SPECIAL REPORT

KAMEDO Report 89: Terrorist Attack in Bali, 2002

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Abstract
On 12 October 2002, two bombs exploded on the island of Bali in Indonesia, destroying two bars in the tourist district of the holiday resort Kuta Beach. The explosions killed 202 people from 21 different countries, and >300 people were injured. A team of observers conducted structured and unstructured interviews, and lessons learned from the experience were identified. This report summarizes various elements of the response including: (1) prehospital care; (2) coordination; (3) hospital response; and (4) Australia's efforts in air evacuation.

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Introduction
Event
Shortly after 23:00 hours on 12 October 2002, two bombs exploded on the island of Bali in Indonesia. Two bars in the tourist district of the holiday resort Kuta Beach were destroyed completely.

The explosions killed 202 people from 21 different countries and >300 people were injured. Most of them were tourists. Initially, the injured were taken to hospitals and clinics on Bali. The majority were treated at Sanglah General Hospital, the largest hospital in Bali. They were treated by the regular staff at the hospital with the support of volunteers. Eventually, reinforcements arrived in the form of medical teams from other Indonesian hospitals and abroad.

The most seriously injured foreign nationals, 135 in total, were evacuated by air during the days immediately after the bombing. Most were flown to Australia, approximately 10 people were flown to Singapore, and about 10 more were flown to other places.

The Australian Air Force (RAAF) evacuated a total of 66 patients from Bali to Darwin, Australia over a 21-hour period. Following stabilization and emergency treatment at the Royal Darwin Hospital, the 40 most seriously injured patients were flown by civilian air ambulance to burn units in Australia. The RAAF made four more flights from Bali, carrying 35 persons with slightly less serious burns.

Methods
Structured and unstructured interviews were conducted by a team of observers.

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Results

Efforts in Bali

Explosions and Fires—Eyewitness accounts have reported the terrible scenes that followed the explosion. These accounts explain how quickly the fire spread after the explosions. Several people reported how small groups of people held each other's hands and tried to make their way out of the collapsed building in the darkness. The first person to get out escaped with minor injuries; the second also managed to escape, but with serious burns; the third person did not make it out alive.

Prehospital Care—The rescue work and transport of the injured were performed mostly by volunteers, who removed the injured from the scene of the explosions as soon as they were found. The responding ambulances had neither the personnel nor the equipment to provide advanced medical attention at the scene. Reports from the incident described that many of the injured died in the arms of the rescuers.

Prioritization and Supervision—No triage was performed at the scenes of the explosions. Instead, the injured were transported without any sorting process taking place. Initially, dead bodies also were taken to the emergency departments of the Sanglah General Hospital, which further increased the pressure on the staff of the departments. The lack of coordination in conjunction with the transport of the injured, as well as the lack of means of communication, meant that the emergency department at Sanglah General Hospital could do little about the chaotic situation. They had no contact with the ambulances or the scenes of the explosions.

Medical care coordination was not organized at the scene. Had this been improved, the directing of patients to different hospitals in the area probably would have been better, which would have reduced the influx of less seriously injured persons at Sanglah General Hospital. However, there was a lack of a control structure and technical means of communication for those in charge of medical treatment.

Hospital Response

Sanglah General Hospital became overloaded. On the other hand, there are few hospitals in the world, if any, that could have handled such a large influx of seriously injured patients. The hospital experienced a shortage of monitoring equipment, medicines, consumables, sterilized instruments, linen, etc. The hospital management and volunteers tried to solve these problems in different ways, such as attempting to find support from organizations outside of the hospital, mainly the hotels.

Apart from the medical personnel employed at the clinics in the area, a large number of volunteers helped with the injured at the hospitals. Volunteers included both Balinese and foreign tourists, people who had no medical training, and medical personnel on holiday in Bali.

The overload on the medical system on Bali meant that the medical personnel needed all of the qualified help they could access. Sanglah General Hospital was in a difficult situation, as it received the majority of the injured, including most of the tourists. This, in combination with a lack of interpreters and the arrival of foreign volunteer medical personnel, led to a situation that was difficult to control by the hospital management.

None of the senior doctors at the hospital appeared to have been in a position where they could lead the efforts of the volunteers—neither during the night nor during the day after the bombing. If there had been such leadership, the volunteer doctors could have worked directly under the direction of the staff of the doctors at the hospital. This could have reduced both the legal difficulties that resulted, and the friction that arose between the hospital and the volunteer groups. There is reason to consider how the Swedish medical system would handle a similar situation.

Most of the patients had not been prepared in any way prior to operations and wound assessments, such as being undressed or bandaged, nor had any of the patients been identified. To maintain order among the patients, a number was written somewhere on uninjured skin. This number then was used when the patient was reported to the nursing ward. The medical documentation was very brief.

Australia's Efforts with Air Evacuation

Perspectives of Medical Evacuation by Air—Australia was hard hit by the bomb attacks on Bali. Apart from the 83 Australian nationals who were killed, 129 Australians were among the injured. Thus, it was important for those responsible in Australia to act as quickly and efficiently as possible to evacuate the country's citizens. In this case, the rapid evacuation and repatriation occurred in two stages by air. This involved considerable geographical spread and extended across several time zones.

Many Australians were killed and injured in the terrorist attacks in New York City on 11 September 2001. After this event, a complete review was made of the contingency plan for incidents involving large numbers of Australians abroad. The result was a new way of reacting to global events—the Global Response Monitoring System. One of the components in the Global Response is the rapid activation of an emergency call unit with 12 switchboard operators. These can mediate calls to up to 700 specially trained government officials in Canberra. In conjunction with the bomb attack in Bali, this function was activated at 06:00 h (04:00 h Balinese time) to receive calls from anxious relatives of the victims. At the same time, information regarding the incident was posted on the Department of Foreign Affairs and Trade Website. The Website also had the number of the emergency call unit, urging Australians to call and provide information about their relatives.

During the first 24 hours after the news about the explosions was received from the Australian Consul in Bali, the Australian Department of Foreign Affairs and Trade identified 113 injured Australians by checking hospitals, hotels, and the airport. Through the Consulate in Bali, it was proposed to the Indonesian Minister for Health that the injured should be evacuated to Australia by the RAAF. No formal request for assistance was made by Indonesia. It was more a "formal invitation to Australia to help", according to the Australian Department of Foreign Affairs and Trade. The basis was the extensive collaboration between the countries at an administrative level that has been in place in many areas for a long time, including among others the Australian Federal Police (AFP).

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From a diplomatic point of view, it is common practice that aid from one nation to another is preceded by a formal request for assistance. This did not take place in this case. Deviation from this practice represents a breach of the other country's sovereignty, which is particularly sensitive if military resources are used, e.g., in connection with air transport. In this case, the invitation to help was equated with a formal request for assistance. What was unusual in this case, was that the aid was primarily for affected persons from their own country—it was not a general aid effort. However, it can be maintained that evacuation of a large number of foreign injured persons releases medical resources that could instead be used by the citizens of the country affected, which means that the aid effort has a more general effect.

Evaluation of Security, Information, and Leadership during Medical Evacuations by Air

At the time of the bomb attack in Bali, there was no plan in place for how Australia would deal with a large number of its citizens being injured in a neighboring country. The evacuation in Bali was more the work of energetic individuals, particularly during the early stages, rather than a coordinated response from a prepared organization. In formal terms, responsibility for citizens abroad rests with the Department of Foreign Affairs and Trade, but this Department does not possess any transportation resources. The only organization with resources to implement a large-scale evacuation of injured persons was the RAAF. The solution was that military aircraft were used to fly civilian patients out of Bali.

However, the medical equipment available gave rise to a number of problems, as they were not adapted to the versions of the C-130 military aircraft used during the assignment. Nor did the equipment have the battery capacity for a prolonged operation as required. Furthermore, there were no transformers to allow the equipment to run on electric power taken directly from the aircraft—this has since been corrected. There were not any adapters for the electrical sockets used in Bali.

This illustrates the question of airworthiness and patient safety, and should be compared with how aircraft with medical equipment and personnel were handled in conjunction with the 2004 Southeast Asia Earthquake and Tsunami, where in many cases, there was neither certification of the equipment nor approved attachments for the medical equipment.

The central planning of the evacuation from Bali was based on unsatisfactory information, and there was a shortage of expertise regarding transport of injured persons by air.

It was decided to charter a smaller civilian jet that was available in Bali to transport the most critically injured patients. This could be ordered since the Department of Foreign Affairs and Trade had access to US$75,000 that could be used in an emergency for transport by air ambulance.

It has been difficult to obtain information concerning who made the decision to use the civilian aircraft, which was the first to leave Bali. Likewise, it has been difficult to find details about what happened to the patients during this transport.

The airline, Qantas, spontaneously organized extra evacuation flights for a large number of less seriously injured and uninjured persons.

Logistics during Medical Evacuation by Air

When the first C-130 aircraft landed in Bali, the crew was met by a representative from the Department of Foreign Affairs and Trade. The representative stated that a number of injured persons recently had been flown out on a private jet bound for Perth. There were no injured persons remaining at the airport. It was stated that the most seriously injured were at Sanglah General Hospital, a 40-minute drive from the airport.

A doctor and two medical assistants were given the task of setting up an assembly point at the airport. The rest of the team was transported to Sanglah General Hospital in the same vehicle that brought the representative from the Department of Foreign Affairs and Trade to the airport. The three satellite telephones that had been brought were given to the doctors so that they could maintain contact with each other, the hospital in Darwin, and top ranking Air Force staff.

When the first C-130 aircraft landed in Darwin, it was met at the airport by a team from the Royal Darwin Hospital composed of anesthetists, intensive care nurses, and doctors from the medical air evacuation team. Management on-site was exercised by the head of the hospital's Anesthesiology Department. The doctor was able to maintain contact by mobile phone with an ambulance officer who coordinated the arrival of ambulances at 3–5 minute intervals. The doctor also had contact with the head of the emergency ward at the hospital to report the number and conditions of the patients who were en route to the hospital. The organization for reception at the airport can be cited as a good example of how logistics and communication should take place.

Several air ambulances were parked at Darwin Airport, although these could not be used before the crews had their stipulated rest periods.

On the Monday following the event, various civilian air ambulance operators arrived at Darwin Airport, including the Royal Flying Doctor Service. According to the Royal Darwin Hospital, they arrived on their own initiative without liaison. In several cases, the crews of the civilian air ambulances tried to take control of the work at the airport, and on two occasions, there was some confrontation between the civilian air ambulance crews and the team from the hospital in Darwin. Only in two cases was there direct reloading of patients who were considered to be in a stable condition.

The Australian aircraft with injured persons flew to Darwin, Australia. The Royal Darwin Hospital was used as a collection point/staging facility. The volume and quality of the care provided at the hospital in Darwin was impressive and was based on solid training and exercises.

At the hospital in Darwin, there was only 12 hours to prepare from the time the decision was made to help until the first patients arrived. This time was used to recap training along with planning and preparing for the work to be done. They also thought ahead by sending home some of the staff to rest, but they were not as forward thinking with regard to their own supervisory team and other key persons.

Through a carefully considered combination of personnel with varying degrees of experience, it was possible to make optimal use of the more experienced personnel at the hospital's emergency department. In addition, they also worked in separate rooms. In each room, there was a con-

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sultant who was responsible for prioritizing resources. There also were senior physicians in charge at the emergency ward and the intensive care unit. All information to and from the hospital management was channeled through these departmental consultants.

Reports show that patients with burns who had undergone emergency surgery (fasciotomy and escarotomy) began bleeding again from their wounds during the flight. The reasons for this are unclear, although vibrations or a fall in body temperature during the flight, with its subsequent impact of coagulation, could have been contributing factors.

Only three patients had been intubated prior to or during the long flight from Bali. However, within an hour of arrival at the hospital in Darwin, another 12 patients required endotracheal intubation—all of these had burns to the face and respiratory system. The problems in the respiratory system were ascribed to rapid swelling as a result of the patients suddenly receiving fluid replacement.

Responses at the Royal Darwin Hospital in Australia

There was never a shortage of blood at the hospital, but to avoid confusion, it was decided to consistently use "disaster identity numbers" when requisitioning blood, because many foreign citizens were expected among the patients. Despite this, certain employees began to use the patients' names, which led to confusion and uncertainty in the handling process. This illustrates the importance of maintaining one identity labeling system.

Groups of specialists in internal medicine and general practitioners monitored and followed up the fluid balance of the patients on the wards. These groups relieved the surgeons and anesthetists. At the same time, the feeling that everyone at the hospital was involved in the work was reinforced.

Discussion

The interviews conducted in this study helped identify valuable lessons to be considered in the management of future disaster responses.

Prehospital Care

In an incident such as this, fire spreads very quickly. It is vital that evacuation routes are marked clearly and that these are adequate for the number of visitors. The fact that many victims died on the scene indicates that the majority these victims died of serious injuries to organs with hemorrhagic shock rather than respiratory problems or similar complications. Therefore, it is not particularly likely that the number of early deaths would have been reduced if the injured had been cared for by paramedics, as would be the case in western countries. However, had there been treatable injuries, more lives could have been saved if more advanced medical care had been available at the scene. Triage, coordination, and a good communication system tangibly could facilitate treatment of the injured and reduce the pressure on the receiving hospital in chaotic situations. At an early stage, it also is important to establish a control system at the scene of an incident that distributes the injured in such a way so that not all are sent to one hospital.

Hospital Response

To avoid the shortages of equipment and materials that occurred in this incident, it could be valuable to identify the potential capability of volunteers or private companies to make equipment available in an emergency overload situation.

To ensure order and medical documentation of patients, casebooks and identity tags should be used. If these were to become unavailable, a plan should be in place for how this should be handled.

Evaluation of Security, Information, and Leadership during Medical Evacuations by Air

In the event of evacuations by air involving several time zones, it is vitally important at an early stage to clarify the times that are used in conjunction with communication and the keeping of records. Both local time and coordinated universal time (UTC) should be provided. In addition, it is conceivable that a rapid response team (RRT) with specific medical equipment could have been sent quickly to Bali by jet. This team could have completed plans, commenced aid work, and prepared for the evacuation at the airport.

The question regarding who is responsible for making medical evacuation decisions and who should assume the responsibility for medical care remains. In Australia and Sweden, the state lacks or has limited potential to take over the control of medical care in connection with serious or extraordinary incidents during peacetime. This is a weakness regarding incidents that are of such magnitude that national coordination of resources is required.

Conscripting a large airline to contribute to the evacuation of less seriously injured and uninjured persons should be considered an asset, although this should be coordinated with the national operations team. In order to handle this type of incident effectively at an early stage, a primed operations team should be in place on a national level.

Logistics during Medical Evacuation by Air

Injured persons can be distributed out among several hospitals, which requires a special logistics system with the ability for those conducting the evaluation to locate different hospitals in order to take over the medical care there. This requires a means of communication to maintain contact between the aircraft and the groups that set off to collect patients.

As soon as a need for air evacuation in which long flight times are involved is noted, resources should be sent so that the pilots can have their statutory rest period prior to making the medical transport flight. There are no equivalent rules for the medical personnel, but rest is equally important for this group, and should be taken into account prior to a long medical transport assignment.

The confrontation that arose due to the lack of coordination at the airport in Darwin could arise anywhere in the world. The role of coordinator is important in situations like these. This role should be filled at an early stage by a more experienced person who is trained for the assignment and who has an insight into both air operations and medical matters. However, the impressive quality of care provided at the hospital in Darwin illustrates the importance of exercises, training, and team spirit. In this way, a consid-

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erable contribution was made by a relatively small hospital. The capacity to use the time rationally for preparations and rest also should be taken into account.

One could mistakenly believe that it is warm on a plane. The temperature during transport is far from 37°C, perhaps 20°C at best. This, combined with a long flight time, could lead to hypothermia in seriously injured patients, particularly those having burns with major heat loss as a result of fluid evaporating from the damaged skin.

The Australian Air Force used Hercules (C-130) planes for the assignment. The medical equipment that was taken on board was not certified for the versions of the aircraft type used (C-130 J and C-130 H). This entailed a risk from an airworthiness and patient safety point of view. It is important that certification takes place to ensure both air safety and patient safety.

The problems that arose in the respiratory system of some patients were due to the rapid swelling from fluid replacement. It could be that fluid replacement according to Parkland's formula produces a side effect in the form of noticeable swelling in the respiratory system, which could be difficult to handle in a transport situation. This raises the point of considering giving less fluid replacement before and during transport, as compared to the customary treatment models, as long as the patient is not intubated, in order to avoid serious respiratory problems in non-intubated patients during the flight.

Whether or not this affects the survival rate in the long term is unknown, but it should be weighed against the fact that the patients in this case arrived at the hospital in Darwin alive. This area should be the subject of further evaluation.

Reflections on Aid to Citizens Abroad

Australian authorities and companies have not claimed any compensation for their efforts, whether it be medical care or for the air transport of foreign citizens.

Lessons Learned

1. The rapid activation of Air Medevac units, in conjunction with the evacuation of foreign citizens abroad, must be clarified before this resource becomes operative.
2. One cannot always assume that patients who are to be transported have received adequate emergency care. Air Medevac units must be provided with materials so that, if necessary, personnel can take emergency measures and prepare or stabilize injured persons prior to them being transported by air.
3. There should be technical resources available to allow patient data to be transferred between the aircraft and the receiving hospital.
4. Frameworks for cooperation between Medevac units and the assistance organizations must be clarified.

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