Strategies to Improve Emergency Nurses' Response Time Through Training Programs: Strategi untuk Meningkatkan Waktu Tanggap Perawat Gawat Darurat Melalui Program Pelatihan

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Background: Emergency units rely on nurses' rapid response times to manage critical situations effectively. Overcrowding and inadequate triage skills often compromise patient outcomes. **Gap:** Limited evidence exists on the most effective interventions to improve emergency nurses' response times. **Aim:** This systematic review evaluates evidence-based interventions for enhancing response times in emergency nurses. **Results:** From 15 studies, effective interventions include simulation-based education, triage training (e.g., Emergency Severity Index, Swiss Triage System), virtual simulations, and hands-on basic life support (BLS) training. BLS and triage training most significantly improve response times by prioritizing patient severity and enhancing emergency handling. **Novelty:** This review integrates global evidence, highlighting the combined impact of simulation-based and triage training programs. **Implications:** Healthcare systems should adopt tailored interventions, such as BLS simulations and triage training, to optimize emergency department efficiency and patient outcomes.

Highlights:

- Critical Interventions: Simulation-based education and BLS training are the most effective in enhancing nurses' emergency response times.
- Global Evidence: Findings from 15 studies highlight diverse strategies, including virtual simulations and triage systems, for improving efficiency.
- Practical Implications: Tailored interventions like BLS and triage training directly improve patient outcomes and emergency department performance.

Keywords: Nursing, Improve, Response Time, Emergency Rooms

Introduction

The emergency unit is at the forefront of the emergency response system, health workers who work in this unit are the main actors in providing first aid [1][2][3]. Meanwhile, response time is a key performance indicator in emergency services and is related to "bedside-focused patient assessment, pathophysiological classification," and "goal-directed intervention protocols" in the four Rapid Response System (RRS) groups which are associated with an increase in the number of identified patients at risk, reduced time to RRS activation and/or treatment and reduced rates of

cardiac arrest and/or in-hospital death [4][5][6].

In accordance with the AHCA (America Hospital Association) in 2017, the community is very dependent on emergency services as the main source of assistance for emergency cases and those that require rapid medical treatment, thereby reducing pain and avoiding death [7][8]. Indonesia, as an ASEAN country, shows relatively high data on patient visits to emergency departments. This is proven by the total number of emergency department visits in 2017 reaching 4,402,205 [9]. Looking at this data, the role of health workers in the emergency unit, especially nurses, requires them to master the skills and knowledge in providing fast and appropriate nursing actions.

Overcrowding in emergency rooms is a major problem throughout the world that has a negative impact on the quality of service. Correct assessment of the level of emergency by nurses is needed by carrying out patient-centered triage. Prolonged EDLOS causes high hospital mortality rates in sepsis patients who require ICU care in China, this is due to limited medical resources [10]. Those who experience greater pressure (less experience) are more aware of the need to improve their professional knowledge and skills in relation to nursing education because they struggle to overcome a problem in each emergency patient [11]. Based on the results of this research, it shows that the factors that influence the response time of nurses can be seen from the factors of the nurses themselves.

One strategy that hospitals can use to increase the response time of nurses, especially those working in the emergency unit, is by increasing the knowledge and competencies expected of frontline nurses, namely preventing and controlling infections related to health services, handling critically ill patients, first aid skills, respiratory support care, psychological care and grief counseling [11][12]. This systematic review aims to identify the best current evidence for improving emergency nurse response time and the effectiveness of these interventions.

Method

A search was conducted to identify similar and relevant systematic reviews that had been conducted. Articles and journals were appropriate for systematic review according to Preferred Reporting Items for Systematic Review and Meta Analyze (PRISMA).

1. Literature Search and Screening

Searches were conducted to identify articles or journal publications using key search terms. Search terms were constructed in collaboration with an academic librarian and were based on a PICOS structured question. Three groups of search terms were used and then combined using the Boolean operators AND and OR including (intervention, strategy, method) AND (improve, upgrade) AND (response time, emergency response) AND (nurse, nursing, nurs). All keywords were used in each database. Articles or journals there were included in the inclusion criteria were limited by year and language used according to the inclusion criteria. Online databases searched included Science Direct, ProQuest, Pubmed, SAGE and Google Scholar. References that correspond to systematic reviews are used to identify further studies. Duplicate articles and journals are removed and research is filtered according to inclusion and exclusion criteria, based on abstracts and titles. Full text for all articles and journals included including being downloaded and researched by one researcher using a screening tool to confirm that the study met the inclusion criteria.
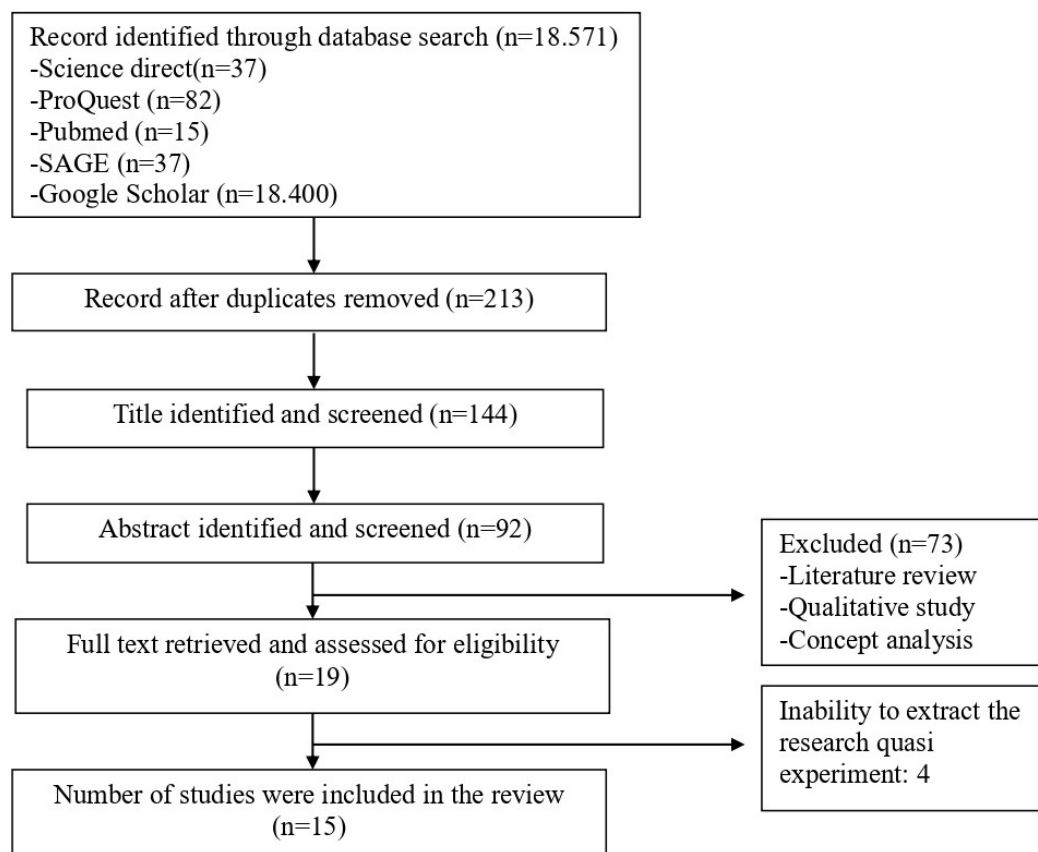
2. Selection Criteria

Figure 1. *PRISMA Flow Diagram [13]*

Studies were required to meet the following criteria to be eligible for inclusion in the systematic review journal articles published in the English language between January 2019 until December 2024. Studies were included in the review if they reported primary research on interventions designed to increase response time, with quasy experiment or Experiment design. Journal extraction was not appropriate is done by taking into account the inclusion criteria of the study to be discussed. Studies that fall under the inclusion criteria are seen from the year of publication, research design used, interventions, participants, data changes, outcome measures. After data extraction and quality analysis, the main features and research findings were discussed by four authors to construct a structure for the synthesis of research findings. Response time change is calculated by subtracting the pre-intervention / comparison group data from the post-intervention group data.

3. Data Extraction

For each included article, the data extracted included the author's name, year of publication, country, participant setting, type of intervention, instrument, follow up, measurement and P-value. To assess the quality of each included study, a meticulous quality assessment was performed using the Joanna Briggs Institute (JBI) tool with a feasibility of 70%. The JBI assessment covers various aspects, including the representativeness of the sample, the appropriateness of the study's methodology, the validity and reliability of the measures used, and the adequacy of response rates.

Results and Discussion

A. Result

1. Literature search

A total of 171 records were identified from Science direct=37 articles, ProQuest=82 articles, Pubmed=15 articles, SAGE=37 articles and Google Scholar=18.400 articles. A total of 18.571 articles were checked for titles, abstracts and met the inclusion criteria. Next, the suitability was assessed and deemed to meet the requirements and included in the review of 15 articles.

2. Characteristics of included studies

No	Author, Year, Country of Origin	Participant Setting	Type of Intervention	Instrument, Follow Up	Measurement
1	(Sterner et al., 2022) Sweden [14]	102 new graduate nurses	The simulation-based education (Airway, Breathing, Circulation, Disability, Exposure assessmen)	Perception to Care in Acute Situations (PCAS) scale	The nurse's ability to provide care in acute situations
2	(Bednarek-Chaluda et al., 2024) Poland [15]	410 participants in 74 emergency departments across Poland in 2020	Education program on ESI triage in Poland	A metrics sheet and 5 clinical cases (A-E) to triage	Participants' knowledge regarding triage
3	(Zagalioti et al., 2023) Yunani [16]	36 ENs (Emergency Nurses) from the University Department of Emergency Medicine at AHEPA University Hospital	Training in triage by the STS (Swiss Triage System) with simulation scenarios	Questionnaire for triage decision making (Schweizer Triage System Version 1.10 June 2018 (STS))	Effective decision-making in the prioritisation of immediate and critical medical situ- ations, thereby improving patient care
4	(Javadi et al., 2023) Iran [17]	74 triage nurses	Lecturing to flipped classrooms in virtual learning on the knowledge and professional capabilities of triage nurses in the emergency departments	The emergency department triage nurses' professional capability questionnaire The triage knowledge questionnaire	Clinical competence, psychological empowerment and professional commitment Prioritizes patients, identifies high risk and life threatening conditions
5	(Zhang et al., 2021) Tiongkok [18]	120 nurses	Virtual reality simulation training (VRS) and Technical skill training	Emergency care capability assessment scale Assessment of knowledge and skills	Disaster preparedness Knowledge and skills for emergency
6	(Fahajan et al., 2023) Palestine [19]	700 nurses from 13 public hospitals in the Gaza Strip	Simulation-based training program in basic life support (BLS) on the knowledge	Nurse knowledge questionnaire about basic life support	Nurse knowledge of BLS
7	(Al-qbelat et al., 2022) Jordan [20]	100 emergency nurses Jordanian registered nurses (RNs)	Educational Program on Knowledge, Skills, and Personal Preparedness for Disasters	Questionnair disaster preparedness evaluation tool (DPET)	Knowledge Skills Personal preparedness
8	(Jonson et al., 2017) Sweden [21]	13 head nurses' emergency	Short computer-based simulation	Ability questionnaires	Ability to organize and manage initial

		department	exercise "Dig Emergo simulation system"	measure and manage initial responses Nurse self-efficacy scale	response Emergency medical response performance indicators
9	(Bahlibi et al., 2022) [22]	33 nurses who work in the emergency departments	Triage training on the knowledge application and practice	A self-administered knowledge assessing questionnaire and a practice observation checklist	Triage knowledge and nurses' practices in carrying out triage
10	(Koota et al., 2021)[23]	80 emergency nurses	Evidence-Based Practice (EBP) Education on Emergency Nurses	The Evidence-Based Practice Questionnaire, Evidence-Based Practice Beliefs Scale, Evidence-Based Practice Implementation Scale	Nurses' Triage knowledge
11	(Ravindra et al., 2022)[24]	300 nurses	Hands-on training programme on basic life support	Self-administered structured knowledge questionnaire	Nurses' knowledge about BLS
12	(Imran et al., 2023)[25]	35 nurses	Basic Life Support Training Workshop on Nurses Knowledge and Practice	The questionnaire consists of Multiple-Choice Questions BLS checklist recommended by AHA	Knowledge Practice
13	(Zhong et al., 2023)[26]	43 nurses	Flipped learning format and virtual simulation	Assessment Questionnaire of Clinical First Rating Scale of Self-directed Learning Competence for Nurses	Capability of Nurses Competence for Nurses
14	(Moon & Cho, 2022)[27]	75 Nurses emergency department	Competency-Based Triage Education Application	Triage Questionnaire	Triage competency Performance
15	(Prakoeswa et al., 2022)[28]	50 nurses of ER in Surabaya	Basic trauma and cardiac life support training	Instruments for assessing knowledge, skills, and attitudes	Knowledge, attitude and skill

Table 1. *Characteristics of the included studies*

The studies included in the review used a quasi-experimental research design with the participants being emergency department nurses. In this literature study, three studies used randomized control trials and twelve studies used quasi-experiments [14]. The studies included in this review were conducted from various countries including Sweden, Poland[15],Yunani, Iran, China, Palestine, Jordan, Eritrea, Finland, India, Pakistan, South Korea and Indonesia. Interventions were carried out in emergency departments. Based on the results of the literature review, the effective ways include : The simulation-based education (Airway, Breathing, Circulation, Disability, Exposure assessmen), Education program on ESI triage, Training in triage by the STS (Swiss Triage System) with simulation scenarios [16], Lecturing to flipped classrooms in virtual learning on the knowledge and professional capabilities of triage nurses in the emergency departments [17], Virtual reality simulation training (VRS) and Technical skill training [18], Simulation-based training program in basic life support (BLS) on the knowledge [19], Educational Program on Knowledge, Skills, and Personal Preparedness for Disasters [20] and Short computer-based simulation exercise "Dig Emergo simulation system" [21], triage training[22], evidence-based practice education[23], hands-

on basic life support training[24], basic life support training workshop[25], flipped learning and virtual simulation[26], competency-based triage education application and basic trauma cardiac life support training.

B. Discussion

To speed up the response time of nurses, especially in the ER, many interventions can be implemented, each health agency has its own interventions. Interventions that can be carried out include providing education in the form of acute situation simulations (ABCD), especially for new graduate nurses. This simulation is carried out as an effort to train nursing skills, nurse experience and prepare nurses to face challenging situations in the emergency unit. The BLS "Basic Life Support" simulation-based training showed that nurses' knowledge of BLS increased after implementing this program. The intervention was carried out by a qualified trainer, PowerPoint, films and hands-on training using a CPR mannequin were used. The training applied starts from cardiac compression, artificial respiration, recovery position, airway management, airway obstruction, first aid for unconscious patients and use of AED (Automated External Defibrillator). Training BLS programs can improve nursing professionals' response times. Other education-based interventions implement validated triage training based on ESI's "The Emergency Severity Index." This research was conducted for three months and the results of this training significantly reduced errors and increased evaluation of priority cases according to triage. Training to improve triage decisions can use the STS "Swiss Triage System". This training can be used as an intervention to speed up the response time of emergency nurses. This training was carried out using e-learning which includes the emergency scale, vital signs assessment, triage categories and causes of hospital admission. This training significantly impacts emergency nurses' triage skills, vigilance in providing safe healthcare services and initial knowledge increased after triage training, korean triage and Acuity Scale (KTAS) educational application has succeeded in increasing triage competency and performance and reducing triage errors[27]. The next intervention that can improve the response time of emergency nurses is to use virtual learning about triage nurses' knowledge and professional abilities. In this study there were control and intervention groups. Apart from using the lecture method, the intervention group received material seven days before implementation, a summary of the material and discussion. Knowledge triage involves prioritizing patients based on ESI and identifying high-risk and life-threatening conditions. Professional abilities consist of clinical competence, psychological empowerment and professional commitment. The research carried out obtained results that using Flipped Classroom learning was more effective than just using the lecture method to increase nurses' professional knowledge and abilities regarding triage. The virtual reality simulation training intervention on nurses' response time abilities combined with skills training showed better improvement, vertical learning and virtual simulation improve emergency response capabilities,the combination of flipped learning and virtual simulation is effective. Furthermore, there is an educational program about the knowledge, skills and personal readiness of nurses in dealing with disaster situations. This educational program has 5 topics (disaster preparedness, triage and rapid treatment, decontamination procedures, basic life support and advanced trauma support psychology. Disasters are one of the causes of overcrowding in the ER so a quick response is needed by nurses to prevent overcrowding in the ER. emergency room. An intervention that can be used especially for heads of emergency units is a short computer-based simulation training program "Dig Emergo simulation system". This exercise provides an opportunity for head nurses to improve their emergency room management skills and increase their general self-efficacy.

From the results of the review, 5 types of interventions were found to speed up the response time of emergency nurses, BLS simulation training [28], triage training, virtual training, disaster preparation and training for emergency room chiefs.

Conclusion

There are various strategies that management can use to improve emergency nurse response times. Based on the results of the literature review, effective methods include: The simulation-based education (Airway, Breathing, Circulation, Disability, Exposure assessmen), Education program on ESI triage, Training in triage by the STS (Swiss Triage System) with simulation scenarios, Lecturing to flipped classrooms in virtual learning on the knowledge and professional capabilities of triage nurses in the emergency departments, Virtual reality simulation training (VRS) and Technical skill training, Simulation-based training program in basic life support (BLS) on the knowledge, Educational Program on Knowledge, Skills, and Personal Preparedness for Disasters, Short computer-based simulation exercise "Dig Emergo simulation system", triage training, evidence-based practice education, hands-on basic life support training, basic life support training workshop, flipped learning and virtual simulation, competency-based triage education application and basic trauma cardiac life support training. Interventions implemented to increase the response time of emergency nurses can improve the quality of nursing services. The intervention that most significantly increases the response time of emergency nurses are triage training and BLS simulation training because they prioritize patients based on severity and provide direct training in handling emergencies. With enhanced skills and increased confidence, nurses can respond more quickly and efficiently. Training in a team context also improves coordination among nurses, making the overall system more responsive to the urgent needs of patients in the emergency department.

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