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AN INTERVENTION PROGRAM TO IMPROVE NURSES' COMPETENCIES IN DISASTER RESPONSE: A MIXED-METHODS STUDY PROTOCOL

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Abstract

Introduction: Indonesia has the highest risk and vulnerability to both natural and non-natural disasters in the world. Aceh Province located on the confluence of two earth fault plates has been discovered to be exposed to a higher risk leading to significant physical, emotional, and psychological problems. Therefore, there is a need for immediate disaster response efforts to reduce the impacts, and nurses are the largest care providers with adequate competencies to ensure effectiveness.

Objective: The study aims to develop a study protocol to measure the effectiveness of the intervention program to improve nurses' competencies in disaster response.

Methods: A sequential exploratory mixed-method study design will be used. A qualitative phase is to explore nurses' competencies in disaster response according to nurses, disaster survivors, hospitalized patients, members of *the Ulama* Consultative Assembly of Aceh, and hospital policymakers using FGDs and in-depth interviews. The result of this phase is to develop intervention and instruments. Data are analyzed using a content analysis. A quantitative phase is to examine the effectiveness of the initiated intervention programs on nurses' competencies in disaster response with a randomized controlled trial study design. There will be three groups in this phase, namely Evidence-Based Intervention (EBI) group, Islamic-Based Intervention (IBI) group, and Control Group (CG). The nurses' competencies related knowledge, skill, and attitude will be measured using valid and reliable instruments. Data will be analyzed using independent t-test, and a repeated measure one-way ANOVA.

Discussion: The findings are expected to be the basis for the development of appropriate tools and better intervention in nursing practice and education in relation to evidence and Islamic-based disaster curriculum as well as a guide for future research.

Trial registration: ongoing process with request number ANZCTR 378930

KEYWORDS
nurse; competencies; disaster; response; Islamic; mixed-methods

INTRODUCTION

Indonesia is one of the countries with the highest risk and vulnerability to disaster in the world and this has damaged community livelihoods with significant impacts on the physical, emotional, and psychological conditions of the survivors (Presiden Republik Indonesia, 2007). Natural disasters such as earthquake, tsunami, volcanic eruption, landslide, flood, and storm as well as those related to human activities such as a terrorist attack, chemical explosion, nuclear failure, social conflict, and wars have been reported to have significant effects on the survivors around the world (Al Thobaity et al., 2017; Park & Kim, 2017; Yi et al., 2010). In Indonesia, 42 earthquakes were reported during 2018-2019 and these included those experienced in Lombok, Donggala-Palu, and Banten Provinces. The frequency and consequent effects of these disasters have led to the need for urgent preparedness and effective response, especially for the related health professionals (Siswadi & Prima, 2018). This is very important considering there were 5,405 natural disaster occurrences in Indonesia since the 2018-2019, and the number increases significantly annually (Badan Nasional Penanggulangan Bencana, 2019).

Hospital is a public health service center with significant importance in disaster response and this means each personnel is required to have sufficient competencies to handle the situation. For example, nurses, as the largest population of care providers in the hospitals and communities, are expected to have adequate skills and knowledge to provide immediate medical helps for the survivors (Halstead, 2017; Warsini et al., 2015). However, several studies have reported their competencies in disaster response to be insufficient because they focus more on the physical aspects and this has led to the introduction of Islamic-based disaster response competencies for nurses in handling the psychological, psychosocial and spiritual conditions by some

researchers. This was associated with the need to prioritize disaster preparedness and response capability in areas with a high risk (Baghdady, 2005). Moreover, the experience from the 2004 tsunami and earthquake which led to several problems and death of thousands of people is another reason to improve the capabilities of health care providers such as nurses (Husna et al., 2011).

Previous studies have reported a low competencies for nurses on disaster preparedness and response and 88% of the respondents were found not to be satisfied with the performance of the nurses and physicians in providing care for the survivors (Zarea et al., 2014). Similar results were also discovered in Banda Aceh where the nurses were scarcely skillful in providing the physical, mental, and psychosocial treatments for the tsunami-affected patients in 2004 (Husna et al., 2011). In Sulawesi, they were also reported to exhibit low competencies (Sangkala & Gerdtz, 2018). This, therefore, led to the provision of a framework for disaster nursing by the International Council of Nurses (ICN) and this was divided into three phases including pre-disaster, disaster, and post-disaster. In the pre-disaster phase, the focus is on the adequacy of knowledge, skills, and risk identification abilities, response planning, and several forms of preparedness. During the disaster phase, nurses are required to respond by providing physical, psychological, and holistic care for individuals, families, and communities with priority for vulnerable groups such as pregnant women, children, and the elderly. Meanwhile, the post-disaster phase focuses on the recovery and reconstruction activities of the victims to maintain their survival (International Council of Nurses & World Health Organization, 2009).

Geographically, Aceh, located at the western end of the Sumatra Island, is at the confluence of two earth fault plates, and this makes the province vulnerable and at a high risk of earthquake and tsunami (Badan Nasional Penanggulangan Bencana Aceh, 2015). It is one of the few provinces in Indonesia with special autonomy with the ability to manage and regulate its government, especially in terms of governance, education, and religion (Presiden Republik Indonesia, 2006). For example, Indonesian Law No. 11 of 2006 states that Aceh has the right to implement Islamic *sharia* (law) based on a strong association between the community and Islam as observed in the domination of the province by the Muslim population which was recorded to be 98.2%. Therefore, public services and community activities are conducted based on Islamic principles and the grand design of Islamic *Sharia* in 2017-2021 and this is evident in all of its programs and departments including the hospital (Djalil, 2017).

There is a need to improve the competencies of the nurses in Aceh on disaster response based on Islamic principles and based on the need assessment conducted on five groups including the nurses, patients hospitalized, disaster survivors, members of *Ulama Consultative Assembly* in Aceh, and hospital policymakers, mandatory training was organized to implement and increase the Islamic-based disaster response at the hospital in Banda Aceh in order to support and improve *sharia*-based initiatives in public service.

OBJECTIVES

The objectives of this study are to develop the study protocol to develop an intervention to improve nurses' competencies in disaster response as well as to examine the effectiveness of the intervention programs.

METHODS

Study Design
This research will be conducted using a sequential exploratory mixed-method study design, including the use of phenomenology design for qualitative phase, followed by a randomized controlled trial (RCT) for quantitative phase.

Settings
Qualitative phase
The qualitative phase in this study has been conducted in hospital and community settings on February 12, 2019 - March 23, 2019.

Quantitative phase
The quantitative phase will be conducted at Meuraxa Hospital of Banda Aceh, Ibu dan Anak Hospital of Aceh Government, and Pertamedika Ummi Rosnati Hospital of Banda Aceh. The study population includes nurses who work in the hospitals specifically in the following five wards: emergency department (EDs), intensive care unit (ICU), intensive coronary care unit (ICCU), medical ward, and surgical ward. Those wards are selected based on their importance to the provision of care for patients in the effort towards responding to a disaster.

Samples
Qualitative phase
The qualitative study has been conducted involving 24 nurses from three hospitals as well as other participants including eight disaster survivors, eight hospitalized patients, eight members of *the Ulama* Consultative Assembly of Aceh, and eight hospital policymakers, with a total of 56 participants.

Quantitative phase
The quantitative study (RCT) will be conducted among 150 nurses from three hospitals, and these participants will be selected using a cluster random sampling and divided into three groups with a total of 50 participants for each group. A medium effect size with a power of 0.08, confidence level at 95% and an alpha of 0.05 with a value of d = 0.60 was used in the determination of sample size. The inclusion criteria for the sample will include (a) working at EDs, ICU, ICCU, medical, and surgical wards, (b) working experience for ≥ 2 years, (c) holding at least a diploma degree, and (d) having no annual/study assignment leaves during the study.

Study Procedures
Qualitative phase
The qualitative phase has been completed. The qualitative study was conducted using phenomenology design to understand the experiences of an individual concerning a phenomenon (Creswell, 2009). The study involved the use of FGDs and in-depth interviews. The findings were used for training intervention material (modules) and questionnaire development.

Quantitative phase
The feasibility, acceptability, and effectiveness of the interventions program will be assessed using the quantitative approach. In this regard, a randomized controlled trial (RCT) will be used and the results will be assessed by independent sample t-test with pre-test - post-test control group design to compare the mean of the three groups. Further, a repeated measure one-way ANOVA will be used to determine the

effectiveness of the intervention ([Polit & Beck, 2010](#)) on pre-test and post-test (follow up I and II) within 2-6 weeks after the completion of the program ([Jannah et al., 2016](#)). The description of study design and process are described in **Figure 1** and **2**.
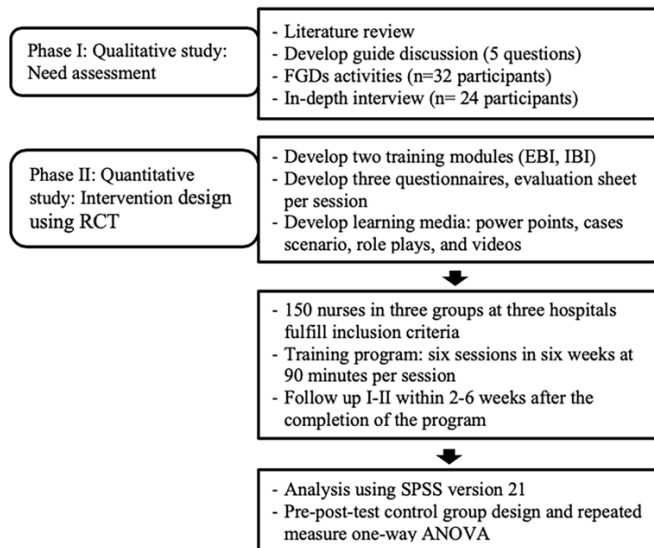

Figure 1 Study design

Intervention Programs for Quantitative Phase
Based on the qualitative findings, three intervention programs have been developed, namely the Evidence-Based Intervention (EBI), Islamic-Based Intervention (IBI), and Control Group (CG), have been developed and will be tested in this study.

1) The Evidence-Based Intervention (EBI)
The EBI group will focus on nurses' competencies on managing psychological, psychosocial, and spiritual aspects ([Bisson & Tavakoly, 2008](#); [Hughes et al., 2017](#); [International Council of Nurses & World Health Organization, 2009](#)). The intervention will be conducted for six sessions over a six-week period, with each session is approximately for 90 minutes. The program consists of session I - introduction and building a relationship of trust with respondents, session II - concept of disaster (definition, type, impact, the law on disasters in Indonesia, and the role of nurses in disasters, session III - nurses' disaster response competencies in managing psychological problems, session IV - nurses' disaster response competencies in managing psychosocial problems, session V - nurses' disaster response competencies in managing spiritual problems, and session VI - review, conclusions, and follow-up plans. Program providers will include three nurses' health educators and one psychologist. Various interactive methods will be used in the implementation of program intervention including lecture, discussion, videos, case scenario, demonstration, and storytelling.

2) The Islamic-Based Intervention (IBI)
The IBI group will focus on managing psychological, psychosocial, and spiritual aspects ([Bisson & Tavakoly, 2008](#); [Hughes et al., 2017](#); [International Council of Nurses & World Health Organization, 2009](#)) and was developed based on *Standar dan Instrumen Sertifikasi Rumah Sakit Syariah* ([Dewan Syariah Nasional Majelis Ulama Indonesia (Dsn- Mui) & Majelis Upaya Kesehatan Seluruh Indonesia (Mukisi), 2017](#)) and also the results of the needs assessment. This is also conducted for six sessions over a six-week period with each session being approximately 90 minutes. The program consists of session I -

introduction and build a relationship of trust with respondents, session II - the concept of disaster in Islamic perspective, session III - nurses' Islamic-based disaster response competencies in managing psychological problems, session IV - nurses' Islamic-based disaster response competencies in managing psychosocial problems, session V - nurses' Islamic-based disaster response competencies in managing spiritual problems, and session VI - review, conclusions, and follow-up plans. The IBI will provided by nurses' educators and an Islamic psychologist using lecture, discussion, videos, demonstration, cases scenario, and story-telling.

(3) The Control Group (CG)
The control group will be conducted as routine day care according to the competencies gained in the hospital without any specific intervention.

Training for Program Providers for Quantitative Phase
One day training will be provided to all program providers (three nurses' health educators and one psychologist/Islamic psychologist) to ensure that they can administer the intervention program as expected. The program will be trained in Banda Aceh by the researchers one week before conducting the study.

Retention of Participants
To maintain and improve the fidelity of the participants, we will provide door prizes for each session, attractive training material, snacks box, transportation cost for every training session, souvenir, and a 3 credit points training certificate from the Indonesian National Nurses Association (INNA).

Measurements for Quantitative Phase
In the RCT study, respondents will be asked to fill the demographic data including age (years), gender, latest level of education, religion, length of work (in years), working unit/ward, experience in disaster/emergency training, as well as the type of training attended and year. The nurses' competencies are measured based on knowledge, skills, and attitude in managing psychological, psychosocial, and spiritual problems in disaster response. The knowledge will be measured using the questionnaire named "Nurses' Knowledge in Disaster Response Questionnaire (NKDRQ)" consisting of 28 questions with multiple choices and each correct answer scored 1 while the incorrect one was scored 0 and this means the highest obtainable score is 28 while the lowest is 0. The attitude will be measured using the "Nurses' Attitude in Disaster Response Questionnaire (NADRQ)" and consisted of 30 statements with a Likert scale (1-5) indicated by "strongly agree = 5", "agree = 4", "doubt = 3 ", "disagree = 2", "strongly disagree = 1" and this means the highest possible score is 150 and the lowest is 30. Furthermore, the skills will be measured using the "Nurses' Skill in Disaster Response Questionnaire (NSDRQ)" consisting of 28 items using "true and false" dichotomous scales with the "true" scored 1 and the "false" 0 and this means the highest obtainable score is 28 and the lowest is 0. At the end of each session, program evaluation will be conducted using three essay questions and an observation sheet consisting of 12 statements with a checklist of "yes" and "no".

The three self-report questionnaires were developed based on an extensive literature review. The validity will be conducted with three experts including a disaster nurse, a mental health nurse, and an Islamic

psychologist. The content validity index (CVI) score of 0.9 will be used as the excellent standard (Polit & Beck, 2010). Interrater reliability will be assessed with randomly selected 25% sample of baseline (*N*= 38) (Ford et al., 2011). This will involve a test-retest to measure the correlation between the same person's score as well as the application of internal consistency to evaluate the interrelatedness among items or sets of items in the scale (Polit & Hungler, 1991). The results satisfied the criteria for reliability as observed with the score ≥ 0.7 (Polit & Beck, 2010).
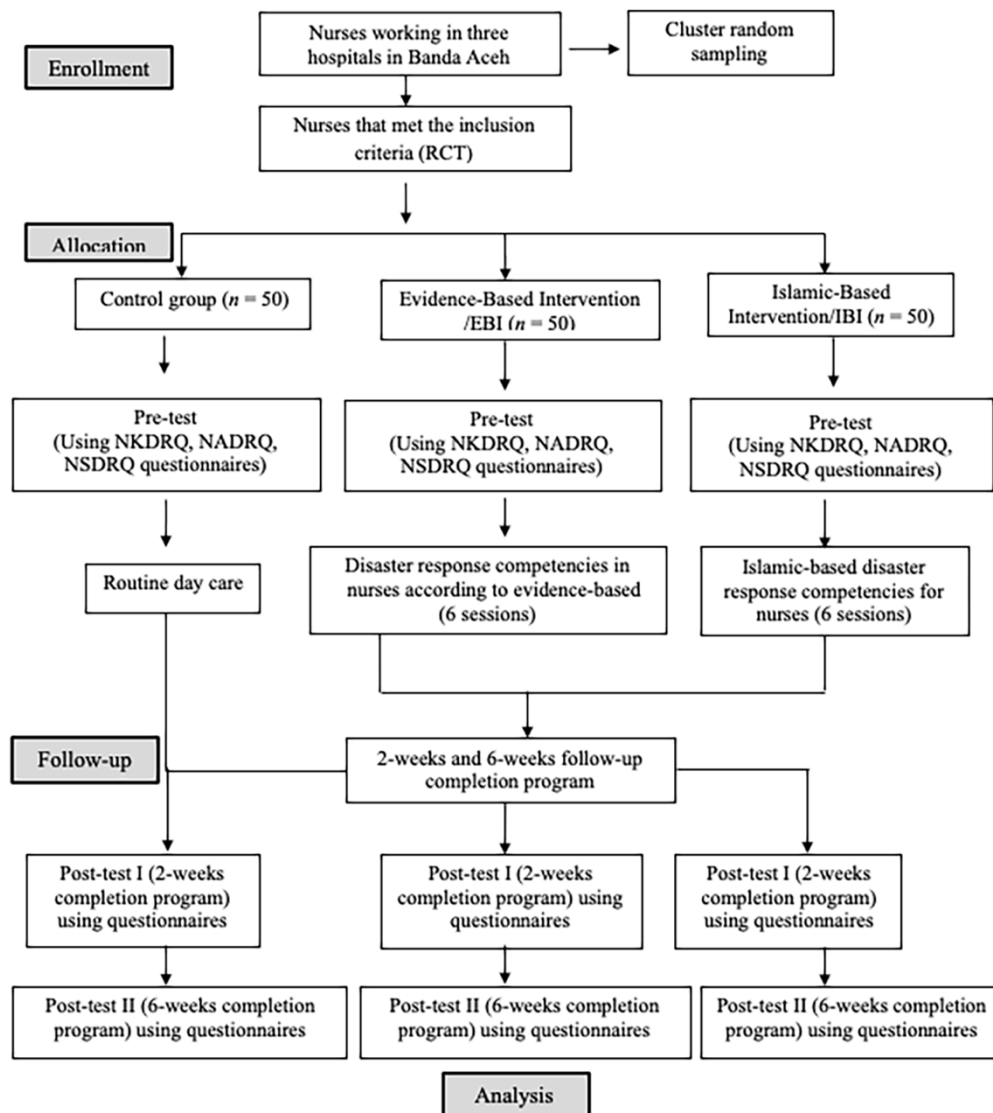

Figure 2 Flow diagram for the respondents recruited and enrolled in the intervention program

Data Analysis
Qualitative phase
The qualitative analysis was conducted manually using conventional inductive content analysis (Graneheim & Lundman, 2004), and eight subthemes and four themes were created and these were used to support the module developed to improve the Islamic-based disaster response competencies for nurses in Banda Aceh hospitals.

Quantitative phase
The quantitative data will be analyzed using SPPS version 21 for window. Descriptive statistics will be used to explain the percentage, mean, standard deviation, and median of the population studied. Meanwhile, the data for each variable will be assessed using Intra-Class Correlations (ICCs) after the Cronbach's Alpha test is provided values of ≥ 0.7 for the variables (Polit & Beck, 2014). The disaster response competencies between groups will be analyzed using inferential statistics independent t-test with pre-test-post-test-control group design (Polit & Hungler, 1991) to compare the mean scores of knowledge, skills, and attitudes before and after the intervention in the three groups. Moreover, a repeated measure one-way analysis of variance (ANOVA) will be also applied to compare the scores of pre-tests on follow-up I and II in the three groups while the Between-Subject Effect will be used to evaluate the difference of scores between the intervention and control groups. However, the variations within the same group will be evaluated using Within-Subject Effects while those observed within each measurement time will be assessed using the Interaction Effect (Polit & Hungler, 1991). Multivariate linear regression will be applied in special cases to compare the competencies between three groups, EBI, IBI, and CG. For example, to determine nurses working in intensive care/EDs and those that do not, those with experience in disaster response and those without, etc. Finally, both the qualitative and quantitative data integrated into a unified phenomenon.

Ethical Consideration

This study was approved by the Ethics Committee of the Provincial Hospital of dr. Zainoel Abidin Banda Aceh with number 1171012P on January 25, 2019. An appropriate informed consent has been signed by each participant in the qualitative phase. We will ask the participants in the quantitative phase to sign the same consent if they agree to participate in this study.

DISCUSSION

The high vulnerability and risk of disasters in Indonesia, particularly in the Aceh Province, within the last fifteen years require the full preparation of the entire society, especially the nurses as the main responder and workforce in disaster response, both in hospitals and communities. Literature review have reported the lack of nurses' competencies in disaster preparedness and response both in Indonesia and other countries of the world. However, Aceh is one of the provinces that have implemented Islamic *sharia* since 2001 to regulate the life of the community including public services such as hospitals and this was supported by the government, *sharia*-based policies, and majority of its Muslim population, Islamic culture, customs, and Islamic-principles adopted by the societies. There is an urgent need for this study in compliance with government regulations, regional policies, and the people of Aceh to realize *sharia*-based services and due to the fact limited studies have been conducted on Islamic-based disaster response competencies of nurses.

The aim of this study is to develop the study protocol to examine the effectiveness of the interventions evidence-based and Islamic-based programs on nurses' competencies in disaster response in Banda Aceh hospitals. The qualitative phase in this study has been analyzed and used to develop modules for training intervention and instrument development. The interventions that have been developed are based on evidence and Islamic perspectives.

This study is expected to provide an intervention program with local wisdom approaches such as religion, beliefs, culture, and customs to provide care and support for disaster survivors. As nurses are the main responders to disasters, this study is very important. The findings are also expected to be significantly useful for nursing practice and education, particularly for the development and adoption of an Islamic-based disaster nursing curriculum throughout the world.

Declaration of Conflicting Interests
No conflicts of interest are reported in this study.

Authorship Contributions
CH drafted and conceptualized all the manuscript while HK, MY, and TT made revisions and criticisms. All authors agreed with the final version of the manuscript for publication.

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