

Forensic aspect of disaster casualty management

Tsunami Victim Identification in Thailand

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Introduction

On December 26, 2004, a 9.0 Richter scale earthquake occurred north of Sumatra Island. (1) The result of this extensive earthquake caused a huge tsunami which later struck many countries on the coast of the Indian Ocean causing nearly 217,000 deaths and approximately 125,000 injured. In recorded history it is the largest number of deaths caused by a tsunami (1). After the earthquake, the tsunami hit Thailand at Kata and Patong beach in Phuket first. The height of the waves was about 4-5 meters (2). Less than 10 min later, the tsunami struck the Khao-Lak area, a renowned tourist attraction site. The height of the waves at Khao-Lak was even higher, up to 10 meters (2). Within a half an hour of the strike, the areas were flood and subsequently covered by mud and debris. An estimated 8,500 victims were injured and 5,395 were killed by the tsunami. The force of the waves destroyed everything in its path. The Thai authorities together with volunteer rescue teams from across Thailand and other nations mobilized to rescue and treat the victims.

The tsunami caused the largest number of deaths from a single incident in modern Thai history with Phang Nga Province suffering the highest number of fatalities lined formally pristine beaches or were scattered under rubble and pools of water. This devastation was beyond the scope of existing mass disaster planning. As the magnitude of the disaster unfolded it required all of the emergency response resources of the Thai government and the assistance of resources from many other countries.

Table 1. The number of deaths in each province reported by the Thai authorities (3)

Province	No. of Thai death	No. of foreign death	Undetermined nationality	Total
Phang Nga	1,266	1,633	1,325	4,224
Krabi	357	203	161	721
Phuket	151	111	17	279
Ranong	156	4	0	160
Trang	3	2	0	5
Satun	6	0	0	6
Total	1,939	1,953	1,503	5,395

Source: Department of Disaster Prevention and Mitigation, Ministry of Interior (as of 24-3-05)

Under the Thai law, a forensic investigation is required for these types of deaths. In general, the purpose of an investigation is to identify the victim, to determine the time and place of death along with the cause and manner of death. In the case of the tsunami disaster, the main purpose of the forensic investigation is the identification of victims.

Management of dead bodies

Every disaster occurred in Thailand will be under the responsibility of the Department of Disaster Prevention and Mitigation (DPM) of Ministry of Interior, however, this tsunami devastation was over the expectation of the Thai government. The responsible institution was not clear or well organized in the first few days, especially dealing with dead bodies. December 29, 2004, the DPM took responsibility and provided the guideline for management of dead bodies. At the same time, the DPM ordered that the victim identification in all five provinces be consolidated under the control of the Royal Thai Police. The Phang-Nga province, was left under the responsible of the Forensic Science Institute, Ministry of Justice (4). The victim identification committee chaired by the Minister of Interior then was set up later on January 13, 2005. The management of dead bodies was supported by many institutes and organizations, for instance, universities, military, local government, police, public health personnel, non-government organizations and other volunteers.

Search and recover of the dead bodies.

The recovery of dead bodies was conducted by the local government, military and volunteer rescue team from charity foundations. After rescue survivor victims, the teams were searching death people and transferred these bodies to temporary morgues nearby. The searching teams did not label the number to the bodies, nor map the location the bodies found. This operation was not under one central commander.

Victim identification in the early phase

After many deaths were reported, with no forensic team in the affected areas, forensic and other relevant professionals from other regions of the country self reported to the disaster sites. They came from police headquarter, service institutes and academic institutes. Most of them moved into the affected areas a day after the disaster. Without a central command for the whole disaster victim identification at the start of the disaster, each team set up their temporary morgues, mostly located in Buddhist temples.

A forensic examination site was established in Phuket and Krabi provinces. In Phang-Nga, there were at least five examination sites, two of them located in Ta-Kua-Pa district which had the highest number of deaths. Each forensic team prepared its relevant staff as well as necessary equipments and supplies. However, the numbers of cases were higher than anyone could expect and more staff was needed. Thousands of volunteers soon arrived and tried to help as much as they could. They assisted in transferring the bodies, tagging and numbering, cleaning the bodies, etc. The government authorities as well as the Ministry of Public Health also provided additional equipment and supplies.

The deceased bodies were recovered and transferred to these morgues by rescue teams. Without any refrigerated container nor method to preserve the bodies, the forensic teams had to examine the bodies quickly as before the corpses decomposed. The forensic teams recorded external appearances, personal belongings and specific marks on the deceased following their protocols. Photographs were taken in almost every case, mostly using digital cameras. About 600 deceased were fingerprinted by forensic science police. The reasons not all of the bodies were fingerprinted due to the lack of cooperation between relevant authorities, not enough fingerprint experts and bodies decomposition.

On the fifth day after the disaster, volunteer dentists were deployed to the ground by the Thai Dentist Council to conduct dental examinations. About 550 Thai dentists around the country involved in this operation and most of them were not in the forensic field before. DNA specimens were collected from all of the bodies. In the first few days before the bodies decomposed, buccal mucosa, hairs and muscle tissues were collected. The rib, tooth and femur were used in decomposed corpses. These specimens were sent to DNA laboratories in Thailand, mainly, in Siriraj hospital, Ramathibody hospital, Forensic Medicine of the Royal Thai Police, and Institute of Forensic Medicine, Ministry of Justice.

Identification and Release bodies in the early phase

There were about 500 bodies identified at scene by their families and released by the local authorities. Thai forensic teams examined more than 3,600 cases and released about 1,100 cases (Table 2). These early examinations were conducted with limited resources and limited cold storage for dead bodies. During the first few days when bodies were still quite intact, the identification was confirmed mainly by external appearances and physical evidences. The longer the time, the more difficult to identify the body due to decomposition. However, there were 111 victims identified and released based on dental records examined by the Thai Dentist team (tables 3).

Table 2. Summary of identifications, examinations and releases by Thai forensic teams

No. of deaths	Identified by local authorities	Examined by Thai Forensic team before TTVI	Released by Thai Forensic team before TTVI
5395	560	3,698	1,151

Data on April 18, 2005

Table 3 Summary of victims identified by Dental examination during the early phase

No. of deaths	Dental examination by Thai Dentist team	Identified and released based on Dental records
5395	2070	111

Data on April 18, 2005

Victims Identification under the TTVI operation

After the disaster there were a number of deaths including of many foreign tourists in Thailand (1). The Interpol offered the assistance and sent a representative to Thailand for the assessment of the situation. Subsequently, the Interpol arranged an urgent meeting in the head quarter on Jan 5, 2005 (5). The disaster victim identification (DVI) teams from many countries then were deployed to the southern of Thailand.

The Royal Thai government also realized that bodies were getting more decomposed making identification difficult. So the experience teams were needed to facilitate the identification and return the bodies back to their homeland. The Thai government then ordered that identification efforts be consolidated under one Thai Tsunami Victim Identification (TTVI) operation under the control of Thai authorities (6). The fundamental aspect of the TTVI operation is the international cooperation under Thai authority to provide equitable treatment to all dead bodies and to apply the same standards for identification to everyone.

Identification and Release of the bodies under TTVI

Under the TTVI operation, the I-DVI teams had examined more than 3,600 bodies including additional body examinations. Regardless of nationalities, all the corpses were collected all relevant information necessary for identification. As of April 18, 2005, there are 1,369 bodies identified whereas 2,242 ante mortem information documents from victim's families come to the TTVI-IMC. With in these ante mortem records, there are only 368 records from Thai victim families. This might reflect the accessibility of Thai victim families to provide their information to the center. There are 2,315 bodies left waiting to be identified.

Table 4 Summary of identifications, examinations and releases by TTVI up to April 18, 2005

Examined by TTVI (including additional examination)	Identified and released by TTVI	Bodies unidentified
3,684	1,369	2,315

Source: TTVI on April 18, 2005

Up to now, the important evidence used for identification is dental records. About 86% of identification is based on dental records and about 12% is fingerprint and less than 0.5% is relied on DNA results. Since bodies were deteriorated, physical appearance does not play that much role in the identification as primary evidence.

Table 5 shows the reconciled bodies by primary evidence.

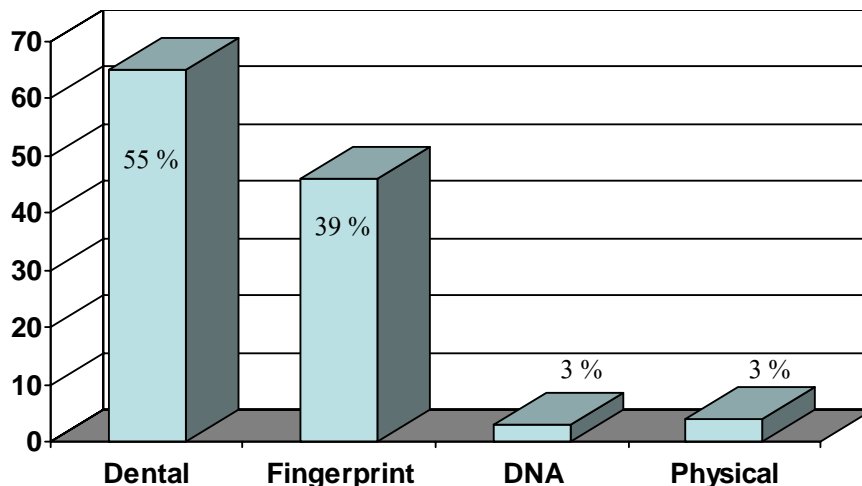
Primary evidence							
Dental		Fingerprint		DNA		Physical	
number	%	number	%	number	%	number	%
1,174	85.5	172	12.6	6	0.4	17	1.2

Source: TTVI on April 18, 2005

The bodies identified so far were from 33 nationalities. Within 5,395 reported deaths, the bodies identified and released by any mean are 3,080 cases. There are 2,315 bodies left which is approximately 43% of total deaths in Thailand, waiting for identification.

After consolidation of the victim identification into one system, all Thai bodies were collected more evidences for identification. Fingerprint plays much more important role in identification of Thai citizens. As shown in Figure 1, there were 118 Thai bodies identified under TTVI, 55 % of them based on dental record while almost 40 % relied on the fingerprint. This number will be increased since more ante mortem fingerprints are received from Thai victim families.

Figure 1 Reconciled Thai victims by primary evidence under TTVI (after Feb 3, 05)



Source: TTVI on April 18, 2005

Conclusion

Tsunami attacked on December 26, 2004 caused numerous of health problems in Thailand and the death of over 5,000 people. The situation was apparently exceeded the available response resources. The lack of a central command center and the national mass fatality plan at the start of the disaster are important problems. And this did slow down the victim identification process. The identification at the early period mostly relied on external appearances. Without the cold storage of the bodies was pressure on the forensic investigation teams. The system of numbering and labeling the bodies was not well organized at the beginning caused difficulty in tracking the bodies later on. Shortage of forensic experts caused incomplete data collection from the every corpse.

When the bodies were decomposed, additional means of identification are needed. Both Thai authorities and the Interpol set up the Thai Tsunami Victim Identification to assist the identification of all victims without any races or ethnicity discrimination, in order that all victims can be returned to their loved ones. More than 600 DVI personnel from 29 countries and hundreds of Thai scientists and officers have worked together under the TTVI operation. All the bodies were completely examined under Interpol DVI guideline. Until now more than 1,300 bodies were identified under the TTVI process. The most important evidence using in body's identification is dental record, especially with the victims from European countries. A fingerprint is the second most evidence used. DNA, in contrast, expected to play an important role, is found to be less useful. Not only its high cost, DNA analysis is also time consuming and it may face the problem of decomposition of specimens. At the mid of April 2005, there are 2,315 bodies which is about 43% of deaths in Thailand left waiting to be identified and returned to their homeland. Even though relevant information were collected from all the deceases, body identification may not proved due to lack of ante mortem data from victims' relatives.

From this devastating incidence, it is clear that Thailand needs a national mass fatality response plan. The country has to have the national system for mass victim identification. This includes personnel recruitment, corpse storage and examination, ante mortem data collection, data management, most importantly family assistance. Without the proper system for identification process, it can cause hazard to living people (7). In term of victim families, it leads to mental problem until their loved ones are identified and brought home. Although the situation in Thailand is not in an

ideal condition, relevant professionals had deal with numerous of corpses. But if the nation has a plan to deal with this issue together with international assistances, the problem of dead body management would be solved in a better manner and may be faster and less expensive.

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