	3	2	3	5	5/5 = 1	1
DM14	3	3	3	3	4	5	5/5 = 1	1
DM15	3	3	3	3	4	5	5/5 = 1	1
DM16	4	3	3	2	4	4	4/5 = .8	0.8
DM17	4	3	3	3	4	5	5/5 = 1	1
DM18	4	3	3	3	4	5	5/5 = 1	1
DM19	4	3	3	3	4	5	5/5 = 1	1
DM20	4	3	3	2	3	4	4/5 = .8	0.8
DM21	4	3	3	3	3	5	5/5 = 1	1
DM22	4	3	3	3	3	4	4/5 = .8	0.8
						Sum of Item-Level I-CVIs		**20.8**
				CVI/Ave[2]: 20.8/22 = **0.945** **S-CVI/UA[3]:** 16/22 = **0.727**				

Table 4. Emergency Competency (Assessment and Intervention)

Emergency Management Competency					
Assessment	**5**	**4**	**3**	**2**	**1**
1. Differentiates abnormal breath to normal sounds.					
2. Differentiates effective to ineffective ventilation.					

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3. Performs a neurological assessment using Glasgow Coma Scale and National Institute of Health Stroke Scale.					
4. Interpreting cardiac arrhythmia and identifying life threatening condition.					
5. Performs evaluation of pain using appropriate pain scale: Likert and FACES for pediatrics.					
Intervention	5	4	3	2	1
1. Perform in setting up different oxygen therapy adjuncts and knows how to administer.					
2. Perform in insertion of an oral or nasopharyngeal airway.					
3. Performs suctioning: orally, nasopharyngeal or tracheal.					
4. Performs intubation/ventilating patient for intubation.					
5. Perform in assisting, set up and monitor chest tubes and emergency tracheostomy.					
6. Perform in assisting with appropriate interventions with actual or potential life-threatening alterations in respiratory function					
7. Perform the 12 and 15 lead ECG.					
8. Using the ED cardiac bedside monitor and central station.					
9. Performs and maintains peripheral IV access in adult and pediatric.					
10. Performs the skill in obtaining blood sample when necessary.					
11. Performs insertion of nasogastric tube and orogastric tube.					
12. Performs the insertion and removal of a male and female patient with IFC and 3way foley catheter.					
13. Performs the continuous bladder irrigation set up, monitoring, and nursing interventions.					
14. Demonstrates the ability in monitoring fluid balance as per ED Standards of Care					
15. Perform the insertion of intravenous fluid as prescribed.					
16. Perform doing the CPR as needed.					
17. Perform the administration of emergency drug as prescribed.					
18. Document all the procedures done to the patient.					

Table 5. The Disaster Management Competency

Disaster Management Competency	**5**	**4**	**3**	**2**	**1**
1. Demonstrates the ability in the application of cervical collar.					
2. Demonstrates the ability to assist in spinal stabilization.					
3. Demonstrates in evaluating and understanding related neurological system: ABG's,					

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CBG and Electrolytes.					
4. Demonstrates the ability to give a concise transfer of accountability to incoming shifts, within the department and specific unit.					
5. Demonstrates the ability to do a proper communication.					
6. Participates with the other discipline in planning disaster management drills and exercise at the institution.					
7. Interprets and analyze the performance of staff during the drill.					
8. Communicates disaster-related priority information promptly to designated individuals.					
9. Demonstrates basic crisis communication skills during disaster events.					
10. Communicates with all responders and receivers and uses disaster terminology correctly.					
11 Communicates roles and responsibilities of nurses to others involved in planning, preparation, response and recovery.					
12 Participates in development of organizational incident plan consistent with national standards.					
13 Participates with others in post-event (actual or exercise) evaluation					
14 Maintains safety for self and others throughout disaster.					
15 Wearing of PPE as directed through the chain of command.					
16 Performs a rapid physical and mental assessment on assigned individual.					
17 Performs a basic first aid as needed by individuals.					
18 Isolating individuals at risk of spreading communicable diseases.					
19 Separating individuals from manageable to severe cases.					
20 Referring individuals to specific health care providers.					
21 Performs triage based on the condition of the patient.					
22 Demonstrates understanding of ethical practice during disaster response that is based on utilitarian principles.					

Table 5. The Disaster Management Competency. It reflects the constructed tool items for assessing disaster management competency for nurses.

Table 6. Demographic profile of the respondents N=240

Demographic Profile of the Respondents		**Frequency**	**Percentage**
Age	20-30 years old	109	45.4
	31-40 years old	109	45.4
	41-50 years old	16	6.7

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	> 50 years old	6	2.5
Sex	Male	62	25.83
	Female	178	74.17
Highest Educational Attainment	MA holder	24	10
	BSN	216	90
Length of Experience	1-5 years	129	53.75
	6-10 years	73	30.42
	11-15 years	23	9.58
	>15 years	15	6.25
Position in the Hospital	SN	182	75.80
	HN/CN	23	9.60
	Supervisor	19	7.90
	Nurse Manager	16	6.70
Number of Seminar and Training Attended	0	33	13.75
	1-2	98	40.83
	3-4	39	16.25
	5-6	29	12.08
	>6	41	17.08
		N=240	**100%**

Table 6. The demographic profile of the respondents (N=240) with the frequency and percentage including age, sex, highest educational attainment, length of experience, position in the hospital and number of seminar and training attended.

DISCUSSION

This study developed a tool to assess nurses' competencies in performing procedures related to emergency and disaster management. Nurses represent a significant portion of the professional healthcare workforce in communities. A 2016 OECD report revealed that 80% of nurses felt over-skilled for their roles, with many citing artificial barriers that prevent them from working to their full potential. To effectively integrate advanced nursing practice roles within the broader team during disasters, it is essential to clearly define the scope of practice, knowledge requirements, and skill development needs (Chief Nursing and Midwifery Officers Australia, 2020).

The tool was developed based on the International Council of Nurses (ICN) disaster competencies, with modifications focusing on emergency and disaster management in a single instrument (Fitzpatrick et al., 2022). The competencies for Level I and Level II nurses were derived from the ICN Core Competencies in Disaster Nursing 2.0, released in 2019. The study emphasizes that effective nursing practice during emergencies and disasters requires both clinical competence and the application of utilitarian principles—doing the greatest good for the greatest number while minimizing harm. These principles include preparation and planning, communication, incident management, safety and security, as well as law and ethics. Specifically, the disaster management component of the tool was revised according to distinct domains and presented sequentially. The emergency management competency section of the tool is built upon a comprehensive synthesis of findings

from numerous research studies.

CONCLUSION

The results demonstrated that the tool is both a valid and reliable instrument for assessing nurses' competencies in emergency and disaster management. This scale effectively evaluates nurses' ability to perform procedures in both emergency and disaster situations. The development of this tool has several important implications, including its potential use in planning targeted training programs and seminars to enhance nurses' skills in these critical areas. Moving forward, further research is recommended, particularly studies that explore additional variables, such as cultural factors, to ensure the provision of high-quality care services to diverse populations.

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Institutional Review Board Statement: The study was conducted according to the guidelines of the Institution, through ethical consideration granted approval by the St. Paul University Philippines Research Ethics Committee (SPUP REC) SPUP_2024_0248_SR_JL.

Informed Consent Statement: Informed consent was obtained from all the participants that was involved in the study after thoroughly explained the purpose of the study and their security.

Conflicts of Interest: The author declare no conflict of interest.

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