Nursing faculty members’ experience in the disaster area following the Great East Japan Earthquake: Focus on disaster prevention

Yukari KAMEI, Yumi TAMURA, Mie NAIKI, Tomoko NISHIDA, Yuuki TONOKI, Minako MORITA and Kaoru MORIOKA*

Japanese Red Cross College of Nursing, Tokyo, Japan

Abstract

Aim: This study identified issues associated with disaster prevention measures in three Educational Nursing Institutions (ENIs) affected by the Great East Japan Earthquake in 2011.

Methods: Participants were eight ENI nursing faculty members in the Tohoku region. A qualitative descriptive methodology was utilized using semi-structured interviews. The focus was on the successful aspects of the participants’ actions following the disaster. Disaster prevention issues that were identified were divided into two categories: rehabilitation period and emergency conditions. Categories were classified using the narratives of the eight participants.

Results: Five issues identified in the rehabilitation period were: (1) clarification of the role of schools in the area; (2) communication methods at the time of disaster were not established; (3) emergency equipments were insufficient; (4) the need to review content of disaster prevention training; and (5) failure to utilize the disaster prevention manual adequately. Six issues mentioned in the emergency conditions are as follows: (1) the roles of faculty and staff were not clarified; (2) command and control systems were underdeveloped; (3) evacuation methods were not defined; (4) the safety confirmation system was incomplete; (5) the role of students was unclear due to a lack of infrastructure to adequately support them; and (6) it was difficult to care for the students.

Conclusions: Educational Nursing Institutes should be aware that their institutions could be utilized as evacuation centers following disasters, despite not being designated as such in the regional disaster prevention plan. As a result, ENIs should be prepared to fulfill their role in assisting survivors. In addition, disaster prevention plan should equally balance the business continuity plans for disasters, thus ensuring “student safety and health management”. Also, “measures to resume and continue education” are necessary.

Key words: disaster prevention, earthquake, experiences, issues, nursing faculty

INTRODUCTION

Japan is vulnerable to widespread infrastructure damage and loss of life as a result of frequently occurring natural disasters. The Great East Japan Earthquake of March 2011 was one such natural disaster that resulted in disaster-prevention structures being severely damaged or totally destroyed. The unprecedented earthquake that had such a high magnitude highlighted the problems experienced by regions, hospitals, and educational institutions because they were not adequately prepared to respond to natural disasters.

The earthquake exposed the need for disaster prevention to be incorporated into education, training, and the development of a coordinated disaster-prevention
system within the local community (Shibayama & Hoko, 2015). A report by the Committee for Policy Planning on Disaster Management (Cabinet Office General for Policy Planning, Disaster Management, 2013) stated that the focus should be on the future promotion and development of a disaster-prevention culture. The report particularly proposed that systematic disaster prevention, along with education in schools, should be a priority. From the knowledge gained from past disasters, it is suggested that the discovery and utilization of intellectual property are important. According to the National Institute for Education Policy Research (2013), the proportion of national public schools designated as shelters by municipalities is 91.5% for elementary, junior high and high schools, and special support schools.

The Ministry of Education, Culture, Sports, Science and Technology established the experts’ conference on disaster education and disaster management which received the Great East Japan Earthquake in 2011, and published a “Guideline for preparing school disaster prevention manual (earthquake and tsunami disaster)”. This guideline is aimed at elementary schools, junior high schools and high schools (Ministry of Education, Culture, Sports, Science and Technology, 2012). There is a need for a manual to be prepared for use by higher educational institutions, as one currently does not exist.

Given the high incidence of natural disasters occurring in Japan, it can be anticipated that Educational Nursing Institutions (ENIs) will also become designated evacuation centers in the future. One important step in providing disaster-prevention education to educational institutions of all levels is to ensure students are adequately instructed on how to use the disaster-prevention awareness information to protect themselves. Four questions are particularly important and should be addressed by ENIs in the event of a disaster: (1) in what ways should ENIs cooperate with their local regions and hospitals to respond to disasters?; (2) how much responsibility should ENIs have in supporting local residents and associated medical facilities?; (3) when should regular educational activities resume?; and (4) in what ways should ENIs provide physical and mental support to their students? In addressing these important questions, the Japan Association of Nursing Programs in Universities (2013) published a Disaster Prevention Manual (DPM) to be used by all higher educational institutions.

Previous studies had focused on the extent of nursing students’ awareness of disaster prevention and related matters (Matsukiyo, 2012; Matsukiyo, Nomura, & Morimoto, 2009). However, no study has addressed what occurred at ENIs immediately following the 2011 earthquake or how the individuals at the ENIs responded. The present study focused on the experiences of staff at the nursing facilities in ENIs between the periods of the occurrence of the earthquake and the time schools reopened. The study examined the disaster-prevention system of ENIs, the functions of disaster-prevention education, and the issues stemming from disaster-prevention responses.

From in-depth analysis, this study highlights the issues pertaining to disaster-prevention measures in ENIs affected by the 2011 earthquake.

**METHODS**

**Definition of terms**

Table 1 explains the terms and their definitions used in this study.

**Research design and sample**

To add to our understanding of the actions taken by nursing faculty members of ENIs during the disaster phases, a qualitative descriptive study was conducted to identify the action taken by faculty members using data from interviews. Interviews were conducted between June 2014 and March 2015. Three schools entered into an agreement to conduct studies with the researchers. Six faculty members from a nursing school and one each from two universities in the Tohoku region damaged by the 2011 Great East Japan Earthquake participated in this study.

The interview methodology was semi-structured to encourage participants to report on and freely discuss the issues they experienced during the disaster-affected periods that this study examined.

Interviews were conducted in private to promote candid responses and ensure confidentiality for participants. After obtaining consent from each participant, oral recordings of the interviews were made. In order to fully address the issue relating to disaster-prevention measures, it was necessary to recall how the situation unfolded during the disaster phases. Each participant was interviewed about their experiences during three distinct periods relating to the disaster: (1) when the earthquake first struck; (2) when educational activities resumed; and (3) 1 year later. The content of each interview focused on three questions: (1) what was most memorable about the Great East Japan Earthquake and after regular classes resumed?; (2) what did you do during Phase 0 and Phase 1 of the disaster? At that time, what did you feel, and what do you remember?; and (3) what types of changes did you consider necessary for practical disaster training
and resuming classes in the year following the disaster?

**Analytical methods**

Verbatim records of the interview data were created. Corresponding narratives regarding reflections and issues at the time of Phases 0 and 1 of the disaster, which were experienced by faculties, were extracted and classified based on common themes present in the responses, and then summarized into sub-categories and categories.

**Ethical considerations**

This study was approved by the Japanese Red Cross College of Nursing Research Ethics Review Committee (approval number: 2014-20). Requests for participation and explanation of the study were mailed to target institutions. The study was explained verbally and in writing to the participants who consented to participate. All participants were informed that their participation was voluntary and that they had the right to decline or withdraw from the study at any time without penalty. The participants were informed that the data sets were anonymous and that all documents and memos used during the interviews would be handled with the utmost care and destroyed at the completion of the research. The participants were also informed that the results of the study would be published in professional journals and presented at conferences.

**RESULTS**

Interviews ranged between 60 and 160 min, with an average length of 90 min. The average teaching experience was 13.16 years (ranging from 4 to 23 years). Characteristics of participants are presented in Table 2.

Interview data were classified and summarized into sub-categories and categories. Furthermore, disaster-prevention measure data were extracted separately and classified as being in the rehabilitation period or as part of the emergency conditions. Five issues were identified for the rehabilitation period, and six issues for the emergency conditions.
conditions. The categories and sub-categories of these issues are presented below. Quotes from the participants were provided regarding their experiences and relief activities during the disaster phases. Additional information was provided by participants when further explanations were necessary.

### Issues arising during the rehabilitation period

#### The role of schools in the disaster area was unclear

This issue consists of two sub-categories within the issue of clarifying the role of universities in the area. These two sub-categories were “the role of schools in the disaster area was not clear” and “schools became shelters during the disaster phase causing confusion among staff”. Categories for the rehabilitation period are presented in Table 3.

The necessity of clarifying the role of ENIs in their local areas was demonstrated; specifically, the need for developing clear written guidelines explaining their roles. One interviewee stated, “There were so many neighbors, however, as students lived in the area and could not be on their own, they too gathered here” (Ms. H, August 31, 2014).

Though not designated as shelters, ENIs spontaneously became shelters at the time of the 2011 earthquake. A participant remarked, “As the role of disaster relief activities for faculty members of ENIs was unclear, faculty members must keep on [volunteering]” (Ms. G, August 27, 2014). During Phase 0 of the disaster, the participants stated that volunteer activity was necessary. Due to the lack of reliable systems in place and ensuring chaos, staff of ENIs could not adequately organize volunteers.

#### Communication methods at the time of the disaster were not established

A sub-category, “Staff were unable to establish contact methods other than by telephone” relates to a group of pre-determined methods of communication, which the participants related to issues of confirming students’ safety and communicating with training hospitals. The only communication method available was the emergency phone that was temporarily installed during disasters for use by survivors.

#### Emergency equipment were insufficient

This issue with the universities’ emergency equipment was identified, with the participants stating that preparing emergency items before the disaster is necessary. Depending on the communities, the types of emergency items were not determined according to the characteristics of ENIs. One participant stated: “Students dress rather flashy. In the event that it is not possible to prepare

| Category | Sub-category | Key Elements |
|----------|--------------|--------------|
| The role of schools in the disaster area was unclear | The role of schools in the area was not clear | The role of schools in the area at the time of an emergency must be examined. |
| Communication methods at the time of the disaster were not established | Staff were unable to establish a contact method other than telephones | Cellular towers were not functional, so some people attempted to use public phones, but the distance to public phones was far and it took a long time to get to them. |
| Emergency equipment were insufficient | Types and quantities of emergency equipment were insufficient | It was important to leave nursing shoes in schools. |
| It is necessary to review the content of disaster-prevention training | Disaster-prevention training was inadequate | It is important to practice disaster response regularly. |
| Disaster Prevention Manual (DPM) instructions were inadequate | Staff did not grasp the contents of the DPM | The disaster manual was not confirmed during the 2011 earthquake, and people could therefore not act according to its instructions. |
| | The DPM content was not specific | People could not act without detailed instructions regarding their conduct at the time of the 2011 earthquake. |
emergency items, we should at least have nursing shoes for our students” (Ms. G, August 27, 2014). As ENI students are predominately female, they did not stock appropriate footwear to be worn during emergency evacuation activities; therefore, footwear should be considered as an emergency equipment to be stocked.

*It is necessary to review the content of disaster-prevention training*

The category was formed by one subcategory “disaster prevention training was inadequate”. The disaster-prevention training provided during the rehabilitation period was found to be inadequate. The content of the training and how it was to be implemented were identified as issues to be addressed.

One participant explained: “We were doing things [disaster-prevention training], with the focus on evacuation routes, fire extinguisher use and confirmation of other things. The training was conducted by the faculty members” (Ms. H, August 31, 2014).

This study found previous disaster-prevention training was lacking, that university clerical staff had previously been responsible for implementing disaster-prevention training, and the faculty’s attitude toward such training was passive.

*The Disaster Prevention Manual (DPM) instructions were inadequate*

This issue consisted of two sub-categories: “Staff did not grasp the contents of the DPM” and “the DPM content was not specific”.

The DPM was prepared at ENLs at Phase 0 of the disaster; however, faculty members failed to follow the instructions given in the manual so were unable to take on the role designated to them at Phase 0 of the disaster. Ms. H pointed out that “at the time, the DPM on how to respond was not adequate for the disaster situation being experienced. No one suggested that we should follow the instructions of the manual therefore, no one acted on it” (Ms. H, August 31, 2014). The reason for the faculty members being unable to act according to the instructions was that they did not read the DPM. Ms. H also explained that the DPM was indispensable by stating:

By reviewing the DPM again, we realized that we could not take action without detailed definitions, such as what the motions are like at magnitude 5 or closer to

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| Category | Sub-category | Key Elements |
|----------|--------------|--------------|
| The roles of faculty and staff were unclear | The roles of the faculty and staff at the time of the 2011 earthquake were unclear | The role of the faculty during the earthquake was not pre-determined. I did not gather information but waited with students for instructions. I did not think of actively gathering information. While I was hesitating, the tsunami struck. I thought we had to run away from the tsunami, but there was no instruction to do so. I hesitated about where to evacuate to. |
| The command and control system was undeveloped | Evacuation decisions were announced too late | The evacuation plan for students during the earthquake was vague. I was unable to confirm the safety of faculty. I was unable to gather information well. It took time to confirm students’ safety. The communication system did not function at all. |
| Evacuation methods were not established | Student evacuation methods were not concrete | It took a long time to confirm the safety of faculty and students |
| The safety confirmation system was not established | There was no established method to determine the safety of faculty and students | It is necessary to establish a system to confirm safety. The process of safety confirmation was done by hand. |
| The role of the students was unclear | It was difficult to determine the role of the students at the time of the earthquake | The role of nursing students at the time of the earthquake was difficult to define. The extent to which students should participate in rescue activities was difficult to determine. |
| It was difficult to care for the students | It was difficult to secure a private place where students could rest | There was no place to talk privately. I was unable to provide a private space for students to cry, and I felt bad. |
magnitude 6, etc. Without these detailed definitions, we were clueless (Ms. H, August 31, 2014).

In the chaos of Phase 0 of the disaster, because participants did not have a more detailed DPM, participants were unsure of how to respond appropriately to the situation unfolding.

**Issues during the emergency conditions**

Six categories were identified as issues for this phase: (1) “the roles of faculty and staff were unclear”; (2) “the command and control system was undeveloped”; (3) “evacuation methods were not established”; (4) “the safety confirmation system was not established”; (5) “the role of the students was unclear”; and (6) “it was difficult to care for the students”. Categories of emergency conditions are presented in Table 4.

**The roles of faculty and staff were unclear**

The roles of faculty and staff were unclear, which was identified in the sub-category of: “The roles of the faculty and staff at the time of the earthquake were unclear” due to the lack of specific guidelines and faculty members not actively seeking information. “(In the DPM) the role of faculty in the event of fire was to provide evacuation guidance and supervise the shipment of goods; however, the role at the time of the earthquake was not written in the DPM” (Ms. E, January 30, 2015). Ms. F described the lack of instructions as: “I wanted to be…with the students. We were not doing anything, not even gathering information….We thought there would be instructions. We were staying alert, but we did not specifically do anything” (Ms. F, January 30, 2015).

**The command and control system was undeveloped**

This consisted of the sub-category “the evacuation decision came out late”. Faculty stated that they believed it was necessary to escape from the predicted tsunami and mentioned that delayed evacuation instructions were an issue. Faculty pointed out that the tsunami arrived while they were contemplating their next mode of action: “I think I was afraid of a tsunami, so I think I told another teaching faculty member…that we needed to run to a higher elevation. However, as no clear instruction was given, we remained with the students” (Ms. E, January 30, 2015).

**Evacuation methods were not established**

The sub-category “student evacuation methods were not specific” was identified. Ms. F stated, “For example, how to evacuate students during training was rather vague” (Ms. F, January 30, 2015). Participants agreed that the method for evacuating students (evacuation methods) was not specific enough.

**The safety confirmation system was not established**

This consisted of two sub-categories: “It took a long time to confirm the safety of faculty and students” and “no method to determine the safety of the faculty and students was established”. The participants explained that it took a long time for all the student information to be gathered into the safety confirmation system and that the safety of the faculty could not be confirmed. Establishing a safety confirmation system was regarded as important. “We confirmed the damage situation to the students and created a temporary handwritten list. It is necessary to set up a safety information system that be accessed quickly with our cell phones” (Ms. H, August 31, 2014). Clerical staff handled safety confirmations and information about students’ safety during the 2011 earthquake; however, the information was documented by hand, which was a slow and tedious process.

“There was no established method to determine the safety of faculty or students”. One participant remarked, “of course there is food on the university campus, but I guess a safety confirmation mechanism should be properly put in place” (Ms. G, August 27, 2014). In addition to the lack of emergency items, there was no system for checking the safety of students and faculty members.

**The role of the students was unclear**

This category of “the role of the students was unclear” was derived from the sub-category “It was difficult to determine the role of the students at the time of the earthquake”. Participants stated that they struggled with how much students should participate during and following the disaster. Participants also did not know how to manage the students during the emergency conditions. As the students’ role during Phase 0 of the disaster and the policies concerning that role for ENIs were unclear, the participants reported that they struggled with whether to allow the students to help with rescue and recovery activities. Ms. B stated: “I guess hospitals, and by that, I mean nursing students, are expected to volunteer” (Ms. B, August 21, 2014); Ms. A remarked: “Some blamed the teaching staff for allowing students to volunteer” (Ms. A, August 21, 2014). There was a lack of relevant information with which to decide what to do, as one participant pointed out:

I think we all felt that [students were not to help with aid activities]. I think some felt that [participation] could be, for example, a good learning opportunity.
in this earthquake, many students themselves were survivors, so before we performed our role as nurses, we could not be sure about student’s homes, parents’ homes, and their own safety, etc. (Ms. F, January 30, 2015)

It was difficult to care for the students
The category “It was difficult to care for the students” was derived from the sub-category concerning the difficulty of securing a place that the students could use individually. During the disaster phase, our study found there were issues with providing care and support to students who were survivors. Also, students needing emotional support had no privacy to express their concerns and needs. Ms. A described the issue:

I felt really bad that students had no chance to cry. . . . We did not have a safe place where students could relax in ENIs. It just was physically impossible. . . . I realized how important a private room is at such a time. (Ms. A, August 21, 2014)

The issue of physical space was a major issue in the ENIs where facilities were damaged.

DISCUSSION
The functions of ENIs during the disaster phase
There is a need for schools to be involved in preparations for the disaster phase regardless of the type of disaster. School administrators are responsible for managing the students’ safety and health, supporting the establishment and operation of a school shelter, and the resumption of early and continuing education courses (Nakao, Uno, Terumoto, & Takahashi, 2013). Many elementary and junior high schools were designated as municipal shelters (Amitani, Sudo, Tsuboyama-Kasaoka, Ishikawa, & Sako, 2017); however, no report was made on the designation of ENIs (Cabinet Office, 2015). This research revealed that ENIs served as shelters and disaster relief centers for residents in their local areas during the 2011 earthquake despite not being designated as shelters in local area disaster prevention plans. This occurred because residents misunderstood or were not aware of the local area disaster prevention plans. As educational institutions are familiar places due to their construction and locations, and ENIs are linked to health and well-being, residents may have perceived them as safe shelters. It can be anticipated that residents may again use educational institutions and ENIs as shelters during future disasters. Therefore, it is important to prepare these educational institutions to meet the expected needs and behaviors of the local residents (United Nations Office for Disaster Risk Reduction, 2008).

Educational Nursing Institutions should prepare for disasters based on their local disaster prevention plans. In the likely event of non-designated facilities being used as shelters in future disasters, it is necessary to amend and clarify the role of ENIs and create a comprehensive disaster-prevention plan; in doing so, the local areas’ characteristics and an understanding of the potential scale and damage caused by disasters should be taken into consideration. Equally, institutions systematic disaster-mitigating actions should be systematized (human resources, commodities, technologies, and finances), and emergency items should be catalogued, stored appropriately, and periodically reassessed. In addition, promoting disaster-prevention education and preparing for disasters should be evaluated during the rehabilitation period.

Of equal importance, as indicated by categories of “roles of faculty and staff were unclear” and “command and control systems were undeveloped”, is the need to prepare manuals that outline the operational requirements of shelters following a disaster and also to clarify the roles of faculty and staff. The development of operational requirements and clarification of the roles of faculty and staff would prevent the confusion that prevailed following the disaster. Also, such a step would ensure the development of a command and control system, which was lacking during past disasters.

In emergency conditions, local area residents demanded that the ENIs organize volunteer rescue and recovery efforts. Therefore, pre-disaster preparations for such efforts in preparation for future disasters are required. In addition, the category “the role of the students was unclear” was considered an issue for ENIs who provided shelter and disaster-relief activities. Participants pointed out that the educational institutions should prepare for students’ safety and the resumption of regular classes where and when appropriate. Student safety and health management should be considered as an important requirement for the individual educational institution. At the same time, it is necessary to carefully consider the appropriateness of students’ participation in disaster-relief activities, particularly during rescue and recovery stages of a disaster.

A business continuity plan for disasters
A business continuity plan (BCP) is a comprehensive action plan that preliminarily analyzes and determines the risk that a business cannot survive following a disaster, and specifies the minimum operation necessary for continuation, restoration time, and countermeasures
all involved agreed that the educational intervention in disaster preparedness. At the conclusion of the project, a basis for building a continuous community partnership creating a partnership with the community and served as community health nursing course. This was achieved by 32 students were able to e project to prepare for future disasters. In this project, students developed a community-based health education activities.

private entities about preparations for rehabilitation is important to consult with local governments and to play a more constructive role when a disaster occurs, it is important to understand the likely nature of a disaster and plan accordingly.

In disaster-prevention training, a range of activities should be learned regarding safety confirmation, information communication, evacuation, and how to respond to stranded students, as well as learning about types of disasters (Shiwaku, Fujieda, Takeuchi, & Shaw, 2010). Equally, nursing institutions must formulate their own BCPs after carefully examining the effectiveness of BCPs, including inspections and preparations during the rehabilitation period, which have expanded in scope from emergency conditions experiences since the 2011 earthquake.

Recommendations for regional cooperation
This study identified that ENIs were utilized as shelters under emergency conditions. Therefore, in order for ENIs to play a more constructive role when a disaster occurs, it is important to consult with local governments and private entities about preparations for rehabilitation activities.

Adams and Canclini (2008) reported that nursing students developed a community-based health education project to prepare for future disasters. In this project, students were able to effectively achieve the goals of their community health nursing course. This was achieved by creating a partnership with the community and served as a basis for building a continuous community partnership in disaster preparedness. At the conclusion of the project, all involved agreed that the educational intervention would be more effective if activities were expanded and presented at a community health fair or a “Disaster-Preparedness Fair”.

The project highlighted how nursing schools play an important role in preparing local communities for disasters. Also, that it is necessary to establish a partnership between communities and universities during the rehabilitation period.

A final report by the Central Disaster Management Council Committee for Policy Planning on Disaster Management (2012) stipulated universities, which are autonomous entities, should plan to participate in volunteer activities regarding disaster prevention and disaster responses in their neighborhoods. It is also important to work with residents and disaster-prevention officials familiar with previous disasters in the region.

During the 2014 Nagano earthquake, there were several reported cases of neighbors and residents rescuing people left in collapsed houses. Following the 2016 Kumamoto earthquake, neighbors and residents also helped each other. Residents were also active in managing their shelters (Mainichi Newspaper, 2016). The importance of supporting mutual aid between residents can be understood from the activities they involved themselves in following disasters.

Few would argue that, in general, relationships between residents in urban centers are not particularly strong. The same can be said about ENIs in urban centers and the local residents. Information about local characteristics, local disaster hazards, and residents who might require assistance following a disaster is often scant. To address this, ENIs could promote improved communication and cooperation by hosting community events, and having faculty members attend events planned by the local communities. These pre-disaster activities would serve to better prepare ENIs and communities by helping them in activities following a disaster, which would have positive lasting generational benefits.

CONCLUSION
Issues associated with disaster-prevention measures in ENIs affected by the 2011 earthquake were present during either the rehabilitation period or under emergency conditions. Issues experienced during the rehabilitation period consists of five categories: (1) “the role of schools in the disaster area was unclear”; (2) “communication methods at the time of the disaster were not established”; (3) “emergency equipment was insufficient”; (4) “it is necessary to review the content of disaster prevention training”; and (5) “Disaster Preven-
tion Manual (DPM) instructions were inadequate”. Issues experienced during the emergency conditions consisted of six categories: (1) “the roles of the faculty and staff were unclear”; (2) “the command and control systems were undeveloped”; (3) “evacuation methods were not established”; (4) “the safety confirmation system was not established”; (5) “the role of students was unclear”; and (6) “it was difficult to care for the students”. Furthermore, the utilization of DPM was inadequate. This research clarified the issue of disaster-prevention measures at the time of disaster occurrence in ENIs. In addition to this, the findings will be a valuable resource for future preparations, which will allow for the adequate response to any natural or man-made disaster.

Limitation of the study
The participants of this study were limited to one region. In essence, studies covering a broader expanse of territory would further assist us in order to understand similarities and differences between regions. For ENIs, further research could help them more accurately determine how well-equipped they are in regards to their preparedness and responses to natural disasters.

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DISCLOSURE
The authors have no conflicts of interest to declare.

AUTHORS’ CONTRIBUTIONS
YK was responsible for the study conception; YK, Y.Tamura, MN, TN, Y.Tonoki, and MM were responsible for the study design; YK, Y.Tamura, MN, TN, Y.Tonoki, and MM performed the data collection; YK performed the data analysis; YK was responsible for the drafting of the manuscript; YK and Y.Tamura made critical revisions to the paper for important intellectual content; Y.Tamura, MM and KM supervised the study.

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