CASE REPORT

# Medical Response of a Physician and Two Nurses to the Mass-Casualty Event Resulting in the Phi Phi Islands from the Tsunami

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**Keywords:** evacuation; leadership; mass-casualty event; nurse; preparedness; triage; tsunami

**Abbreviations:**
ATLS = Advanced Trauma Life Support
h = hours

**Received:** 06 September 2005
**Accepted:** 22 September 2005
**Revised:** 11 October 2005

**Web publication:** 22 May 2006

**Abstract**

The Phi Phi Islands are isolated islands located about one hour by ship from the mainland in Krabi province of Thailand. There is a small medical facility where the director is the one physician that provides care to residents and tourists. This small medical facility faced an enormous mass casualty incident due to the 2004 Tsunami. The hospital was damaged by the Tsunami wave and was not functional, one crewmember died and another was injured. Medical care and evacuation posed a unique problem in the Phi Phi Islands due to remoteness, limited medical resources, lack of effective communication with the main land and the large number of victims. An alternative medical facility was located in a nearby hotel. The crew included the medical director, two nurses, two additional staff members, 10 local volunteers, and hotel staff members. The medical crew had to treat 600–700 casualties in 24 hours. Most of the victims were mildly injured, but approximately 100 (15%) of the victims could not walk due to their injuries. The medical director, made a conscious decision to initially treat only circulation ("C") problems, by controlling external hemorrhages. This decision was driven by the lack of equipment and personnel to deal with airway ("A") and breathing ("B") problems.

In the post-disaster debriefing, the Phi Phi Island hospital physician noted five major lessons concerning disaster management in such extreme situation in a small facility located in a remote area: (1) effective resistant communication facilities must be ensured; (2) clear, simple "evacuation plans" should be made in advance; (3) plans should be made to ensure automatic reinforcement of remote areas with evacuation vehicles, medical equipment and medical personnel; (4) efficient cooperation with medical volunteers must be planned and drilled; and (5) every team member of such a hospital must participate in an educational program and periodic drills should be done to improve the disaster and emergency medicine capabilities.

This case report is an example for caregivers all over the world, of an amazing lesson of leadership and courage.

**Ammartyothin S, Ashkenasi I, Schwartz D, Leiba A, Nakash G, Peltz R, Goldberg A, Bar-Dayan Y: Medical response of a physician and nurses to the mass-casualty event in the Phi Phi Islands from the Tsunami.** ***Prehosp Disast Med*** **2006;21(3):176-178.**

## Introduction

The Phi Phi Islands are isolated islands located about one hour by ship from the mainland in the Krabi province of Thailand. There is a small medical facility where the director is the only physician that provides care to residents and tourists. At this facility, there are a total of 15 staff members, including four nurses. The facility has five observation beds, and although it is called a "hospital", it actually is a small, primary care center.

The facility operates on a full-scale five days/week and is open for emergencies on the weekends. The patient volume averages 50–100 patients per day. Most patients are managed by nurses who are capable of providing primary care and prescribing medications (for diabetes, hypertension, and other

diseases). Patients requiring the care of a physician are evaluated by the Facility Director. Complex medical cases or those that require hospitalization are transferred to the provincial hospital.

This small medical facility faced an enormous mass-casualty incident due to the 2004 Tsunami.

**Case Report**

Prior to the 2004 Tsunami, the most significant incident that this healthcare center faced was a motor vehicle accident that resulted in eight casualties (one severely injured) that occurred in 2003. The medical staff members stated that they had not had any mass-casualty incidents or disaster drills during the previous three years. The medical director previously had participated in an advanced trauma life support (ATLS)[1] course in Bangkok, but the remainder of the medical crew had a shorter training experience. They felt this was a significant flaw in their disaster preparedness.

On the day of the Tsunami, the islands of Phi Phi sustained severe damage and flooding.[2] At 10:30 hours (h) local time, the wave reached Phi Phi Island and flooded the hospital. The medical team climbed to the second floor, where they remained until two hours later. Due to the proximity of their facility to the shore, the facility was damaged severely. The lower floor of the patient-care building was destroyed. Upon notification of the event, the seven staff members on-site moved all the patients to the second floor. An assistant pharmacist stayed on the lower floor and was killed, and a nurse was injured by a falling beam.

Three hours after the Tsunami waves flooded the Island, the medical staff was able to leave the building. They went to a nearby hotel that also had sustained severe damage, where they provided medical care to the injured victims. According to the Medical Director, 600–700 people at the hotel required medical attention. Most were mildly injured, but approximately 100 (15%) of the victims could not walk due to their injuries. Medical care was provided in the dining room located on the second floor, where all victims had been moved because of the fear that a second tsunami was coming. The team used bedsheets for dressing wounds and controlling external bleeding. Initially, the medical crew consisted of the Medical Director, two nurses, two additional medical staff members, 10 local volunteers, and hotel staff members. The team members conducted a quick, primary survey and provided initial medical care. Because of the number of victims and the lack of medical equipment, they focused on controlling external bleeding and, at this immediate stage, did not treat patients with airway and breathing problems. The Medical Director believed that about 50 of the victims (7–8%) had their external bleeding controlled at this stage.

The local staff worked without outside help until 15:30 h (four and a half hours after the Tsunami), when a helicopter with an additional medical team (one physician and two nurses) arrived. At this time, the medical crew began preparing victims for evacuation. By 16:30 h, all patients had been moved out of the hotel, either near the helicopter landing site, in preparation for evacuation, or to a non-critically injured casualty concentration site in the surrounding hills. The evacuation of victims via helicopters also began at this stage. At 18:30 h, an additional medical team (one physician and two nurses) arrived by helicopter. The Medical Director assigned the team members to one of two treatment sites. Army personnel that had arrived to the area helped move medical equipment from the hospital to the sites. An alternate landing site had to be prepared after nightfall, and docks damaged by the Tsunami had to be repaired to allow docking of boats. By daybreak, most victims had been evacuated by air. The rest were evacuated by boats sent from the mainland (coordinated through the Krabi provincial "war room", which was operated under the control of the governor of Krabi, and included representatives of all the emergency, rescue, and health organizations of the province. The physician and his team stayed on the Island to take care of the patients overnight. The hospital was not functional until 15 February 2005.

**Discussion**

Medical care and evacuation posed a unique problem in the Phi Phi Islands due the remoteness, limited medical resources, lack of effective communication with the mainland, and the large number of victims.[3] The Medical Director (and only physician in the Islands during the initial treatment phase), made a conscious decision to initially treat only circulation ("C") problems, by controlling external hemorrhages. This decision was driven by the lack of equipment and personnel to deal with airway ("A") and breathing ("B") problems. This is a good example of the need to make difficult decisions on the allocation of scarce resources, under such overwhelming circumstances.[4]

In the post-disaster debriefing, the Phi Phi Island hospital physician noted five major lessons concerning disaster management in such an extreme situation:

1. *Communication*—Effective communication is important for the management of any mass casualty incident. In remote areas with limited resources, this issue is critical. Good communication systems must withstand the actual event and the unavoidable, subsequent surge in communications volume;
2. *Clear and simple "evacuation plan"*—The victims from the Phi Phi Islands first were evacuated to a safe place. Later, they were prioritized for evacuation from the Island according to injury severity and urgency. Setting evacuation priorities was crucial for those who most urgently required advanced treatment; continuous basic care was provided to the rest. One major difficulty encountered by the Director of the Phi Phi medical facility was the lack of communication with the mainland in the initial hours;
3. *Medical supply and crew reinforcement*—As in other large-scale disasters caused by natural hazards, the local army played a major role, by transporting medical crews and equipment to affected areas and evacuating victims to inland hospitals;
4. *Efficient use of volunteers*—Medical personnel can be found everywhere (either military personnel, civilian bystanders, or tourists). Medical facilities should take this into consideration and prepare themselves to incorperate these volunteers into the organic medical staff, and coordinate their work efficiently; and

5. *Preparedness*—In a small facility, every team member must participate in an educational program. In this event, this minimal training was an ATLS course for the hospital's physician, and a participation by all the nurses at a shorter, five-day, critical care training at Bangkok. However, most of the medical team members felt that more intensive training and a periodical drill program would improve their capabilities.

## Conclusion

The well-organized treatment and evacuation in the Phi Phi Islands was performed by few responders of the ruined primary health center. There should be considerable discussion concerning disaster management in remote, disaster-affected areas. Moreover, it serves as an example for disaster caregivers all over the world, of an amazing lesson of leadership and courage.

**References**

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