

**Perceived Triage Skill and Its Related Factors Among Emergency Nurses
in East Java Province, Indonesia**

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ABSTRACT

Triage skill is an essential competency required for emergency nurses. This study aimed to determine the level of triage skill perceived by emergency nurses, and to examine the relationships between triage knowledge, training experience, work experience, and their triage skill. The subjects included 266 emergency nurses working in two secondary and two tertiary government hospitals in East Java Province, Indonesia. The data were collected using a set of questionnaires including the Demographic Data Sheet, the Triage Skill Questionnaire (TSQ), and the Triage Knowledge Questionnaire (TKQ). The questionnaires were translated to the Indonesian version after being validated by three experts. Cronbach's alpha coefficient for the TSQ was .93, and the correlation coefficient for the TKQ was .99. The relationships between triage knowledge, work experience and triage skill were analyzed by Pearson product-moment correlation, except the training experience and triage skill which analyzed by Spearman Rho.

The results showed that the mean scores of triage skill and work experience were at a moderate level ($M = 75.12$, $SD = 11.23$, and $M = 59.48$,

SD = 33.81, respectively). However, the mean scores of triage knowledge and training experience were at a low level (M = 55.26, SD = 13.16, and M = 4.47, SD = 3.19, respectively). There were significant positive correlations between triage skill and triage knowledge ($r = .38, p < .01$), training experience ($r_s = .37, p < .01$), and work experience ($r = .27, p < .01$).

The findings suggested that continuing education and training courses related to triage should be proposed to improve and sustain their skill which, in turn will provide better quality of care and patient safety.

Key words: triage skill, triage knowledge, work experience, training experience, emergency nurse

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CHAPTER 1

INTRODUCTION

Background and Significance of the Problem

The emergency department (ED) of a hospital generally provides immediate care 24 hours every day. Under its care, unpredictable numbers of patients come to ED suffering from various conditions with unknown severity, urgency, and indefinite diagnosis. According to Milbrett and Halm's study (2009), the complaints of the patients coming to ED, from the most to the least common, were abdominal pain, headaches, chest pain, lower back pain, lower extremity pain, upper respiratory infection, oral pain/toothache, soft tissue injury or motor vehicle accident, upper extremity pain, shortness of breath, nausea and vomiting, pelvic pain and dizziness or syncope. However, some of those patients were often suffering from life threatening conditions, such as cardiac arrest, airway obstruction, and shock. Those conditions had to be prioritized to provide them early immediate care to save their lives.

In addition to the complexity of emergency conditions, the over crowdedness of patients visiting ED could have an impact on the quality of care by diversifying the resources intended for patients in need of emergency care to the individuals who have potentially less urgent needs (Milbrett & Halm, 2009). Emergency nurses have to maintain quality and effectiveness of care for the patients. There is consensus that triage is an essential procedure in ED as an effective system for reducing waiting time and ensuring that all patients visiting ED receive

appropriate treatment (Nuttal as cited in McNally, 1996; Bailey, Hallam & Hurst as cited in McNally).

According to Hogan and Laird (as cited in Qureshi & Veenema, 2007), ED triage is a type of triage that emergency nurses perform daily as a routine duty in ED. The goal is to identify the most severe cases who are in need of immediate care (Qureshi & Venema). ED triage is composed of primary and secondary triage decisions (Gerdtz & Bucknall, as cited in Considine, Botti, & Thomas, 2007). Primary triage decision is related to the procedures of primary assessment and allocation of patients to appropriate treatment. Secondary triage decision is related to the initiation of nursing intervention and providing comfort to the patients (Gerdtz & Bucknall, as cited in Considine et al., 2007). This study will focus on primary triage since it is the initial assessment to be performed in the ED triage room.

Primary triage in ED includes the procedures of rapid assessment, patient categorization, and patient allocation. Rapid assessment aims to quickly identify the condition of patients who are at risk of a life threatening condition and need immediate treatment (Proehl, 2007). The procedures of rapid assessment consist of assessment of responsiveness, chief complaint, airway, breathing, and circulation. Then the emergency nurses categorize the patients into three categories i.e., emergent, urgent, and non-urgent. The patients in emergent and urgent categories must be treated before the patients in the non-urgent categories (Sharma, 2005). After categorizing, the patients will be allocated to another section of ED to get appropriate treatment.

For the effectiveness of ED triage, all above procedures require the ability to make decisions accurately and in a timely manner. Therefore, emergency nurses should have triage skill to perform effectively to avoid over or under triage. The Australian Government Department of Health and Ageing (2007) mentioned that under-triage means that the patients receive a lower level of urgency that could result in a prolonged waiting time before medical intervention and thus risk an adverse outcome. In contrast, over-triage means the patients receive a higher level of urgency that could lead to some risks and effect other patients waiting in ED. Failure to sort and prioritize urgent needs of individual patients may lead to delay in treatment. The American Hospital Association conducted a survey of hospitals in April 2002 and reported the sentinel alert that of 55 cases with treatment delay, 29 cases occurred in ED, whereas 26 other cases occurred in other setting such as ICU and ICCU. In addition, from the 55 delay in treatment cases, 52 cases dead (Joint Commission on Accreditation of Healthcare Organizations [JCAHO], 2002). In Indonesia, most triage is performed by emergency nurses in collaboration with physicians. Besides, the emergency nurses in some hospitals perform triage independently. There is no information regarding the levels of triage skill of the emergency nurses.

Triage skill is an essential competency required for emergency nurses (Andersson, Omberg, & Svedlund, 2006; Gerdtz & Bucknall, 2001; Gilboy, Travers, & Wuerz, 1999). However, there are several factors relating to the triage skill of emergency nurses including triage knowledge (Andersson et al., 2006; Considine et al., 2007), training experience (Chung, 2005; Kelly & Richardson, 2001; McNally, 1996), and working experience (Andersson et al.; McNally). Other factors were also reported, such as working environment (Andersson et al.) and the personal

characteristics of the emergency nurses (Goransson, Ehrenberg, Marklund, & Ehnfors, 2006).

Regarding the above, three main factors were selected in this study according to the evidence support of their contribution. Firstly, triage knowledge is needed for emergency nurses to improve their clinical practice and skills to ensure a high standard of emergency care and positive patient outcomes (Considine & Hood, 2000). There are three types of knowledge in decision making for nurses, including factual knowledge, procedural knowledge, and conceptual knowledge (Patel, Kaufman, & Arocha, 2002). Factual knowledge is knowledge about a fact or set of facts without broad understanding. Procedural knowledge is a kind of knowing related to how to perform actions in many activities. Conceptual knowledge involves the integration of new information with previous knowledge and needs a deeper level of understanding (Patel et al., 2002). However, there is controversy regarding the relationship between factual knowledge and triage decisions. Considine et al. (2007) reviewed eight studies related to triage decisions. It was found from three studies that factual knowledge had a positive relationship with triage decisions. In contrast, a study by Considine, Ung, and Thomas (as cited in Considine et al.) found no correlation between the accuracy of triage decisions and factual knowledge.

Secondly, training experience can improve the nurses' triage skill in identifying the patient's scale of urgency, diagnosing the patient, and providing emergency nursing intervention in ED (Chung, 2005). To be skillful in triage, emergency nurses are required to participate in training programs regarding triage and related topics such as basic cardiac life support (BCLS), advanced cardiac life support (ACLS), basic traumatic life support (BTLS), advanced traumatic life support (ATLS), triage

courses, ambulance protocol, etc. Moreover, training programs should provide a variety of experience such as demonstrations and return demonstrations, scenario practice, clinical practice, and so on. They should attend training refresher courses every one to three years as evidence or guidelines might be revised every one to three years (Black & Davies, 2005). Therefore, this study examined the training experience in the past three years.

Thirdly, the previous experiences in ED have made the nurses familiar with actual situations (Andersson et al., 2006). There are three criteria for experience based on Watson (as cited in Considine et al., 2007) including: 1) the passage of time, 2) gaining skills or knowledge, and 3) exposure to an event. Therefore, the working experience in this study refers to the duration of work time as emergency nurses. The Emergency Nurses Association (as cited in Bracken, 2003) recommended that ED triage should be performed by nurses with a minimum of six months of emergency nursing. However, there is also controversy in the relationship between working experience and triage decisions. Ferrario (2003) found that nurses who had either less experience or more experience possessed similar triage decision making when they performed. In addition, the previous five studies reviewed by Considine et al. found that there was no significant relationship between experience and triage decision making skills.

In Indonesia, each province has 1-2 tertiary and 6-8 secondary government hospitals that provide emergency services to patients 24 hours a day. The situation in ED of these hospitals is overcrowded with patients coming in with both traumatic and non traumatic illnesses. At the forefront of ED, 1-2 emergency nurses with or without a physician take on the role of triage decision making. According to

the study by Wardhani (2001) it was found that at one hospital in East Java province, the mortality rate in the ED was 26.4%. Since every hospital in Indonesia concerns itself with patient safety issues and a high quality of care, it is necessary to examine an emergency nurse's triage skill and related factors. The study findings were expected to provide useful information to improve triage skill among emergency nurses in the context of Indonesia.

Objectives of the Study

The objectives of this study were:

1. To determine the level of triage skill perceived by emergency nurses in East Java province, Indonesia.
2. To examine the relationships between triage knowledge, training experience, working experience and triage skill among emergency nurses in East Java province, Indonesia.

Research Questions

There are two research questions including:

1. What is the level of triage skill perceived by emergency nurses in East Java province, Indonesia?
2. Are there any relationships between triage knowledge, training experience, and working experience on triage skill among emergency nurses in East Java province, Indonesia?

Conceptual Framework

The conceptual framework of this study was constructed based on the synthesis and integration of literature review in the area of emergency nursing. Triage skill in ED is the performance of emergency nurses using decision-making capabilities to prioritize patients into the right categories within a limited space of time (Andersson et al., 2006; Gerdtz & Bucknall, 2001; Gilboy, 2005). Triage skill includes rapid assessment, patient categorization, and patient allocation (Bracken, 2003; Gilboy; Zimmerman & Herr, 2006; Gilboy, & Travers, 2007).

Three main factors related to triage skill including triage knowledge, training experience, and working experience were focused on in this study. Triage knowledge was examined in terms of factual knowledge and procedural knowledge, which are essential as basic areas of knowledge for emergency nurses to perform triage effectively (Patel et al., 2002). Factual knowledge is knowledge about a fact or set of facts without broad understanding such as anatomy, physiology, pathophysiology, and common illnesses of patients visiting ED. Procedural knowledge is a kind of knowing related to how to perform actions in many activities such as nursing techniques used in primary triage. The training experiences can improve the nurses' triage skill for identifying a patient's scale of urgency, diagnosing the patient, and providing emergency nursing intervention in ED (Chung, 2005). To be skillful in triage, the emergency nurses are required to participate in training programs regarding triage and related topics, and should take refresher courses every one to three years. Working experience refers to the period of time working as emergency nurses. Figure 1 presents the conceptual framework of this study. The

factors related to triage skill are the level of triage knowledge, training experience, and working experience.

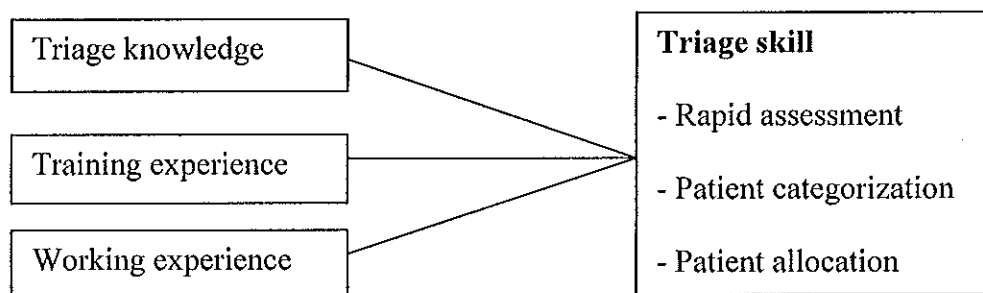


Figure 1 *Conceptual Framework of the Study*

Research Hypotheses

1. There is a positive relationship between triage knowledge and triage skill of emergency nurses.
2. There is a positive relationship between training experience and triage skill of emergency nurses.
3. There is a positive relationship between working experience and triage skill of emergency nurses.

Definition of Terms

Triage skill referred to the level of nurses' perception of their ability in making decisions accurately and in a timely manner in the following areas: 1) rapid assessment, 2) patient categorization, and 3) patient allocation. It was measured by the Triage Skill Questionnaire (TSQ) developed based on the literature review.

Triage knowledge referred to the level of factual and procedural knowledge required for emergency nurses to perform rapid assessment, patient

categorization, and patient allocation. It was measured by the Triage Knowledge Questionnaire (TKQ) developed based on the literature review.

Training experience referred to the numbers of times and the types of previous training in triage and related topics in the past three years, such as attending short courses, workshops, etc. It was measured by using the training index.

Working experience referred to the numbers of months working as emergency nurses.

Scope of the Study

This descriptive research aimed to examine the level of triage skill of the emergency nurses working in emergency departments of four government hospitals in East Java province, Indonesia during January and February 2010.

Significance of the Study

The findings of this study provide useful information to recognize the role of emergency nurses in performing triage with knowledge and skill. The knowledge gained from this study would be beneficial for improving the triage skill of emergency nurses in Indonesia.

CHAPTER 2

LITERATURE REVIEW

This study aimed to determine the level of triage skill of emergency nurses and examine factors related to triage skill. Related literature were reviewed and presented sequentially as follows:

1. Overview of emergency care
 - 1.1 Emergency department
 - 1.2 Emergency care
2. Triage
 - 2.1 Triage concept
 - 2.2 Triage skill of emergency nurses
3. Factors related to triage skill development of emergency nurses
 - 3.1 Triage knowledge
 - 3.2 Training experience
 - 3.3 Working experience
 - 3.4 Other factors

Summary

Overview of Emergency Care

Emergency department

Emergency department (ED) is a dynamic setting in a hospital with a

high number of severe cases, who come to ED needing immediate care. Emergency nurses in ED have to provide a high level of emergency care 24 hours a day (Oktay & Kilicaslan, 2009). The availability of ED on weekends, after hours, holidays, and with no appointment or cash requirement, makes it a more likely treatment choice for many patients (Burch & Kozeny, 2003). Therefore, emergency nurses should be able to confront dynamic situations, such as: 1) unexpected conditions that need immediate intervention, 2) allocation of limited resources, 3) need for urgent care, 4) geographic factors, 5) unpredictable numbers of patients, 6) unknown patient severity, urgency, and identification, and 7) cultural and language problems (MacPhail, 2003).

ED services are not only a receiving center for critically ill and injured patients, but also a 24-hour shelter for people who are frightened and have no caring unit to visit (MacPhail, 2003). Patients come to ED with critical conditions, such as cardiac arrest, airway obstruction, respiratory failure, shock, anaphylaxis, or metabolic disorders associated with an acute life-threatening event that needs essential assessment and immediate care (Cosby et al., 2008). However, the clinical problems of patients coming to ED consist of different problems requiring classification (Williams & Crouch, 2006). Cunningham (as cited in Milbrett & Halm, 2009) mentioned that one third of emergency visits have been classified as non-urgent or semi-urgent. According to a study by Milbrett and Halm the top chief complaints of patients visiting ED were abdominal pain, headaches, chest pain, lower back pain, lower extremity pain, upper respiratory infection, oral pain/toothache, soft tissue injury or motor vehicle accident, upper extremity pain, shortness of breath, nausea and vomiting, pelvic pain, and dizziness/syncope.

The high utilization of services provided by ED contributes to overcrowding which can have an impact on the quality of care, in terms of diverting the resources intended for patients in real need of emergency care to individuals who have potentially less urgent need of emergency care (Milbrett & Halm, 2009). ED has to maintain quality and effective care of patients, whereas the facilities and staff are limited. ED visits by patients has steadily increased over the last decade, which has led to an increase in hospital admissions and patient overload within ED (McNally, 1996). The data in the U.S. illustrated that between 1993 and 2003 patients' visits to ED had increased 26%, approximately 114 million per year (McCaig, as cited in Millbrett & Halm). Failure to sort and prioritize urgent needs of individual patients may lead to delay in treatment. The American Hospital Association conducted a survey of hospitals in April 2002 and reported the sentinel alert that of 55 cases with treatment delay, 29 cases occurred in ED, whereas 26 other cases occurred in other setting such as ICU and ICCU. In addition, from the 55 delay in treatment cases, 52 cases dead which may impact to quality of care and patient safety (JCAHO, 2002).

In Indonesia, East Java province has 2 tertiary and 8 secondary government hospitals which provide emergency services 24 hours every day. Each tertiary hospital serves 800 admitted patients. As type-A hospitals, the tertiary hospitals functions as referral hospital from district hospitals. Consequently, approximately 50-100 cases per shift come to ED in the tertiary hospital,. Each secondary hospital serves 600 admitted patients. As type-B hospitals, the secondary hospitals receive patients referred from community health centers. Each secondary hospital ED is also overcrowded, with approximately 25-40 cases per shift. However, the most common cases coming to both tertiary and secondary EDs are similar. They

are patients with traumatic brain injury, multiple trauma, cardiovascular disease, diarrhea, diabetic coma, asthma attacks, fractures, dengue hemorrhagic fever, renal failure, and hepatic failure.

The tertiary government hospital ED is divided into four parts, including the triage room, critical/resuscitation room, observation room and operating theatre. Although there are 25-40 emergency nurses per shift, they are assigned to work in several areas. Only 2-3 emergency nurses work in the triage room. Some hospitals have physicians working with the triage nurses. There are 6-7 emergency nurses per shift in the secondary hospital ED. A general physician and a nurse work in the secondary hospital triage room.

Emergency care

Emergency nurses at the forefront of ED have to provide high quality care to the patients who need emergency care (Almeida, 2004). Emergency nursing is commonly known as a specialty area in nursing and has triage nursing as a subspecialty skill (Ritchie, Crafter, & Little, 2002). The most vital role of triage nurses in conducting their work is to make a correct triage prioritization within a limited time in ED, to perform effective triage. (Andersson et al., 2006). The role of emergency nurses is to have responsibility in ensuring patient safety, managing patient flow and directing medical resources (Fry & Burr, 2002). In general, the initial assessment in ED must be provided by starting with airway, breathing, and circulation (ABC), providing immediate treatment for identified threats to ABC, and allocate the patient to the appropriate treatment area (Bracken, 2003).

In Indonesia, the role of emergency nurses at the forefront of ED is to assess and prioritize the patients' need who come with various conditions. However, most emergency nurses have finished their diploma in nursing. They focus on asking chief complaints, and measuring vital signs in order to assess airway, breathing, and circulation. In the tertiary government hospital, there are specialist physicians in ED, especially in surgical and internal medicine. In the secondary government hospitals, there is a physician in ED. The specialist physicians are on call. Thus, the physicians of both tertiary and secondary hospital take on the role of emergency management such as opening airways, intubation, defibrillation, resuscitation, and minor surgery. The emergency nurses work as assistants for example administering intravenous fluid and medication, stopping bleeding, monitoring vital signs, and observing signs and symptoms.

Triage

The first entry point when the patient comes to ED is the triage room (Whitby, Ieraci, Jhonson, & Mohsin, as cited in Considine et al., 2007). In other words, triage is the gateway to ED (McNally, 1996). Triage is used worldwide to manage patient flow with safety when the patients needs service (Marsden, 2008). In this situation, emergency nurses in triage have a crucial role in the effective running of ED. In effective triage services, patient flow passes through the emergency care system while ensuring that those with greatest need receive immediate treatment (Gilboy, 2005). In ED in Australia, the triage room is the first point where patient assessment takes place and skilled emergency nurses have responsibility taking care

of the emergency patients (Considine, Ung, and Thomas, as cited in Considine et al.). Also in Indonesia, physicians and ED nurses perform triage as the initial service when the patients that need immediate care come to ED.

Triage concept

Definition of triage

Triage is the process of sorting and categorizing patients based on the sickest patient as priority (Handysides, as cited in Andersson, Omberg, & Svedlund, 2006). It had been used since the early 1960s when there was a requirement for emergency services to provide emergency care to the patients (Bracken, 2003). Nowadays, triage is a sub specialization in emergency nursing (Shields, as cited in Fry & Burr, 2002).

Types of triage

According to Hogan and Lairet (as cited in Qureshi and Veenema, 2007) there are five types of triage consisting of ED triage, incident triage, disaster triage, tactical military triage, and specific condition triage. The ED triage is the type that emergency nurses perform daily as a routine duty in ED. The goal of this triage is to identify the sickest of patients in order to assess and provide treatment to them first. The incident triage occurs when an emergency department is the type that has a large of number of patients and the emergency nurses provide care for all patients using additional resources (on-call staff). The disaster triage is the type when disaster occurs the local emergency services are overwhelmed to the point that immediate care cannot be provided to every person who needs treatment. The tactical triage is the type used only in military systems, for triage and transport decisions when soldier are on the battlefield. The specific condition triage is used when patients suffering from an

incident concerning weapons of mass destruction such as radiation, or biological or chemical contaminants (Hogan & Lairet, as cited in Qureshi & Veenema, 2007).

The goals of ED triage

Triage is a vital element when caring safely for ED patients. According to Gilboy (2005), triage involves the rapid sorting of patients who visit ED to decide whether the patients need immediate intervention. It is aimed at sorting the patients into the right categories at the right moment for the right rationale. Moreover, the triage process categorizes the patients into those who require immediate care and those who can wait for treatment (Bracken, 2003). Therefore, several goals of triage are: 1) rapid assessment, 2) patient categories, 3) assignment to correct area of care, 4) allocation of the patient, 5) initiation of diagnostic measures, 6) initiation of emergency care, and 7) health education (Jones, as cited in Jones, Endacott, & Crouch, 2003).

ED triage systems

The ED triage systems are typically designed to identify the most urgent (or potentially the sickest) cases to ensure that they receive priority treatment, followed by the less urgent cases on a first-come, first-served basis. In routine ED triage, resources are available to treat every patient, although those who are less severely ill or injured must wait longer (Iserson & Moskop, 2007).

There are several triage acuity severity rating systems (MacLean, as cited in Gilboy, 2005). Two-level triage rating system refers to categorizing patients simply as sick or not sick. The sick patients are those who are in need of urgent care because of some life threatening condition and not sick patients are those patients

whose conditions do not require immediate care and who will not be compromised if care is delayed (Gilboy).

Three-level triage rating system refers to categorization of patients into three levels. Historically, it is the most widely used system in various hospitals worldwide. Firstly, an emergent case, which requires immediate care. Patients in this category have a life threatening condition. Secondly, there are urgent cases, which require prompt care; and then non urgent cases in which the patient is not in a critical condition and can wait safely (Gilboy, 2005). The four level triage rating system includes categories, such as life threatening, emergent, urgent, and non-urgent (Gilboy). Five level triage rating systems are currently recommended as the standard by the Emergency Nurses Association [ENA] and American College of Emergency Physicians [ACEP] (Gilboy).

The three level triage systems are used particularly in ED departments of Indonesian hospitals. As a developing country, for Indonesia it is difficult to develop a four and five level triage system because of inadequate facilities and lack of human resources in ED.

Triage skill of emergency nurses

Triage skill is the performance of emergency nurses using decision-making capabilities to prioritize patients into the right categories within a limited space of time (Andersson et al., 2006; Gerdtz & Bucknall, 2001; Gilboy, 2005). The allocation of an acuity rating has implications to the patients' waiting time and treatment in the ED. If emergency nurses perform triage accurately and timely. It will lead to effective patient safety (Goransson, Ehrenberg, Marklund, & Ehnfors, 2005).

Therefore, emergency nurses need to be skillful in triage. According to previous studies, an emergency nurse is expected to assess every patient entering ED within two to five minutes of arrival (ENA, as cited in Gilboy, 2005). However, Travers (1999) mentioned that two minutes standard time led to accuracy in triage only with 22% of the patients, and the time range was from 0.5 to 11.1 minutes for the rest of the patients.

The ED Triage can be divided into primary triage decisions and secondary triage decisions (Gerdtz & Bucknall, as cited in Considine et al., 2007). Primary triage decision is related to triage assessment, patient categorization, and allocating the patients for advanced treatment. Secondary triage decision is related to initiation of nursing intervention, and provides comfort to the patients (Gerdtz & Bucknall, as cited in Considine et al). In this study, the researcher will focus only on the primary triage decision as the basic triage of emergency nurses.

The primary triage includes rapid assessment, patient categorization, and patient allocation in triage with accuracy and timeliness when performing this skill.

1. Rapid assessment. The goals of the triage process are to collect data from the patients for categories who need immediate treatment in ED and to provide support information from the patient and relatives. Use of the triage process provides the essential protocol in ED to approach all patients (Bracken, 2003). Therefore, triage nurses should have an ability to take an accurate patient history, conduct a brief physical assessment, and rapidly determine clinical urgency, which are crucial to the provision of safe and efficient emergency care (Travers, 1999).

The assessment in triage is defined as rapid systemic collection of data relevant to each patient (ENA, as cited in Bracken, 2003). The goal of the rapid assessment is to quickly identify the condition of patients with life threatening risks who need immediate treatment (Proehl, 2007). Triage, as stated earlier, should be a rapid, relatively superficial assessment taking no longer than a few minutes. Its purpose is to elicit information from the patient in order to determine their present problem. (Marsden, 2008). Simple Triage and Rapid Treatment (START) system technique involves the assessment of the parameters of respiration, perfusion, and mental state (Super, Groth & Hook, as cited in Gebhart & Pence, 2007).

Rapid assessment has to be conducted for all patients visiting ED, regardless of a patient's initial problem, to make sure that the risk of life threatening conditions are identified and to get immediate treatment. The focus of rapid assessment is the ABC (airway, breathing, and circulation) to determine life threatening patient condition and appropriate intervention (Lombardo, 2003). The ABC guideline for emergency nurses is used in rapid assessment (Sedlak, 2003). A is clear airway, B is normal breathing, and C is good circulation. The expectations are all essential for life. Emergency nurses must have practice assessing ABC integratively and simultaneously, first A, then B, and then C (Jones, Endacott, & Crouch, 2003).

The procedural ABC in rapid assessment is to look, listen, and feel for 10 seconds. In order to look emergency nurses investigate and check as follows: 1) look in the upper airway for blood, vomit, foreign bodies, edema, and tongue obstruction, 2) look at the chest for chest movement, rate and depth of respirations, use of necessary accessory muscles, symmetrical or asymmetrical breathing pattern,

and 3) look at the skin to investigate for integrity, wounds, texture, and color. When listening emergency nurses investigate 1) listen for sounds in the airway such as gurgling, snoring, and wheezing and 2) listen for silent or noisy breathing. When feeling emergency nurses feel for air blow from the patient mouth or nose with nurses cheek and major pulses, rate, volume and rhythm (Jones et al., 2003).

The first step in rapid assessment, airway (A) assessment is performed to identify a patient's problems with airway, and to eliminate any airway obstruction. In order to maintain patency, the emergency nurse can insert oropharyngeal or nasopharyngeal tube airway, and protect the patient with a cervical collar for suspected cervical spine injury. (Sedlak, 2003). Emergency nurses should know, when clearing the airway by correct positioning such as chin lift, jaw thrust with or without head tilt if the patient has suspected cervical spinal injury (Jones et al., 2003). The second step, breathing (B) assessment is conducted to find out the occurrence and effectiveness of respiratory works and to identify others problems in breathing. The emergency nurse can give interventions to help the patient, such as administering oxygen therapy, manual ventilation, or bag-valve-mask ventilations (Sedlak, 2003). The third step, circulation (C) assessment is conducted to evaluate pulsation and quality, character, assessment of the capillary refill, skin color and temperature, and assess the patient with diaphoresis. Emergency nurses can initiate chest compressions, together with administration of emergency drugs, or give resuscitation with an appropriate intravenous fluid; and control blood loss (Sedlak, 2003).

2. Patient categorization. After combining the information collected from rapid assessment, the emergency nurse uses a triage acuity rating system, to categorize the patient (Gilboy & Travers, 2007). Patients are assigned into one of four

triage categories, which are as follows: 1) immediate priority (red) with intervention to save from a life threatening illness/injury; 2) delayed priority (yellow) is serious but not a life-threatening illness/injury; 3) minor priority (green) for walking injured, and 4) low priority/deceased (black) is dead or expected to die (Gebhart & Pence, 2007).

To categorize patients appropriately, the Australian Government's Department of Health and Ageing (2007) mentioned that there are three possible patient outcomes in triage categories:

1. Under-triage means the patient in ED receives a triage decision that is lower than the triage level of urgency. This category can impact in a prolonged waiting time to medical intervention for the patient and risks an adverse outcome.

2. Correct (or expected) triage means the patient in ED receives a triage decision that is right with his triage level of urgency. This category optimizes the time to intervention for the patient and limits the risk of a difficult outcome.

3. Over-triage means the patient in ED receives a triage decision that is higher than triage level of urgency. This category can impact a shortened waiting time to intervention for the patient; however, it risks in a difficult outcome for the other patients waiting in ED.

To avoid under-triage which compromises patient safety, and over-triage which exhausts ED resources too early, triage decisions must be as accurate as possible (Fernandes et al., 2005).

3. Patient allocation. After categorizing, the patients will be allocated to another area in ED to receive more advanced treatment to get resuscitation and medication. According to Handysides (as cited in Bracken, 2003), the allocation

process in triage to reduce the waiting time, and be cost effective in ED. Moreover, the allocation patients based on triage scale acuity ratings has significant implications for the patients' waiting time and treatment in the ED. Emergency nurses have responsibility to allocate the patients safely and effectively (Goransson et al., 2005).

It is concluded from previous studies that triage skill is essential for emergency nurses to provide a high quality of care. Triage skill in primary triage consists of rapid assessment, patient categorization, and patient allocation. Emergency nurses must perform in an accurate and timely manner to avoid over-triage and under-triage that can affect patient safety.

Factors Related to Triage Skill Development of Emergency Nurses

Based on the literature review from previous studies there are several factors related to triage skill development of emergency nurses including triage knowledge (Andersson et al., 2006; Considine et al., 2007), training experience (Chung, 2005; Kelly & Richardson, 2001; McNally, 1996), Other factors were also reported, such as working environment (Andersson et al.) and the personal characteristics of the emergency nurses (Goransson et al., 2006). The factors related to triage skill have been outlined as follows:

Triage knowledge

Triage knowledge is needed for emergency nurses to improve their clinical practice and skill in triage to ensure a high standard of emergency care and positive patient outcomes (Considine & Hood, 2000). Therefore, nurses consider

triage knowledge as important to implement during prioritization of the sickest patient. Triage knowledge is required to develop triage skill in emergency nurses (Andersson et al., 2006). Triage knowledge is important in triage skill because factual knowledge can influence nurses to make triage decision accurately. (Considine et al., 2007). There are three types of knowledge in decision making such as: procedural knowledge, factual knowledge, and conceptual knowledge (Patel et al., 2002). Factual knowledge is knowledge about a fact or set of facts (Patel et al.). Emergency nurses should have factual knowledge for triage such as human anatomy, physiology, and pathophysiology and special knowledge such as common illnesses in ED and related topics of triage (Gilboy & Travers, 2007). Procedural knowledge is a kind of knowing related to how to perform actions in many activities (Patel et al.). Decision making in clinical guidelines is the result of procedural knowledge. The acquisition of conceptual knowledge involves the integration of new information with previous knowledge and needs a deeper level of understanding (Patel et al.).

Emergency nurses have to conduct a variety of cognitive processes for clinical assessment of the patients in emergency. This assessment is made on the basis of knowledge and formal education of the nurse. Triage assessment is made on the basis of knowledge during emergency care. The performance of triage skill in the effective manner needs knowledge about conducting triage (Harris & Hendricks, 1996). Therefore, in order to determine patients who need to be assessed immediately and who can wait safely, the emergency nurses need knowledge for conducting triage in ED (Gilboy, 2005).

However, there is a controversy regarding the relationship between factual knowledge and triage decisions. Considine et al. (2007) reviewed four studies

that examined the effect of factual knowledge on triage decisions. Three studies found that factual knowledge has a relationship with triage decisions in triage skill. On the other hand, the study of Considine, Ung, & Thomas (as cited in Considine et al., 2007) showed no correlation between accuracy in triage decisions and knowledge.

Training experience

The clinical competence of a triage nurse can be improved by theoretical and practical training (Atack, Rankin, & Then, 2005; Considine & Hood, 2000). Wolf (2008) found that training in triage is useful and it can enhance the confidence level of the nurse's triage skill. Therefore, training can improve the triage nurses' skills to identify the patient's scale of urgency, assign the patient a diagnosis, and coordinate with emergency nursing in ED (Chung, 2005). Forsgren, Forsman, and Carlstrom (2009) suggested that regular triage training contributes to improved skills in the nurses to handle stressful work situations. The learning-teaching process of training involves activities such as formal courses, lectures, study days, workshops, demonstrations, scenario practice, self directed learning, etc. (ACEM, as cited in Kelly & Richardson, 2001). A survey study found that the emergency nurse required special training (i.e., triage course, advanced cardiac life support, assessment, certification in emergency nursing, extended orientation) to improve their triage skill (Purnell, as cited in Bracken, 2003). In Australia, emergency nurses should have training before they perform triage skill in ED. The benefits of a training course in triage skill helps the nurse to conduct consistent triage and this results in better patient outcomes due to reduced triage errors in ED (Kelly & Richardson). Moreover, studies of a clinical nurse educator in Victorian ED in Australia showed that the skill to perform triage was proved to be dependent on the nurses training of Basic Life

Support (BLS) and Advance Cardiac Life Support (ACLS) (Considine & Hood, 2000). The duration of training in emergency department from two or three days for basic emergency and one month to three months training for advanced training. There should be training refresher sessions every 1-3 years due to the periodic revision of evidence or guidelines (Black & Davies, 2005). Therefore, this study examines training experience in the past three years.

Working experience

The triage process requires the skill of an experienced emergency nurse (Bracken, 2003). The term "experience" is used generally in nursing and is also used to define the nurse's skill experience in caring for sick patients (Watson, as cited in Considine et al., 2007). There are three criteria for experience based on Watson (as cited in Considine et al.) including: 1) the passage of time, 2) gaining skill or knowledge, and 3) exposure to an event. The essential criteria for an effective triage are to possess emergency nursing experience and skill in rapid assessment and correct determination of patient urgency (Bracken, 2003). Moreover, McNally (1996) identified that the nurses develop triage skill through clinical experience and some of them had long-time experience of work in an ED. Experienced nurses provide a sense of safekeeping to the triage team and the less experienced nurses look for more advice and support while making their prioritization. Previous experience in ED might have made the nurse familiar with the actual situation (Andersson et al., 2006).

Ferrario (2003) found that less experienced and more experienced triage nurse's decision to be the same when they performed triage. In particular, clinical nursing experience should not be seen as a greater standard for triage assignment (Goransson, Ehnfors, Fonteyn, & Ehrenberg, 2007). In addition,

Considine et al. (2007) reviewed five studies in which they examined the effect of triage nurse experience on triage decisions and found that there is no significant relationship between the experience and improved triage decision making in triage skill. However, the Emergency Nurses Association (as cited in Bracken, 2003) recommended that triage should be performed by emergency nurses having a minimum of six months emergency nursing experience.

Other factors

Some internal and external factors may be related to triage skill. The internal factors were personal factors. Personal capacity consisted of courage, confidence and rationality when performing triage (Andersson et al., 2006). According to the study by Goransson et al. (2006) who examined links between internal personal characteristics of nurses such as age, gender, and personal behavior with their triage skill abilities. It was shown that there was low significant relationship between these factors and triage skill. The external factors in ED were work environment such as workload and work assignment. (Andersson et al.). However, the different cultural context of working environment, policy, and workload in another cultural context may affect triage skill. Therefore, these factors were included in the study data for further explanation and comparison to previous studies.

Summary

Based on the literature review, it can be concluded that triage skill is essential for emergency nurses. The emergency nurses must have triage skill to take care of patients in ED effectively. Triage skill includes rapid assessment, patient categorization, and patient allocation. The main factors related to triage skill consist of triage knowledge, training experience, and working experience, are focused on in this study.

In Indonesia, the ED in the hospital is overcrowded. The most common cases of patients going to the ED for triage are traumatic brain injury, multiple trauma, cardiovascular disease, diarrhea, diabetic coma, asthma attack, fracture, dengue hemorrhagic fever, renal failure, and hepatic failure. There are two to three emergency nurses per shift in the triage room. Most emergency nurses hold diplomas in nursing. Their experience in working at ED range from six months to five years. They have attended several training courses on emergency, such as BLS, ACLS, BTLS, Ambulance, and a few have attended triage training programs conducted every year. There is no study exploring triage skill among nurses working in ED in Indonesia. In addition, there are some controversies in the relationship between the three main factors namely knowledge, training experience, working experience, and triage skill. The study is therefore required to examine the level of triage skill and further exploration of the relationship between those variables among emergency nurses in Indonesia.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter consists of the design of the study, population and setting, sample, instrumentation, data collection, and data analysis.

Research Design

This research study is a descriptive correlation study. A cross-sectional design was used to examine data from January to February 2010 in four government hospitals in East Java, Indonesia.

Population and Setting

The population of this study consisted of emergency nurses working at emergency department (ED) in East Java province, Indonesia. There are four tertiary hospitals and 15 secondary hospitals in Java province. The tertiary hospitals consist of two government hospitals and two private hospitals. The secondary hospitals consist of eight government hospitals and seven private hospitals. The target populations in this study were nurses working in ED in tertiary and secondary government hospitals. The government hospitals were selected in this study for the target setting based on the following reasons:

1. The government hospital provides public emergency services as referral hospitals for the eastern area of Indonesia.
2. The ratio of patients to nurses and physicians of government hospital is higher than private hospital.
3. The working environment of government hospitals is different from that of private hospitals.

Sample and Sampling

Two tertiary and two secondary government hospitals in East Java province were conveniently selected for this study. There were 306 nurses working in the emergency departments of these hospitals. However, two-hundred sixty six (266) emergency nurses having a nursing education background with at least a diploma in nursing participated in this study.

Instrumentation

This study used self-report questionnaires for data collection. The questionnaires developed by the researcher based on the literature review, consisted of: 1) Demographic Data Sheet (DDS), 2) Triage Skill Questionnaire (TSQ), and 3) Triage Knowledge Questionnaire (TKQ).

Demographic Data Sheet (DDS)

The Demographic Data Sheet (DDS) included age, gender, educational level, training experience related to triage, and work experience (Appendix B).

Training experience in the past three years was interpreted using training index with the formula: number of training x number of times. The higher score reflected the higher training experience. Work experience was calculated using months of working as emergency nurses. The greater the number of months of work experience reflected greater experience.

Triage Skill Questionnaire (TSQ)

The TSQ was developed based on the literature review to measure nurses' perception of their ability in making accurately and timely decisions in the following areas of triage: 1) rapid assessment, 2) patient categorization, and 3) patient allocation (Appendix C). It was a 37-item questionnaire with three dimensions including rapid assessment (item 1-27), patient categorization (28-34), and patient allocation (35-37). Subjects were asked to respond to each item using the following 1-5 rating scale: 1 = need improvement, 2 = poor, 3 = fair, 4 = good, and 5 = very good. The possible range of the total score of triage skill was 37-185. The total score was converted to percentage. Using the criterion-reference, the following scores were interpreted as follows: < 60% = low level of triage skill, 60-80% = moderate level of triage skill, and > 80% = high level of triage skill.

Triage Knowledge Questionnaire (TKQ)

The TKQ developed by the researcher was used to measure triage knowledge of emergency nurses. It consisted of 35 multiple-choice questions (MCQ). Each question has four choices. The correct answer for each item was scored 1 and an

incorrect answer was scored 0. The higher scores indicated the better knowledge. The possible total score range of triage knowledge was 0-35. The total score was converted to percentage. Using the criterion-reference similar to the TSQ, a total score of less than 60% was a low level of knowledge, 60-80 % was a moderate level of knowledge and more than 80% was a high level of knowledge.

Psychometric properties of the instruments

Validity of the Instruments. The content validity of the questionnaires was evaluated by three experts. Two experts were the instructors at the Faculty of Nursing and Faculty of Medicine, Prince of Songkla University, Thailand, who had expertise in emergency nursing and emergency medicine. The third was an instructor from Indonesia, who had expertise in emergency medicine. After all experts validated the instruments, then the questionnaires were modified in accordance with recommendations by experts.

Reliability of the instruments. The pilot project was conducted with 20 subjects to test the reliability of the instruments. The TSQ was tested for internal consistency yielding Cronbach's alpha coefficient of .93. The TKQ was tested using the test-retest method, with three days time elapse to ensure the stability of the instrument. The test-retest reliability coefficient of TKQ was achieved at .99.

Translation of the instruments

The instruments of this study were translated by back translation method using two bilingual translators from the Nursing Science Program, Brawijaya University Malang Indonesia. The first translator translated the English instruments into the Indonesian language. The second translator translated the Indonesian version

back into the English version. Finally, the researcher identified the consensus from the two translations of the Indonesian version of the instruments.

Data Collection

Data were collected after obtaining approval from the Institutional Review Board (IRB) of the Faculty of Nursing, Prince of Songkla University and the directors of the four selected hospitals.

1. The researcher met the head nurses in ED to explain the purpose of the study.
2. The researcher was introduced by the head ED nurse of each hospital to the ED nurses in order to explain the purpose, benefits, and ethical consideration of this study.
3. The subjects who agreed to participate in this study were requested to sign a consent form.
4. A set of questionnaires was left one week for them to complete. The questionnaires were returned with help from the ED head nurse.
5. The researcher checked the completeness of each questionnaire.
6. The researcher observed and discussed environment of each ED with the head ED nurse.

Ethical Consideration

The research approval was obtained from the Institutional Review Board (IRB) of the Faculty of Nursing, Prince of Songkla University. Permission from the directors of the four hospitals was also granted. In addition, the researcher obtained ethical clearance from the Ethical Committee of Medical Research, Faculty of Medicine, Brawijaya University. The researcher explained the purpose and benefits of the study. Potential subjects who agreed to participate in this study were requested to sign the consent form. The subjects were informed about their right to withdraw at any time from this study for any reason without any fear or negative consequences. The researcher maintained the anonymity of the subjects by using code and all of the information was kept confidential.

Data Analysis

Data were analyzed by using a computer analysis program. The following statistical procedures were performed:

1. The characteristics of subjects, training experience, work experience, triage knowledge, and triage skill scores were analyzed by using frequency, percentage, range, mean, and standard deviation.
2. Data on training experience, work experience, triage knowledge, and triage skill were tested for normal distribution and linearity.
3. Pearson product-moment correlation coefficient was applied to analyze the relationships between the level of triage knowledge, working experience,

and triage skill. Spearman Rho was applied to analyze the relationship between training experience and triage skill because the training experience score was not normal distribution.

CHAPTER 4

RESULTS AND DISCUSSIONS

This study aimed to determine the level of triage skill perceived by emergency nurses in East Java province, Indonesia and to examine the relationships between triage knowledge, training experience, working experience and the nurses' triage skill. This chapter also presents and discusses the research findings as follows: the demographic data, the level of triage knowledge, training experience, working experience, and triage skill.

Results

Demographic characteristics

Table 1 presents the demographic characteristics of the subjects. The sample consisted of 266 emergency nurses. The majority (71.40%) were female, with a mean age of 33.37 years ($SD = 7.54$). Most of the subjects (94.40%) had a diploma in nursing. The rest (5.60%) had finished their Bachelor's degree in nursing. Three quarters of the subjects (75.60%) were working in tertiary government hospitals; the rest (24.40%) were working in secondary government hospitals.

Table 1

Frequency and Percentage of Subjects Classified by Demographic Characteristics
(N=266)

Demographic Characteristics	Frequency	Percentage
Gender		
Female	190	71.40
Male	76	28.60
Age (years) (Min-Max = 22 – 53, M = 33.37, SD = 7.54)		
20-30	108	40.60
31 – 40	103	38.70
> 40	55	20.70
Educational background		
Diploma in Nursing	251	94.40
Bachelor in Nursing	15	5.60
Level of hospital		
Hospital A (tertiary hospital)	150	56.40
Hospital B (tertiary hospital)	51	19.20
Hospital C (secondary hospital)	35	13.20
Hospital D (secondary hospital)	30	11.20

The total numbers of emergency nurses from each hospital was 176, 64, 35 and 31 respectively. Regarding the tertiary hospitals (Hospital A and B), there were 25 – 40 emergency nurses per shift. Two or three of those nurses rotated to work in the triage room, in which the ratio of triage nurses to patients was 1: 30-40. In Hospital A, a physician was in the triage room; whereas there was none in Hospital B. Approximately 50 – 100 cases per shift were both traumatic and non traumatic problems being treated at ED. The most common trauma cases from the most to the least were traumatic brain injury, urinary tract injuries, open wounds of extremities, maxillofacial injuries, fracture of clavicle, and multiple organ injuries. The most

common non-traumatic cases from the most to the least were diarrhea, acute pharyngitis, acute upper respiratory infection, fever, dyspepsia, severe hypertension, stroke, spontaneous vertex delivery, asthma, gastritis, gastroenteritis, measles, renal failure, and DHF.

In the secondary hospitals (Hospitals C and D), there were 6-7 emergency nurses per shift. A general physician and a nurse had responsibility in the triage room, in which the ratio of triage nurse to patients was 1: 25-40 approximately. The most common problems of patients visiting ED from the most to the least were fever, head injury, diarrhea, wound laceration, stroke, asthma, appendicitis, fever, DHF, GE (Gastroenteritis), ulcer, CVA (Cerebrovascular Accident), DHF, vomiting, colic abdomen, and gastritis.

Level of training experience, working experience, triage knowledge and triage skill

During the past three years, all subjects had attended the Basic Life Support (BLS) training course, 59.39% had attended the Basic Trauma Life Support (BTLS) training course, 30.83% had attended the Advanced Life Support (ACLS) training course, and 29.32% had attended the Triage Officer Course (TOC). In addition, some had been trained about ambulance protocol, the Advanced Trauma Life Support (ATLS), ECG resuscitation, Trauma Nursing Care (TNC), Emergency Care, first aid in emergency, and disaster management. By training index calculation, 66.2% of subjects had training experience at a low level (1 - 5), 28.6% had training experience at a moderate level (6 - 10), and only 5.2% had training experience at a high level (> 10) (Table 2).

More than half of the subjects (51.90%) had experience in working in ED for more than five years, whereas the rest (48.10%) had less than five years work experience in ED. However, most (82.30%) had less than five years work experience in triage rooms. Only 17.70% had more than five years working experience in triage rooms. Currently, there were only 16.20% working in the triage room (Table 2).

Table 2

Frequency and Percentage of Subjects Classified by Experiences (N=266)

Experience	Frequency	Percentage
Training experience (more than one answer)		
BLS (Basic Life Support)	266	100.00
BTLS (Basic Trauma Life Support)	158	59.39
ACLS (Advanced Cardiac Life Support)	82	30.83
TOC (Triage Officer Course)	78	29.32
Ambulance protocol	39	14.66
ATLS (Advanced Trauma Life Support)	34	12.78
ECG Resuscitation	27	10.15
TNC (Trauma Nursing Care)	23	8.64
Emergency care	8	3.00
First Aid in Emergency	8	3.00
Disaster management	7	2.63
Training index		
Index of training 1-5	176	66.20
Index of training 6-10	76	28.60
Index of training > 10	14	5.20
Working experience in ED		
6-60 months	128	48.10
> 60 months	138	51.90

Table 2 (continued)

Experience	Frequency	Percentage
Working experience in triage room		
6-60 months	219	82.30
> 60 months	47	17.70
Current working in triage room		
Yes	43	16.20
No	223	83.80

More than half of the subjects (58.30%) got triage knowledge scores of a low level, 40.60% got triage knowledge scores at a moderate level (Table 3). Most subjects (65.40%) perceived their total triage skill at a moderate level, and also perceived all sub-dimensions of triage skill at a moderate level (Table 3).

Table 3

Frequency and Percentage of Subjects Classified by Level of Triage Knowledge and Triage Skill (N = 226)

Variables	Level		
	Low n (%)	Moderate n (%)	High n (%)
Triage knowledge	155 (58.30)	108 (40.60)	3 (1.10)
Triage skill	27 (10.20)	174 (65.40)	65(24.40)
Rapid assessment	24 (9.00)	177 (66.50)	65(24.50)
Patient categorization	18 (6.80)	212 (79.70)	36 (13.50)
Patient allocation	19 (7.20)	181 (68.00)	66 (24.80)

The mean score of training index as training experience was 4.47 (SD = 3.19) which was at a low level. The mean score of working duration as work experience was 59.48 months (SD = 33.81) which was at a moderate level. The mean score of triage knowledge was 55.26 (SD = 13.16) which was at a low level. The mean score of total triage skill was 75.12 (SD = 11.23) which was at a moderate level (Table 4).

Table 4

Range, Mean, Standard Deviation, and Level of Training Experience, and Working Experience, Triage Knowledge, and Triage Skill Scores (N=266)

Variables	Possible range	Actual range	Mean	SD	Level
Training experience	1-16	1-16	4.47	3.19	Low
Working experience (months)	0-60	6-160	59.48	33.81	Moderate
Triage knowledge	0-100	23-83	55.26	13.16	Low
Triage skill	5-100	49-99	75.12	11.23	Moderate
Rapid assessment	5-100	45-99	74.99	11.25	Moderate
Patient categorization	5-100	30-100	74.72	13.23	Moderate
Patient allocation	5-100	43-100	75.17	13.35	Moderate

Table 5 showed five items with the highest and lowest scores of triage knowledge. More than 80% of the subjects had correctly answered on knowledge regarding assessment of multiple trauma, signs and symptoms of DHF (Dengue

Hemorrhagic Fever), etiology of asthma, intervention to protect cervical spine injury, and assessment of hepatic failure. However they had the lowest score < 40% of knowledge regarding appropriate response to the patient with AMI (Acute Myocardial Infarction), signs and symptoms of AMI, assessment levels of consciousness of a TBI (Traumatic Brain Injury) patient by the Glasgow Coma Scale (GCS), signs and symptoms of skull fracture, and initial management for the patient with DKA (Diabetic ketoacidosis).

Table 5

Frequency and Percentage of the Subjects with Five Items of the Highest and the Lowest Correct Answers Related to Factual and Procedural Knowledge in Triage

Triage knowledge	N	%	Type of knowledge
Five items with highest scores			
1. The assessment of patient with multiple trauma	236	88.70	Factual
2. Identify signs and symptoms of DHF	235	88.30	Factual
3. Identify the cause of asthma	224	84.20	Factual
4. Identify intervention to protect cervical spine injury	223	83.80	Procedural
5. The assessment of hepatic failure	216	81.20	Factual
Five items with lowest scores			
1. Identify the appropriate response to the patient with AMI.	19	7.10	Procedural
2. Identify common complications of AMI	27	10.20	Factual
3. The assessment level of consciousness of TBI patient by GCS	50	18.80	Procedural
4. Identify signs and symptoms of skull fracture	60	22.60	Factual
5. Identify initial management for a patient with DKA	80	30.10	Procedural

According to triage skill as shown in table 6, the five items with the highest scores of perceived triage skill were related to rapid assessment. The lowest scores of five items of perceived triage skill were related to rapid assessment to perform life saving intervention (Table 6).

Table 6

Mean and Standard Deviation of Five Items with the Highest and Lowest Scores of Triage Skill

Triage skill	Mean	SD	Subscale
Five items with highest scores			
1. Assess temperature of patient	4.01	.71	Rapid assessment
2. Look at abnormal chest movement of patient	3.98	.66	Rapid assessment
3. Assess circulation by checking pulse rate and rhythm of patient	3.88	.76	Rapid assessment
4. Positioning of airway to maintain patency by chin lift	3.88	.72	Rapid assessment
5. Assess or ask chief complaint of patient rapidly	3.86	.57	Rapid assessment
Five items with lowest scores			
1. Perform insertion of oropharyngeal or nasopharyngeal airways	3.40	1.02	Rapid assessment
2. Assess internal and external bleeding	3.46	.88	Rapid assessment
3. Control blood loss by stopping bleeding	3.58	.81	Rapid assessment
4. Perform manual ventilation	3.59	.86	Rapid assessment
5. Perform bag-valve-mask ventilations	3.62	.92	Rapid assessment

Relationships between triage knowledge, training experience, working experience and triage skill

The correlation assumptions were tested. The assumption of normality was found on triage skill, triage knowledge, and working experience scores. Therefore, the Pearson's moment correlation coefficient (r) was used to analyze the correlation of these variables. However, training experience scores were not of normal distribution so the researcher used Spearman Rho to analyze the correlation between training experience and other variables. Table 7 showed that there were significantly positive relationships between triage knowledge, training experience, and working experience with triage skill ($r = .38, p < .01$; $r_s = .37, p < .01$; and $r = .27, p < .01$, respectively).

Table 7

Relationship Between Factors to Triage Skill Using Pearson's Product Moment Correlation and Spearman rho (N = 266)

Variables	Correlation			
	Triage skill	Triage knowledge	Training experience	Working experience
Triage skill	-			
Triage knowledge	.38**	-		
Training experience (a)	.37 **	.28**	-	
Working experience	.27* *	.43**	.31**	-

** $p < .01$

(a) Analyzed with Spearman Rho

Discussions

Characteristics of subjects

The results showed that most emergency nurses (94.40%) in this study had received a diploma in nursing. Similarity to generally nurses in Indonesia, the majority of them completed the diploma in nursing and some of them graduated with a Bachelor's degree (Pusat Pendidikan Tenaga Kesehatan [Pusdiknakes], 2008). Since the Faculty of Nursing was established in 1995, nursing education in Indonesia has continued to expand, and graduate nursing courses have been developed (Wanda, 2007). Although, some universities offer Bachelor's degrees, Master's degrees, and Doctoral degrees (Shields & Hartati, 2003), high degree-prepared nurses tend to work in academic institutions. Most nurses who have worked in the clinical setting finished a diploma in nursing. This is unlike nursing education in developed countries, such as Australia, where Gerdtz and Bucknall (2001) found that the emergency nurses had graduated with Bachelor's degrees in nursing, certificates of emergency nursing, and Master's in emergency nursing.

Level of training experience, working experience, triage knowledge and triage skill

Training experience. The mean score of training index used to reflect training experience was at a low level. All emergency nurses in this study had attended at least one training course particularly BLS, but a few had attended the course special to triage. This finding was congruent with a study by Chung (2005) who found that all emergency nurses in Hong Kong had been trained, but none of

them had received a triage training course and they lacked formal training. The reason might have been the work load. From observation while collecting data, the researcher found that the selected hospitals were overcrowded. There were approximately 50-100 patients per shift in the tertiary hospital, and 25-40 patients per shift in the secondary hospital. The ratio of nurse to patient was 1: 20-30, which was outstandingly higher than the standard ratio (1:4) in the United States (Malone, 2003). The work load situation might have been a reason why the emergency nurses had no chance to attend the training courses.

The previous study among clinical nurse educators of ED in Australia showed that the skill to perform triage was proven to be dependent on the nurses' training in Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) (Considine & Hood, 2000). In this study the majority of emergency nurses had received training in BLS and nearly one-third of them (30.82%) had received training in ACLS. Kelly and Richardson (2001) suggested that emergency nurses should take triage training to perform triage effectively and efficiently. The training regarding triage skill could contribute to emergency nurses conducting an effective triage process, thus resulting in better patient outcomes due to reduced triage errors in ED.

Working experience. The mean score of work duration to reflect working experience was at a moderate level. Fifty percent of emergency nurses in this study had more than 5 years work experience. As in a previous study, it was found that the majority of emergency nurses had more than five years working experience (Fry & Burr, 2001). Moreover, it was found that the number of years of working experience could be an important factor for triage assignment (Andersson et al., 2006).

Triage knowledge. The mean score of triage knowledge was at a low level. As in a study by Jezewski and Feng's (2007), it was found that the knowledge of emergency nurses in the U.S. was at a low level. The reason might have been that almost all emergency nurses in this study had graduated with only a diploma, and a few had attended training courses special to triage knowledge. In addition the finding revealed that only 16.20% of them currently worked in triage rooms. In contrast, Dangsuwan, Boonyung, and Apichato (2008) found that the knowledge of emergency nurses was at a moderate level. Most subjects of this study had graduated with a Bachelor's degree in nursing. This finding indicated that continuing education or training courses related to the triage process should be provided to emergency nurses in Indonesia.

In addition, this study showed that more than 80% of emergency nurses had correctly answered on knowledge regarding assessment of multiple trauma, signs and symptoms of dengue hemorrhagic fever (DHF), etiology of asthma, intervention to protect cervical spine injury, and assessment of hepatic failure. However they had the lowest score (below 40%) of knowledge regarding an appropriate response to the patient with myocardial infarction (AMI), signs and symptoms of AMI, assessment of consciousness level of traumatic brain injury (TBI) using Glasgow Coma Scale (GCS), signs and symptoms of skull fracture, and initial management for the patient with DKA. Similar to the study by Holdgate, Morris, Fry, and Zecevic (2007), they found that emergency nurses in Australia were able to perform triage accurately among patient with injuries (90.90%) and fever (89.70%) except patients with cardiovascular problems about whom they had low accuracy (58.80%). The explanation of this finding is as follows.

The most common cases coming to ED in Indonesia are traumatic brain injury, multiple trauma, cardiovascular disease, diarrhea, DKA, asthma attack, fractures, DHF, renal failure, and hepatic failure cases, respectively. Trauma emergency cases are more common than non-traumatic emergency cases, because there is a high prevalence of traffic and occupation accidents. Moreover, Indonesia is an area susceptible to natural disasters such as earthquakes, floods, tsunamis, etc. It is necessary for ED nurses to prepare themselves to be knowledgeable about traumatic injuries. For non-traumatic emergency, DHF is one of the top ten cases in ED, leading to high morbidity and mortality in Indonesia (Kusriastuti & Sutomo, 2005). Most ED nurses have experience to assess and manage cases of DHF. In addition, they have the ability to manage asthma attack cases by administering oxygen and using inhalation drugs, whereas AMI and DKA are too complicated and require specific treatment for appropriate management.

Triage skill. The findings revealed that the mean scores of triage skill and its sub-dimensions were at a moderate level. This may be because the emergency nurses in this study had more experience, and 82.30% of them had worked in triage rooms. As in previous studies, it was found that the perceived self-assessed competence of nurses working in emergency settings were at a moderate level (Salonen, Kaunonen, Meretoja, & Tarkka, 2007).

In addition, most of the emergency nurses had the highest skill regarding the assessment of temperature, looking at abnormal chest movement, assessing or asking for chief complaints rapidly, positioning the airway to maintain patency by chin lift, and checking the pulse rate and rhythm. This may be because these skills focus on rapid assessment by A, B, and C (Airway, Breathing, and

Circulation) which are usually related to basic nursing skills. Congruently, the findings from previous studies in Australia, also supported the observation that emergency nurses had a higher score of performance in vital sign measuring (Fry & Burr, 2001; Gerdtz & Bucknall, 2001).

However, the emergency nurses in this study perceived their lowest triage skill regarding insertions of oropharyngeal or nasopharyngeal airways, assessment of internal and external bleeding, stopping bleeding, manual ventilation, and bag-valve-mask ventilations. These skills were mainly performed by physicians rather than nurses. In addition, nurses who had graduated with diplomas in nursing might not have been skillful in these procedures.

Relationships between triage knowledge, training experience, working experience and triage skill

The findings of this study showed that there were significantly positive low correlations between triage skill and working experience ($r = .27, p < .01$), training experience ($r_s = .37, p < .01$), and triage knowledge ($r = .38, p < .01$). This indicated that emergency nurses who had higher knowledge, more work experience, and more training experience would have higher skills.

Working experience had the lowest relationship with triage skill. This finding was similar to findings of a previous study by Salonen et al. (2007) who found that competence of emergency nurses had a correlation with working experience ($r = .27, p = .001$), and Goransson et al. (2006) who found that working experience in ED had a significant relationship with triage decisions ($r = .13, p = .008$). However, Hicks, Merritt, and Elstain (2003) found that more years of experience increased the decision-making consistency in triage skill ($r = .42, p = .004$). Moreover, Andersson et

al. (2006) revealed that experienced emergency nurses had more abilities in triage skill than novice emergency nurses. In addition Cone and Murray (2000) found that there were different levels of triage decision making between novice (< 5 years) and expert (> 5 years) emergency nurses. Ferrario (2003) found that emergency nurses who had more experience would have more ability to perform triage.

Training experience had a positive relationship with triage skill which reflects that the more trainings or drills there are, the higher the skills that nurses develop. However, more than half of the emergency nurses in this study had a low level of training experience (66.20%), which could lead to low level relationship between training experience and triage skill. This was consistent with a study by Forsgren, Forsman, and Carlstrom (2009) who suggested that regular triage training could improve the skill of nurses to handle stressful work situations.

Triage knowledge had a positive relationship with triage skill even though it was at a low level. This means that if triage knowledge is high, the triage skill would also be high. This finding was congruent with a previous study by Considine et al. (2007) who reviewed four studies to examine the effect of factual knowledge on triage decisions. It was found that factual knowledge had a relationship with triage decisions in triage skill. Moreover, there was a relationship between knowledge, skill, and judgment in nursing practice (Evans & Donnelly, 2006) and intuition with clinical experience (Smith & Cone, 2010).

All factors had a low relationship with triage skill. These might be related to other factors affecting triage skill which are not included in this study such as hospital policy, multi-task competency of emergency nurses, age of emergency nurses, and environmental factors such as overcrowding in ED, and nurse to patient

ratio. As in a previous study which indicated that work environment, particularly workload and practical arrangements affected triage skill (Andersson et al., 2006). To improve triage skill, all above factors should be further explored.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

Conclusion

A descriptive correlation study was designed to examine relationships between triage knowledge, training experience, working experience and triage skill among emergency nurses in East Java province of Indonesia during January and February, 2010. Two-hundred sixty-six (266) emergency nurses with a minimum of a diploma degree in nursing were recruited from two tertiary and two secondary government hospitals. The data were collected using self-reported questionnaires: the Demographic Data Sheet (DDS), the Triage Skill Questionnaire (TSQ), and the Triage Knowledge Questionnaire (TKQ). The instruments was validated by three experts and tested with 20 subjects the reliability. The TSQ was tested by Cronbach's alpha coefficient yielding of .93 and TKQ was tested for test-retest reliability yielding a correlation coefficient of .99. The data were analyzed using descriptive statistics and correlation analysis. The results of the study are summarized below.

Summary of the study results

The majority of emergency nurses were female with a mean age of 33.37 years. Most of them had a education level of diploma in nursing. During the past three years, all subjects had mainly attended Basic Life Support (BLS) and Advanced Life Support (ACLS), with a few training course on short course, and

disaster management. More than half of the subjects had work experiences more than 5 years in ED and only 16.20% of subjects currently worked in the triage room.

The mean scores of triage skill and working experience were at a moderate level. Whereas the mean scores of training experience and triage knowledge were at a low level. However the subjects in this study have a high level in knowledge regarding to assessment of multiple trauma, sign and symptom of dengue hemorrhagic fever (DHF), etiology of asthma, intervention to protect cervical spine injury, and assessment of hepatic failure; and a at low level in knowledge regarding appropriate response to the patient with myocardial infarction (AMI), sign and symptoms of AMI, assessment consciousness level of traumatic brain injury (TBI) using Glasgow Coma Scale (GCS), sign and symptoms of skull fracture, and initial management for the patient with DKA. There were significantly positive regard to the relationships between triage skill and other factor, triage knowledge ($r = .38, p < .01$), triage skill and training experience ($r_s = .27, p < .01$), and triage skill and working experience ($r = .36, p < .01$).

Strength and Limitation of the Study

This study included the large sample size. Consequently, the sample could be representatives of the emergency nursing in East Java, Indonesia.

However, the limitation of this study may be characterized by the use of self-report measurement for triage skill. The subjects' self-report only would not reflect the real practice. The subjectivity of each emergency nurse while filling in the questionnaire might not reflect their real performance of triage skill. Observation should be included in this study to confirm the findings.

Implications and Recommendations

The findings of the study could contribute to nursing practice, nursing administration, and nursing research as follows:

1. Nursing practice in the triage room should be of concern as the primary assessment as it would impact on patient safety and the quality of care. The role of emergency nurses in the triage process should be encouraged and using current research evidences to improve patient outcomes.

2. According to the findings of this study, the triage knowledge and triage skill of emergency nurses are required to update or refresh regularly. Moreover, educational programs should add more knowledge regarding non traumatic emergencies such as acute myocardial infarction (AMI), diabetic ketoacidosis, and alteration of consciousness.

3. Further research should be designed to test the effectiveness of educational program or training course on triage knowledge and triage skill among the emergency nurses. Triage decision making of emergency nurses should be compared with that of the physician to evaluate the accuracy of triage. Furthermore, patient outcomes should be measured for evaluating the effectiveness of nursing practice in the area of triage.

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APPENDICES

APPENDIX A

Informed Consent Form

Dear participants

My name is Mukhamad Fathoni, I am a nursing educator in Nursing program, Faculty of Medicine, Brawijaya University, Malang Indonesia. Now, I am a Master student of Nursing Science in Prince of Songkla, Thailand. I am conducting a nursing research project to study factors related to triage skills among emergency nurses. If you agree to participate, you will be asked to complete a set of questionnaire that will ask you about your personal information, things you do during triage and knowledge related to triage. It will take around 30-60 minutes to complete the questionnaires. Please do not hesitate to ask me if you find any difficulties in understanding items of the questionnaires.

This research project has been approved by the Institutional Review Board (IRB), Faculty of Nursing, Prince of Songkla University, Thailand. The study procedures will have no harm to you or your institute. Your personal identity and the information gathered will be kept confidential.

You have a right to withdraw from the study at any time without any effect. Information from this study will be beneficial for development of emergency nursing particularly in triage skill. Your signature on this form will indicate that you understand this study and its procedures and you are willing to participate in this study. Thank you for your kind cooperation.

.....
Name of Participant Signature Date

.....
Name of Researcher Signature Date

If you have any questions or need more information, please feel free to contact me on the following addresses : Nursing program, Medical Faculty-Brawijaya University, Malang, Indonesia, Jl.Veteran No 14 Malang, Phone/Fax (+62-341-569117), e-mail : mfathony@yahoo.com, or you can also contact my thesis advisor Dr. Hathairat Sangchan at Faculty of Nursing, Prince of Songkla University, Hat Yai Songkla, Thailand 90112, e-mail : hathairat.s@psu.ac.th.

Signature of researcher

Mukhamad Fathoni

APPENDIX B

Demographic Data Sheet (DDS)

Code:

Instruction

I would like to ask you some information regarding personal data. Please answer by putting marking (√) in the space available as that is appropriate for you and/or filling in the blank.

1. Age years

2. Gender : 1 () Male 2 () Female

3. Highest educational background:

1 () Diploma in Nursing

2 () Bachelor in Nursing

3 () Bachelor non Nursing

4 () Postgraduate in Nursing

5 () Postgraduate non Nursing

6 () Others specify.....

4. Working experience

4.1 Which type of hospital are you working? () Tertiary () Secondary hospital

4.2 How long have you been working as a nurse in ED?years.....months

4.3 How long have you been working as a nurse in triage room?

.....years.....months

4.4 Do you currently work in triage room? () yes () no

5. Training and continuing education

Did you attend any training, course or workshop during the past three years?

No	Training	Number of training	Duration of training course	Please describe types or patterns of the training such as lecturing (L), workshop (W), demonstration (D), clinical practice (CP), etc.				
				L	W	D	CP	etc
	Basic Training:							
1.	- Basic Cardiac Life Support (BCLS)	.....	.....days					
2.	- Advanced Cardiac Life	.....	.....days					

	Support (ACLS)							
	Advanced Training:							
3.	- Basic Trauma Life Support (BTLS)	.....	.....days					
4.	- Advanced Trauma Life Support (ATLS)	.....	.....days					
5.	- Triage course	.....	.....days					
6.	- Trauma in Nursing Care	.....	.....days					
7.	- Ambulance protocol	.....	.....days					
8.	- Disaster management	.....	.....days					
9.	- Emergency care	.....	.....days					
10.	- Other..... (Please identify it)	.....	.....days					

6. Working environment (collected by researcher)

- 5.1 How many emergency nurses per shift?.....*
- 5.2 How many emergency nurses in the triage room per shift?.....*
- 5.3 How many patients coming to ED per shift?*
- 5.4 How many doctor contribute in triage room per shift?.....*
- 5.5 Describe the ED environment.....*

(Date.....)

Signature.....

APPENDIX C

Triage Skill Questionnaire (TSQ)

Instruction: Please assess your own ability in triage skills by check list the number on scale 1 to 5 following each statement below. There are five options available : **5 = very good, 4 = good, 3 = fair, 2 = poor, 1 = need, improvement**

No	Triage skill	Perceived Triage Skill				
		Very good (5)	Good (4)	Fair (3)	Poor (2)	Need improvement (1)
	Rapid Patient Assessment					
1	Assess patient include vital signs with rapid assessment in 2-5 minutes					
2	Assess or ask chief complaint of the patient rapidly					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

No	Triage skill	Perceived Triage Skill				
		Very good (5)	Good (4)	Fair (3)	Poor (2)	Need improvement (1)
23	.....				
24	.....				
25	.....				
26	.....				
27	.....				
	Patient categorization					
28	Catagorization the patient according to triage priority					
29	.....				
30	.....				
31	.....				
	Patient allocation					
32	Make a decision to allocate the patient with priority 1 (Resuscitation in ED) in the right place					
33	.....				
34	.....				
35	.....				
36	.....				
37	.....				

APPENDIX D

Triage Knowledge Questionnaire (TKQ)

The questionnaire provides 30 questions regarding knowledge on triage skill.

Please check your choice by putting mark (x) in the available options A, B, C, and D.

Case 1 for question number 1 - 3

The male patient, 66 years old with the chest pain, come with the family by car. He has history of hypertension and DM 2 years ago, conscious

1. What is specified pain in Myocardial infarction (MI)?
 - a. Crushing subclavial pain
 - b. Occurs with cause, primarily early in the morning
 - c. *May radiate to the jaw, back, and left arm*
 - d. Can relieved by the rest

2. Which of the following questions would best help emergency nurse to discriminate pain caused by non cardiac problem?
 - a. "Have you ever had this pain before?"
 - b. "Can you describe the pain to me?"
 - c. *"Does the pain get worse when you breathe in?"*
 - d. Can you rate the pain on a scale 1 to 10, with 10 being worst?

3. What will you do as emergency nurse to handle the patient?
 - a. Administer nitroglycerin to reduce chest pain
 - b. Start CPR
 - c. Give oxygen
 - d. *Start ECG*

Case 2 for question number 4 – 6

- 4.
- 5.
- 6.

Case 3 for question number 7- 9

- 7.
- 8.
- 9.

Case 4 for question number 10 - 12

- 10.
- 11.
- 12.

Case 5 for question number 13 - 15

- 13.
- 14.
- 15.

Case 6 for question number 16 - 18

- 16.
- 17.
- 18.

Case 7 for question number 19 – 21

- 19.
- 20.
- 21.

Case 8 for question number 22 – 24

- 22.
- 23.
- 24.

Case 9 for question number 25 - 27

- 25.
- 26.
- 27.

Case 10 for question number 28 - 30

- 28.
- 29.
- 30.
- 31.
- 32.

- 33. The patient has no pulse or respirations. After calling for help, the first action the nurse should take is:
 - a. Start a peripheral IV
 - b. Initiate closed-chest massage

- c. Establish an airway*
 - d. Obtain the crash cart
34. Which of the following is the correct initial drug and dose for treatment of asystole?
- a. epinephrine 2mg IV
 - b. atropine 0.5 mg IV
 - c. lidocaine 1mg/kg IV
 - d. epinephrine 1mg IV
35. A patient who has Ventricular Fibrillation has failed to respond to 3 shocks. After started an IV and inserted a tracheal tube, confirming proper placement. Which of the following drugs should this patient receive first?
- a. Amiodarone 300 mg IV push
 - b. Lidocaine 1 to 1.5 mg/kg IV push
 - c. Procainamide 30 mg/min up to a total dose of 17 mg/kg
 - d. Epinephrine 1 mg IV push*

APPENDIX E

Table 8

Mean and Standard Deviation of Score and Frequency and Percentage of Subjects with correct answer Classified by Each Item of Triage Skill (N=266)

Triage skill	Mean	SD	Perceived Triage Skill				
			Very good n(%)	Good n(%)	Fair n(%)	Poor n(%)	Need improve- ment n(%)
Rapid Patient Assessment							
1. Assess patient include vital signs with rapid assessment in 2-5 minutes	3.83	.59	25 (9.4)	172 (64.7)	67 (25.2)	2 (0.8)	-
2. Assess or ask chief complaint of the patient rapidly	3.86	.57	27 (10.2)	177 (66.5)	61 (22.9)	1 (0.4)	-
3. In unconscious patients, look in the upper airway such as blood, vomit, foreign bodies, oedema, and tongue obstruction as assess airway patency	3.80	.73	41 (5.4)	139 (52.3)	78 (29.3)	8 (3.0)	-
4. Decide to open airway and remove foreign body when airway is obstructed according to airway management (A)	3.69	.84	38 (14.3)	132 (49.6)	76 (28.6)	16 (6.0)	4 (1.5)
5. Give positioning airway to maintain patency by chin lift	3.88	.72	45 (16.9)	151 (56.8)	63 (23.7)	6 (2.3)	1 (.4)
6. Perform clear airway by correct position with jaw thrust and head tilt	3.77	.74	30 (11.3)	163 (61.3)	59 (22.2)	11 (4.1)	3 (1.1)
7. Perform clear airway by correct position by jaw thrust without head tilt if the patient suspect cervical spinal	3.68	.78	31 (11.7)	139 (52.3)	78 (29.3)	17 (6.4)	1 (.4)
8. Perform to insert oropharyngeal or nasopharyngeal airway	3.40	1.0	33 (12.4)	107 (40.2)	65 (24.4)	55 (20.7)	6 (2.3)
9. Look at the chest about patient chest abnormal movement	3.98	.66	56 (21.1)	149 (56.0)	61 (22.9)	-	-

Table 8 (Continued)

Triage skill	Mean	SD	Perceived Triage Skill				
			Very good n(%)	Good n(%)	Fair n(%)	Poor n(%)	Need improve- ment n(%)
10. Assess rate and depth of respirations to observe (B) breathing rate and pattern rhythm with look and listen	3.84	.65	33 (12.4)	162 (60.9)	66 (24.8)	5 (1.9)	-
11. Look at the patient skin to investigate for integrity, wounds, bruising, texture, and color	3.84	.68	39 (14.7)	151 (56.8)	71 (26.7)	5 (1.9)	-
12. Listen the noise in the airway such as gurgling, snoring, and wheezing	3.82	.79	44 (16.5)	147 (55.3)	62 (23.3)	9 (3.4)	4 (1.5)
13. Listen the silent or noisy breathing	3.70	.77	43 (6.2)	108 (40.6)	107 (40.2)	8 (3.0)	-
14. Feel air blow from the patient with my cheek	3.72	.75	39 (4.7)	122 (45.9)	96 (36.1)	9 (3.4)	-
15. Administer oxygen therapy	3.79	.68	34 (12.8)	147 (55.3)	80 (30.1)	5 (1.9)	-
16. Perform manual ventilation	3.59	.86	37 (13.9)	112 (42.1)	89 (33.5)	27 (10.2)	1 (0.4)
17. Perform bag-valve-mask ventilations	3.62	.92	45 (16.9)	111 (41.7)	74 (27.8)	36 (13.5)	-
19. Check pulse rate and rhythm according circulation assessment (C)	3.88	.76	47 (17.7)	156 (58.6)	47 (17.7)	16 (6.0)	-
20. Assess of the capillary refill	3.77	.73	40 (15.0)	134 (50.4)	84 (31.6)	8 (3.0)	-
21. Assess the temperature the patients	4.01	.71	62 (23.3)	149 (56.0)	50 (18.8)	5 (1.9)	-
22. Assess the patient with diaphoresis	3.58	.81	29 (10.9)	120 (45.1)	94 (35.3)	22 (8.3)	1 (0.4)
23. Perform chest compressions in critical condition of the patient	3.77	.91	54 (20.3)	122 (45.9)	71 (26.7)	12 (4.5)	7 (2.6)
24. Collaborative with physician to administer emergency drugs	3.80	.88	51 (19.2)	134 (50.4)	66 (24.8)	8 (3.0)	7 (2.6)
25. Assess internal and external bleeding	3.46	.88	22 (8.3)	117 (44.0)	98 (36.8)	20 (7.5)	9 (3.4)

Table 8 (Continued)

Triage skill	Mean	SD	Perceived Triage Skill				
			Very good n(%)	Good n(%)	Fair n(%)	Poor n(%)	Need improve- ment n(%)
26.Perform control blood loss appropriately to stop bleeding the patient	3.58	.91	31 (11.7)	130 (48.9)	74 (27.8)	24 (9.0)	7 (2.6)
27.Collaborate resuscitation to provide appropriate intravenous fluid	3.82	.84	48 (18.0)	143 (53.8)	62 (23.3)	6 (2.3)	7 (2.6)
Patient categorization							
28.Catagorization the patient according to triage priority	3.86	.68	42 (15.8)	148 (55.6)	73 (27.4)	3 (1.1)	-
29.Identify the patient who require immediate care, urgent, and non urgent according to triage categorization	3.85	.68	36 (13.5)	162 (60.9)	63 (23.7)	3 (1.1)	2 (0.8)
30.Avoid the condition of the patient with over-triage and under-triage	3.58	.79	34 (12.8)	124 (46.6)	91 (34.2)	15 (5.6)	2 (0.8)
31.Initiation nursing intervention during triage categorization	3.58	.79	31 (11.7)	110 (41.4)	109 (41.0)	14 (5.3)	2 (0.8)
Patient allocation							
32.Make a decision to allocate the patient with priority 1 (Resuscitation in ED) in the right place	3.83	.76	45 (16.9)	143 (53.8)	65 (24.4)	13 (4.9)	-
33.Make a decision to allocate the patient with priority 2 (Critical care in ED) in the right place	3.80	.78	47 (17.7)	132 (49.6)	74 (27.8)	13 (4.9)	-
34.Allocate make a decision to allocate to the patient with priority 3 in the right place (Ambulatory in ED) correctly	3.85	.83	61 (22.9)	119 (44.7)	72 (27.1)	14 (5.3)	-
35.Allocate the patient with nursing intervention safety in ED	3.73	.77	41 (15.4)	120 (45.1)	98 (36.8)	5 (1.9)	2 (0.8)

Table 8 (Continued)

Triage skill	Mean	SD	Perceived Triage Skill				
			Very good n(%)	Good n(%)	Fair n(%)	Poor n(%)	Need improve- ment n(%)
36. Allocate the patient by collaboration with other emergency nurse & medical doctor with hand over effectively	3.73	.74	33 (12.4)	140 (52.6)	84 (31.6)	7 (2.6)	2 (0.8)
37. Allocate the patient to get advance treatment in ED in accurately and timely	3.85	.68	41 (15.4)	149 (56.0)	72 (27.1)	4 (1.5)	-

APPENDIX F

Table 9

Frequency and Percentage of Subjects with Correct Answer Classified by Each Item of Triage Knowledge (N=266)

Triage knowledge	Type of Knowledge	N	%
1. To identify the appropriate assessment to the patient with fracture of the extremity	Procedural	193	72.60
2. To identify the intervention of fracture in ED	Procedural	79	29.70
3. To identify the complication of fracture	Factual	149	56.00
4. To identify the assessment of fracture of the femoral neck	Factual	208	78.20
5. To identify the disease from chief complaint	Factual	235	88.30
6. To identify the complication of DHF as DSS	Factual	225	84.60
7. To identify initial management of DHF in ED	Procedural	200	75.20
8. To identify the appropriate response to the patient with AMI.	Procedural	19	7.10
9. To identify the common complication of AMI	Factual	27	10.20
10. To identify the pathophysiology of CHD	Factual	100	37.60
11. To identify the chief complaint of acute cholecystitis	Factual	147	55.30
12. To identify the acid-base and electrolyte imbalance	Factual	140	52.60
13. To identify the etiology of asthma	Factual	224	84.20
14. To identify the physical assessment in asthma	Procedural	197	74.10
15. To identify the assessment of past history patient with hepatic failure	Factual	216	81.20

Table 9 (Continued)

Triage knowledge	Type of Knowledge	N	%
16. To identify the assessment of past history patient with hepatic failure	Factual	205	77.10
17. To identify the assessment of jaundice patient with hepatic failure	Procedural	68	25.60
18. To identify the intervention reduce severe vomiting	Factual	104	39.10
19. To identify the region of abdominal trauma	Factual	146	54.90
20. To identify the complication with shock	Procedural	92	34.60
21. To identify intervention resuscitation of bleeding	Factual	137	51.50
22. To identify the phase of acute renal failure	Factual	214	80.50
23. To identify monitoring of ARF	Procedural	130	48.90
24. To identify intervention patient with ARF	Factual	98	36.80
25. To identify the assessment patient with DKA	Procedural	80	30.10
26. To identify the initial management for the patient with DKA	Factual	60	22.60
27. To identify the sign of the base of skull fracture	Factual	50	18.80
28. To identify Glasgow Coma Scale (GCS) score of patient with TBI	Procedural	199	74.80
29. To identify intervention reduce intracranial pressure	Factual	236	88.70
30. To identify the assessment of patient with multiple trauma 30. To identify intervention cervical spine injury	Procedural	223	83.80
31. To identify the assessment patient with pneumothorax	Factual	195	73.30

Table 9 (Continued)

Triage knowledge	Type of Knowledge	N	%
32. To identify the complication of oropharyngeal airway	Factual	175	65.80
33. To identify the appropriate first action for the arrest patient	Procedural	88	33.10
34. To identify the appropriate management to the patient with asystole	Factual	164	61.70
35. To identify the appropriate management to the patient with ventricular fibrillation	Factual	122	45.90

APPENDIX G
LIST OF EXPERTS

Three experts examined the content validity of Demographic data Sheet (DSS), Triage skill Questionnaire (TSQ), and Triage Knowledge Questionnaire (TSQ).

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- 1) Fathoni, M., Sangchan, H., & Songwatthana, P. (2010). *Triage skills and related Factors among Emergency Nurses in East Java Province, Indonesia*. Oral Presentation. The 2nd International Conference on Humanities and Social

Sciences, Faculty of Liberal Arts, Prince of Songkla University. April 10th
2010.Hat Yai, Thailand.