

# Emerging role of dental professionals in collaboration with medical personnel in disaster relief following the 2016 Kumamoto earthquakes: implications for the expanding scope of dental practice

## INTRODUCTION

In 2011, the Great East Japan Earthquake struck east Japan, causing Japan to enter a period of high earthquake activity<sup>1</sup>. On 14 and 16 April 2016, earthquakes with magnitudes measuring 6.5 and 7.3, respectively, caused severe damage in Kumamoto Prefecture. Two-hundred and sixty-four people were confirmed dead; 50 deaths were directly caused by the earthquakes and 214 deaths were caused by earthquake-related factors. The peak number of evacuees was 183,882 people, total financial damage was 4.6 trillion yen (approximately 43 billion US dollars), 191,599 houses were damaged and numerous roads and rail lines were destroyed<sup>2</sup>. We participated in a dental support mission in the Minami-aso area, where essential utility lifelines were damaged.

The Minami-aso area was the area most heavily affected by the earthquakes. As a result of collapse of the Aso Bridge, severe damage to the Tawarayama Tunnel and destruction of numerous roads caused by the second earthquake on 16 April, the Minami-aso area became temporarily isolated. The Minami-aso municipal assembly reported that 27 residents died out of a population of 11,619<sup>3</sup>. Approximately 2,761 homes were damaged and 692 houses collapsed completely, comprising 94.8% and 23.8% of all buildings in Minami-aso, respectively<sup>3</sup>. The peak number of evacuees reached 3,043 on 17 April<sup>4</sup>. The Japan Self-Defense Forces conducted disaster relief operations immediately after the earthquakes occurred, allowing aid to reach the Minami-aso area, including our dental support mission.

Dental professionals play an important role during natural disasters. One of the conventional roles of dentists is to identify dead bodies by tooth and dental treatment information<sup>5–7</sup>. This method is particularly effective and many people have been successfully identified, even when their bodies have been

damaged, such as during the 2004 Indian Ocean earthquake<sup>8</sup>.

Dentists also play a role during the aftermath of natural disasters, as described in two recent reports. One report described cavity-prevention efforts in disaster-affected children<sup>9</sup>. Eating habits often change in disaster areas, and the importance of oral hygiene practices is often diminished because other issues are seen as more pressing. Another report demonstrated a relationship between disaster areas and pathogenesis of oral candidiasis<sup>10</sup>. Thus, other dental challenges may arise in disaster areas.

One emerging challenge in the dental field is to prevent aspiration pneumonia following disasters. In the 1995 Great Hanshin-Awaji earthquake, the most frequent cause of earthquake-related death was pneumonia<sup>11</sup>. Pneumonia-related deaths were also significantly increased in the aftermath of the Great East Japan Earthquake<sup>12</sup>. Of the affected people who died of pneumonia, most cases were in older adults with aspiration pneumonia. Older adults requiring care are at great risk of disaster-related death.

In the present dental support mission, one of the objectives was to prevent disaster-related death by aspiration pneumonia. Our dental team provided support for dysphagia rehabilitation (e.g. eating instructions or swallowing training) in the aftermath of the 2016 Kumamoto earthquakes in collaboration with medical staff. The aim of this paper was to describe our dental support mission during the 2016 Kumamoto earthquakes.

## OUTLINE AND AIM OF THE DENTAL SUPPORT MISSION

We conducted a dental support mission in Minami-aso from 24 April 2016 to 1 May 2016. Fukuoka Dental College sent two dentists and two dental hygienists to Minami-aso at the request of the Japan Dental Association. The dental support mission (first

team) started on 23 April, and we joined the team on 24 April. Local dental professionals, the Fukuoka Dental Association team and teams from dental colleges in Fukuoka Prefecture also joined the dental mission. The mission was supervised by the Aso Disaster Recovery Organization and was conducted in cooperation with various professional personnel, including medical support teams, non-profit organisations and nursing, pharmacist and dietitian teams. The aims of the dental support mission were to provide dental checkups in evacuation centres, to prevent disaster-related death by aspiration pneumonia, and to aid in the recovery of the dental practice system. To achieve these aims, members of the Fukuoka Dental College support team were selected from among experienced staff members of the Center for Visiting Dental Care and Division of Gerodontology. One dentist had participated in a dental support mission during the Great East Japan Earthquake and another dentist had experience in providing swallowing training to dysphagia patients with medical staff collaboration.

This study was conducted in full accordance with the World Medical Association's Declaration of Helsinki. We obtained verbal consent from all participants and directors of nursing homes. This study has not been independently reviewed; it was exempt from the usual ethical approval process and was approved by Fukuoka Dental College Ethics Committee in an expedited review.

### **ORAL HEALTH RAPID ASSESSMENT USING A STANDARDISED SYSTEM**

Oral health assessments by the Fukuoka Dental College team were started on 24 April as designated dental support activities. Subjects requiring assessment were prioritised. A team of volunteers from the general populace informed us of crisis situations in nursing homes using a social networking service, allowing us to quickly understanding the problems that needed attention. Facilities and affected people were separately assessed using standardised assessment sheets<sup>13</sup> produced by the Japan Dental Association. Facilities were assessed for their general condition, oral hygiene tools and environment, need of dental treatment and dental practice system. Affected people were assessed for major complaints, oral symptoms and oral hygiene level (only when a need for intervention was determined to exist). Oral health was assessed using the Oral Health Assessment Tool (OHAT)<sup>14</sup>, and dietary condition was evaluated during the assessment of affected people. Both were very effective in assessing evacuees' condition, and the OHAT was also useful for handoff communication. Our team assessed 392 affected people at 27 facilities within 8 days.

### **ORAL HEALTH CARE AND DENTAL TREATMENT**

We provided oral health care and dental treatment to affected people who needed treatment according to individual assessments. These interventions started on 25 April in nursing homes, evacuation centres and among local residents. Because of cooperation with local dental personnel in Minami-aso, we were able quickly assessing the situation and efficiently provide support to the various ongoing missions. A few dental clinics reopened within a week after the disaster, and we sent patients, who were in good general condition, to these clinics. Two dentists and two dental hygienists cared for approximately 20 residents per day, and 125 residents were assessed per week. Oral health-care intervention was required in 77 cases, dental treatment was required in 27 cases and dysphagia rehabilitation was required in 11 cases; however, identification of bodies was not necessary. Oral health care was provided by a dentist and a hygienist, one of whom provided care while the other kept records.

### **COLLABORATION WITH NUTRITIONISTS AND MODIFICATION OF THE SOUP KITCHEN MENU**

We soon concluded that dietary instruction would be important for dysphagia rehabilitation. The Japan Medical Association Team also recognised the importance of nutritionists for patients with diabetes and renal disease. We consulted with Minami-aso village workers and medical staff, and The Japan Dietetic Association-Disaster Assistance Team was sent from The Kumamoto Dietetic Association. After discussions with the nutrition team, thickening agent for drinks and specific diets for patients with diabetes and renal disease were secured. In addition, the soup kitchen menu was modified so that the large rice balls being given to most evacuees were converted into standard-sized rice balls and rice gruel, after consultation with the Japan Self-Defense Forces. These dietary modifications enabled provision of appropriate diets to the affected people.

### **INDIVIDUAL INSTRUCTION FOR DYSPHAGIA REHABILITATION**

Human resources were secured to support medical and dental missions in providing individual instruction for dysphagia rehabilitation. We accompanied various medical staff to care venues, especially nursing homes, in which we observed affected people during meal-times (meal rounds) and provided individual dietary support. Individual support included making food-texture modifications, such as the addition of thickening agents to drinks and teaching appropriate eating methods to prevent aspiration pneumonia (*Figure 1*). Dentists also directly instructed those with dysphagia

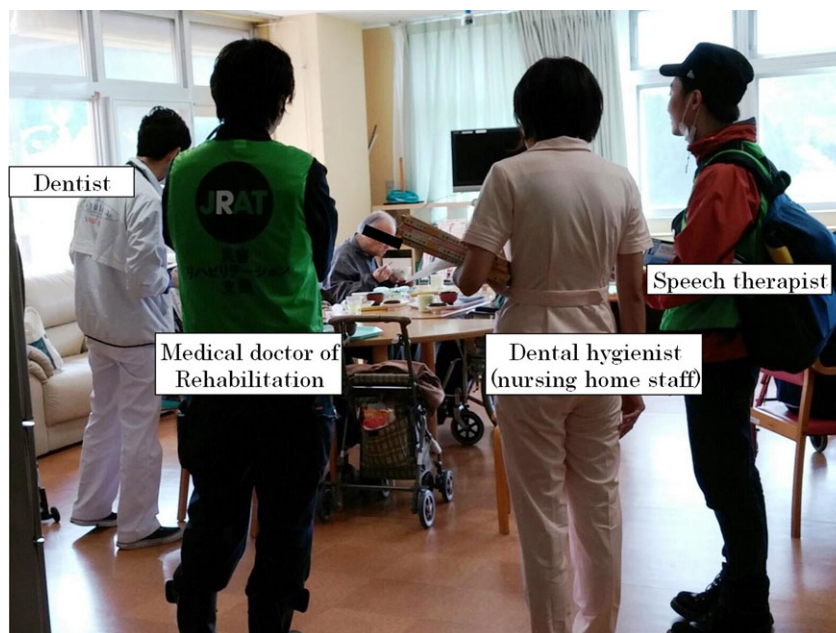


Figure 1. Meal rounds with various medical personnel who provided instruction about appropriate food-texture modifications in nursing homes.



Figure 2. A dysphagia patient receiving eating instruction from the Fukuoka Dental College team.

in eating methods to prevent aspiration pneumonia (Figure 2). In this dental mission, active information exchange with medical staff was necessary. Our cooperation with the Japan Rehabilitation Assistance Team aided in their efforts to prevent increased occurrence of disuse syndrome and pulmonary embolism. This collaboration was effective because many affected people had similarly high risks of disuse syndrome. At our request, the public health nursing team provided oral hygiene instruments to public health nurses for

house calls, and other medical staff provided us with clinical information.

#### ACHIEVEMENTS OF THE DENTAL SUPPORT MISSION

In this mission, we assessed 392 affected people at 27 facilities and provided oral health intervention for 125 affected people. By immediately requesting a nutrition team, the soup kitchen menu offered by the

Japan Self-Defense Forces was appropriately modified to meet the needs of affected people. In addition, dysphagia rehabilitation support was provided with cooperation from various medical personnel. Because of these strategies, there was no significant increase in aspiration pneumonia cases, and oral infection prevention efforts were resumed soon after the disaster. Moreover, we engaged in numerous positive interactions with other health-care teams. The teams consulted with us about the dental support team's assessment system and worked together to share information about issues such as the general condition of affected people or their activities of daily living.

## SUMMARY AND DISCUSSION

This dental support mission, which was initiated 8 days after the 2016 Kumamoto earthquakes and continued for 3 weeks through the rotation of teams and members, provided oral health care, instruction for dysphagia rehabilitation, and other support in collaboration with nutritionists, rehabilitation teams and various medical personnel. Because of these interventions, one of the main objectives – prevention of disaster-related death by aspiration pneumonia – was achieved.

We are confident that frequent oral health care, food modifications and the information about affected people with dysphagia shared with us by various medical staff helped us to prevent deaths from aspiration pneumonia. Moreover, cooperation with local medical or care personnel was crucial in efficiently implementing the dental support mission.

However, some disaster-related deaths occurred from non-pneumonia-related factors, such as pulmonary embolism or disuse syndrome. The common feature of these cases was frailty. Our dental team provided care to many frail affected people, and we attempted to disseminate relevant patient information to various medical personnel. For instance, the dental team joined the Aso Disaster Recovery Organization, which was under the jurisdiction of the Kumamoto Prefecture disaster management headquarters. The Aso Disaster Recovery Organization meeting was held with various medical staff, and we relayed patient information to these teams. Moreover, we participated in meal rounds with the medical rehabilitation staff of nursing homes and worked closely with various medical personnel in a variety of venues. This mission was revolutionary for the dental team because many previous dental support missions in Japan were conducted with only dental staff. Although some efforts were required to encourage more cooperation between dental and medical staff, this was necessary to prevent disaster-related death in frail affected people.

Although it proved to be adequate, the assessment system used in this mission requires improvement.

The individual assessment sheet was particularly inconvenient. Thus, we began to use the OHAT in the middle of the mission. Visual or simple assessment sheets, such as the OHAT, are desirable in disaster settings, such as this mission. Moreover, assessment tools that allow those without professional dental knowledge to assess oral conditions enable dental professionals to focus more on providing care.

One limitation of this report was a lack of knowledge of the role of dental professionals in health-care teams. In Japan, dentists actively provide dysphagia rehabilitation. The role of dental professionals during disasters in other countries may vary, although dental professionals are presumed to help maintain dietary habits by providing oral health care. Understandably, dental professionals cannot provide care beyond their dental expertise. It is expected that further strong earthquakes on active fault zones, such as the Nankai Trough or East Nankai, will occur in Japan<sup>15</sup>. Therefore, the role of dental professionals must constantly change to meet the needs of the community during natural disasters.

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## Conflicts of interest

None declared.

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