

**Figure 6** Areas where pain occurs due to urinary tract diseases.

- Let NMCP, PHN, CSW, or medical staff know if an elderly person is taking medication.
- Continue taking medication and inhaling bronchodilators.
- Avoid exposure to smoke and dust.
- Try to wash your hands and gargle regularly.
- Keep warm and do not stay in the cold.

#### 10. Chronic kidney disease (CKD)

##### Signs and symptoms of CKD

If elderly evacuees have any of the following symptoms, CKD might be worsening. Please contact medical staff if the following symptoms are detected:

- Inactivity, fatigue, or weakness
- Edema
- Appetite loss
- Nausea and/or vomiting
- Pruritus.

##### Measures to prevent CKD in shelters

- Let NMCP, PHN, CSW, or medical staff know if an elderly person is taking medication.
- Continue taking medicine.
- Have regular blood pressure checks.
- Restrict salt intake.
- Drink enough water to prevent dehydration.
- Keep warm.
- Be careful about infectious diseases such as colds.

#### 11. Urinary diseases

##### Signs and symptoms of urinary diseases

If an elderly person experiences some of the more severe symptoms of urinary diseases listed below, call medical staff immediately.

- Pain on urination
- Lower abdominal pain (Fig. 6)
- Back pain, lumbago (Fig. 6)
- No urination for half a day or longer

- Distention of lower abdomen
- Bloody urine
- Cloudy smelly urine
- Frequent urination
- Incontinence
- High fever (in cases of pyelonephritis, 38°C or higher)
- Limiting water intake in order to avoid frequent urination or incontinence.

##### Measures to prevent urinary diseases in shelters

- Replenish fluids with at least one liter of water per day in persons without particular illness such as heart failure or kidney failure.
- Do not avoid going to the toilet.

#### 12. Post-traumatic stress disorder (PTSD)

##### Signs and symptoms of PTSD

Please contact medical staff if an elderly person has any of the following symptoms. Please contact medical staff if the following signs are detected:

- Sudden change in personality
- Absent-mindedness and the inability to respond quickly
- Restlessness
- Frequent hyperventilation
- Frequent palpitations
- Panic attacks.

##### Measures to prevent PTSD in shelters

- If elderly people feel distressed or pain, they should confide in someone (a medical staff member, NMCP, PHN, or CSW).
- It may be necessary for the elderly to take medication if they cannot sleep or feel distressed and there is no alternative.

#### 13. Depression

##### Signs and symptoms of depression

It is not unusual for an elderly person to experience grief after suffering from severe stress. Please contact a medical staff member if the following symptoms of depression are detected:

- Cannot help thinking of bad things
- Not knowing what to do despite actually having many things to do
- Feeling too sluggish to move, although the results of a medical checkup and blood tests are normal
- Unable to sleep at night
- Always thinking of dying.

##### Measures to prevent depression in shelters

- It is important to maintain a routine, including waking up and going to sleep at the same time daily.
- If elderly people feel distressed or pain, they should confide in someone (a medical staff member, NMCP, PHN, or CSW).

- It may be necessary for the elderly to take medication if they cannot sleep or feel distressed and there is no alternative.
- If an elderly person has been attending a clinic for the treatment of depression, please tell a medical staff member. It is important that the person continues to receive treatment.

#### 14. Behavioral and psychological symptoms of dementia (BPSD)

##### Signs and symptoms of BPSD

Please contact a medical staff member if the following symptoms of dementia are detected:

- Restlessness and speaking in a disjointed manner
- Paranoid or having delusions (e.g. a false idea of being robbed)
- Becoming angry or starting to cry suddenly.

##### Measures to prevent BPSD in shelters

- Create an environment in which dementia patients can spend time with familiar people.
- Prepare a quiet environment so that dementia patients can get adequate sleep at night.
- Preparations should be made so that a dementia patient can be transferred to a professional medical institute when psychological symptoms or behavioral abnormality is observed.

#### 15. Delirium

##### Signs and symptoms of delirium

Please contact medical staff if any of the following physical symptoms are detected in elderly persons who had previously been well and not experienced any decrease in cognitive function:

- Speaking or behaving in an erratic manner
- Absent-mindedness or being distracted
- Emotional instability (e.g. becoming angry, starting to cry, or getting excited suddenly).

##### Measures to prevent delirium in shelters

- Particular attention should be paid to dehydration, infections, and other underlying physical disorders, which can cause delirium in the elderly. Please be aware that elderly people with physical disorders are potential delirium patients.
- Keeping the elderly company and talking to them to provide stimulation are effective for preventing lethargy during the daytime. At night, create a quiet environment to help them achieve a regular sleeping pattern.

#### 16. Dental diseases

##### Signs and symptoms of dental diseases

If an elderly person is showing some of the more severe symptoms of dental disease listed below, call medical staff immediately.

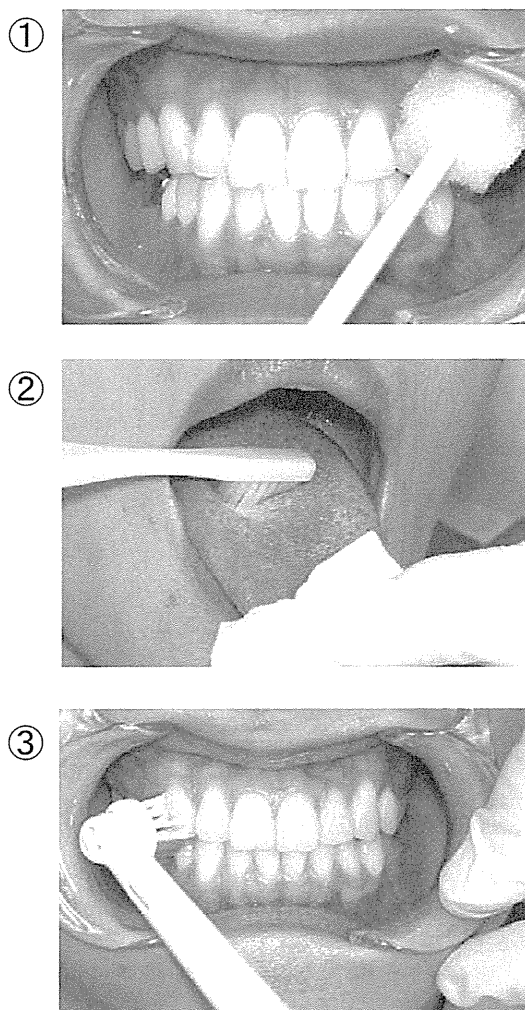


Figure 7 Systematic oral care program.

- Pain from dental caries
- Swelling and bleeding of the gingival
- Severe halitosis
- Fur on the tongue.

##### Measures to prevent dental diseases in shelters

- Keep cleaning the mouth.
- Brush the teeth every day.
- Those who are unable to do the above independently need to receive a systematic oral care program (Fig. 7)<sup>10</sup>
  - 1 Remove oral-mucosal and gingival saburra by using an oral care sponge for one minute.
  - 2 Remove fur from the tongue with a tongue brush for half a minute.
  - 3 Remove bacterial flora from the tooth surface with an electric toothbrush for 2.5 minutes, if an electric power supply is available.
  - 4 Rinse the mouth for 1 minute.

## 17. Functional inactivity

### Signs and symptoms of functional inactivity

Elderly people often may not complain of their subjective symptoms accurately, or they may not be aware of a decline in their health. Thus, it is important for NMCP, PHN, or CSW to be aware of elderly persons' health conditions as well as the whereabouts of subjects who require support and/or nursing care.

If an elderly person shows some of the more severe symptoms of functional inactivity listed below, call medical staff and/or shelter staff.

- Being isolated, with no attempt to communicate
- Narrow range of activities and staying indoors
- Lying down all day long

### Measures to prevent functional inactivity in shelters

- Encourage subjects to greet each other and make small talk in the shelter.
- Exercise regularly.
- Bend and stretch your arms and legs often, even in the narrow living space in the shelter.
- NMCP, PHN, or CSW should evaluate the reserve capability of elderly subjects with functional inactivity promptly.

## 18. Decubitus

### Signs and symptoms of decubitus

NMCP, PHN, or CSW should actively survey the onset of decubitus ulcer, particularly on the hip, the backbone, the heel, and the back of the head, in bedridden subjects. Since this illness needs long-term management, contact medical staff and arrange transport to the hospital.

### Measures to prevent decubitus in shelters

- Change bedridden subjects' position every 2 hours a day.
- Keep the skin clean.

## 19. Heat stroke

### Signs and symptoms of heat stroke

In summer, pay special attention to heat stroke in elderly people in shelters. The main features are hot skin (body temperature  $\geq 40^{\circ}\text{C}$ ) without sweat and drowsiness. Call medical staff immediately as this condition will cause fatality.

### Measures to prevent heat stroke in shelters

- Keep cooling the neck or under the arms.
- Do not restrict water intake.

## II. Signs of acute diseases in elderly

If any of the following symptoms is encountered in the elderly, they may be severely ill due to acute disease.

These signs of acute diseases are sensitive enough to rapidly detect a severe state in elderly evacuees. NMCP, PHN, or CSW should consult attending medical staff immediately. Asterisks denote signs indicating the need for emergency transport.

### 1. Disturbance of Consciousness (Japan Coma Scale [JCS] Scoring)

- Rousable by being spoken to but reverts to previous state if stimulus stops (JCS II-10)
- Rousable with loud voice but reverts to previous state if stimulus stops (JCS II-20)
- Rousable only by repeated mechanical stimuli (JCS II-30)
- \* Unrousable using any forceful stimuli but responds to avoid the stimuli (JCS III-100 to III-300).

### 2. Shock

- \* Anemia (e.g. pallor of lips and/or nails)
- \* Bleeding due to external injuries
- \* Disturbance of consciousness (JCS III-100 to III-300)
- Abnormal skin turgor, a physical sign of dehydration
- Dry tongue
- \* A decline in BP: systolic BP  $< 90$  mmHg
- \* An increase or decrease in pulse rate (i.e. resting pulse rate of more than 120 beats/minute or less than 50 beats /minute).

### 3. Dyspnea

- Shallow and rapid respiration, puffing (shallow breathing)
- Shoulder breathing (accessory muscle use)
- Flaring of wings of the nose and dilated nostrils (nasal alar breathing)
- Violet color to lips and nails (cyanosis)
- Wheezing or whistling while breathing (wheeze/stridor)
- Sleeping with the upper body raised in order to breathe (orthopnea)
- Weak breathing, suspended on occasion (apnea)
- Pursing the lips when exhaling (pursed lips breathing)
- \* Collapse of supraclavicular or intercostal spaces when inhaling (inspiratory retraction)
- \* Distension of the abdomen/shrinking of the chest when inhaling, and shrinking of the abdomen/ distension of the chest when exhaling (seesaw breathing)
- \* Obvious asymmetric movement of the chest during respiration
- \* Respiratory rate less than 10/minute or more than 30/minute.

### 4. Acute abdomen

- \* Uncontrollable abdominal pain

- \* Hematemesis, vomiting blood
- \* Tarry (black) stool, visibly bloody stools not due to hemorrhoids
- \* Frequent vomiting
- \* Abdominal swelling, abdominal distension
- \* Severe anemia (pallor of face or lips).

#### 5. *Neurological abnormalities.*

- \* Motor disturbance including hemiparesis/hemiplegia/numbness, muscle weakness of the face (central facial palsy), eyelid drooping (ptosis)
- \* Aphasia (difficulty with verbal expression, auditory comprehension)
- \* Sensory or vibratory disturbance (unilateral)
- \* Visual field defect/hemianopia, double vision/polyopia
- \* Loss of balance when sitting, standing, or walking; loss of coordination
- \* Pupils not isocoric
- \* Convulsions or cramps.

#### 6. *Chest pain*

- \* Chest pain, oppression, burning, or choking sensation in anterior chest
- \* Increasing frequency and worsening angina attacks compared with 2 weeks earlier
- \* Chest symptoms even at rest or at night
- \* Continuation (without improvement) of these symptoms in spite of aspirin or nitroglycerine use
- \* Duration of chest symptoms: more than 20 minutes.

#### 7. *Hypertensive emergency*

- \* Hypertension (systolic BP  $\geq$  200 mmHg).

#### 8. *High fever*

- Shivering (shaking chills) coinciding with high fever and potential severe infectious diseases (i.e. bacteremia)
- Burning forehead and poor response to being called.

#### 9. *Hematuria*

- Red and/or tea-colored urine.

### **III. Symptoms of anxiety in elderly in shelters**

If an elderly person is showing some of the symptoms listed below, immediately ask medical staff to assess the presence of serious diseases.

#### 1. *Dysphagia, difficulty in swallowing*

- Coughing or breathing in food while swallowing

- Aspiration (i.e. escape of food or liquid into the lungs) or labored breathing while swallowing
- Recurrent pneumonia, respiratory infections, or choking experiences
- Wet vocal quality (“gurgly” voice) after swallowing
- Irritability during feeding or failure to thrive
- Prolonged feeding times (more than one hour)
- Unexplained weight loss.

#### 2. *Diarrhea*

- Subject has diarrhea and a fever.
- Similar symptoms (diarrhea) are observed in surrounding evacuees.
- If diarrhea persists for two days or more, ask medical staff to assess, in order to avoid dehydration.

#### 3. *Constipation*

- Change in bowel habit
- Constipation with abdominal pain
- Constipation for 2 or more days.

## **Discussion**

On 11 March 2011, an earthquake with a 9.0 magnitude occurred off of Japan’s Pacific coast and hit northeast Japan. The earthquake was followed by huge tsunamis, which destroyed many coastal cities.<sup>11,12</sup> A total of 14 841 people died in these events, and 10 063 persons are still missing as of 6 May 2011.<sup>13</sup> In addition, 109 086 homes were completely or partially destroyed, and 3970 roads were damaged.<sup>13</sup> There are still 119 967 displaced people (down from approximately 470 000 on March 14) living in shelters because of disrupted community utility services and/or health risks related to the nuclear power plant accidents in Fukushima.<sup>13-15</sup> Specifically, 37 482, 35 923, and 25 501 persons took refuge into the 357, 403, and 157 evacuation centers located in Iwate, Miyagi, and Fukushima prefectures, respectively.<sup>13</sup>

There were several reports concerning medical needs following the 2011 earthquake off the Pacific coast of Tohoku. For instance, reports have highlighted the importance of managing the exacerbation of chronic illnesses (e.g. hypertension, cardiac disease, DM, and chronic pulmonary disease) as well as dehydration in elderly evacuees, especially as it was difficult to source enough medication for their chronic illnesses.<sup>16,17</sup> Health workers should pay attention to the possible spread of acute diseases such as gastroenteritis, diarrhea, and other illnesses associated with dirty water.<sup>16</sup> In addition to physical health problems, it is important to rapidly detect long-term mental problems in the elderly (e.g. PTSD, depression, BPSD, and delirium) triggered by the disaster.<sup>16,17</sup> Medical specialists have indicated

that thousands of victims will be in need of long-term counseling to cope with the loss of their relatives, friends, and homes.<sup>16</sup>

There were some cases that previous guidelines failed to cover because of the unexpected phenomena following the Tohoku earthquake. Therefore, it is essential that we are mindful of the difficulties in establishing general guidelines that can cover a wide (and unexpected) range of disasters. Feedback regarding the booklets will need to be collected from NMCP, PHN, or CSW to assess the guidelines' usability. We further need to investigate the morbidity and mortality from disaster-related illnesses among the elderly in order to clarify efficacy of these guidelines.

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## Conflict of interest

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TUG groups. The difference in SPMT score at the second follow-up lost significance after additionally controlling for the baseline value.

## DISCUSSION

This study found that the gait speed and mobility were associated with global cognitive function after 3 years and were cross-sectionally associated with executive and memory functions. The results could suggest that slowing of mobility can be observed before decline in global function and coinciding with impairment in executive and memory functions in people aged 80 and older. These findings based on octogenarians and nonagenarians in Okinawa, Japan, known for their longevity, give additional generalizability to previous findings.<sup>2,10</sup> This association has potentially important implications for early detection of cognitive impairment in older people.

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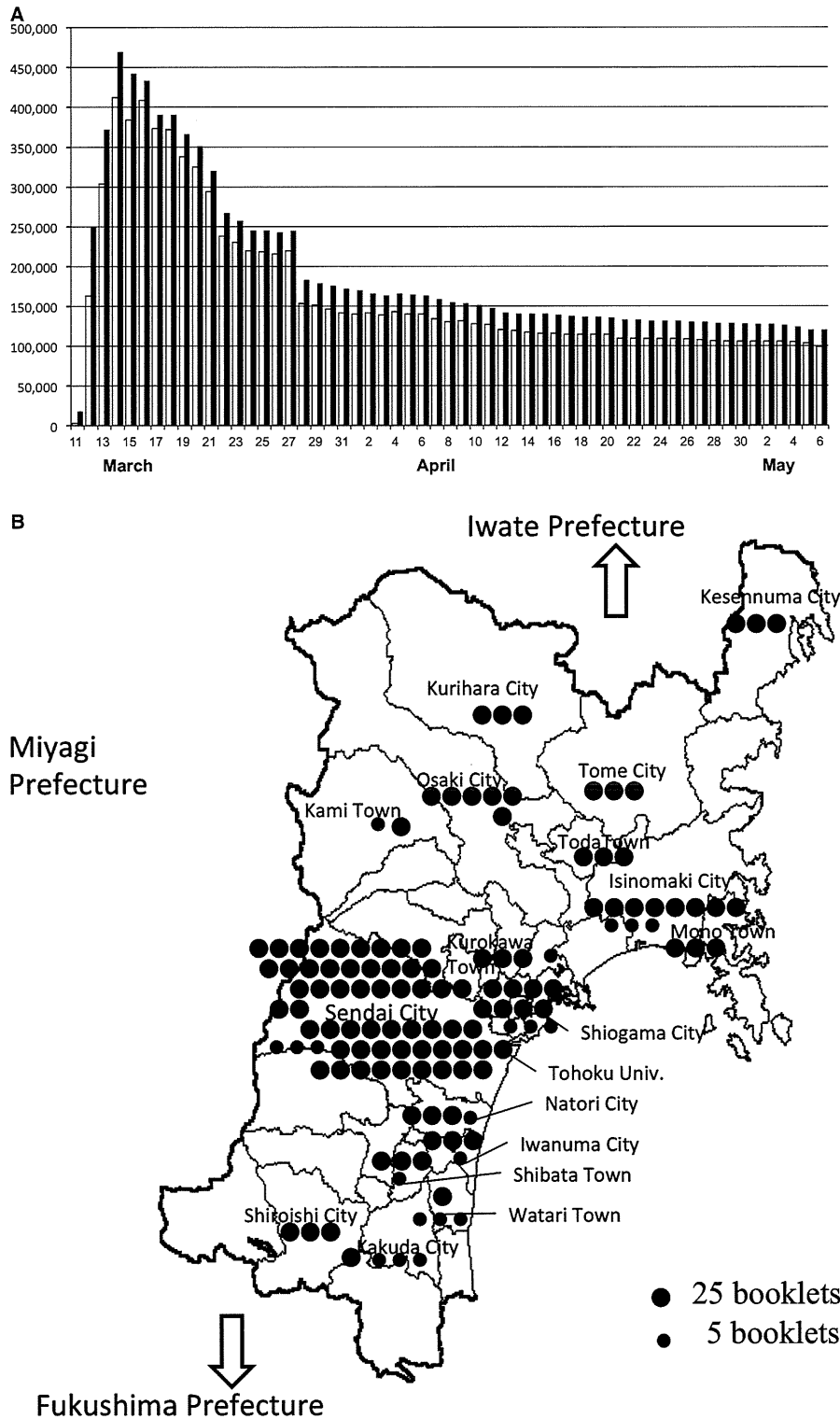
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## COMMENTS/RESPONSES

### GUIDELINES FOR NON-MEDICAL CARE PROVIDERS TO DETECT ILLNESSES IN ELDERLY EVACUEES AFTER THE 2011 EARTHQUAKE OFF THE PACIFIC COAST OF TOHOKU

*To the Editor:* On March 11, 2011, at 2:46 p.m. (JST), a strong earthquake occurred off the Pacific coast of Japan and hit the northeast part of the country. Devastating tsunamis followed that destroyed many coastal cities.<sup>1</sup> The magnitude of this quake according to the Japan Meteorological Agency was Mj9.0. A huge number of aftershocks continued after the quake, even now (May 6, 2011). According to the report by the National Police Agency of Japan, as of May 6, 2011, 14,841 people had died in this disaster, and 10,063 were still missing.<sup>2</sup> In addition, 109,086 homes were completely or partially destroyed, and 3,970 roads were disrupted.<sup>2</sup> As shown in Figure 1A, 119,967 displaced people (peak number approximately 470,000 on March 14, 2011) were still living in shelters supplied by the government as of May 6, 2011, because of disruption of community utility services and health risks of nuclear power plant accidents in Fukushima.<sup>2,3</sup> In particular, 37,482, 35,923, and 25,501 persons took refuge in the 357, 403, and 157 evacuation centers located in Iwate, Miyagi, and Fukushima prefectures, respectively.<sup>2</sup>

Drs. Shigeto Morimoto and Takashi Takahashi reported an outbreak of norovirus gastroenteritis in elderly evacuees after the 2007 Noto Peninsula earthquake in Japan.<sup>4</sup> There were 74 evacuees, including 61 elderly persons, in the shelter where the outbreak occurred.<sup>4</sup> Thirty-one evacuees with gastroenteritis, 29 of whom were aged 65 and older (mean age 76 ± 7), were examined and treated.<sup>4</sup> This experience suggests that elderly victims are more susceptible to disaster-related illnesses (i.e., infectious diseases, exacerbation of underlying illnesses, and mental stress) and disaster-related death. Therefore, a plan to establish guidelines to detect illnesses and perform triage rapidly in elderly evacuees was necessary. In April 2010, the six authors of the



**Figure 1.** (A) Variations in number of evacuees from March 11 to May 6. Black and white bars denote total number of evacuees in Japan and number of persons still evacuated in Iwate, Miyagi, and Fukushima prefectures, respectively. (B) Distribution of guideline booklets to detect illnesses in elderly evacuees in Miyagi prefecture. These were distributed in the largest city, Sendai, where most people in this prefecture were living. Large and small closed circles indicate 25 and 5 booklets, respectively.

current letter formed the Study Group of “Guidelines Regarding the First Steps and Emergency Triage to Manage Elderly Evacuees” under a grant-in-aid for scientific research from the Ministry of Health, Labour, and Welfare of Japan.

Two types of guidelines were established: one for medical care providers (MCPs) and the other for non-MCPs (NMCPs, e.g., public health nurses and certified social workers). The guidelines for NMCPs seemed to be more effective

than those for MCPs, because there were limited MCP resources. The guidelines had three chapters: features of critical illnesses and prevention, acute symptoms, and chronic symptoms in elderly evacuees. For NMCPs to be able to understand the contents easily, it was written concisely.

One week after the 2011 earthquake off the Pacific coast of Tohoku, the guideline booklets were sent through members of the Japan Geriatrics Society (JGS) or the Japan Medical Association Team (JMAT) to NMCPs working in Iwate, Miyagi, and Fukushima. JGS and JMAT members were dispatched to these areas to care for evacuees. NMCP staff used the booklets to detect illnesses rapidly in elderly evacuees in shelters or homes. For example, the booklets were distributed in the largest city, Sendai, where most people in Miyagi were living (Figure 1B). The aim was to reduce morbidity and mortality from disaster-related illnesses in elderly evacuees. An investigation of the differences in morbidity and mortality between areas where the guidelines were and were not applied is planned.

The Japanese people had already experienced another strong quake, the Great Hanshin earthquake, which caused serious damage in the Kobe area on January 17, 1995. This disaster also hit the elderly population of an urban society particularly hard. More than half of the deaths were in those aged 60 and older, and in this age group, female mortality was almost double that of men.<sup>5</sup> Surviving older adults were largely left to their own devices and were marginalized in shelters. Elderly evacuees tended not to complain about their problems, so their suffering tended to be underestimated,<sup>5</sup> and it is therefore important for NMCPs to detect medical conditions quickly in elderly evacuees.

The situation of the recent disaster is different from that of the Great Hanshin quake in terms of the presence of tsunamis and nuclear power plant accidents. The recent quake's epicenter was located beneath the sea and caused huge tsunamis, whereas the Hanshin quake's epicenter was under the land and did not cause tsunamis. Most of the deaths were a result of the tsunamis this time, whereas the victims of the Hanshin quake were related to structure collapses and fires. Moreover, the recent evacuees in Fukushima are at short- and long-term health risks from the nuclear power plant accidents.<sup>3</sup> Therefore, a survey of the morbidity and mortality from disaster-related illnesses in elderly evacuees in Iwate, Miyagi, and Fukushima is needed.

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### GAIT VELOCITY VERSUS THE TIMED UP AND GO TEST: WHICH ONE TO USE FOR THE PREDICTION OF FALLS AND OTHER ADVERSE HEALTH OUTCOMES IN PRIMARY CARE?

*To the Editor:* We read with great interest the recent article by Viccaro and colleagues in which they evaluated the predictive ability of the Timed Up and Go Test (TUG test) and gait velocity (GV) for falls and other adverse health outcomes.<sup>1</sup> Gait velocity predicted most geriatric outcomes, as did the TUG, and GV took less time to complete and demonstrated better prediction in individuals with intermediate (TUG = 12–15 seconds, GV = 0.6–1.0 m/s) and slow test performance (TUG < 12 seconds, GV < 0.6 m/s).

An important consideration when applying mobility measures across the spectrum of older people is the level





## LETTER TO THE EDITOR

# Actions of the Japan Geriatric Society in response to the 2011 off the Pacific Coast of Tohoku Earthquake: First report

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Dear Editor,

A huge earthquake occurred in Japan on March 11, 2011 at 2:46 PM (Japanese standard time). The Japan Meteorological Agency officially announced that this earthquake was named the “Off the Pacific Coast of Tohoku Earthquake” and had a magnitude of 9.0. This disaster presented several unique characteristics compared to previous earthquakes in Japan, including the great Hanshin-Awaji earthquake, because it brought about a large tsunami, resulting in exceptional damage in the northeast-east areas of Japan and destruction of many coastal cities.<sup>1</sup> According to the report by the National Police Agency of Japan, 15 413 people died as of June 11, approximately 90% of them drowned. In addition, the huge tsunami disaster took an unexpected turn, with 8069 persons still missing. This terrible disaster shows the uniqueness of this earthquake. Approximately 470 000 people had to be evacuated to shelters as a result of unavoidable circumstances at the peak (on 14<sup>th</sup> March), and around 100 000 people are still living in shelters. In addition, the huge tsunami unexpectedly resulted, not only in widespread destruction of communities, but also in nuclear power plant accidents in Fukushima, leading to the collapse of daily life of many residents.

The Japan Geriatric Society (JGS) immediately formed the Disaster Supportive Center on 18<sup>th</sup> March 2011 and took several steps to deal with this huge disaster. First, the JGS grappled with the issue of geriatric medicine in the disaster, in cooperation with the Study Group of the “Guidelines Regarding the First Steps and Emergency Triage to Manage Elderly Evacuees”. In the case of elderly victims, even after their safe evacuation to a refuge, it is possible that they may suffer from

disaster-related illnesses, including the deterioration of pre-existing illnesses, cerebro-cardiovascular disease, infectious disease, and mental stress. In general, these disaster-related illnesses are induced by numerous factors, such as psychological distress, dehydration, and sympathetic nerve hyperactivation, and can lead to fatal and non-fatal conditions. Simultaneously with establishing the guidelines, the Study Group and JGS also made a manual for non-medical care providers (NMCP; e.g. public health nurses and certified social workers). The aim of this simple manual was to help NMCP and/or the families of the elderly to quickly identify illnesses in elderly evacuees. The booklets were distributed to a widespread stricken area, mainly Iwate, Miyagi, and Fukushima prefectures, by JGS members and Japan Medical Association Teams in each prefecture. Therefore, our mission in the JGS, using both the guidelines and the manual, was to extend life-saving medical help to as many elderly evacuees as possible via the reduction of susceptibility to disaster-related illnesses and death.

Next, the JGS Supportive Center immediately decided to dispatch a medical support team to a refuge in Soma City, Fukushima, as well as visit Ishinomaki and Higashi-Matsushima, Miyagi, to investigate the damage situation for elderly victims. In addition, the JGS also sent a support team of physicians to Mitsuke, Niigata, which shares a border with Fukushima prefecture. Mitsuke City, with 42 500 residents, accommodated around 500 refugees in three shelters. Most of the refugees were from Minami-Soma City where it had been recommended that people evacuate because of the nuclear power plant accidents. Since Mitsuke City itself has been struck by natural disasters twice in the last 10 years, but had no damage from the earthquake this time, the quality of support to refugees here was quite

different from that in the center of the area struck by the earthquake and tsunami (Abe Y *et al.*, unpubl. data. manuscript in preparation).

Now, beyond the chronic phase, elderly evacuees are being gradually shifted from shelters to temporary housing. However, it is possible that they may have serious new problems, they might lose stimulation from the outside world and become miserable (e.g. survival guilt and nightmares). These emotional changes may lead to a decline in cognitive function and disused muscle atrophy of their extremities while in temporary housing. Another goal of JGS is to prevent a decline in the cognitive and functional abilities of the elderly in the long term through multidisciplinary support. The JGS needs to carry out a longitudinal investigation to clearly address the psychological distress and somatic symptoms in elderly victims based on posttraumatic emotional stress with

exposure to disastrous conditions. In addition, the development of a national disaster plan for mental health in the elderly may also be required.

### Acknowledgement

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## REVIEW ARTICLE

# Infectious Diseases after the 2011 Great East Japan Earthquake

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A catastrophic earthquake occurred off the Pacific coast of Japan on 11 March 2011, striking the north-eastern part of the country. The earthquake was followed by huge tsunamis, which destroyed many coastal cities and towns. Many displaced people moved into shelters or temporary homes supplied by the government, not only because of disruptions to community utility services but also because of health risks associated with nuclear power plant malfunctions in Fukushima. In this review, we summarize the characteristics of illnesses that occurred in the aftermath of this earthquake, including respiratory tract infection (tsunami-related aspiration pneumonia, legionellosis and influenza), wound infection (tetanus) and other infections (food poisoning, tsutsugamushi disease and measles). Our review also outlines several activities concerning the management of illnesses and infection control.

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## 1. Introduction

On 11 March 2011, at 2:46 PM (Japan Standard Time), a catastrophic earthquake occurred off the Pacific coast of Japan, striking the northeastern part of the country. The earthquake was followed by devastating tsunamis, which destroyed many coastal cities and towns (Figure 1).<sup>1</sup> According to the Japan Meteorological Agency, the magnitude of this earthquake was Mj9.0. A huge number of aftershocks have continued to occur since the earthquake, even up to the time of writing this article (21 October 2011). The tsunamis, which reached heights of 10–38 m, completely destroyed more than 90% of the dwellings in the towns that they struck. According to the report by the National Police Agency of Japan, as of 21 October 2011, 15,828 people had died in this disaster, and 3760 individuals are still missing.<sup>2</sup> In addition, 302,066 homes were completely or partially destroyed, and 3559 roads were destroyed.<sup>2</sup> Many displaced people (peak number approximately 470,000 on 14 March 2011) were living in shelters or temporary homes supplied by the government, not only because of disruptions to community utility services but also because of health risks associated with nuclear power plant malfunctions in Fukushima.<sup>3,4</sup> In particular, 37,482, 35,923 and 25,501 people were residing in the 357, 403 and

157 evacuation centers located in Iwate, Miyagi, and Fukushima prefectures, respectively, as of 6 May 2011.

Patient information regarding hospital admissions for respiratory diseases in the aftermath of the Great Hanshin-Awaji Earthquake in 1995 was obtained using questionnaires.<sup>5</sup> The queries concerned individuals who were admitted from the day of the earthquake until 10 weeks later, and the total number of patients admitted with respiratory diseases was 148. Patients with lobar pneumonia or focal pneumonia, or both, accounted for 58.8% of the total, and those with upper respiratory tract infection made up 19.6%. These observations suggest that infectious diseases are among the main illnesses requiring hospital treatment in the aftermath of an earthquake, and that they may lead to disaster-related deaths among evacuees.

In this review, we summarize the characteristics of illnesses including respiratory tract infection (tsunami-related aspiration pneumonia, legionellosis and influenza), wound infection (tetanus) and other infection (food poisoning, tsutsugamushi disease, and measles) that occurred in the aftermath of the 2011 Great East Japan Earthquake. Our review also outlines several activities concerning the management and prevention of these illnesses.

## 2. Respiratory tract infection

After the tsunamis that occurred off the coast of Banda Aceh, Sumatra, Indonesia, in 2004, tsunami-related aspiration pneumonia with lung and brain abscesses probably caused by polymicrobial pathogens was documented in a 17-year-old girl with

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Figure 1 Sendai city destroyed by tsunamis.

respiratory distress and hemiparesis.<sup>6</sup> Likewise, Okinaga<sup>7</sup> has reported clinical aspects of tsunami-related pneumonia in the aftermath of the 2011 tsunamis at the annual meeting of the Japan Geriatrics Society (JGS). Fifty-six subjects having tsunami-related pneumonia were admitted in the period 11–31 March to Kesennuma City Hospital in Miyagi. This was a significantly greater number of patients than the 12 pneumonia cases admitted during the same period in 2010. Six subjects with pneumonia as a result of tsunami drowning were transferred to the hospital during 11–14 March, and the remaining patients having pneumonia not associated with the drowning, some of whom revealed a bilaterally diffuse bud-in-trees appearance on chest computed tomography (CT) scans, were admitted later. Forty-six (82.1%) of the tsunami-related pneumonia patients were aged 70 years or older. They had been living in evacuation centers ( $n = 25$ ), nursing homes ( $n = 11$ ), and their own houses ( $n = 10$ ) before admission, and seven (63.6%) of the 11 nursing-home residents died after admission, suggesting that this population might be at risk of poor prognosis. Seventeen individuals with shelter-acquired pneumonia (SAP), who were transferred to Tohoku University Hospital, have been described by Suzuki and her colleagues.<sup>8</sup> The mean age of the subjects in that study was 81.6 years (male:female ratio, 14:3), and all had a history of cerebrovascular accident or neurodegenerative disorder. The mean duration between arrival at the shelter and SAP onset was 15.2 days. Laboratory tests on admission showed low levels of serum albumin (2.6 g/dL), cholesterol (110 mg/dL), and peripheral blood lymphocyte count (1032/ $\mu$ L), with high serum C-reactive protein concentrations (21.1 mg/dL). Urine pneumococcal antigen test showed positive in three subjects. The chest CT scans indicated that consolidation was located in the lower part or the back of the lungs. In addition, the patients had both prolonged swallowing reflexes (4.1 seconds, normal <2.0 seconds) and low sensitivities of cough reflex (2.1 log mg/mL, normal <0.5 log mg/mL). These data suggest that silent aspiration might have triggered the development of SAP. Under the unfavorable circumstances found in shelters, the evacuees were forced to sleep on narrow spaces on the floor in a supine position, hesitated to cough in order to avoid making noise, and did not pay attention to their oral care (i.e., tooth brushing or cleaning false teeth). Guidelines for preventive interventions for SAP need to be established immediately.

According to a report from the Infectious Disease Surveillance Center of the National Institute of Infectious Diseases,<sup>9</sup> data

regarding legionellosis which occurred in stricken areas, are shown in Table 1. Four patients, including three adults and an infant, who were living in either Iwate or Miyagi, had been caught in the tsunami disaster on 11 March, and one of them died as a result of this illness. Since tsunami waters may contain soil microbes such as *Legionella* species, clinical doctors need to consider the possibility of legionellosis (incubation period 2–10 days) when examining and treating people suffering from pneumonia after a tsunami disaster.<sup>10</sup> Elderly evacuees under unfavorable circumstances have an increased risk for developing pneumonia, and those who aspirate a small amount of the organism may develop legionellosis. Ebisawa et al<sup>11</sup> have reported pulmonary co-infection of *Legionella* and multiple antibiotic-resistant *Escherichia coli* in a previously healthy 75-year-old woman, as a result of immersion in tsunami waters 1 km inland from the Pacific coastline following the 2011 Great East Japan Earthquake. This patient required drainage several times and long-term use of multiple antibiotics according to the bacteria observed and an antibiotic susceptibility test. Clinicians should be aware of infectious diseases caused by multiple pathogens, including *Legionella* species, in the environment following a tsunami.

After the Great East Japan Earthquake, survivors were exposed to cold conditions. Data on influenza virus detected during 12–21 March in and around Sendai city have been documented.<sup>12</sup> Of 1180 visits to Sendai City Emergency Center, 335 subjects received a rapid detection test for the influenza virus. The A type virus was found in 107 (31.9%) patients, while the B type virus was found in only five (1.5%) individuals. The Sendai Institute of Hygiene has reported dominant identification of subtype H3N2, suggesting that the subtype might be circulating in the area. Fortunately, influenza occurred sporadically among evacuees ( $n = 3$ ) and in support staff at the different shelters. Preseason vaccination against the influenza virus is recommended for elderly individuals and support staff.

### 3. Wound infection

An outbreak of tetanus was observed from December 2004 to January 2005 after tsunamis struck Aceh province, Indonesia.<sup>13</sup> A total of 106 patients with clinically diagnosed tetanus were reported in the first month after the disaster, and most cases occurred among adults. The mortality ratio was 18.9%, and was higher among older individuals and among those with short incubation periods. According to a report from the Infectious Disease Surveillance Center,<sup>9</sup> data regarding tetanus that occurred in the stricken areas in the 2011 disaster in Japan, are shown in Table 2. Nine patients, who were living in either Iwate or Miyagi, had already been injured in the disaster on 11 March. The median age of these subjects was 65 years (range, 56–82 years), and none died. Clinicians always need to consider the possibility of this infection when examining and treating individuals with injuries from tsunamis, especially those who have lockjaw and/or muscular contraction. In addition, preventive measures against tetanus, including both wound cleaning and immunization, should be performed in the context of the disaster.

Table 1 Data regarding legionellosis after the 2011 Great East Japan Earthquake

Case no.	Area (prefecture)	Age (years)	Onset date	Diagnosis date
1	Iwate	2	3/11/2011	3/31/2011
2	Miyagi	70s	3/17/2011	3/17/2011
3	Miyagi	60s	3/18/2011	3/20/2011
4	Iwate	30s	NA	3/27/2011

NA = not available.

**Table 2** Data regarding tetanus after the 2011 Great East Japan Earthquake

Case no.	Area (prefecture)	Age (years)	Onset date	Diagnosis date
1	Miyagi	50s	NA	3/20/2011
2	Iwate	60s	3/19/2011	3/25/2011
3	Iwate	50s	3/21/2011	3/21/2011
4	Miyagi	60s	3/21/2011	3/25/2011
5	Miyagi	80s	3/22/2011	3/25/2011
6	Miyagi	60s	3/25/2011	3/27/2011
7	Miyagi	70s	3/25/2011	3/28/2011
8	Miyagi	60s	3/29/2011	4/1/2011
9	Miyagi	70s	NA	4/6/2011

NA = not available.

#### 4. Other infections

An outbreak of norovirus gastroenteritis among elderly evacuees following the 2007 Noto Peninsula Earthquake was documented.<sup>14</sup> There were 74 evacuees, including 61 elderly people, in the shelter where this outbreak occurred. Thirty-one evacuees with acute gastroenteritis, 29 of whom were aged 65 years or older, were examined and treated. Two patients developed aspiration pneumonia and were admitted to the hospital. A medical aid team instructed all the evacuees on personal hand-washing, gargling and the use of disinfectants on environmental surfaces. Few subjects with gastroenteritis were reported in the center 1 week later. After the 2011 earthquake, medical care providers (MCPs) should pay attention to the possible spread of gastroenteritis, diarrhea, and other illnesses caused by contaminated drinking water and food.<sup>15</sup> Fortunately, the gastroenteritis occurred sporadically, not epidemically, at the stricken areas during acute and subacute stages after the disaster.<sup>16</sup> In June 2011, food poisoning caused by *Clostridium perfringens* occurred through the food provisions of support staff living outside the stricken areas.<sup>17</sup> Volunteers should take maximum precautions against food contamination.

Before the 2011 disaster, Tsutsugamushi disease in people infected with *Orientia tsutsugamushi* was endemic in Fukushima in spring and autumn. Therefore, the disease occurrence through a landslide caused by the earthquake is considered a serious problem.<sup>18</sup> However, epidemiological reports regarding this infection have not been performed.

Measles transmission following tsunamis was observed in India in 2004–2005.<sup>19</sup> On 30 March, 2011, a healthy foreigner visited Japan to collect data at the stricken areas, and then suffered a fever and systemic eruption on 6 April. The patient was diagnosed with measles, based on detection of the virus (genotype D4) in a throat swab sample by reverse transcription-polymerase chain reaction assay.<sup>20</sup> Measles is a highly contagious infectious disease with a significant public health impact among displaced people, and it is necessary to strictly monitor its onset.

#### 5. Countermeasures

In April 2010, 10 members formed a study group on guidelines for first steps and emergency triage to manage elderly evacuees of natural disasters. Two types of guidelines were established: one for MCPs and another for non-MCPs (NMCPs) (the latter including, for example, volunteers, helpers and family members taking care of elderly relatives), public health nurses (PHNs), or certified social workers (CSWs). The guidelines for NMCPs, PHNs, and CSWs seemed to be more effective than those for MCPs, because there were limited MCP resources. The guidelines had three chapters as follows: (1) features and prevention of critical diseases in the elderly in evacuation areas; (2) signs of acute diseases in the elderly; and (3) symptoms of anxiety in the elderly at shelters.<sup>21</sup>



**Figure 2** A community center for evacuees at Higashi-Matsushima city.

After the 2011 earthquake, 20,000 guideline booklets were sent by members of the JGS and the Japan Medical Association Team (JMAT) to NMCPs, PHNs and CSWs working in Iwate, Miyagi (Figure 2), and Fukushima.<sup>22</sup> The JGS and JMAT members were dispatched to these areas to care for evacuees. NMCPs, PHNs, and CSWs used the booklets to detect illnesses rapidly in elderly evacuees at shelters or homes. The aim of this study is to reduce morbidity and mortality from disaster-related illnesses including infectious diseases (influenza, pneumonia, gastroenteritis, urinary tract infection, cellulitis, tuberculosis) in elderly evacuees. Surviving older adults were largely left to their own devices, and were marginalized at shelters. Elderly refugees tended not to talk about their problems, so their suffering tended to be underestimated.<sup>23</sup> It is therefore important for NMCPs, PHNs, and CSWs to quickly detect medical conditions in this population.

Kanamori and his colleagues have described infection control campaigns at shelters in Miyagi after the 2011 earthquake.<sup>24</sup> The Tohoku Regional Infection Control Network acted functionally and collaboratively on the activities at the shelters and hospitals at the stricken areas. This network had four main activities: (1) infectious disease consultation; (2) infection control educational programs and training; (3) infection control interventions; and (4) regional cooperation with local government against infectious diseases. Similar network activities will be performed in other areas in the future.

#### 6. Conclusion

A large number of evacuees were exposed to cold, unhygienic conditions and malnutrition because of power failures, insufficient food provision, and a lack of running water at evacuation centers (such as gymnasiums and school halls) after the 2011 earthquake. The refugees (especially elderly subjects and infants) faced the threat of infectious diseases. Therefore, MCPs, NMCPs, PHNs, and CSWs should pay special attention to medical conditions in these populations, because elderly or infant patients are susceptible to disaster-related death.

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LETTER TO THE EDITOR

# Actions of the Japan Geriatric Society in response to the 2011 off the Pacific Coast of Tohoku Earthquake: First report

Katsuya Iijima,<sup>1</sup> Kentaro Shimokado,<sup>2</sup> Takashi Takahashi,<sup>3</sup> Shigeto Morimoto,<sup>4</sup> Yasuyoshi Ouchi<sup>1</sup> and Members of JGS Disaster Supportive Center

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Dear Editor,

A huge earthquake occurred in Japan on March 11, 2011 at 2:46 PM (Japanese standard time). The Japan Meteorological Agency officially announced that this earthquake was named the “Off the Pacific Coast of Tohoku Earthquake” and had a magnitude of 9.0. This disaster presented several unique characteristics compared to previous earthquakes in Japan, including the great Hanshin-Awaji earthquake, because it brought about a large tsunami, resulting in exceptional damage in the northeast-east areas of Japan and destruction of many coastal cities.<sup>1</sup> According to the report by the National Police Agency of Japan, 15 413 people died as of June 11, approximately 90% of them drowned. In addition, the huge tsunami disaster took an unexpected turn, with 8069 persons still missing. This terrible disaster shows the uniqueness of this earthquake. Approximately 470 000 people had to be evacuated to shelters as a result of unavoidable circumstances at the peak (on 14<sup>th</sup> March), and around 100 000 people are still living in shelters. In addition, the huge tsunami unexpectedly resulted, not only in widespread destruction of communities, but also in nuclear power plant accidents in Fukushima, leading to the collapse of daily life of many residents.

The Japan Geriatric Society (JGS) immediately formed the Disaster Supportive Center on 18<sup>th</sup> March 2011 and took several steps to deal with this huge disaster. First, the JGS grappled with the issue of geriatric medicine in the disaster, in cooperation with the Study Group of the “Guidelines Regarding the First Steps and Emergency Triage to Manage Elderly Evacuees”. In the case of elderly victims, even after their safe evacuation to a refuge, it is possible that they may suffer from

disaster-related illnesses, including the deterioration of pre-existing illnesses, cerebro-cardiovascular disease, infectious disease, and mental stress. In general, these disaster-related illnesses are induced by numerous factors, such as psychological distress, dehydration, and sympathetic nerve hyperactivation, and can lead to fatal and non-fatal conditions. Simultaneously with establishing the guidelines, the Study Group and JGS also made a manual for non-medical care providers (NMCP; e.g. public health nurses and certified social workers). The aim of this simple manual was to help NMCP and/or the families of the elderly to quickly identify illnesses in elderly evacuees. The booklets were distributed to a widespread stricken area, mainly Iwate, Miyagi, and Fukushima prefectures, by JGS members and Japan Medical Association Teams in each prefecture. Therefore, our mission in the JGS, using both the guidelines and the manual, was to extend life-saving medical help to as many elderly evacuees as possible via the reduction of susceptibility to disaster-related illnesses and death.

Next, the JGS Supportive Center immediately decided to dispatch a medical support team to a refuge in Soma City, Fukushima, as well as visit Ishinomaki and Higashi-Matsushima, Miyagi, to investigate the damage situation for elderly victims. In addition, the JGS also sent a support team of physicians to Mitsuke, Niigata, which shares a border with Fukushima prefecture. Mitsuke City, with 42 500 residents, accommodated around 500 refugees in three shelters. Most of the refugees were from Minami-Soma City where it had been recommended that people evacuate because of the nuclear power plant accidents. Since Mitsuke City itself has been struck by natural disasters twice in the last 10 years, but had no damage from the earthquake this time, the quality of support to refugees here was quite

Letter to the Editor

1 different from that in the center of the area struck by the  
2 earthquake and tsunami (Abe Y *et al.*, unpubl. data.  
3 manuscript in preparation).

4 Now, beyond the chronic phase, elderly evacuees  
5 are being gradually shifted from shelters to temporary  
6 housing. However, it is possible that they may have  
7 serious new problems, they might lose stimulation  
8 from the outside world and become miserable (e.g.  
9 survival guilt and nightmares). These emotional  
10 changes may lead to a decline in cognitive function  
11 and disused muscle atrophy of their extremities while  
12 in temporary housing. Another goal of JGS is to  
13 prevent a decline in the cognitive and functional abili-  
14 ties of the elderly in the long term through multidis-  
15 ciplinary support. The JGS needs to carry out a  
16 longitudinal investigation to clearly address the psy-  
17 chological distress and somatic symptoms in elderly  
18 victims based on posttraumatic emotional stress with

19 exposure to disastrous conditions. In addition, the  
20 development of a national disaster plan for mental  
21 health in the elderly may also be required.

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portive Center consists of Ouchi Y, Shimokado K, Ito  
H, Oba K, Iwamoto T, Akishita M, Kozaki K, Eto M,  
and Iijima K.

**Reference**

1 Shibahara S. The 2011 Tohoku earthquake and devastating  
2 tsunami. *Tohoku J Exp Med* 2011; **223**: 305–307.



TUG groups. The difference in SPMT score at the second follow-up lost significance after additionally controlling for the baseline value.

## DISCUSSION

This study found that the gait speed and mobility were associated with global cognitive function after 3 years and were cross-sectionally associated with executive and memory functions. The results could suggest that slowing of mobility can be observed before decline in global function and coinciding with impairment in executive and memory functions in people aged 80 and older. These findings based on octogenarians and nonagenarians in Okinawa, Japan, known for their longevity, give additional generalizability to previous findings.<sup>2,10</sup> This association has potentially important implications for early detection of cognitive impairment in older people.

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**Author Contributions:** The authors are fully responsible for the study concept and design, methods, analysis, interpretation, and manuscript preparation.

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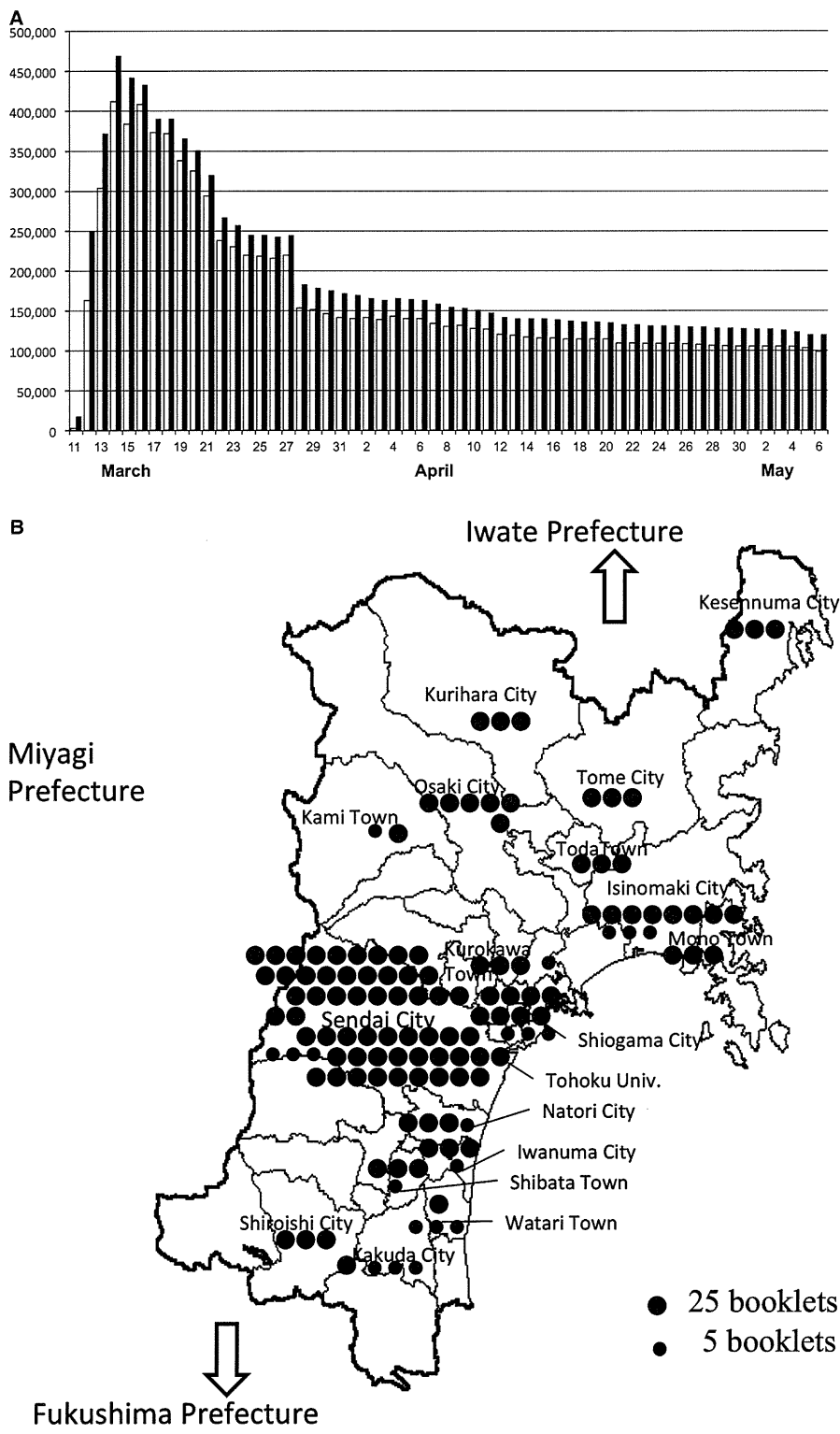
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## COMMENTS/RESPONSES

### GUIDELINES FOR NON-MEDICAL CARE PROVIDERS TO DETECT ILLNESSES IN ELDERLY EVACUEES AFTER THE 2011 EARTHQUAKE OFF THE PACIFIC COAST OF TOHOKU

*To the Editor:* On March 11, 2011, at 2:46 p.m. (JST), a strong earthquake occurred off the Pacific coast of Japan and hit the northeast part of the country. Devastating tsunamis followed that destroyed many coastal cities.<sup>1</sup> The magnitude of this quake according to the Japan Meteorological Agency was Mj9.0. A huge number of aftershocks continued after the quake, even now (May 6, 2011). According to the report by the National Police Agency of Japan, as of May 6, 2011, 14,841 people had died in this disaster, and 10,063 were still missing.<sup>2</sup> In addition, 109,086 homes were completely or partially destroyed, and 3,970 roads were disrupted.<sup>2</sup> As shown in Figure 1A, 119,967 displaced people (peak number approximately 470,000 on March 14, 2011) were still living in shelters supplied by the government as of May 6, 2011, because of disruption of community utility services and health risks of nuclear power plant accidents in Fukushima.<sup>2,3</sup> In particular, 37,482, 35,923, and 25,501 persons took refuge in the 357, 403, and 157 evacuation centers located in Iwate, Miyagi, and Fukushima prefectures, respectively.<sup>2</sup>

Drs. Shigeto Morimoto and Takashi Takahashi reported an outbreak of norovirus gastroenteritis in elderly evacuees after the 2007 Noto Peninsula earthquake in Japan.<sup>4</sup> There were 74 evacuees, including 61 elderly persons, in the shelter where the outbreak occurred.<sup>4</sup> Thirty-one evacuees with gastroenteritis, 29 of whom were aged 65 and older (mean age 76 ± 7), were examined and treated.<sup>4</sup> This experience suggests that elderly victims are more susceptible to disaster-related illnesses (i.e., infectious diseases, exacerbation of underlying illnesses, and mental stress) and disaster-related death. Therefore, a plan to establish guidelines to detect illnesses and perform triage rapidly in elderly evacuees was necessary. In April 2010, the six authors of the



**Figure 1.** (A) Variations in number of evacuees from March 11 to May 6. Black and white bars denote total number of evacuees in Japan and number of persons still evacuated in Iwate, Miyagi, and Fukushima prefectures, respectively. (B) Distribution of guideline booklets to detect illnesses in elderly evacuees in Miyagi prefecture. These were distributed in the largest city, Sendai, where most people in this prefecture were living. Large and small closed circles indicate 25 and 5 booklets, respectively.

current letter formed the Study Group of “Guidelines Regarding the First Steps and Emergency Triage to Manage Elderly Evacuees” under a grant-in-aid for scientific research from the Ministry of Health, Labour, and Welfare of Japan.

Two types of guidelines were established: one for medical care providers (MCPs) and the other for non-MCPs (NMCPs, e.g., public health nurses and certified social workers). The guidelines for NMCPs seemed to be more effective

than those for MCPs, because there were limited MCP resources. The guidelines had three chapters: features of critical illnesses and prevention, acute symptoms, and chronic symptoms in elderly evacuees. For NMCPs to be able to understand the contents easily, it was written concisely.

One week after the 2011 earthquake off the Pacific coast of Tohoku, the guideline booklets were sent through members of the Japan Geriatrics Society (JGS) or the Japan Medical Association Team (JMAT) to NMCPs working in Iwate, Miyagi, and Fukushima. JGS and JMAT members were dispatched to these areas to care for evacuees. NMCP staff used the booklets to detect illnesses rapidly in elderly evacuees in shelters or homes. For example, the booklets were distributed in the largest city, Sendai, where most people in Miyagi were living (Figure 1B). The aim was to reduce morbidity and mortality from disaster-related illnesses in elderly evacuees. An investigation of the differences in morbidity and mortality between areas where the guidelines were and were not applied is planned.

The Japanese people had already experienced another strong quake, the Great Hanshin earthquake, which caused serious damage in the Kobe area on January 17, 1995. This disaster also hit the elderly population of an urban society particularly hard. More than half of the deaths were in those aged 60 and older, and in this age group, female mortality was almost double that of men.<sup>5</sup> Surviving older adults were largely left to their own devices and were marginalized in shelters. Elderly evacuees tended not to complain about their problems, so their suffering tended to be underestimated,<sup>5</sup> and it is therefore important for NMCPs to detect medical conditions quickly in elderly evacuees.

The situation of the recent disaster is different from that of the Great Hanshin quake in terms of the presence of tsunamis and nuclear power plant accidents. The recent quake's epicenter was located beneath the sea and caused huge tsunamis, whereas the Hanshin quake's epicenter was under the land and did not cause tsunamis. Most of the deaths were a result of the tsunamis this time, whereas the victims of the Hanshin quake were related to structure collapses and fires. Moreover, the recent evacuees in Fukushima are at short- and long-term health risks from the nuclear power plant accidents.<sup>3</sup> Therefore, a survey of the morbidity and mortality from disaster-related illnesses in elderly evacuees in Iwate, Miyagi, and Fukushima is needed.

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### GAIT VELOCITY VERSUS THE TIMED UP AND GO TEST: WHICH ONE TO USE FOR THE PREDICTION OF FALLS AND OTHER ADVERSE HEALTH OUTCOMES IN PRIMARY CARE?

*To the Editor:* We read with great interest the recent article by Viccaro and colleagues in which they evaluated the predictive ability of the Timed Up and Go Test (TUG test) and gait velocity (GV) for falls and other adverse health outcomes.<sup>1</sup> Gait velocity predicted most geriatric outcomes, as did the TUG, and GV took less time to complete and demonstrated better prediction in individuals with intermediate (TUG = 12–15 seconds, GV = 0.6–1.0 m/s) and slow test performance (TUG < 12 seconds, GV < 0.6 m/s).

An important consideration when applying mobility measures across the spectrum of older people is the level



## COMMISSION REPORT

# Guidelines for non-medical care providers to manage the first steps of emergency triage of elderly evacuees

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On 11 March 2011, a strong earthquake occurred off of Japan's Pacific coast and hit northeastern Japan. The earthquake was followed by huge tsunamis, which destroyed many coastal cities. As a result, the Study Group on Guidelines for the First Steps and Emergency Triage to Manage Elderly Evacuees quickly established guidelines enabling non-medical care providers (e.g. volunteer, helpers, and family members taking care of elderly relatives), public health nurses, or certified social workers to rapidly detect illnesses in elderly evacuees, and 20 000 booklets were distributed to care providers in Iwate, Miyagi, and Fukushima prefectures. The aim of this publication is to reduce susceptibility to disaster-related illnesses (i.e. infectious diseases, exacerbation of underlying illnesses, and mental stress) and deaths in elderly evacuees. **Geriatr Gerontol Int 2011; 11: 383–394.**

**Keywords:** earthquake, elderly evacuee, emergency triage, guidelines, non-medical care provider.

## Background

Japanese people have already experienced a variety of natural disasters including earthquakes,<sup>1</sup> typhoons,<sup>2</sup> tsunamis,<sup>3</sup> and others. It is very important to manage

the medical care of elderly evacuees in the wake of disasters because: (i) elderly subjects (especially those needing to live in shelters) may suffer excessive mental and/or physical stress under the altered environment; and (ii) it is difficult to maintain medical management of chronic illnesses (e.g. hypertension, diabetes mellitus, cerebrovascular or cardiac disease) when care has already been started at local medical institutions. It was reported that acute risk factors possibly triggered cardiovascular events in hypertensive elderly patients after the Hanshin-Awaji earthquake.<sup>4</sup> Increased incidence of transient left ventricular apical ballooning (takotsubo cardiomyopathy) was also described after the Mid Niigata Prefecture Earthquake of 2004.<sup>5</sup>

In April 2010, the Study Group on "Guidelines for the First Steps and Emergency Triage to Manage Elderly

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**Authors' contributions:** Shigeto Morimoto and Takashi Takahashi contributed to the study concept and design. Masafumi Kuzuya, Hideyuki Hattori, and Koichi Yokono performed acquisition of data. Katsuya Iijima and Shigeto Morimoto analyzed and interpreted the data. Takashi Takahashi and Shigeto Morimoto prepared the manuscript.