

Effectiveness of the Time Rushing Game Method in Enhancing Knowledge, Skills, and Self-Efficacy in Health-Oriented Disaster Response Simulations

By Uti Rusdian Hidayat



Effectiveness of the Time Rushing Game Method in Enhancing Knowledge, Skills, and Self-Efficacy in Health-Oriented Disaster Response Simulations

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Abstract

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Aims: This study aimed to evaluate the effectiveness of the time rushing game method in enhancing knowledge, skills, and self-efficacy in health-oriented disaster response simulations. **Methods:** A quasi-experimental study was conducted with 115 students. The Time Rushing Game consisted of measuring knowledge, skills and self-efficacy in conducting disaster response simulations. The Time Rushing Game intervention consisted of triage, evacuation and initial assessment procedures, each with a time limit of 10 minutes. After receiving the intervention or playing the disaster simulation, knowledge, skills and self-efficacy were measured again. Knowledge and self-efficacy were measured using a questionnaire. Skills are measured using an observation sheet. **Results:** Significant improvement in knowledge ($p=0.000$), skills ($p=0.000$), and self-efficacy ($p=0.000$) after intervention using the Time Rushing Game learning method. **Conclusion:** The Time Rushing Game effectively enhanced students' knowledge, skills and self-efficacy in health-oriented disaster response simulations. This learning method should be implemented not only in health-oriented disaster response simulations but also in simulations in other case study-based courses.

Keyword: Time Rushing Game, Knowledge, Skills, Self-Efficacy, Disaster Response Simulation

INTRODUCTION

Disasters became of the problems faced by the world and Indonesia. According to data from the Emergency Events Database in 2024, there were 393 natural disasters that affected 167.2 million people. These natural disasters claimed 16,753 lives and caused economic losses amounting to US\$ 241.95 billion (Delforge et al., 2025). Indonesia is one of the countries with the highest levels of disaster vulnerability in the world (Pertiwi et al., 2020). Geographically, Indonesia was located in the Ring of Fire, making it prone to various types of disasters such as earthquakes, tsunamis, volcanic eruptions, floods, landslides, forest fires, and other hydrometeorological disasters (Hakim & Lee, 2020). According to data from the National Disaster Management Agency (BNPB) in 2024, there were 1,117 disaster events with 8.1 million people affected and 540 fatalities (Badan Nasional Penganggulangan Bencana, 2025). This situation requires the community, institutions and government to be prepared to face

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disaster risks that can occur at any time and cause significant impacts on the social, economic and health aspects of society (Nasution et al., 2025).

In the context of disaster management, disaster training is an important component of disaster risk reduction efforts (Righi et al., 2021). The training aimed to improve the knowledge, skills, and preparedness of individuals and communities so that they were able to take appropriate action before, during, and after a disaster occurs (Mariam et al., 2021). Without adequate education and training, first responders often panic, make wrong decisions, and were unable to save themselves or help others optimally (Mızrak & Aslan, 2024). In addition, disaster management training was also needed to improve cross-sector coordination between security forces, health workers, volunteers and the general public (Gooding et al., 2022). Poor coordination could slow down the evacuation process, increased the risk of casualties, and hampered post-disaster recovery (Idrus et al., 2025). Therefore, capacity building through systematic, standardized and continuous training is essential.

Disaster training focused not only on disaster management, but also on preparedness education, evacuation simulations, the use of safety equipment, first aid, and psychosocial recovery (Righi et al., 2021). Various studies showed that communities that receive disaster training have faster response capabilities, lower anxiety levels, and higher safety levels compared to communities without training (Guo et al., 2025). Based on this urgency, disaster training was important investment in improving community resilience. By increasing capacity and understanding through training, it is hoped that communities will be better able to deal with disaster threats independently, reduce the risk of casualties, and accelerate recovery after a disaster occurs. One training method that can be applied in disaster management is the Time Rushing Game method (Mirza et al., 2024).

Time Rushing Game is rooted in experiential learning theory, whereby learning occurs through concrete experiences, reflection, and reapplication. This game provided a learning facility for experimenting, accepting the consequences of decisions, and repeating strategies without real risk. International literature shows that educational games designed according to the experience cycle improve retention, motivation, and procedural skills in the context of disaster risk mitigation (Tsai et al., 2020). One of the distinguishing features of Time Rushing Games is the addition of time pressure/time limits that simulate urgent conditions. Experimental studies and theoretical reviews have found that time pressure can alter decision-making strategies. In emergency contexts, well-designed time pressure can increased focus, shorten response times, and promote effective experiences (Taheri et al., 2023).

The novelty of this study consists of combining several stages of activities, such as triage, evacuation, and initial assessment, in the form of a structured simulation-based time-rushing game with a case study approach. The triage procedure using Simple Triage and Rapid Treatment (START) emphasized speed and accuracy in selecting patients through the use of triage tags/marks. These triage marks determined which victims must be immediately evacuated or transported to a field hospital or main hospital. In carrying out evacuation and transportation, the researchers emphasized accuracy in the evacuation process, consisting of several aspects such as the accuracy of treating patients' injuries, the accuracy of using the appropriate type of evacuation equipment, and the simultaneous assessment of the rescuers. The final stage of the game was the initial assessment process at the field hospital, which included checking the airways, breathing, circulation, disability, and exposure. Participants will be asked to make a quick assessment and management decision for each examination to determine whether the patient should be immediately referred to the main hospital, not immediately referred, or can be treated at the field hospital. All these stages must be completed within 30 minutes. This time limit puts pressure on the students in the time-rushing game simulation.

A preliminary study conducted by researchers found that disaster simulation-based learning conducted by students in the laboratory was in line with the curriculum developed by the institution. Interviews with 10 students revealed that simulation learning conducted in the laboratory was becoming less interesting and boring. Students wanted outdoor simulations with interesting cases. Based on the above explanation, the researchers tested the Time Rushing Game method to improve knowledge, skills and self-efficacy in disaster simulations.

METHODS

This study used a quasi-experimental design with a one-group pretest-posttest. The study was conducted at STIKes YARSI Pontianak in November 2025. The population in this study consisted of 114 students from the 7th semester of the bachelor of nursing and the 5th semester of associate degree of nursing who had taken the Emergency Nursing and Disaster Nursing courses. The research sample consisted of 114 people selected using total sampling. Pretest data collection was conducted on 10–12 November 2025 using knowledge and self-efficacy questionnaires, as well as skills assessment through laboratory simulations evaluated by three assessors. On 16 November 2025, participants received an explanation of the disaster

simulation learning method using The Time Rushing Game approach and then undertook case-based simulations as a posttest.

The simulation consisted of triage using the START method, victim evacuation based on triage results and injury severity, and initial assessment at a field hospital to determine referral needs. After completing the skills assessment, participants filled out posttest questionnaires on knowledge and self-efficacy. The research instruments used were knowledge questionnaires, observation sheets and self-efficacy questionnaires. The knowledge questionnaire consisted of 20 questions with a Guttman scale, where ⁶ correct answers were given a value of 1 and incorrect answers a value of 0, with the lowest score being 0 and the highest 20. The knowledge questionnaire used by the researcher had been tested for validity and reliability on 20 respondents ($r_{table} = 0.444$) that was declared valid ($r_{count} = 0.738-0.875$) and reliable (Chronbach Alpha = 0.979). The self-efficacy questionnaire consisted of 10 statements with a Likert scale of very unsure valued at 1, unsure valued at 2, less sure valued at 3, sure valued at 4, and very sure valued at 5. The highest score is 50 and the lowest is 10. The self-efficacy ¹⁶ questionnaire has been tested for validity and reliability on 20 respondents ($r_{table} = 0.444$) that declared valid ($r_{count} = 0.630-0.855$) and reliable (Chronbach Alpha = 0.941).

The observation sheet used in the study consisted of triage, evacuation and initial assessment procedures. The triage assessment was scored as 1 for correct and 0 for incorrect with 10 cases (lowest score 0 and highest score 10). The evacuation assessment consisted of 17 assessment components with a score of 0-2 (highest score 34 and lowest score 0). The observation sheets were tested for validity and reliability through assessment by three experts using the content validity index (CVI) approach. The observation sheets, consisting of triage, evacuation and initial assessment observation sheets, were declared valid and reliable with a CVI of 0.867 for triage, 0.833 for evacuation and 0.89 for initial assessment.

The data were analyzed using SPSS Version 2020. The univariate data consisted of respondent characteristics (age and gender), knowledge, skills, and self-efficacy before and after the intervention. The statistical test used was the non-parametric Wilcoxon test. This study was approved by ⁵ the Health Research Ethics Committee of STIKes YARSI Pontianak with number: 095/KEPK/STIKes.YSI/X/2025.

RESULTS

A total of 114 respondents agreed to participate in this study. A total of 88 respondents were women (77.2%) with an average age of 21 years (Table 1). Before the intervention, the majority of respondents had low knowledge (68 people, 59.6%), poor skills (104 people, 91.2%) and low self-efficacy (104 people, 91.2%). After the intervention, the majority of respondents had moderate knowledge (67 people, 58.8%), adequate skills (109 people, 95.6%), and moderate self-efficacy (109 people, 95.6%) (Table 2).

Table 1: Respondent Characteristics Based on Age (n=114)

Variable	Mean	SD
Age	21.35	0,959

Table 2: Respondent Characteristics (Gender), Knowledge, Skills and Self-Efficacy (n=114)

No	Variable	Category	f	%
1	Gender	Men	26	22.8
		Women	88	77.2
2	Knowledge (Pretest)	High	0	0
		Moderate	46	40.4
		Low	68	59.6
3	Knowledge (Posttest)	High	42	36.8
		Moderate	67	58.8
		Low	5	4.4
4	Skills (Pretest)	Good	0	0
		Adequate	10	8.8
		Poor	104	91.2
5	Skills (Posttest)	Good	4	3.5
		Adequate	109	95.6
		Poor	1	0.9
6	Self-efficacy (Pretest)	High	0	0
		Moderate	10	8.8
		Low	104	91.2
7	Self-efficacy (Posttest)	High	4	3.5
		Moderate	109	95.6
		Low	1	0.9

The results of the statistical test showed an increase in knowledge ($p=0.000$), skills ($p=0.000$) and self-efficacy ($p=0.000$) after the intervention using the Time Rushing Game learning method (Table 3).

Table 3. Improved of Knowledge, Skills and Self-Efficacy After Intervention of the Time Rushing Game Learning Method (n=114)

Variable	Positive Ranks	Negative Ranks	Ties	<i>P Value</i>
Knowledge	77	0	37	0.000*
Skills	106	0	8	0.000*
Self-efficacy	106	0	8	0.000*

*Wilcoxon test

Positive ranks indicate an increase of knowledge after the intervention were 77 people, an increase in skills were 106 people, and an increase in self-efficacy were 106 people. There were 37 people whose knowledge level remained unchanged, and 8 people each whose skills and self-efficacy remained unchanged (Table 3).

DISCUSSION (12pt, all caps, Time News Roman, Bold, 1,5 space)

The results of this study indicated that there were differences in changes in knowledge, skills and self-efficacy in conducting disaster management simulations after the intervention. There were several respondents whose knowledge, skills and self-efficacy did not change (Ties) after the intervention. No respondents showed a decline in knowledge, skills and self-efficacy after the intervention. **The findings of this study indicate that the Time Rushing Game is effective in improving participants' knowledge, skills, and self-efficacy in disaster management.** These results are consistent with various international and national studies which state that game-based learning and simulations provide a more in-depth, responsive, and practice-oriented learning experience compared to conventional methods (Solinska-Nowak et al., 2018).

Knowledge improvement occurs because The Time Rushing Game provides an interactive learning experience that allows participants to understand mitigation, response, and evacuation measures through realistic scenarios. The interactivity in the game reinforces the information encoding process and facilitates long-term knowledge retention. Meta-analysis studies show **that game-based learning significantly improves cognitive learning outcomes in various educational contexts (Mao et al., 2022).** In addition, disaster simulations that require **players to make quick decisions based on visual and instructional information** have proven effective in reinforcing procedural concepts, such as rescue priorities and risk assessment (Bai et al., 2024). Research by Hastuti & Arisanty (2023) showed that game media such as Ludo Disaster Alert can improved students' understanding of floods and earthquakes when presented in a visual and interactive form. These results indicated that the use of game models in disaster

education is highly relevant to the Indonesian context, especially given the high prevalence of natural disasters such as earthquakes, floods, and volcanic eruptions. In addition to cognitive aspects, Time Rushing Game also improved participants' skills. This game presents a simulated environment that closely resembles real conditions, allowing participants to practice rapid response measures such as hazard identification, emergency decision-making, and evacuation procedures under time pressure.

Study from Choi & Song (2024) showed that the use of game-based simulations in Psychological First Aid (PFA) training significantly improved participants' ability to assess situations and respond appropriately in emergencies compared to traditional lecture methods. Repeated practice in games reinforced the motor-cognitive skills needed in disaster response, helping participants to internalize procedures without having to experience real risks (Hidayat et al., 2024). Increased self-efficacy is also one of the important contributions of the Time Rushing Game. According to Bandura's theory, self-efficacy is formed primarily through experiences of success (mastery experiences). In the game, each participant's success in completing a mission within a certain time limit becomes a source of psychological reinforcement, thereby increasing their confidence in handling disasters in real-life situations. Study of Dumblekar & Dhar (2021) emphasized that game-based learning consistently increases participants' self-efficacy through feedback and reward mechanisms within the game. Choi & Choi (2024) showed that simulation-based PFA training increases participants' confidence in responding to emergencies, proving that games can be an effective tool in strengthening psychological preparedness. The element of time pressure in the Time Rushing Game plays an important role in distinguishing this game model from conventional simulations. Time pressure simulates real-life conditions where decisions must be made quickly and accurately.

Bai et al (2024) explained the elements of urgency in disaster simulations improved participants' ability to manage cognitive stress and maintain focus on safety priorities. Time pressure also trains participants to make decisions based on trained intuition, which is an important skill in the disaster response phase. However, there are several limitations. Many of the studies underlying these findings still use quasi-experimental designs and do not conduct long-term measurements, so the effects of knowledge and skill retention have not been fully measured. Solinska-Nowak et al (2018) highlights that the heterogeneity in serious game design makes generalizing results a challenge in itself. In addition, national research is still limited to small samples and basic education contexts, so more comprehensive studies need to

be conducted on populations of students, health workers, volunteers, and the general public. Overall, the results of this study reinforce the evidence that Time Rushing Game is an effective and relevant pedagogical innovation for improving community capacity in disaster management. By combining elements of simulation, time pressure, interactivity, direct feedback, and repetitive practice, this game is able to strengthen the cognitive, skill, and psychological aspects necessary for emergency response. Further development and large-scale effectiveness testing are needed to ensure its long-term benefits and its ability to be widely used in disaster education, especially in Indonesia.

CONCLUSIONS

There was an increase in knowledge, skills and self-efficacy in health-oriented disaster response simulations using the time rushing game learning method. This method can be used in formal learning processes, particularly in disaster nursing courses.

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