Constraints on Transport of Injured Victims after the Earthquake for Disaster Victims’ Evacuation Model Development: A Phenomenological Study

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Abstract

The big earthquake has an impact on the risk of injury to the victims. The wounded victim needed urgent medical assistance to survive. The effectiveness of this service depends heavily on the response speed of stakeholders. To increase the response rate, a detailed emergency response plan is needed. The study aims to identify restrictive factors in evacuating victims of post-earthquake injuries. This qualitative research has a phenomenological design. Participants in this study were 15 nurses who participated in the Disaster Victim Evacuation (DVE) process and who met the criteria with the purposive sampling technique. Data is collected through a deep interview (IDI) using open questions. Data analysis is done using the inductive content analysis method. Two themes contributed to the DVE process as an ERP, namely, 1) restriction of institutional support and 2) cancellation of evacuation routes. These findings have provided an overview of several factors that directly contributed to the implementation of the DVE process.

1. Introduction

Earthquakes in the past have caused many fatalities and injuries. The Indonesian government described 2,856 people injured by earthquakes in Indonesia in 2018 [1]. This trend is evident in the case of Aceh, a province located in the northern part of Sumatra, Indonesia [2], where 923 people were injured in the 2016 earthquake [3]. These statistics highlight Aceh Province as a region prone to earthquakes in Indonesia [4].

Earthquakes also often cause uncertain conditions. This uncertainty can be in the form of disruption to communication network services, transportation, or scarcity of resources [5]. Uncertainty coupled with the high risk of injury [6] and various types of victims' conditions make it difficult to handle an emergency response [7]. Seriously injured victims need immediate assistance to stay alive [8]. However, efforts to provide fast service become problematic because they must go through long lines and procedures.

Constraints were also found related to emergency response operations, starting from identifying and assessing problems and making decisions as in [9]. They identified constraints in determining the location of victims, uncertainty about the number of victims, and
choosing the road to the hospital. In contrast, they focus more on operational constraints related to first aid and medical intervention because of identifying the actual condition of the victim, starting from the condition of the victim being found until the victim receives treatment at the hospital. These problems or constraints have an impact on the speed and optimization of response time and assistance to injured victims in disaster response activities [6].

The evacuation as part of service efforts during the Disaster Emergency Response Period (DERP) is faced with complicated stages, including preparation, pick-up, and delivery of victims to the hospital stage.

Evacuation as part of service efforts during the DERP is a stage with complex and challenging activities and considerations. These stages include the preparation stage, picking up and delivering victims to the hospital [6]. One of the sub-activities in the evacuation preparation process stage is obtaining accurate and relevant information for quick and correct decision-making. However, to obtain it, constraints must be overcome because the post-disaster situation is very difficult [10]. For the stages of picking up and dropping off victims, the challenges and complexities faced include differences in care needs related to the age of the victims and activities for arranging transportation equipment, taking into account the capacity, specifications, and emergency conditions of the victims [11]. In addition, the effectiveness of the DisasterVictimEvacuation (DVE) process is highly dependent on the disaster location and environmental conditions [12]. The long distance to the referral hospital, the state of damaged infrastructure, congested routes, and the large number of seriously injured victims were the constraints that were often experienced [7, 9]. These constraints will undoubtedly reduce the speed of victim evacuation [9, 13].

The speed of response of stakeholders living in disaster-affected areas is closely related to the conditions and impacts of the disaster [5]. Learning from the large earthquake disaster that hit Iwate Prefecture, Japan, in 2011, the local government was unable to function, and the medical staff was severely weakened by the tsunami disaster [5]. The replacement hope is assistance from stakeholders from areas not affected by the disaster [13]. However, the time interval between responses to first aid is not fast [7], and even in large disasters, teams from nearby areas team members and medical equipment are insufficient [5].

Nurses are one of the main professions in disaster emergency services [13], and the role and competence of nurses are very much needed during the emergency response period [14]. The presence of nurses in various healthcare settings allows them to act early in emergency response to disasters throughout almost the world [15]. Nurses are also active in all phases of a disaster based on their respective competencies and expertise, as well as pre-hospital and ambulance care [16]. Apart from this, nurses also consistently strive to advocate for the development of special policies regarding the evacuation process to health service facilities [17]. However, nurses often face several constraints in disaster emergency response activities [14].

The form of disruption to communication network services, transportation, or scarcity of resources. Uncertainty coupled with the high risk of injury and various types of victims' conditions make it difficult to handle an emergency response. Seriously injured victims need immediate assistance to stay alive. However, efforts to provide fast service become problematic because they must go through long lines and procedures.

Considering this and learning from the experiences of the 2004 Aceh earthquake and the 2016 Pidie Jaya, Aceh, it is essential to explore the constraints in each region’s DVE process as an integral part of the ERP. This study aims to identify the constraining factors affecting the transportation of injured victims after the earthquake for DVE model development from a nurse's perspective.

2. Materials and Methods

2.1. Research Design

This research is a qualitative study with a phenomenological design to explore nurses’ perspectives on DVE. This method was chosen because it is designed to identify the core of an individual's experiences that shape perspective [18, 19]. The same method is also used by [20].

We chose this procedure to explore various constraints in the preparation and implementation of the DVE process during DERP. Through in-depth interviews (IDI), participants can tell what they saw, heard, and felt while helping disaster victims.

2.2. Setting and Samples

The data collection process was carried out after the research permit was issued. Formally, interviews with sources were conducted from January to April 2021. This period does not include time for preparation. Participants were nurses who took part in emergency response operations for the 2016 Pidie Jaya earthquake disaster. They were chosen to be able to reveal everything that hampered and slowed down their work in evacuating injured victims to receive definitive care. The
selection of research participants went through three stages:

- Determining participant criteria. This is done to ensure that the participants involved properly understand the direction of the research question. The criteria are nurses who are tasked with evacuating disaster victims from pre-hospital service institutions. Other criteria include experience in earthquake emergency response operations, minimum formal education as a vocational nurse (diploma), attending emergency nursing training, and volunteering to provide information.

- Looking for potential participants using the snowball method. This method was chosen because it helps find participants through participant connectivity and understanding other potential participants who fit the criteria and understand the specific research topic [21]. However, in this step, it is important to look for participants from different areas with the aim of getting a variety of information [22]. This variation was obtained by taking participants from areas affected by disasters and areas not affected by disasters.

- Purposive determination of participants: after prospective participants are obtained, they are verified by comparing them with the criteria and then designated as participants after their willingness is obtained verbally and in writing.

The search and determination of participants was stopped after information saturation [22]. The information saturation of this research consisted of 15 nurses as key participants.

2.3. Measurement and Data Collection

This research uses in-depth interview guidelines resulting from modified guidelines adopted from [23]. The data collection procedure goes through three stages: preparation, implementation, and evaluation [24]. The preparation stage includes the availability of interview guidelines, preparation of interviewers and participants, preparation of materials and equipment, as well as preparation of time and place. The interview guide that has been prepared contains open questions related to research components that we obtained from the literature study. These components are human resource components, evacuation vehicle components, route components, travel time components, and victim condition components [8, 9, 12, 25–27]. Participant preparation includes an ethical review and approval process as well. The process of communicating a willingness to become a participant and preparing informed consent [28].

IDI implementation and evaluation stages were carried out in two locations based on the origin of the participants. IDI-1 is carried out at the Provincial Health Service, and IDI-2 is carried out at the District Health Service at the Disaster Location. Interviews were conducted directly by the researcher face-to-face (with Health Protocol) for 90-120 minutes. This is done so that the interviewer can investigate the relationship between the participant’s verbal expressions and body language and the research question keywords on the spot. However, this would be very difficult to do with other data collection methods [24, 28]. IDI is carried out by asking open questions and probing to find out constraints in evacuating disaster victims for emergency response plans. IDI is carried out directly by researchers and assisted by a team for the documentation and monitoring process. Recording devices and notebooks collected data during interviews and recorded observations.

2.4. Data Analysis

The evaluation stage of verbal interview results was analyzed manually using the inductive content analysis method through three rotation activities, namely data reduction activities with coding, data categorization, and description activities, and identification of data conclusions [29–31]. Manual analysis was chosen because researchers can carry out data reduction through a comparison process between the results of verbal responses and observations of body reactions and environmental conditions [32]. This is important to reveal the real constraints they felt when evacuating injured victims due to the earthquake. All IDI recordings were immediately transcribed verbatim after the interview to prevent memory bias, as was done in [33].

2.5. Trustworthiness/Rigor

Credibility was achieved by spending sufficient time on data collection. Data saturation is believed to have been reached because no new information was found after four months. Coded interviews were conducted with 15 informants for the validity of the data. The researcher and team actively transcribed and analyzed results, reviewed and coded interviews, discussed findings and compiled final results. Dependability and conformity are enhanced through external checks; therefore, two researchers and two external supervisors evaluated transcripts, codes, and categories to identify discrepancies in the coding process. The resulting transcript was read several times to understand the context well so that the resulting subthemes and themes
Table 1. Demographics of the participants (N = 15).

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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Additional tasks</td>
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<td>53.33</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>Volunteers</td>
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<td>Volunteers</td>
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<td>33.33</td>
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Table 2. Theme of analysis results.

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<td>Availability</td>
<td>Evacuation Vehicle</td>
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<tr>
<td>Knowledge and Skill</td>
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<td></td>
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<td>Understand the operating area</td>
<td>Physical condition</td>
<td></td>
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<tr>
<td>Number of Vehicles</td>
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<td></td>
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<td>Narrow Route</td>
<td>Evacuation Route</td>
</tr>
<tr>
<td>Vehicle condition</td>
<td>Broken Route</td>
<td></td>
</tr>
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<td>Route of full</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Casualties Condition</td>
<td>Mobility</td>
</tr>
</tbody>
</table>

were in line with the research objectives. Interview recordings and transcripts are stored anonymously in a password-protected master folder. Only researchers involved in this research have access to the data.

3. Results

3.1. Characteristics of Participants

The majority of participants were men with an average age of 30 years and in the range of 26 - 49 years. They generally have a Diploma 3 in Nursing. More than half of the interviewees for this research were in the area affected by the earthquake at the time of the incident, and generally, they worked outside their main duties (Table 1).

Although not the main part of this research, participant characteristics such as gender, age, and education have implications for their work results, such as special accommodation, strength, and physical and psychological endurance. Researchers are also looking for nurses who were on duty at the disaster site when the earthquake occurred. We did this to gain more information from the experience of helping in the acute period. We also arranged to obtain information regarding the form of an assignment to be able to identify barriers based on the perspective of their institutional support. The term acute period is used [5] to define the period before assistance from outside the disaster area arrives or the post-disaster primary impact period.

3.2. Analytical Findings

This research succeeded in exploring and identifying constraint factors in the DVE Process. The process of analyzing the collected data was carried out repeatedly, starting from the process of transcription, reduction,
coding, and categorization. This study can identify nine sub-themes and two themes regarding constraints to the DVE process from the nurse's perspective (Table 2).

These constraints are work procedures and policies, funding constraints, accommodation constraints, availability and competency of human resources constraints, as well as constraints to nurses' understanding of the work location. Apart from that, constraints related to hospitals (condition and capacity of hospitals) and constraints related to ambulances (number and condition of vehicles) can also be identified. Furthermore, constraints identified from the nurses' experience were route conditions, vehicle traffic density, and the victim's condition, which affected vehicle speed. The results of a verbatim analysis of these constraint factors by the research team and nursing management experts concluded that these constraints could be categorized into institutional support and evacuation routes.

3.3. Constraints on Institutional Support Factors

3.3.1. Policies and Standard Operational Procedure

In addition to adopting national regulations, Aceh Province has several regulations regarding Disaster Management. However, there are no more technical guidelines regarding disaster emergency response operations.

"There are no guidelines or technical instructions for implementing Aceh-specific disaster emergency response activities. Yes. The Aceh government still uses the Guidelines issued by BNPB for disaster emergency response operational activities." (IDI-1 KP1)

The Department of Health has a Standard Operational Procedure (SOP) made for PSC operations and has become a guideline for operators. PSC SOP for preparation, implementation, monitoring, reporting, and evaluation of services. However, the SOP does not cover services related to evacuation routes for disaster victims.

"Don't have SOP related to ambulance tracking and considering Response times" (IDI-1, KP3)

"Cluster managers during a disaster are also incidental and are "Learning by doing" (IDI-2 KP1)

3.3.2. Finance and Living Accommodation

Limited cash funds are a constraint in emergency response operations. Certainty of financial support for staff accommodation and operational costs is required prior to assignment. As a result, the number of health workers on standby is decreasing. Funds are also limited to increase officer capacity.

"The work program will not run without funding; it doesn't work, there is no own funding if you want to make a picket...; what do you want to give?" (IDI-1 KP1)

Working in a state of high alert can lead to burn-out. Fatigue conditions are exacerbated by limited time to rest and uncomfortable bed conditions.

"Tired, maybe because at that time I didn't get enough sleep and slept in the field, and the patients we referred went back and forth five to six times a day" (IDI-2 KP4)

3.3.3. Hospital capacity

The Pidie Jaya Regional Public Hospital is the closest hospital to the disaster site and is in the same area as the Health Office. However, the hospital suffered heavy damage, and only one building that was suitable for use was available. The building is used as a health service point.

"At 08.00 I arrived at the hospital, the doctors and other health workers at the hospital were not yet active because they were still traumatized" (IDI-2, KP6)

"At that time, the temporary hospital was still there; there was a building that could still be used, fit for use, a temporary emergency unit was formed there." (IDI-2 KP3).

3.3.4. Human resources

Constraints that can be identified related to the readiness of human resources are skill and knowledge. Constraints in the DVE process related to human resources are the low competency of the available health workers. In the initial period of a disaster, the evacuation process was carried out by health workers (survivors), local TNI/Polri, and ordinary people. Professional help is hard to come by. One respondent who works in a hospital admitted that:

"Some victims were taken by survivors, and some victims were taken by ambulance from the health center and hospital ambulance to the health post" (IDI-2 KP2)

"Early treatment is more important than referring patients directly if we know the appropriate intervention procedures..." (IDI-1 KP6)

In the following period, when help arrived, these
problems diminished. The evacuation process was carried out by lay and professional health workers from the Indonesian National Armed Forces (TNI), Indonesian National Police (Polri), and National Search and Rescue Agency (Basarnas), as well as other volunteers. However, another constraint was found, namely, related to understanding location conditions. This constraint, of course, reduces the speed of anticipating changes in conditions.

"When we pick up the victim...we don't understand the route chosen...sometimes we find the bridge is broken, so we have to turn back again" (IDI-2 KP4).

The time span between these two periods is the preparation time for departure and travel time to the location of the incident, so the time span between the incident and the time of receiving health services from the professional staff is long.

3.3.5. Vehicle

The identification results show that three categories of vehicles are used for DVE. In the case of the Pidie Jaya earthquake, the cars used included emergency ambulances (K1), non-emergency ambulances (K2), and non-ambulance vehicles (K3) for evacuating victims from the Health Service Post to the referral hospital, only using the K1 vehicle.

"There were victims among the community, and there were victims who were delivered by ambulance from the “Puskesmas” and local hospital ambulances to the Health Service Post." (IDI-2 KP1)*.

"In the evacuation operation, we used an ambulance K1 belonging to our institution, yes...all of them are four wheels,......with various sizes....." (IDI-1 KP2).

One of the constraints to the DVE process is the shortage of ambulances. Due to the limited number of ambulances, officers picked up two victims in one ambulance. In the initial post-disaster phase, the vehicles used were category K2 and K3 vehicles. However, after assistance from outside the affected area arrived, the evacuation was carried out using K1 and K2 vehicles.

"In the past, we carried more than one victim, but the condition of the victim was different; we put one victim seriously to sleep, and one could only sit in a cabin chair to speed up the evacuation process" (IDI-2 KP8).

"The Health Service Post is experiencing a shortage of ambulances because all the ambulances that have delivered and picked up victims have not returned." (IDI-2 KP5).

The ambulance used for the surgery is, of course, a proper operation. However, under certain conditions, the physical size of the vehicle becomes a constraint in the DVE process. The vehicle's size affects its maneuverability on the way. During a disaster, the condition of an ambulance becomes riskier or easily damaged. Officers need extra work to assess the vehicle's state before evacuating the next victim.

"If the size of the road is not sufficient to pass through because the ambulance is wider than the road, then the solution is to walk to lift the victim on a stretcher or even have to be carried" (IDI-1 KP3).

"Damage to vehicles that have occurred during the trip, namely reduced tire pressure, tire bursts, and engine damage" (IDI-2 KP5)

3.4. Constraints on Evacuation Route

3.4.1. Physical Condition

Disasters often damage roads, which are the primary facility for the evacuation process. Damage to these facilities will slow down the provision of assistance to victims. Road damage also interferes with medical assistance during the journey. Narrow or disconnected roads and non-standard road contours and inclines will make it difficult for ambulances to pass; the condition of these routes is clearly unsafe to pass. Evacuation using a motorbike or evacuation without a vehicle is an alternative, even though it is difficult and safety is not guaranteed. If this route cannot be passed, then taking an alternative route is another solution, although it has not been proven effective or efficient.

"There is a problem when the size of the road cannot be traced with an ambulance" (IDI-2 KP2).

"Road conditions such as the road are not wide enough, the asphalt is broken, rocky, and some are even muddy affecting the evacuation time...we are slow" (IDI-1 KP1)

3.4.2. Mobility

The national road, as the main route for referring victims to hospitals, is often congested, especially in the direction of the disaster site. The density occurs because people and their vehicles have filled the road. The thickness of the route increases on the streets passed by refugees. The density made it difficult for the evacuation team to enter the location.
"We will encounter traffic jams when evacuating victims, such as crowds on the side of the road, yes we are sometimes annoyed, but we still refer to evacuation efforts." (IDI-1 KP1)

"It’s difficult to enter the location because people and their vehicles have filled the road; sometimes they have to go down on foot to help victims or to open the road." (IDI-1 KP1)

It was found that the vehicle’s speed in delivering the victim from the location to the Health Service Post was slower than picking him up. This is because the car already contains the victim.

"The time to deliver the victim is longer than returning to the post, so we have to condition the speed of the ambulance; if the patient is too uncomfortable, we can’t rush it" (IDI-1 KP3)

“When transporting patients with open fractures, it takes a long time because we have to perform actions such as pressure dressings, splints, IVs, and other measures.” (IDI-2 KP2)

4. Discussion

Support for implementing emergency response operations in the health sector is very important, significantly increasing assistance’s effectiveness, efficiency, and affordability [34]. Research shows that supporting the provision of hospital and ambulance capacity when a disaster occurs can help increase the number of victims who can be saved. However, in [5], it was explained that the nearest hospital was ordered to accept victims of serious injuries due to the earthquake. However, it cannot function optimally because the transformer and converter are not functioning. Regions with weaker civil infrastructure and severe damage from disasters will make faster emergency response operations difficult [9]. Emergency response leaders can optimize the use of all available resources and facilities. [6] DVE resource management activities help balance loads between hospitals and avoid unnecessary waiting times and relocations of victims [35].

In general, disasters can cause various losses. After the big earthquake, many victims were found in various conditions [5]. In general, based on the Simple Triage and Rapid Treatment (START) method, victims are divided into victims who died, injured victims who needed immediate assistance, and victims who were not seriously injured with waiting time and did not suffer injuries [12, 36]. According to [34], physical injury victims are classified as severe and non-severe. In the START method, the level of injury is assessed based on the condition of the pulse, breathing, bleeding, and level of consciousness.

In the early post-disaster phase, it showed that pre-hospital health services in disaster-affected areas were not functioning. However, health assistance for victims, including transportation of victims to receive health services, is still provided by the community or disaster survivor health workers. Family or closest community members independently help evacuate injured victims to local hospitals. Victims with light, moderate, or serious injuries are transported by available vehicles or ambulances. Things like this have an impact on the availability of emergency medical care facilities for seriously injured victims [37] because they are unable to carry out independent evacuation [38].

Following all standard operating procedures is important in making quick decisions about providing assistance as needed [39]. However, during the Pidie Jaya earthquake, the availability and affordability of reference rules, service standards, and operational standards were not good. So, the operational procedures taken are very situational and do not take response time into consideration. Studies reveal that incorporating standard response times into SOPs is useful for improving the effectiveness of pre-hospital care [38].

Understanding or at least quickly adapting to the victim evacuation route certainly accelerates the anticipation of constraints related to this route [38]. However, this research revealed that not all ambulance officers understood the route, especially those outside the disaster area. This adds to the constraint of increasing the travel time. Understanding or at least quickly adapting to the victim evacuation route certainly accelerates the anticipation of constraints related to this route [35].

DVE usually uses land vehicles such as ambulances. However, damage to road infrastructure has affected the speed of vehicles in evacuation [40]. The types of modes that can be used are also more limited because some of the larger ambulance sizes are difficult to maneuver in the narrowed road conditions caused by the disaster. Sometimes, the nurse on duty uses an ambulance to transport two victims, but the level of emergency for victims is different; this was also revealed in the study. This is a positive thing when the number of ambulances is limited because ambulance capacity affects the number of victims evacuated [41], but ambulances must be used to evacuate victims according to their type and capacity [40].
The time difference between the incident and the initial time of definitive health services obtained by the victim is long because the time of readiness and preparation of officers is not fast. In addition, the speed of the vehicle to take the victim from the location found to the health post was slower than that of the vehicle picking him up. To reduce this, it is important to take into account the total time required to refer the victim to the hospital. To summarize the time of the evacuation process, of course, you must choose a short route, update the function and capacity of the hospital, and always pay attention to the possibility of the victim surviving [6].

The condition of roads became damaged, narrow, and crowded after the earthquake [42]. This condition results in limited modes of transportation that can evacuate victims to primary health services [35]. This condition causes the travel time to reach the location to be longer [9, 38]. The opportunity to repair or rebuild road infrastructure in a short time is also very small, especially in remote areas [43]. This condition clearly hampers the assistance process for victims. Another solution is to prepare alternative routes and emergency infrastructure, prepare alternative health facilities and hospitals for evacuation, prepare a competent team in disaster conditions [6, 38] and help evacuate victims using air transportation [44]. Emergency response leaders can optimize the use of all available resources and facilities [6]. DVE resource management activities help balance the load between hospitals and avoid unnecessary waiting times and casualty relocation [34]. This condition causes limited modes of transportation that can evacuate victims to primary health services [35]. This condition causes the travel time to get to the location to be longer [9, 38]. There is also very little possibility of repairing or rebuilding road infrastructure in a short time, especially in remote areas [43].

The time difference between the incident and the initial time of definitive health services obtained by the victim is long because the time of readiness and preparation of officers is not fast. In addition, the speed of the vehicle to take the victim from the location found to the health post was slower than that of the vehicle picking him up. To reduce this, it is important to take into account the total time required to refer the victim to the hospital. To summarize the time of the evacuation process, of course, you must choose a short route, update the function and capacity of the hospital, and always pay attention to the possibility of the victim surviving [6].

5. Conclusions

This research has succeeded in exploring and identifying constraint factors in the DVE Process. These constrain factors are divided into two categories, namely factors related to institutional support and evacuation route factors. This finding is important for eliminating all constraints to speed up the evacuation process.

This research succeeded in exploring and identifying inhibiting factors in the DVE process. These inhibiting factors are divided into two categories, namely factors related to institutional support and evacuation route factors. Nurses expressed many constraints to their DVE work. However, only matters relating to the effectiveness of the DVE process are disclosed.

The basic variables for exploring these constraints come from reference studies, including policies, work guidelines, human resource competence, vehicle condition and capacity, evacuation route conditions, hospital conditions, and capacity. Further investigation revealed several constraints in the study area, namely crowded evacuation routes by observer vehicles from outside the affected area, budget limitations, and a lack of understanding of evacuation routes and work areas.

This finding is important in ERP development because it tries to eliminate constraints found in order to speed up the DVE process. The government and stakeholders need to include a process of identifying and mapping potential constraints regularly in the ERP. In addition, this constraint factor is an important variable in developing the DVE scenario model. This scenario model includes constraint factors in DVE as a consideration in reducing the amount of DVE taken until arriving at the hospital. However, before formulating the DVE model, it is recommended to test the constrain variables that contribute to the effectiveness of the DVE process with a quantitative study.


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Ethical Clearance: The interview procedure began after obtaining ethical approval and research permission from the local health office. This research has received ethical approval from the Ethics Committee of the Faculty of Nursing, Syiah Kuala University, with Research Code Number 113008090720 of 2020.
Informed Consent Statement: The preparation process for interview participants includes submitting their willingness to become a resource via WhatsApp messages, detailed explanations about the research, and participant consent procedures. Consent as a participant was given in written form after verbal approval via WhatsApp. We also provide a detailed explanation of research procedures in accordance with health protocols during the pandemic. Researchers optimize existing teams to ensure research does not harm participants or researchers. The interview was conducted in one of the health service office rooms, which had been specially designed to follow standard health protocols during the COVID-19 pandemic.

Data Availability Statement: Data is available upon limited request.

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Conflicts of Interest: All the authors declare that there are no conflicts of interest.

References


