

The Terror Attack on Bali, 2002

Kamedo-report 89

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The Committee for Disaster Medicine Studies (KAMEDO) has been in existence since 1964. It started under the auspices of the Swedish Research Delegation for Defence Medicine, which, however, was reorganized in 1974 and KAMEDO was transferred to the Swedish Defense Research Agency (FOA). In 1988, KAMEDO was integrated into the Unit for Emergency Preparedness at Socialstyrelsen/The National Board of Health and Welfare.

KAMEDO's main task is to send observers to disaster areas all over the world to study recent disasters, collect useful information and to get familiarized with the problems of disaster medicine. The observers are sent to disaster areas with short notice; they collect relevant information on a collegial basis from doctors and others, thereby pointing out that all information received is strictly for scientific use. Four main groups of interest that have been studied are medical, psychological, organizational and social aspects of disasters.

The results of the studies are published in KAMEDO-reports. Since 1979 (report No. 34) they all include an English summary which, as of No. 55, are available from the National Board of Health and Welfare's website www.socialstyrelsen.se. A few reports have been fully translated into English but are not available on the website.

The general guidelines for KAMEDO's operations are established by a committee that convenes two to three times each year. Ongoing tasks are primarily handled by the two scientific secretaries who work for KAMEDO on a consultant basis.

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Preface

Just before midnight, Saturday, 12 October, 2002, two bombs detonated at the Kuta Beach holiday resort on the Indonesian island of Bali. The explosions claimed 202 lives and more than 300 persons were injured. Most of the dead and injured were tourists from 21 different countries. It was later determined that this was a terrorist attack with political motives.

The original purpose of KAMEDO's observers' visit was to study aeromedical evacuation of the injured from hospitals on Bali to other hospitals, primarily in Australia. Decision-making processes, logistics and care were in focus. Australia has a well-developed air medevac service and an exchange of experiences would benefit the development of the Swedish air medevac service, which is conducted within the framework of the project Swedish National Air Medevac (SNAM). This project will be concluded at the beginning of 2007 and thereafter enter the operational phase.

The SNAM concept has been tested in conjunction with the evacuation from Thailand after the tsunami in 2004, and this report briefly compares the aeromedical evacuation from Bali and Thailand. The purpose of the observer visit was expanded during the course of work to also embrace rescue and medical actions on Bali during and after the bombings. Of special interest was how the influx of volunteers was dealt with, in particular the foreign health care providers who were visiting the country. This issue again arose in conjunction with the Asian tsunami disaster in 2004.

The material was gathered through interviews in Indonesia and Australia in January 2004. An important written source of information is a report on the care of the most seriously injured at the largest hospitals on Bali, written by doctors and others with onsite operative duties.

This report is aimed for those who work with medical and psychological care during major incidents and disasters, to those responsible for training and to disaster planning co-ordinators at county councils and municipalities, as well as to national agencies, committees and organisations with interests in disaster management.

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We would like to thank the Swedish embassy in Jakarta for its assistance in facilitating our visit to Bali, and particularly consulate officer Marie-Louise Olsson, who besides permitting herself to be interviewed, also arranged most of the interviews on Bali and accompanied us as an interpreter and guide during the two days we spent on the island.

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Analysis of material

The final review and analysis of the material was conducted by two of the authors (Helge Brändström and Per Örtenwall). This then formed the basis of the conclusions and recommendations that are expressed in the report. These shall thus be considered as personal views that do not necessarily represent the views of the entire author group.

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Abbreviations

ADF – Australian Defence Forces

AFP – Australian Federal Police. There are also state police in the various states/territories.

AME – Aeromedical Evacuation

ASF – Aeromedical Staging Facility: casualty assembly point awaiting air transport

ATLS – Advanced Trauma Life Support

CST – Central States and Territory: Time zone in Australia (UTC + 9.5 hrs)

CVC – Central Vein Catheter

DFAT – Department of Foreign Affairs and Trade

DVI – Disaster Victim Identification

EMA – Emergency Management Australia

EST – Eastern States and Territory: Time zone in Australia (UTC + 10 hrs)

GMT – Greenwich Mean Time: Time zone/London time; presently referred to as UTC

CICU – Coronary Intensive Care Unit

IRA – Irish Republican Army

ICU – Intensive Care Unit

RAAF – Royal Australian Air Force

RDH – Royal Darwin Hospital

RAH – Royal Adelaide Hospital

SNAM – Swedish National Air Medevac

SNAM-light, MD 80 with military stretchers – Aircraft type used in evacuation from Thailand after the tsunami disaster in 2004

UTC – Universal Time Zone: Time zone/London time; previously referred to as GMT

WST – Western States and Territory: Time zone in Australia (UTC + 8 hrs)

Zulu time – GMT/UTC: Time zone/London time

Summary

Introduction

On October 12, 2002, shortly after 11 pm, two bombs exploded on the island of Bali in Indonesia. Two bars in the tourist district of the holiday resort Kuta Beach were totally destroyed.

The explosions claimed the lives of 202 people from 21 different countries and more than 300 people were injured. Most of them were tourists. The injured were initially taken to different hospitals and clinics on Bali. The majority were treated at the largest hospital on Bali, the teaching hospital Sanglah General Hospital. 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 from 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, 10 or so were flown to Singapore and a further 10 or so were flown to other places.

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

The observers' experiences and conclusions

Efforts on Bali

Explosion and fire

Eyewitness accounts report the terrible scenes following the explosion and from these accounts it can be seen how quickly after the explosion the fire must have spread. Several people report how small groups of people held each other's hands and in the darkness tried to make their way out of the collapsed building. The first person to get out escaped with minor injuries, the second also managed to escape but with serious burns – the third didn't make it out.

Comments: In this type of incident, fire spreads very quickly. It is vital that evacuation routes are clearly marked and that these are adequate for the number of visitors.

Pre-hospital care

The rescue work and transport of the injured were carried out largely by volunteers. The injured were transported from the scene of the explosion as soon as they were found. The ambulances had neither the personnel nor the equipment to provide advanced medical attention at the scene. Reports from the incident describe how the injured died in the arms of the rescuers.

Comments: This description indicates that the majority who died at the scene died of serious injuries to organs with haemorrhagic shock, rather than respiratory problems or similar complications. It is therefore not particularly likely in this case that the number of early deaths would have been reduced if the injured had been taken care of 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 ambulance medical care had been available.

Prioritisation and command

No triage was carried out at the scene of the explosion and instead the injured were transported without any sorting process taking place. Initially, dead bodies were also taken to the emergency department, which further increased the pressure on the department. The lack of co-ordination 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 not do anything about the chaotic situation. They had no contact with the ambulances or the scene of the explosion.

Comments: Triage, co-ordination and a good communication system could tangibly facilitate treatment of the injured and reduce the pressure on the receiving hospital in chaotic situations. Communication is a weak link also in Swedish healthcare and ought to be developed.

Medical command was not organised at the scene. Had this been the case, the directing of patients to different hospitals in the area would probably have been better, which would have at least 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.

Comments: It is important to at an early stage establish a command system at the scene of an incident which distributes the injured in such a way that not all are sent to one hospital. From a Swedish point of view the work that has recently been done on developing the “control of medical care at the scene of an incident” function would be of considerable value in this type of incident.

Work at the hospital

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. Monitoring equipment, medicine, consumables, sterilised instruments, linen and so on ran out. The hospital management and volunteers tried to solve these problems in different ways, among other things by attempting to find support from organisations outside the hospital, mainly the hotels.

Comments: It could be of value from a Swedish point of view to identify the potential capacity of volunteers or private companies to make equipment available in an emergency overload situation.

Apart from the medical personnel employed at the clinics in the area, a large number of volunteers helped with the injured at the hospitals – both Balinese and foreign tourists, people who had no medical training whatsoever, as well as health care providers on holiday on Bali.

Comments: The overload on the medical system on Bali meant that they needed all the qualified help they could get. Sanglah General Hospital found itself in a particularly 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 health care providers, led to a situation that was difficult to control for the hospital management.

None of the senior doctors at the hospital appeared to have been in a position where they could lead the voluntary work – neither during the night nor during the day after the bombing. If this had been the case the volunteer doctors could have worked directly under the lead of the doctors at the hospital. This would probably have reduced both the legal difficulties 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, such as being undressed or bandaged, prior to operations and wound assessments. Nor had any patient been identified. To maintain order among the patients a number was written somewhere on uninjured skin. This number was then used when the patient was reported to the nursing ward. The medical documentation was very brief.

Comments: Even in chaotic situations on site medical records and identity tags should be used. If these were to run out or not be available, a plan should be in place for how this is to be handled.

Australia's efforts in conjunction with evacuation by air

World perspective of the medical evacuation by air

Australia was hard hit by the bomb attacks on Bali – apart from the 83 Australian nationals who were killed there were also 129 Australians among the injured. It was thus 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 took place by air in two stages. This involved considerable geographical spread and extended across several time zones.

Comments: In the event of evacuations by air involving several time zones it is vitally important to clarify at an early stage the times that are used in conjunction with communication and the keeping of records. Probably both local time and UTC ought to be given. This became very clear during this incident but also in connection with the Swedish evacuation of injured persons from Thailand following the tsunami in 2004.

Many Australians were killed and injured in the terrorist attacks in New York, USA on September 11, 2001. After this, 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 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 on Bali this function was activated at 6 am (4 am Balinese time) to receive calls from anxious relatives. 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.

Comments: Australia's Global Response monitoring system is an interesting means of providing the country's citizens with help in the event of a major incident abroad. Sweden could benefit from studying in more detail how the system has been built up and learn from Australia's experience.

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

***Comments:** 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, which did not take place in this case. It was more a case of a “formal invitation” to Australia to help. Deviation from 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 obviously 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 thus not a general aid effort. The same applied for the Swedish evacuation following the tsunami in Asia in 2004. 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 command during medical evacuations by air

At the time of the bomb attack on Bali there was no plan in place for how Australia would deal with a large number of its citizens being injured in a neighbouring country. The evacuation on Bali was more the work of energetic individuals, particularly during the early stages, rather than a co-ordinated response from a geared-up organisation. In formal terms, responsibility for citizens abroad rests with the Department of Foreign Affairs and Trade but it does not have any transport resources. The only organisation 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.

The medical equipment, however, gave rise to a number of problems as it was not adapted to the versions of the C-130 used during the assignment. Nor did the equipment have the battery capacity for a protracted assignment such as this. Furthermore, there were no transformers to allow the equipment to run on electric power taken directly from the aircraft; this has, however, since been corrected. Nor were there any adapters for the electricity sockets on Bali.

***Comments:** This illustrates from a Swedish point of view the question of airworthiness and patient safety and ought to be compared with how aircraft with medical equipment and personnel were handled in conjunction with the tsunami, where in many cases there was neither certification of the equipment brought, nor approved attachments for the medical equipment. SNAM-light with military stretchers in an MD 80 was an exception to this, with approved stretcher stands and airworthy medical equipment.*

It is obvious that 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.

Comments: *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 produced ground for planning, it could have commenced the aid work and it could also have prepared the evacuation at the airport.*

It was decided to charter a smaller civilian jet that was available on Bali to transport the most critically injured patients. This could be ordered due to the fact that the Department of Foreign Affairs and Trade had access to USD 75,000 which could be used in an emergency for transport by air ambulance. Following a request for dispensation for the aircraft (for noise reasons) it could fly directly to Perth.

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.

Comments: *The above illustrates from a Swedish point of view the question of who makes the medical evacuation decision and who assumes responsibility for medical care. Both in Australia and in Sweden the state lacks the potential, or has very limited potential, to in peacetime take control of medical care in connection with serious or extraordinary incidents. This is obviously a weakness regarding incidents that are of such magnitude that national co-ordination of resources is required. It ought to be compared with how certain aircraft were handled during the evacuation by air of injured persons to Sweden in conjunction with the tsunami disaster. In that situation the National Board of Health and Welfare assigned responsibility for medical care to a specified county council during the SNAM-light flights, whilst other aircraft flew patients undergoing Swedish medical care without clarification of the liability issue.*

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

Comments: *Forceful action by large airlines to contribute to the evacuation of less seriously injured and uninjured persons should be considered an asset although this ought to be co-ordinated with the national operations team. In order to handle this type of incident effectively at an early stage, a primed operations team ought to be in place on a national level.*

Logistics during medical evacuation by air

When the first Hercules plane landed on 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 had recently 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 drove 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 which had been brought were given to the doctors so that they could maintain contact between them, the hospital in Darwin and top ranking air force staff.

Comments: With regards to the Swedish air ambulance SNAM this is an important experience. Injured persons can be spread out among several hospitals, which requires a special logistics system with the ability for those evacuating to locate different hospitals in order to take over the medical care there. This requires the presence of means of communication, to maintain contact between the aircraft and the groups that set off to collect patients.

When the first Hercules plane landed in Darwin it was met at the airport by a team from the Royal Darwin Hospital, comprising anaesthetists, intensive care nurses and doctors from the medical air evacuation team. Management on site was exercised by the head of the hospital's anaesthesiology department. He was able to maintain contact by mobile phone with an ambulance officer who checked that empty ambulances arrived at 3-5 minute intervals. The doctor also had contact with the head of the emergency ward at the hospital to report who was on the way in.

Comments: The organisation for reception at the airport can be cited as a good example of how logistics and communication ought to take place. This model is well worth incorporating into Swedish contingency plans.

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

Comments: As soon as a need for air evacuation has been noted in which long flight times are involved, resources ought to 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 health care providers but of course rest is equally important for this group which should be taken into account prior to a long medical transport assignment.

On the Monday, various civilian air ambulance operators arrived at Darwin Airport, including the Royal Flying Doctor Service. According to the Royal Darwin Hospital they came on their own initiative, without liaison. In several cases the crews of the civilian air ambulances tried to take over 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, in both cases of patients who were considered to be in a stable condition.

Comments: The situation that arose at the airport in Darwin could very well arise anywhere in the world, including Sweden or anywhere Swedish air ambulances are involved abroad. The role of a co-ordinator is extremely important in situations such as these. This role ought to be filled at an early stage by an experienced person trained for the assignment and with insight into both air operations and medical matters.

The Australian aircraft with injured persons flew to Darwin. The Royal Darwin Hospital was used as a casualty assembly 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.

Comments: This illustrates the importance of exercises, training and team spirit. In this way an impressive contribution was made by a relatively small hospital.

At the hospital in Darwin they had 12 hours to make preparations, from the time the decision was made to help until the first patients arrived. This time was used for recapping on the 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. However, they were not as forward-thinking with regard to their own supervisory team and other key persons.

Comments: The capacity to use the time rationally for preparations and rest ought to be taken into account.

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 worked in separate rooms; in each room there was a consultant who was responsible for prioritising resources. At the emergency ward and the intensive care unit there were also senior physicians in charge. All information to and from the hospital management was channelled through these departmental consultants.

Comments: This working method could be worth testing in the Swedish healthcare system.

Special transport-related problems

Reports show how patients with burns who had undergone emergency surgery (fasciotomy and escharotomy) 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 could have been contributing factors.

Comments: The problem of renewed bleeding during transport could be attributed to vibrations although another possible explanation could be the effect of low temperature (hypothermia) with the subsequent impact on coagulation. One could initially be misled into believing that it is warm onboard an airplane. The temperature during transport is however far from 37°C, perhaps 20°C at best, and this, combined with a long flight time, could very well lead to hypothermia in seriously injured patients, particularly those with burns with major heat loss as a result of fluid evaporating from the damaged skin.

The Australian Air Force used Hercules planes for the assignment. The medical equipment which 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.

Comments: It is important that certification takes place to ensure both air worthiness and patient safety.

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 a further 12 patients needed to be intubated. All 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.

Comments: The above is an interesting observation. 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 very difficult to handle in a transport situation. This raises the question whether to give less fluid replacement, before and during transport, as compared to the customary treatment models, as long as the patient is not intubated. This in order to avoid serious respiratory problems in non-intubated patients during the flight.

Whether 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 ought to be the subject of further evaluation.

The work at the Royal Darwin Hospital in Australia

There was never a shortage of blood at the hospital. To avoid confusion it was decided to consistently use “disaster identity numbers” when requisitioning blood as many foreign citizens were expected among the patients. Despite this, certain employees began after a while to use the patients' names, which led to confusion and uncertainty in the handling process.

Comments: *This illustrates the importance of maintaining one identity labelling 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 anaesthetists. At the same time, the feeling that everyone at the hospital was involved in the work was reinforced.

Comments: *Also in Sweden the equivalent expertise within internal medicine and general medicine ought to be used.*

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.

Comments: *The cost of the help Swedish consular missions could provide to Swedish citizens abroad is often claimed back from the person in question. Assistance organisations only help those who have travel insurance through an affiliated company. There is thus no general obligation to help Swedish or Scandinavian citizens.*

The staff at the Swedish consulate expected that SOS International would act more rapidly and with less bureaucracy as the situation was chaotic.

Comments: *SOS International is a privately owned assistance organisation, based in Copenhagen and charged with the task of bringing home sick and injured persons insured through Scandinavian insurance companies. The company name SOS International brings to mind our domestic emergency call centres – SOS Alarm. This probably leads many Swedes to believe that the organisation's services are a benefit that is available free of charge to Swedish citizens in need of help abroad, not just policyholders. This is, however, not the case.*

Experience pertaining to the air ambulance service in Sweden

- National crisis management in Sweden came into focus following the tsunami disaster in Asia in 2004. How Swedish National Air Medevac (SNAM) can be activated rapidly in conjunction with the evacuation of Swedish citizens abroad must be clarified before this resource becomes operative.
- SNAM is based on the principle that the patients who are to be transported have received adequate emergency care. The events on Bali, however, illustrate that one cannot always assume this. SNAM must be provided with materials so that, if necessary, it can take emergency

measures and prepare or stabilise injured persons prior to them being transported by air.

- There should be technical resources available to allow patient data to be transferred between the aircraft and the receiving hospital.
- Frameworks for co-operation between SNAM and the SOS International emergency call centre and other assistance organisations ought to be clarified.
- SNAM is a civilian, not a military, resource, which should be an advantage from a diplomatic point of view.

The event



Figure 1. Aerial photograph of the devastation after the explosions. Sari Club to the left and Paddy's Bar to the right. PHOTO: Sanglah Hospital

On Saturday, 12 October, 2002, at 23:08 hours, two bombs detonated within a short period of time on the Indonesian island of Bali. The explosions occurred at two nightclubs situated along the main street in the holiday resort of Kuta Beach.

The first, smaller charge was concealed in a vest worn by a so-called suicide bomber who entered Paddy's Bar, a two-storey structure of about 500 square metres.

The second charge was in a Mitsubishi L300 minivan that blocked the traffic on the one-way street outside the Sari Club. The nightclub was situated on the same street as Paddy's Bar but on the opposite side, about 15

metres away. The Sari Club was the most popular nightclub in Kuta Beach – a two-story structure of about 400 square metres with three bars and a dance floor. The local population was not permitted to patronise the establishment with the motivation being that Balinese become too “rowdy” when they consume alcohol.

At the time of the explosion, there were many people at both clubs. Among the guests were players from various rugby teams who were participating in an international tournament on Bali, along with players from an Australian football team.

Statements are, according to the police, contradictory as to the length of time between the two explosions – ranging from several minutes to just a few seconds. It is also unclear as to whether the driver of the minivan left his vehicle before the detonation occurred or detonated the bomb while sitting in the vehicle.

The explosion at Paddy’s Bar severely affected those who were in the building but seems to have passed relatively unnoticed by those who were outside. The force of the car bomb, however, was enormous and completely demolished eight cars and the buildings in the immediate vicinity of the centre of the explosion.

The subsequent police investigation revealed that the charge in the minivan had a core of various explosives that weighed 25 kilos (RDX, AMX and C-4). Around this core, ammonium nitrate, phosphorous and aluminium, among other materials, had been applied for a combined weight of about one ton.

Directly after the detonation in the minivan, severe fires broke out in a number of the nearby buildings and in more than 20 vehicles that were parked along the street or that had been stopped when the minivan came to a halt. More than 50 buildings within a 200-metre radius had received major damages. Four transformer stations for electrical power supply exploded, resulting in a complete loss of electrical power in the neighbourhood. The incident site was almost immediately blacked out.

About 20 minutes later, at 23:30 hours, an additional smaller charge exploded in the vicinity of the American and Australian consulates in the chief city of Denpasar. This did not, however, cause any significant damage.

Bali did not have a common emergency phone number at the time of the bombings. The numbers in use – 110 (police), 113 (fire brigade) and 118 (ambulance) – were quickly overloaded with calls and blocked.

Those who were in the vicinity of the bombs received varying degrees of injury depending on how close they were to the detonation centre. Those who were closest were blown to bits; body parts were found up to several hundred metres away during the days after the attack. For those who survived, the main type of injury consisted of extensive burns, but also crush and shrapnel injuries along with fractures were common. Many had punctured eardrums.

Eyewitness accounts tell of the terrible scenes that occurred at the explosion site. From these accounts, it can be discerned how quickly the subsequent fires must have spread. Several witnesses mention how small groups of people held each other’s hands and tried to make their way out of a collapsed building in the darkness. The first to get out escaped with minor

injuries; the second also managed to escape but with severe burns – the third did not make it out.

Comments: In this type of incident, fire spreads very quickly. The conclusion is that evacuation routes must be clearly marked and adequate for the number of guests.

Background

Type of disaster

The explosion – an act of terrorism

The discussions on terrorism after the events of 11 September, 2001 have largely dealt with weapons of mass destruction. The most common way of spreading terror is by using explosive substances – in other words, carrying out bomb attacks. Of the 93 acts of terrorism that caused injuries to more than 30 persons, conducted in 27 countries during the period 1991–2000, explosive charges or bombs were used in 82 cases.

Explosions are characterised by the release of energy upon rapid incineration of component parts, resulting in a rapidly expanding, fiery gaseous sphere. The increase in volume creates a shock wave or blast that is directly proportionate to the charge's force. If this blast is permitted to freely expand, its force decreases by the cube of the distance from the explosion centre. The charge's force is usually specified in relation to how much TNT would give the same explosive force.

Explosive substances are manufactured commercially for both civilian and military use. On the Internet, there are also formulas for how effective explosives can be produced from simple and readily available ingredients.

If the charge has some form of metal casing, the casing will be fragmented and spread in the form of shrapnel. This effect can be enhanced by the casing's construction or by placing nails or scrap metal around the charge. In military contexts, this type of construction is usually referred to as an anti-personnel weapon.

Explosion injuries

Physical injuries from explosions are divided into primary, secondary and tertiary injuries.

- *Primary blast injuries* mainly affect the body's gas-bearing cavities, i.e. the middle ear, lungs and intestines. Eardrum injuries occur with relatively weak blasts and are thus most common. Primary lung injuries caused by blasts (so-called blast injuries), however, require higher energy levels. These injuries consist of alveolar ruptures with haemorrhaging, sometimes complicated by pneumothorax. Symptoms can sometimes appear with up to a 48-hour delay, in the form of breathing difficulties, oxygen deficiency and coughing of blood. Treatment consists of intubation, assisted ventilation and possible insertion of pleura drains. Intestinal perforations primarily occur in connection with underwater explosions.
- *Secondary injuries* are inflicted by shrapnel from the charge, its casing or other solid parts.
- *Tertiary injuries* are caused by the blast throwing victims against objects in the surroundings. Moreover, thermal injuries occur among those who are closest to the explosion.

Previous bomb attacks

Apart from this report, KAMEDO has published five studies on bomb explosions:

- Bomb attack in Bologna, 1980 (KAMEDO 46).
- The explosion at the World Trade Center in New York, 1993 (KAMEDO 67).
- Terror bombings in Jerusalem, Ashkelon and Tel-Aviv, 1996 (KAMEDO 72).
- Terror attacks against the World Trade Center in New York, 2001 (KAMEDO 84).
- Bomb attack in Finnish shopping centre in 2002 (KAMEDO 87).

In addition, a report is being prepared on the bomb attacks in Madrid, 2004 (KAMEDO 90).

In common for these acts of terrorism is that they have been conducted in public places where a large number of people have been gathered.

Other bomb attacks that have received major attention in the media and claimed a large number of victims are the bombing in Oklahoma City, the IRA's bombings in Northern Ireland and in England, and the bombings of American embassies in Africa.

Moreover, a number of airliners have been targeted by bomb attacks, with the most known incident being the explosion of a Boeing 747 over Lockerbie in Scotland.

Aircraft can themselves also be used as effective terrorist bombs, which was clearly demonstrated against the World Trade Centre in New York and the Pentagon in Washington DC on 11 September, 2001. Medical facilities in the form of military hospitals have been direct targets for bomb attacks both in Northern Ireland and the Chechen Republic.

Injuries vary

The injuries produced depend, among other things, on the environment in which the explosion occurs. It can generally be said that, due to the amplification of the shock wave, explosions in enclosed spaces cause more severe injuries than explosions in open spaces. The most severe injuries occur when an explosion is followed by the collapse of a building. The subsequent fire can – besides burns – also cause smoke-inhalation injuries.

A basic difference between an explosion accident and a terror bombing is the motive. With accidents, there is no intent to inflict injuries. It is the nature of terrorism, however, to inflict as much loss of human life and as much suffering as possible. Also included here is striking terror in and paralysing the society that has been targeted.

Consequently, terror bombings are usually conducted in public places where a large number of people are gathered. Moreover, the charges are often constructed to inflict the greatest possible injury to the victims.

Experience shows that it is difficult to protect oneself against attacks carried out by suicide bombers who have bombs on their persons when detonation occurs.

The emergency treatment of physical injuries is the same, regardless of whether the injuries have occurred as the result of an accident or an act of terrorism. However, there is every reason for supervisory staff to pay special attention to the safety of their personnel. Responses should be led with consideration to the possible existence of secondary charges and the risk for building collapses.

Indonesia

The country in brief

Indonesia consists of 13,700 islands situated in a chain northwest of Australia and southeast of the Asian mainland.



Figure 2. The Indonesian chain of islands extends 5,100 kilometres east to west, and 1,900 kilometres north to south. ILLUSTRATION: CLAES STRIDSBERG

The region is volcanically active and earthquakes occur. The population totals about 230 million persons; just over half live on the island of Java where the capital of Jakarta is situated. The majority of the country's inhabitants, 87 percent, are Muslim. There were previously a large number of principalities or sultanates on the many islands. At the beginning of the 17th century, Indonesia became a Dutch colony. During the Second World War, the country was occupied by Japan, but later gained independence in 1949. The variation in ethnic origins is substantial in Indonesia. Among the inhabitants there are, for example, Javanese, Sudanese and Malaysians, and there are also ethnic groups that have immigrated, such as the Chinese. In recent years, Indonesia has been the site of armed conflicts and uprisings, most recently in the Aceh region.

The country has considerable natural resources, including oil, gas and minerals. The economy flourished during the 1980s and 1990s but the country underwent an economic crisis in 1997, as did other countries in Asia.

At times, the political relations between Indonesia and Australia have been somewhat strained. Disturbances on East Timor after the referendum on independence in 1999 led to the UN sending a peacekeeping force to the island. Australia was one of the countries to send troops, which may be a reason for the intermittently strained relations.

Centre for terrorists

There are several known terrorist organisations in Indonesia. One of these is Jemaah Islamiyah, which fights for the establishment of a fundamentalist state based on Islam in Southeast Asia. The organisation claims to have ties with the militant Islamic network al Qaida and is alleged to be responsible for the bombing on Bali. Jemaah Islamiyah is also believed to be responsible for the bomb attack against the Marriott Hotel in Indonesia's capital Jakarta in 2003 and for the bombing of the Australian embassy in

Jakarta in 2004. All three of these actions targeted foreign nationals. Other bombings have also been conducted, including bombing of the airport in Jakarta. The threat situation has led to several countries, including the United States, issuing warnings to their citizens regarding travel to Indonesia. In Indonesia, security has also been increased at possible bomb targets. The opportunity for vehicles to drive directly to the entrances of the major hotels has, for example, been restricted through the use of cordons with armed guards, metal detectors and similar measures.

Medical organisation

In 1999, Indonesia was 102 on the United Nations' list of 162 countries, ranked by social welfare measured using the human development index (HDI). The country's medical services are not considered to meet Western standards. Consequently, when the Swedish embassy is confronted with more complicated cases of diseases, patients are sent to hospitals in Singapore.

The investments that have been made in medical services have predominantly concerned primary medical care and preventive health care, not hospital care. Public health insurance only includes very basic medical care, and public medical service differs from what we are accustomed to in Western countries regarding care of patients. Relatives are expected, for example, to take responsibility for a large portion of services – providing patients with food, bathing them, making beds, etc. It is therefore rather common that family members live at the ward or on the hospital grounds for as long as a relative is hospitalised. If pharmaceuticals or technical aids beyond the basic level are needed, these can be purchased from the hospital pharmacy after receiving a prescription from the attending doctor.

Medical training for doctors is essentially a legacy from the time when Indonesia was a Dutch colony. A problem for the country's medical profession is that the knowledge of English is not always sufficient for reading international specialist literature. Strong bonds between various specialist organisations and international counterparts are therefore lacking.

Furthermore, there is no tradition among Indonesian doctors of educating themselves abroad. This makes the country's health and medical service rather isolated. Additionally, foreign citizens are not permitted to practice medicine in Indonesia.

Island of Bali

Bali is an island of volcanic origin at the centre of the Indonesian archipelago (Figure 2). The population is just over 3 million. The chief city is Denpasar with about 370,000 inhabitants. The international airport, Ngurah Rai, is located on Bali.

This island has been known as a holiday resort for several years and was visited by 1.6 million tourists annually prior to the bombing. Bali has chiefly attracted Australians, but tourists from many other countries in Asia, Europe and America also visit the island. There are about 30,000 hotel rooms on Bali.

Kuta Beach in southwestern Bali is a well-known beach with good opportunities for surfing. This has led to expanding tourism and has particularly attracted young people.

Bali differs from the rest of Indonesia by Hinduism being the dominating religion (embraced by 95 percent of the inhabitants). The population is largely organised into traditional villages. The elected village council assigns citizens special duties, such as responsibility for safety or for spiritual issues.

Over the years, many Westerners have immigrated to Bali and formed ex-patriot communities, which are strong social networks, partially organised in the form of club activities but also through private gatherings.

In modern times, a number of natural disasters have occurred on Bali – volcanic eruption (1963), earthquake (1976), landslip (2000) and floodings (2001).

Medical services

There are several hospitals on Bali. The largest is Sanglah Hospital, which received most of the wounded after the bomb attack. There are also ten or so smaller clinics and hospitals in the area around Kuta and Denpasar. One of the clinics is operated by International SOS – a firm that is linked to a number of large insurance companies (see the section “Civilian aviation operators”).

The island’s ambulances belong to specific clinics and specific hospitals. There are no formal requirements for medical proficiency for ambulance crews.

Sanglah Hospital is a type B teaching hospital with about 700 beds. The hospital is situated in Denpasar, about 10 kilometres from Kuta Beach. The hospital is well-equipped and has access to modern medical technical equipment of the same type found in western hospitals (CT scanners, ultrasonic devices, etc.).

The hospital was built in the 1950s in the form of pavilions, linked with open walkways. The hospital has subsequently been expanded. The emergency ward, which is well-equipped and built following a Japanese prototype, was completed in 1990. There are three operating theatres, with ten additional operating theatres located in the hospital’s central operation ward. Normally, 150–200 persons seek care at the emergency ward each day.

For the past four years, a multi-disciplinary trauma team provides care to those who have been injured through external violence.

The hospital lacks a special burn unit but three to five beds are usually occupied by patients with burns.

Comments: A patient at a hospital on Bali is dependent on family, relatives and friends for receiving basic service. A patient without access to relatives thus encounters difficulties. For those who are members of ex-patriot communities, this has resulted in individuals stepping in as voluntary family members of sorts to assist other immigrants when they are hospitalised. The volunteers take turns spending time with the patients and helping them in

the same way as Balinese family members. In this way a number of immigrants have become accustomed to providing assistance at the hospitals, despite their lack of medical training.

Australia

The country in brief

Australia is a federation of states that each have individual responsibility for medical care and police services, for example. There are also co-ordinating authorities on the federal level. The population totals about 18 million persons, who primarily live in the south eastern part of the continent. The country extends over three time zones.

Health and medical care in Australia are for the most part provided by the public sector. The states and the federal government are jointly responsible for financing. Emergency medical care at hospitals is entirely free of charge for citizens. Since large parts of the country are very sparsely populated and the distances are substantial, the Royal Flying Doctor Service (RFDS) was started as early as the 1920s.

Medical care in Australia and Sweden has a similar structure in so far as it is provided and led by regionally based organisations (county councils and regions, as well as states). There is little or very limited opportunity for the federal government to assume leadership of medical care in peacetime in conjunction with serious or exceptional circumstances. Furthermore, there is no co-ordination over state borders.

Darwin

Darwin, with approximately 90,000 inhabitants, is the chief city in the northern part of Australia – the Northern Territory. About 200,000 persons live in the territory. Large parts of Darwin were destroyed by cyclone Tracy on Christmas Eve in 1974 and most buildings are thus rather new. The city has the only deepwater port in this part of Australia and is therefore of major strategic importance. A railway that links Darwin with the rest of the country was completed in 2004. The railway is expected to lead to a large portion of the country's shipping being loaded and unloaded in Darwin.

Royal Darwin Hospital

Royal Darwin Hospital (RDH) is the main hospital in the Northern Territory and is situated about ten minutes by car from the airport. The hospital has just over 300 beds, distributed between internal medicine, surgery, obstetrics and gynaecology. Overall, there are about 1,300 employees. Moreover, medical students from Adelaide perform a part of their internships at RDH. The hospital has an intensive care unit (ICU) with eight beds and a coronary intensive care unit (CICU) with three beds. The hospital does not formally provide specialist care (regional medical care), such as neurosurgery or care of burn patients, but because of the long distance to the nearest larger hospital, these types of patients are nonetheless treated by RDH. There are, for example, four beds for burn cases that are

normally occupied by patients with burns covering up to 25–30 percent of the body area.

Work at the emergency ward is carried out by specialists in emergency medicine. This specialty is relatively new and has been practiced in Australia for about 20 years. All doctors working at the emergency ward have undergone intensive care training as a part of their education and perform, for instance, intubation independently and initiate artificial ventilation on emergency patients when necessary. Periodic training is also conducted in emergency treatment, for example, according to the Advanced Trauma Life Support (ATLS®) method. The emergency ward uses a so-called triage system for sorting the injured.

The emergency ward's doctors are also responsible for medical staffing of the aircraft that retrieve the sick or wounded in the Northern Territory from distances of up to 400 kilometres from the hospital. Groups from the hospital also rather frequently take part in patient evacuations from Bali and Timor in Indonesia.

The hospital has experience from a number of larger incidents and disasters, including cyclones, earthquakes, landslips and evacuation of injured from the conflict on Timor. This has resulted in considerable importance being attached to the hospital's disaster planning and in conducting disaster training exercises. In 2001, the hospital even received an award for its disaster planning.

The disaster plan can be activated by the fire and rescue service, the police, ambulance medical care staff or by the responsible physician at the emergency ward when there is a certain amount of casualties. The emergency state is escalated in several steps when the plan is activated. Training in implementing the plan is performed periodically; two weeks before the bomb attack on Bali, an exercise had been carried out based on the scenario of an overturned bus.

The stocks of consumables are somewhat larger at RDH than at other hospitals of comparable size, especially during the cyclone period. The reason for this is the long transport distance. It has been stated, however, that it is fully possible to receive deliveries at the hospital within six to eight hours on condition that air traffic with the outside world is functioning.

About 120 persons seek care at the emergency ward each day, and as a rule, many of them are severely ill or injured. According to the hospital, this is because of the extreme climate, the long distances and a cultural attitude of not seeking help "unnecessarily". Taken together, this means that many patients are in very bad shape when they arrive at the hospital.

Under normal conditions one patient with septaemia is intubated every third day at the emergency ward, which is somewhat more often than at emergency wards of comparable size in Sweden.

The fact that a large portion of the people in the Northern Territory consists of the native population (aborigines) also influences the influx of patients. This population group is said to be overrepresented within most health problem categories, not the least when it comes to accidents.

Activities at the emergency ward are characterised by its chief as "having access to modern hospital facilities in a developing country". The emergency ward moved to entirely new premises in the summer of 2003.

The much smaller, old emergency ward, which in 2002 received the injured after the bomb attack on Bali, has been converted into a polyclinic.

Immediately adjoining RDH is Darwin Private Hospital with 120 beds. Only planned care is provided there. There is neither an intensive care unit nor an emergency ward, but there is an operation ward. The staff of doctors is largely the same as at RDH.

In summary, RDH is a rather small hospital, but with hospital management that is concerned with and actively involved in disaster medicine preparedness. Management has a positive attitude to both training/education and exercises, and does not hesitate to take early action even when decision-making data is inconclusive. As an example, it can be mentioned that the disaster plan was activated in conjunction with the bomb attack against the Marriot Hotel in Jakarta in the summer of 2003.

The emergency ward's personnel are well-trained and have experience of caring for seriously ill and injured patients after emergencies. Employees at all levels appear to take pride in the hospital and in the strong spirit of camaraderie.

Comments: For good disaster medicine preparedness, concerned and involved hospital management, with a positive attitude to training and exercises, is necessary. The ability to care for the injured in Darwin is based on just these conditions.

Rescue work on Bali

Work at the incident site

The explosions occurred in Kuta Beach's entertainment district, where there were many people moving about. The sound of the explosions and the glow from the subsequent fires were noticeable even from far away. Many people, both tourists and the local population, went to the scene of the attack. Some tried to help with rescue work while others were only curious.

The commander of the police's traffic department in Kuta Beach was at his home, just a few hundred metres from the explosion site. The sound first led him to believe that an airplane had crashed at the airport. However, he could see that the cloud of smoke was coming from a much nearer location, and he therefore took his walkie-talkie and bicycled in civilian clothing towards the site. Upon arriving, he was met by the massive destruction of the explosions and the burning fires.

The police commander attempted to organise and lead the work of evacuating the casualties to the nearby hospital. However, he had no actual training for the task other than the experience he had gained in his police duties related to traffic accidents.

The police commander was also the leader of a Muslim association. He therefore contacted association members and called them to the location. Eventually, he also established contact with the police, and the fire and rescue service. The injured were pulled from the ruins of the buildings and evacuated. The number of available ambulances was insufficient and transports were thus mainly carried out using private automobiles and lorries, as well as motorcycles, with the injured placed behind the driver and a volunteer at the rear holding the injured on the saddle during transport. Within three hours, they managed to evacuate 325 casualties from the incident site to fourteen different hospitals and clinics, of which nearly 40 percent were transported to the largest hospital, Sanglah Hospital. The hospitals also received 184 deceased. An additional 18 persons were pronounced dead after forensic examinations.

Table 1 Distribution of injured and dead among the hospitals on Bali

Hospital	Injured	Dead	Total
RS Sanglah	127	184	310
RS Puri Raharja	5	0	5
RSAD	32	1	33
RS Kasih Ibu	24	0	24
RS Wangaya	8	0	8
RS Dharma Usada	5	0	5
RS Dharma Yadnya	1	0	1
RS Prima Medika	16	0	16
RS Graha Asih	3	0	3
RS Surya Usada	15	0	15
RSUD Kapal	2	0	2
Clinic SOS Medika	37	0	37
Clinic BIMC	49	0	49
RS Bayangkara	1	0	1
Total	325	184 (+18)*	509 (527)*

* Body parts from an additional 18 persons were discovered during the forensic investigation. The total number of direct casualties was thus 527.

The police commander was in tears when providing his statement at the subsequent legal proceedings. He told of victims who were alive when they were dug out but who died in the arms of rescue personnel; he had personally experienced more than 20 such deaths during the night. He had ordered the men who seemed to be able to handle the task to help with the injured. Those who had difficulties in dealing with the blood and severe injuries were instead assigned to provide lighting using electric torches.

There was no sorting of casualties at the incident site. The ambulances, which were equipped in various ways, came from different organisations and hospitals. The ambulance crews had not been trained in how to proceed following major accidents or disasters. There was no co-ordination or formal command of ambulance operations.

The first unit from the fire brigade was reported to have been at the incident site at 23:30, while according to other information, the first unit did not arrive until about midnight. The fires were not completely extinguished until 05:30 in the morning. No other staff or command function was established during emergency response operations.

The head of the lifeguards at Kuta Beach took it upon himself to gather body parts and corpses. These were collected and covered or shrouded at the site with white fabrics, such as sheets, blankets and tablecloths that had been collected from nearby hotels. During a period of eight hours, about 200 corpses were attended to in this manner.

The procedure of collecting belongings and moving bodies without first photographing them was later criticised (see the section “Police work”). The actions must be viewed, however, from a religious perspective. In both Hinduism and Islam, this is a way of showing consideration and respect to the dead.

Comments:

- *The rescue work and transport of the injured seems to have been largely carried out by volunteers. There was no organised command of medical response operations. The casualties were immediately evacuated after being found (so-called load-and-go). The ambulances used were not equipped for advanced prehospital care and the personnel did not have the appropriate skills for providing such care.*
- *Witnesses report of injured who were conscious during rescue work but who died immediately afterwards in the arms of rescue workers. This, and the description of the incident site, indicates severe injuries to organs with bleeding trauma as the cause of death.*
- *With consideration to the rapid progression, intravenous infusions would hardly have changed the outcome. It seems not to have been a matter of respiratory problems or other types of injuries that theoretically could have been treated with more advanced ambulance medical care or a better prehospital system. The number of early deaths would probably have not been fewer if the incident had occurred in a city with advanced ambulance medical care of the western model.*

Care at Sanglah Hospital

At about 23:30 (about 20 minutes after the attack), Sanglah Hospital received information by telephone that an explosion had occurred in Kuta Beach and that there could be many casualties. The hospital director called in all available staff and also contacted the department of health in Jakarta as well as the governor of Bali.

Emergency ward

The first 16 patients arrived at 23:50. Casualties continued to stream in during the following hours. Friends, relatives, volunteers and the curious also went to the hospital. The modern emergency ward has a large open space that is well-suited for simultaneously receiving many severely injured. No sorting (triage) had been carried out at the incident site so the injured were instead brought in without prior sorting.

Initially, the dead were also taken to the emergency ward, which further increased the pressure. The lack of co-ordination of transports, as well as the lack of means of communication, meant that the emergency ward could not do anything about the chaotic situation. They had no contact with the ambulances or with the incident site.

By 01:30, 168 patients had been received, of which 121 were hospitalised. The available monitoring equipment was insufficient for the large number of seriously injured.

The three operating theatres in the emergency ward and the additional theatres in the operation ward were soon occupied for emergency

procedures. From 01:30 to 09:00 the following morning, 37 operations were performed (see Table 2 below).

The large number of operations resulted in shortages of sterile goods and linens during the night. This delayed some procedures until the storeroom could be restocked the following day. Pharmaceuticals were unevenly distributed; there were pharmaceuticals at the emergency ward at the same time as there were shortages at other units, including ICU. The medical documentation was very brief.

Cleaning was also a problem. Used equipment, compresses and bandages soiled with body fluids collected on the floors and it was impossible for personnel to find time for cleaning. This was eventually resolved by volunteers, including nursing students, forming cleaning patrols.

Only five patients were put on ventilators during the first 12 hours.

Comments: Triage (sorting), co-ordination and good communication capabilities can tangibly facilitate treatment of the injured and reduce the pressure on receiving hospitals in chaotic situations. Communications is a weak link in Swedish health care too and ought to be further developed.

The operation ward

The operation ward has 10 theatres, each of which is staffed by one scrub nurse, two anaesthetic nurses and two assistant nurses. During the course of a normal working day, more than 20 procedures are performed.

The night of the attack, the first two patients were received at midnight. A total of 29 patients were operated in the operation ward during the night and eight procedures were carried out in the three operating theatres in the emergency ward. Most patients had not been prepared in any way prior to operation and none had been identified. To maintain order among the patients a number was written somewhere on uninjured skin. This number was then used when the patient was reported to the nursing ward.

Table 2 Operative procedures at Sanglah Hospital, 25:50–09:00, the night of and morning after the bomb attack.

Primary diagnosis	Number of patients	Treatment
Burns	17	Debriding or burn surgery
Burns & soft tissue injuries	10	Burn surgery & general surgery
Burns, soft tissue injuries & fractures	3	Burn surgery & fracture surgery
Burns & eye injuries	1	Burn surgery & eye surgery
Fractures	2	Fracture surgery
Abdominal injuries	2	Laparotomy
Abdominal injuries & lacerations	1	Laparotomy & general surgery
Skull injury	1	Craniotomy
Total	37	

SOURCE: SANGLAH HOSPITAL'S OFFICIAL REPORT

Despite the lack of a contact list for personnel outside the hospital, ten nurses arrived at the hospital within 15 minutes and two operating theatres could thus be opened. At 01:30, 52 employees were participating in operations, which permitted eight operating theatres to be kept open until 09:00 the next morning.

With regard to equipment, there was a shortage of pneumatic dermatomes (instruments used in skin transplants).

At the operation ward, there was also a unit with eight beds for those who had undergone operations, and during the night, ten patients were monitored by two nurses and one anaesthetist. The normal time for stays at the unit is 15–20 minutes, but this was extended to two hours because the nursing wards were unable to receive patients. Only one patient died before surgery could be begun. During the following day, an additional 28 procedures were conducted.

Comments: Even in chaotic situations, case records and identity tags should be used. If these were to run out or not be available, a plan should be in place for how this is to be handled.

Evacuation of a nursing ward

One of the hospital's wards (the Melati Ward), with room for 50 patients, was evacuated to make room for the injured.

The situation during the night was chaotic at times according to the hospital's official report. This was not primarily due to the patients. The patients displayed nearly unshakable calm in regard to their own situation; they were mainly concerned about the fate of friends. However, the large number of "outsiders" at the hospital was a problem.

Three nurses normally work nights at the Melati Ward. On the night of the attack, personnel were reassigned from other wards and 15 nursing students were also called in.

Work was complicated by the inability to properly maintain records and other documentation for many patients. Many were not identified. Moreover, of those hospitalised, 66 were foreign nationals and only seven were Indonesians, which meant that personnel and the foreign patients had difficulties in communicating with one another. The lack of interpreters was pointed out as a problem in the report.

It was also noted that many of the injured reported ear discomfort and impaired hearing, directly after arrival at the hospital (see Table 3 below).

Table 3 Reported ear injuries

Type of injury	Number of patients
Tinnitus	36
Dizziness	4
Impaired hearing	19
Ear discomfort	2
Ear haemorrhaging	2
Ear laceration	1
Total	74, of which 55 had punctured eardrums

SOURCE: SANGLAH HOSPITAL'S OFFICIAL REPORT

There was no doctor assigned to the ward. Work was instead led by nurses who received instructions both from the hospital's doctors and from volunteer doctors, who did normally work at the hospital. This created additional confusion and stress in performing duties.

Insufficient co-ordination between the air medical evacuation teams that arrived to pick up patients and the nurses at the ward also created delays in connection with transport from the hospital.

Cleaning was a problem for the ward as well, which was resolved by volunteers helping out, just as in the emergency ward.

Comments:

- *The overload on the medical system on Bali meant that they needed all the qualified help they could get. Sanglah Hospital found itself in a particularly difficult situation because 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 health care providers, led to a situation that was difficult to control.*
- *None of the doctors at the hospital appeared to have been assigned to the Melati Ward in a supervisory capacity – neither during the night nor during the day after the bombing. If this had been the case, the volunteer doctors could have worked directly under the doctors at the hospital. This would probably have reduced both the legal difficulties 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.*

The days after the attack

By 21:00 on 13 October (the day after the attack), 121 injured had been evacuated from the hospital, and on the morning of 14 October, 43 patients remained, all Indonesians. The empty beds were now filled by patients from smaller clinics and hospitals being transferred to Sanglah Hospital.

On 14 October, the hospital staff was reinforced with plastic surgeons from other Indonesian hospitals. Additional nurses from other hospitals on Bali and Indonesia, as well as from other countries (for example, the

Philippines, Australia, the USA, New Zealand and Singapore) assisted in treatment. On the whole, this resulted in a much better environment, both for patients and staff. From the third day after the explosions, the situation was described as having returned to normal, with the exception of the additional personnel at the ward. Some patients could be released but were in need of follow-ups.

Table 4 Nationalities of the bomb victims at Sanglah Hospital after evacuation, 14 October, 2002

Nationality	Number of patients
Indonesia	50
Australia	17
England	5
France	2
Germany	2
Denmark	2
Sweden	2
Ireland	2
Total	82

SOURCE: SANGLAH HOSPITAL'S OFFICIAL REPORT

On 15 October, an additional five patients were transferred from other hospitals on Bali to Sanglah Hospital.

On 16 October, it was decided to recommend the transfer of six of the remaining patients to various burn centres.

On 18 October, foreign burn teams from the USA, Australia and Belgium arrived. These teams took part in 34 supplemental burn procedures performed between 18 October and 8 November. The last patient from the bombings was released from Sanglah Hospital on 4 December.

During the period directly after the attack, the total number of persons seeking care at the hospital's emergency ward drastically decreased.

Supply and technical support

Throughout the entire first week, technical personnel worked with the support of external specialists around the clock. Air conditioning was installed, and extra lighting fitted in corridors and adjacent to the morgue. When refrigeration containers arrived, additional electric power was run into the hospital to power them. Extra telephone lines and faxes were installed and the pager system was upgraded. Furthermore, the hospital's carpenters managed to build 200 coffins for the morgue.

The hospital's water supply system was at times insufficient, and the amount of waste noticeably increased, which was resolved by running the hospital's incinerators for longer periods than usual. The sterilisation centre operated around the clock when the load was heaviest, and compliance with sterilisation requirements was good. The laundry unit received help from hotels, and the hospital kitchen increased its capacity with the help of volunteers and by bringing in food from outside sources.

The supply of pharmaceuticals was managed by the hospital pharmacy co-operating with two other pharmacies. Moreover, at 01:00 on 13 October, the head of the hospital pharmacy contacted all suppliers who might conceivably have suitable pharmaceuticals in stock – infusion solution, antibiotics, burn cream, albumin and similar items. A supplement of narcotic analgesics was also obtained from another hospital.

Pharmaceuticals were later donated by both domestic and foreign pharmaceutical companies, of which most were put to use. However, the expiration date for some pharmaceuticals had passed, or the received pharmaceuticals were inappropriate for the situation.

Official visits and media management

During the days following the bombings, a number of officials visited Sanglah Hospital, including Indonesia's president and vice president, and a number of ministers and foreign diplomats. Each visit caused disturbances in the work in so far as the police and security forces were compelled to cordon off the area. The visits also took time from hospital management staff. Press releases were issued from the hospital each day at 14:00 and all information passed through the hospital's information department. The media could also turn directly to the hospital's various section heads with their questions.

Comments:

- *Sanglah Hospital became overloaded. Few hospitals in the world, if any, could have managed such a large influx of severely injured patients without becoming overloaded.*
- *If medical command had been organised at the incident site, the patients could probably have been better distributed among the various hospitals in the area. If this had been done, Sanglah Hospital would have received fewer patients with lighter injuries. However, there was a lack of both a control structure and technical means of communication for this. From a Swedish point of view, it can be inferred that the work that has recently been done on developing the "on site medical command" function would be of considerable value in this type of incident in distributing the patients among different hospitals.*
- *Monitoring equipment, pharmaceuticals, consumables, sterilised instruments, linen and so on ran out. Here it appears that both hospital management and volunteers tried to contribute to resolving the problems by, for instance, seeking support from outside the hospital. It could also be of value to realise the potential capacity of volunteers or private companies in making equipment available in an emergency overload situation.*

Aftercare

Sanglah Hospital established a programme for house calls after the bombings, with nurses calling on the injured in their homes at an early stage to determine rehabilitation needs. Other specialists, such as psychologists or physical therapist, visited when necessary. A total of 16 persons were checked in this manner, at no cost to the individual.

Various charity organisations also offered rehabilitation programmes for the injured (see the section “Aid based on voluntariness”). Co-ordination between these efforts was, however, less than perfect.

Attending to the dead

At 03:00, the morning of 13 October, transports with the bodies of the deceased began to arrive at the morgue at Sanglah Hospital. There is normally space for ten bodies, but during the course of a few hours, 184 bodies and 308 body parts were received. Body parts were also delivered to the morgue during the following days.

The lack of refrigeration capabilities, in combination with the warm climate, quickly resulted in problems with impending decomposition. The bodies were therefore embalmed in plastic bags, and during the first two days, a large number of volunteers worked with trying to keep the bags covered with ice that was transported to the site.

After two days, two refrigeration containers were obtained in which the bodies that had been identified were placed. The unidentified bodies were stored on the ground so as to avoid having to move the bodies in and out of the refrigerated spaces.

The hospital’s electrical supply had problems in coping with the extra load required by the refrigeration unit.

Identification commissions and forensic teams from several countries took part in identification – from Australia, Hong Kong, Switzerland, Sweden, Finland, Japan, Taiwan and Holland. The ability to store bodies and body parts gradually improved. The Australian police were assigned the task of co-ordinating the work of the various teams (see the section ‘Police work’).

Of the deceased, 54 percent were in the age group 26–35; the majority were Australian citizens. Overall, 21 nationalities were represented among the dead.

Table 5 Nationalities of the dead and injured.

Nationality	Number of dead			Number of injured
	Men	Women	Total	
Australia	39	44	83	129
Indonesia	30	6	36	89
England	17	5	22	23
Sweden	1	5	6	4
United States	4	2	6	3
Germany	1	5	6	10
France	4	0	4	6
New Zealand	3	0	3	9
Holland	2	2	4	0
Denmark	0	3	3	7
Switzerland	2	1	3	3
South Africa	2	0	2	3
Brazil	2	0	2	0
Japan	1	1	2	10
Korea	0	2	2	0
Italy	1	0	1	3
Ecuador	0	1	1	0
Portugal	1	0	1	0
Taiwan	0	1	1	3
Canada	1	0	1	3
Poland	0	1	1	0
Norway	0	0	0	4
Belgium	0	0	0	3
China	0	0	0	1
Austria	0	0	0	1
Hong Kong	0	0	0	1
Deaths at military hospitals	1	0	1	
Deaths in Australia	3	5	8	
Unidentified	3	0	3	2
Total	118	84	202	318

SOURCE: SANGLAH HOSPITAL'S OFFICIAL REPORT

Of the 202 dead, 199 could be identified. In only 15 cases could the bodies be identified by simple means, such as through case records or belongings. In the remaining cases, it was necessary to analyse teeth, perform DNA analyses or to use combinations of these methods (see Table 6). This was because most bodies were badly burned.

Table 6 Various methods used for identifying the dead.

Identification methods	Number
<i>Simple methods</i>	
Case records	13
Belongings	2
<i>Advanced methods and examinations</i>	
Dental records	63
DNA analysis	43
Dental records & DNA analysis	19
Dental records & case records	14
Dental records & belongings	9
Case records & DNA	8
Miscellaneous	28
<i>Unidentified</i>	3
Total	202

SOURCE: SANGLAH HOSPITAL'S OFFICIAL REPORT

From the table above, it can be seen that identification was a complicated process. It required a lot of equipment as well as substantial amounts of office materials for the extensive documentation work. Some of the equipment used in identification was obtained by various charity organisations.

Order in and around the morgue was poor during the first 24 hours. There was no control of people entering the morgue area. Relatives, friends, the curious and the press had free access. The media filmed and photographed without restrictions. The area was, however, eventually screened to prevent viewing.

The identification teams from the various countries quickly agreed on the routines for identification and the release of bodies to relatives. Only one report testifies to a body being released without correct administrative routines being followed.

Many relatives were critical of the authorities for not allowing them to immediately take their deceased family members home, after having identified the bodies, during the period when there was free access to the morgue. The responsible authorities dismissed such arguments, however, since they wanted to be entirely certain that none of the bodies had been mistakenly identified. The bomb attack moreover was the subject of a criminal investigation.

Care at other hospitals and clinics

The wounded were transported, as they were discovered, by friends and volunteers to the medical facilities that were closest. It was only after the incident site had become somewhat more organised that some form of triage was conducted with the most seriously injured being sent to Sanglah Hospital.

In some cases, the patients' injuries were so extensive that the first hospital was unable to deal with them. Some of these patients were therefore transferred to Sanglah Hospital as soon as a number of foreign nationals had been evacuated by air from Sanglah Hospital to Australia.

It was concluded in Sanglah Hospital's official report that other hospitals played an important part in the collected efforts. It was also noted that the emergency load on the hospital could have been tangibly reduced if all of those with lighter injuries had been taken from the beginning to these other hospitals and clinics.

Comments: It is clear how important it is to, at an early stage, establish a command system at the scene of an incident that will distribute the injured so that a single hospital does not receive the entire burden.

Volunteer work

The hospital establishes a command group

In conjunction with Sanglah Hospital beginning to call in personnel, information about the incident spread. The head of the hospital pharmacy called in all pharmacy staff. The head of the support department contacted external suppliers so that they could maintain a state of preparedness.

During the night, many volunteers contributed in various efforts at the hospital. They collected materials and necessities which were subsequently distributed. Furthermore, an information centre was staffed and food and drink for the injured, relatives and personnel was arranged.

Hospital management had no control over this and also observed that certain people tried to take control of the hospital's activities. A decision was therefore eventually made for one of the hospital's management groups to assume responsibility for various forms of contributions, the use of volunteers and similar matters. A tent was raised on the hospital grounds that came to serve as a temporary office for this purpose. It was here that contributions such as food and drink, towels and linens, and cash were received.

Voluntary medical assistance

Besides the health care providers employed at the clinics in the area, a large number of volunteers assisted with the injured at the hospitals. They included Balinese and foreign tourists, people entirely untrained in medical care as well as medical practitioners on holiday in Bali. The tourists had often heard of the incident through concerned relatives calling from home after the explosions.

During the first four days, volunteer efforts were not co-ordinated. Attempts were later made, however, to use Indonesians in logistics, interpreting and in the continuing search for missing persons, while foreign nationals helped at the information centre and in the morgue.

A conference for plastic surgeons had recently been concluded on Bali, and several of the attending surgeons were still on the island. They volunteered their services.

Several descriptions have been published of the work conducted by the volunteer medical practitioners, including a large number of emergency procedures (escarotomies, i.e. incisions through burned, constricting skin) during the night. The problem for the hospital management was that foreign doctors do not have the right to practice medicine in Indonesia. Furthermore, there was no opportunity to check the credentials of the volunteers. During the night of the bombings and the following day, however, the assistance that the foreign doctors could provide was accepted without formally granting permission.

The nursing ward reported that many of the volunteers presented themselves as medical practitioners. Their efforts appeared to have varied from fully integrated interaction with the work of the ordinary hospital staff to medical treatment carried out completely isolated from other care and without reporting over to hospital staff or receiving approval for actions etc. To resolve these problems, it was decided that all volunteers would have to register in the tents that had been erected. It was also decided that all volunteers were to work under the supervision of Sanglah Hospital's own personnel.

According to the hospital's report, the volunteer medical practitioners belonged to one of the following three categories:

- *Conference attendees* from the plastic surgery conference on Bali. These were known by Sanglah's doctors and it was easy to establish the qualifications of the foreign nationals.
- *Foreign doctors and nurses* who volunteered their services. The respective consulates were contacted to confirm their qualifications.
- *Other personnel* who were later sent from foreign institutions to assist at Sanglah Hospital. Their arrivals were preceded by correspondence to confirm their qualifications.

Comments:

- *Volunteers – Balinese and foreign nationals, residents and tourists, medical professionals and laypersons – became involved in working with the casualties, those directly affected and the dead. The actions of volunteers were undoubtedly very beneficial, but there was also obvious friction in co-operation.*
- *Because relatives are expected to take responsibility for providing basic services to patients, a custom of volunteer work at hospitals has been established among those residing on Bali. This explains the spontaneous response from volunteers, not the least from immigrants. Many of the immigrants also have experience in tourism, which entails a high level of service-mindedness and being accustomed to taking the initiative in resolving unanticipated situations.*

- *For hospital management, the assistance of the volunteers was difficult to deal with, especially with regard to the efforts of foreign medical practitioners. On the one hand, they needed all the qualified help they could get with consideration to the extreme overload. On the other, Indonesia has, as do all countries, a system that regulates who may perform medical care within the borders of the country. Moreover, the hospital management naturally has responsibility for the activities carried out on the hospital's premises.*
- *In a later phase, the qualifications of the volunteers could be checked, but this was only possible after several days, when there was time to contact the central health care agency which is formally the authority that can grant exemptions from the applicable qualification requirements. Contacting consulates or embassies during the emergency phase to establish someone's qualifications is more of a fictive solution than a real way of solving the problem.*
- *The situation is not unique for Indonesia; something similar can occur anywhere in the world where many tourists gather and where medical resources are limited in relation to the resulting casualties. This was also what happened during the Asian tsunami disaster in 2004. The situation is further complicated if the casualties and the local health care providers speak different languages.*
- *The disaster plans of Swedish hospitals only address volunteers in the context of a hospital's own personnel reporting for duty without having been directly called in. Also in Sweden, the question of medical practitioners who are not employed at the pertinent medical facility or who have foreign qualifications is unclear. After the tsunami disaster, the government commissioned the National Board of Health and Welfare to investigate this matter as well as other issues (S2005/1841/HS). A proposal was presented on 30 March 2006 in a report concerning preparedness to aid residents of Sweden in the event of disasters abroad ("Uppdrag att se över beredskapen för att omhänderta personer med hemvist i Sverige vid katastrofer utomlands").*
- *Dealing with patient confidentiality partially reflects the friction between the hospital management and the volunteers. The foreign doctors who assisted during the emergency phase became both personally and professionally involved in the patients they treated. But once the emergency situation had passed, and the volunteers' assistance was no longer needed, they were not permitted to find out how individual patients were doing because of patient confidentiality.*
- *Sanglah Hospital was subjected to an extreme influx of severely wounded patients. With due regard to the hospital's resources in relation to the load, a fantastic job was done during the emergency phase. Committed volunteers, acting on their own initiatives, contributed to limiting the repercussions – for victims, those indirectly affected and health care providers – and they also helped*

with the dead. The friction noted between the hospital and the various volunteer groups is understandable considering the given sequence of events.

Australia organises evacuation by air

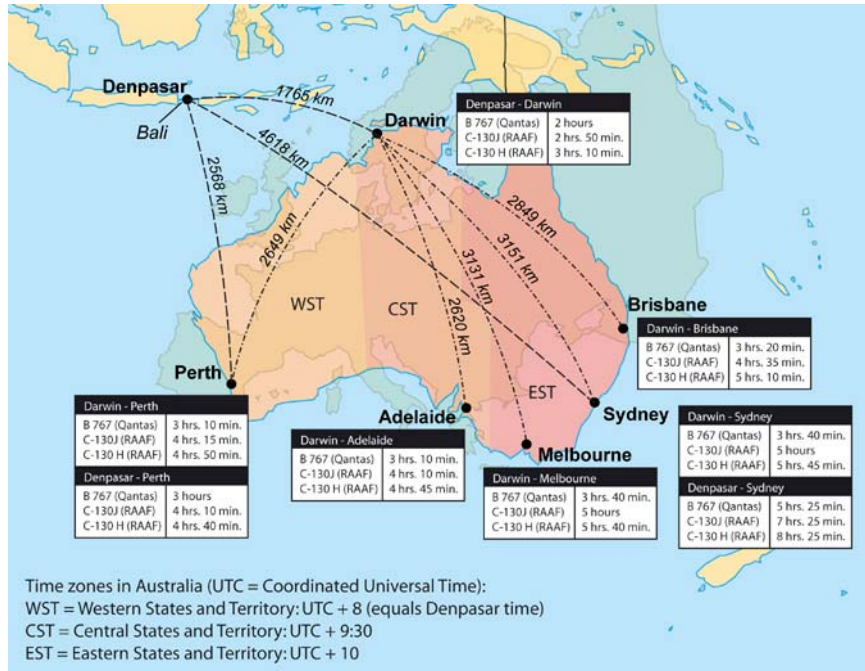


Figure 3. The evacuation from Bali was conducted with flights to Darwin. After reception at Royal Darwin Hospital, the most seriously burned were flown to five burn centres in southern Australia. Co-ordination of response operations was complicated due to activities extending over several time zones.
ILLUSTRATION: CLAES STRIDSBERG

Difficult transport mission

Australia was hard hit by the bomb attack on Bali. Besides having 83 citizens among the dead, 129 Australians were injured. It was thus important for those responsible in Australia to act as quickly and efficiently as possible to succour the country's citizens. In this case, the response was conducted as a rapid evacuation to the home country.

The transport home was carried out by air in two steps (see below). The action had a large geographic dispersion and extended over several time zones, which entailed that the time was different at a given moment at the various locations that were involved in the response operations. This placed considerable demands on co-ordination.

During the following descriptions of the chain of events, times are indicated according to Central States and Territory time (CST) if not otherwise specified. CST is the time zone in which Darwin and Adelaide, for example, are situated. Note that this is world time (UTC) + 9.5 hours, i.e. 1.5 hours before Bali time (see the summary and table below).

To better comprehend the distances, one could project a map of Indonesia and Australia over our part of the world and position Bali over Iceland. Darwin would then be located approximately where Bergen in Norway is. From Darwin, the patients were further transported to burn centres in Perth (corresponding to Spain), Adelaide (Greece), Melbourne and Sydney (Turkey) and Brisbane (the northeast coast of the Black Sea).

Comments: In the event of evacuations by air involving several time zones, it is vitally important to clarify at an early stage the time concepts that are to be used in conjunction with communications and the keeping of case records. Both local time and UTC ought to probably be given. This became very clear during this incident but also in connection with the evacuation from Thailand following the tsunami in 2004.

Time zones

Within one and the same time zone, the same standard time is used. The time zones initially began from the Greenwich meridian – Greenwich Mean Time (GMT). The zero zone extended a half hour east and west of Greenwich, England. This system is still used in shipping and aviation, but on land, more practical lines are used – national borders and coasts, and are subordinate to the actual meridians.

Universal Time (UT) was previously the prevalent system for accurate international time indication. In practice, it is the same as GMT and both are based on astronomical observations.

Increased demands for precision in indicating times, however, led to a corrected world time, so-called Universal Time Coordinated (UTC: Zulu time).

SOURCE: NATIONALENCYKLOPEDIN (SWEDISH).

Decisions at the departmental level

Early information dispersal

Local media, including television, were at the scene in Kuta Beach about 35 minutes after the explosions. The CNN news agency also seemed to have been there early. News of the explosions was broadcast by local radio on Bali at about four in the morning, local time. The number of dead was then reported to be at least 150 persons.

There are normally about 4,000 Australian citizens on holiday in Kuta Beach and in the chief city of Denpasar at any given time; 12 October 2002 was no exception, and many called home to relatives in Australia after the explosion.

There is information indicating that various Australian authorities and organisations were notified early. The Australian consulate on Bali was

aware of the incident at 23:15, i.e. seven minutes after the initial explosion. The consulate immediately began to work on obtaining confirmation and additional information.

At 00:15, i.e. one hour and seven minutes after the initial explosion, the consulate informed the Department of Foreign Affairs and Trade in Canberra (02:15 EST) of the incident and provided a preliminary assessment of its extent.

A policeman from Australia's federal police (Australian Federal Police – AFP) who was onsite informed both the embassy in Jakarta and AFP headquarters in Australia. An army major called his headquarters on Timor in Indonesia and a plastic surgeon called his hospital in Perth. It has not been possible, however, to trace how the information spread further within and beyond these organisations. The headquarters of the Australian Defence Forces (ADF) in Canberra was reported to have received notification at 02:30 and the Department of Defence at 03:00 (EST).

Department of Foreign Affairs and Trade activates a crisis centre

An important duty of foreign affairs ministries/departments in various countries is to support and assist their citizens who are abroad. At the *Australian Department of Foreign Affairs and Trade* (DFAT), this is handled by the consular section. Monitoring is normally conducted by a watch function that is maintained around the clock (*H24 watch office*). An advanced telephone exchange system handles the embassies' emergency telephone calls, 24 hours a day. A high level of service is thus maintained for Australian citizens who need to reach their embassies.

During the terrorist attack on 11 September, 2001 in New York, many Australians were killed or wounded. A complete review was subsequently conducted of preparedness for incidents that simultaneously affect many Australians abroad. The result was a new way of reacting to global incidents – the Global Response monitoring system.

At 02:15 EST (00:15 on Bali), DFAT received information via its monitoring system about the incident and an estimate of its scope from the consulate on Bali. Based on this, it was decided to activate DFAT's crisis centre in Canberra, which is tasked with co-ordinating the government's actions. Not least, it was important to ensure that other departments and government agencies received relevant information.

The crisis centre was activated at 05:00 EST (03:00 on Bali) but it did not initially contact other government agencies. The probable reason for this was that it was not believed that they would be involved in the incident at this stage.

An emergency call unit is established

One of the components in the Global Response monitoring system is the rapid activation of an emergency call unit with 12 switchboard operators. This unit can mediate calls to up to 700 specially trained government officials in Canberra. In conjunction with the bomb attack on Bali, this

function was activated at 06:00 (04:00 Balinese time) to receive calls from anxious relatives. At the same time, information regarding the incident was posted on the DFAT website. The website also posted the number of the emergency call unit, and a request for people to call and provide information about their relatives.

During the first 24 hours, the emergency call unit handled nearly 10 000 telephone calls related to 4 700 persons. DFAT could identify more than 220 persons as missing. During the following 24 hours, a total of 30 000 calls were received.

In addition to the DFAT crisis centre, a support function was also established for the centre – the *Inter-Departmental Emergency Task Force* (IDTEF). The support function was intended to provide the crisis centre with expertise and information from the consular unit. Specialists with knowledge of Indonesia and Bali, security issues and disaster medicine were particularly in demand.

Comments: The Global Response monitoring system is an interesting means of providing the country's citizens abroad with help in the event of a major incident. Sweden could benefit from studying in more detail how the system has been built up and by learning from Australia's experiences.

A decision is made to send aircraft

DFAT's crisis centre called an initial meeting at 09:00 EST (07:00 on Bali) with the support function IDTEF. The purpose was to co-ordinate its own activities with those of other concerned departments and government agencies, including defence, rescue services, the police, and health and medical care services.

At this stage, when air evacuation began to be discussed on a central level, it was believed that flights could be made directly from Bali to various burn centres in Australia. There was no thought that the injured might need to be first taken to Darwin, as an intermediate station. There was no all-embracing summary of information on the central level at this time.

As a result of the meeting at the support function, DFAT issued a press release at 08:30 EST. It was decided that the Royal Australian Air Force (RAAF) would send two Lockheed C-130 Hercules planes with health care providers to Bali to evacuate casualties to Australia. This decision included no limitation to Australian citizens, which nonetheless came to be a widespread perception on Bali.

It was also decided to charter a smaller civilian jet that was available on Bali to transport the most critically injured patients. The flight could be arranged due to the fact that DFAT had access to USD 75 000 which could be used in an emergency for transports by air ambulance. Following a request for exemption for the aircraft (for noise reasons) a flight was made with this plane directly to Perth.

Table 7 Hercules transport aircraft

	C-130 J	C-130 H
Manufacturer	Lockheed	Lockheed
Motors	Four Allison AE2100DE turboprops – rated at 4,590 horsepower, which power 6-blade propellers	Four Allison AE2100DE turboprops – rated at 4,190 horsepower, which power 4-blade propellers
Dimensions	Length: 34.37 m Height: 10.1 m	Length: 29.7 m Height: 11.6 m
Wingspan	40.4 m	40.4 m
Weight	79,380 kg maximum	70,450 kg maximum
Loading capacity	19,500 kg	19,300 kg
Range	5,100 km with 18,155 kg load	6,000 km with 9,295 kg load
Maximum altitude	35,000 feet	40,000 feet
Load	128 passengers, or 74 paratroopers, or 80 stretchers and two doctors or nurses. Can carry various types of vehicles, etc. Carries 30% more than C-130 H	92 passengers, or 64 paratroopers, or 74 stretchers and two doctors or nurses. Can carry various types of vehicles, etc.
Speed	625 km/h (cruising speed)	550 km/h (cruising speed)
Crew	Two pilots and loading master	Two pilots, navigator, flight engineer and loading master
Number	24	12

Actions taken within the first 24 hours

During the first 24 hours after notification from the consul on Bali of the explosions, the Australian Department of Foreign Affairs and Trade (DFAT) had:

- *Identified* 113 injured Australians through checks at hospitals, hotels and the airport through the support of the consulate on Bali.
- *Submitted* a proposal to the Indonesian minister of health that the injured (there was a list of 127 bomb victims, of which 84 were at Sanglah Hospital and 43 at other hospitals) be evacuated to Australia by the RAAF. No formal request for assistance was ever made by Indonesia, but rather a “formal invitation” to assist was extended to Australia, as the DFAT expressed it, based on comprehensive co-operation between the countries on the civil servant level that had been established over a number of years within, for example, the Australian Federal Police (AFP).
- *Informed* the airline Qantas of the need for flying home Australians from Bali. Qantas states, however, that these flights were voluntarily conducted and funded by the airline, acting on its own initiative, and that the government was only informed afterwards when three aircraft were already on the way to Bali.
- *Contacted* businesses with expert knowledge of disaster assistance regarding the need for transport of the deceased to Australia.

- *Reinforced* the 20 Australian embassy and consulate officials who were on Bali with an additional nine persons from DFAT and 14 persons from the federal police in Canberra and Jakarta.
- *Established* local command at Bali's airport with the duty of facilitating the departure of Australians and the arrivals of relatives. This work was led by the vice ambassador, who arrived from the embassy in Jakarta.

Within 36 hours, the consulate had conducted a second search of the hospitals on Bali for more injured Australians. All injured Australians had at this time been evacuated to Australia.

Within 48 hours, five refrigeration containers had been sent to Bali. The Australian Department of Foreign Affairs and Trade and the Australian Federal Police now prioritised, in co-operation with the Indonesian government agencies, making improvements in attending to the deceased at the local morgues.

Comments:

- *Australia's ability to quickly (within 24 hours) assist those affected is impressive and can be compared with the length of time it took for Sweden's aid (three days) to be initiated in connection with the tsunami in Asia.*
- *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. Deviation from practice represents a breach of the other country's sovereignty, which is particularly sensitive if military resources are used, for instance in connection with air transport. What was unusual in this case was that the aid was primarily for affected persons from their own country – it was thus not a general aid effort for all affected. The same applied during the Swedish evacuation after the tsunami disaster in Asia.*

It can be argued that the evacuation of a larger number of foreign casualties freed medical resources that could instead be utilised for the affected country's own citizens. This consequently entails that the response operation achieves a more general effect. In this case the "invitation to help" was obviously equated with a formal request for assistance.

Difficult to locate victims

A major problem was in finding out where casualties had been taken. In this case there were also problems in handling information on foreign nationals who were evacuated to Australia. It was the experience of Swedish embassy staff involved in locating the evacuated Swedes that the strong Australian Privacy Act hindered them from verifying whether any Swedish citizens were hospitalised at a particular hospital.

Changed plans

A number of experiences have led to measures being taken with regard to future incidents. As early as one month after the incident, on the initiative of the Emergency Management Australia (EMA), an initial assessment was made of immediate crisis management within the government and the most important government agencies. This assessment was followed up by a larger assessment conference about one year after the incident, also on the initiative of EMA.

The emergency call unit was expanded from 12 to 30 operators so that the huge number of generated calls could be handled. There was also a need to later be able to document and structure the information that the calls produced.

Initially, only limited funds were available, but this did not affect the measures that were taken. The departments' and government agencies' expenses were later compensated through supplementary allocations. The Australian Defence Forces (ADF), however, had to bear the expenses within the given budget. It was later decided that foreign citizens who were treated at Australian hospitals would be released from any obligations to pay for hospitalisation costs.

After the disaster, a number of general agreements were reached with various businesses that had knowledge and resources that were assessed as valuable in conjunction with disaster recovery.

Comments:

- *When the attack on Bali occurred, Australia lacked a plan for how an incident would be dealt with in which many citizens had been injured in a nearby country.*
- *Formally, the responsibility for citizens abroad rests with the Department of Foreign Affairs and Trade, but which lacks transportation resources. The only organisation with the resources to implement a large-scale evacuation of casualties was the RAAF. The solution was that military aircraft were used to fly civilian patients out. It is obvious, however, that centralised planning of the evacuation was based on unsatisfactory information and that there was a shortage of expertise regarding transport of casualties by air.*
- *The lack of expertise is most clearly illustrated in that it was first planned to fly the patients directly from Bali to burn centres in southern Australia. With the aircraft type used, the C-130 Hercules, it would have meant flight times that required double flight crews if the rules for crew duty flying hours were to be complied with.*
- *It has been difficult to obtain information about who made the decision to use the civilian aircraft, which was the first to leave Bali. According to information received (which could not, however, be verified), three of the eleven casualties onboard died during this direct flight to Perth. From a Swedish perspective, this illustrates the issues of care provider responsibility, airworthiness and patient safety, which should be compared with how certain aircraft with*

medical equipment were used during the evacuation in conjunction with the tsunami disaster.

- *The airline Qantas spontaneously organised extra evacuation flights for less seriously injured and uninjured persons. All responses from Australian government agencies and businesses were characterised by substantial generosity. No reimbursement was demanded, neither for medical care nor air transports of foreign nationals.*

Decisions by Emergency Management Agency

Emergency Management Australia (EMA) primarily takes action in situations that require resource reinforcement and co-ordination between the states. There is no Swedish equivalent to EMA. Elaborate plans for EMA's work are included in, for example, *the Commonwealth Government Disaster Response Plan*, and exercises are regularly carried out with EMA and representatives from the states and crisis management committees.

Requests for disaster assistance from other countries are handled through a separate plan (*Ausassistplan*). However, a formal request for assistance was never submitted to the Australian government in conjunction with the Bali attack. EMA thus had no mandate to take action and initially was in a vacuum.

During the first day after the attack, there were several telephone contacts between the Department of Foreign Affairs and Trade, EMA, the hospital in Darwin, the armed forces and the Department of Health in Australia. After these calls, it was apparent that the allocation of roles and responsibilities among the involved government agencies were unclear. EMA's role did not become clearer until patients began to arrive and it became obvious that they needed to be distributed to hospitals all over Australia. With the support of the Department of Health, EMA was thereafter responsible for co-ordination and distribution of the injured from Darwin to other hospitals in Australia. To enable this, EMA eventually appointed an air medical evacuation co-ordinator who was stationed in Darwin.

EMA primarily relied on military transport planes to conduct the transports. This was because there is no legislation that provides the opportunity to requisition resources in the manner available to incident commanders in Sweden. EMA must therefore rely entirely on commercially available resources.

Duty doctor arranges aircraft

Individuals also took action as news of the incident on Bali began to be received. The doctor who was later appointed as the air medical evacuation co-ordinator was on duty at the intensive care unit at Royal Adelaide Hospital (RAH) on the day in question. He heard about the bomb attack on a radio news broadcast at 08:00 CST.

Although Adelaide and Darwin are 2 600 kilometres apart, the hospital in Adelaide nonetheless treats about 30 burn cases per year from Darwin. The duty doctor telephoned all of his contacts in trying to get word on whether

the hospital in Adelaide would be involved but he was unable to find out anything.

The doctor then contacted the state of South Australia's health minister and finally its prime minister as well. The latter contacted the federal government in Canberra and offered two Lear jets as ambulance aircraft with medical crew and a burn team. He also stated that South Australia would bear all costs. RDH was informed of the offer.

Between 14:30 and 15:30 CST, a teleconference was arranged between the hospital in Adelaide, the state government in South Australia, DFAT, EMA and the state's department of health. During the meeting, the federal government formally accepted the ambulance aircraft and burn team offer but had no perception as to where these would be do the most good – on Bali or in Darwin. The recurring question was: "Where do you want to go?"

Comments: It is important to provide information that is as clear as possible to the country's government so as to enable quick and correct decisions.

Mobile medical teams fly via Darwin

The hospital in Adelaide decided to send the Aero Medical Evacuation teams (AME teams) to Darwin with the ambulance aircraft for possible subsequent deployment to Bali. There was no room on the same plane for the burn team and it travelled to Darwin on a commercial flight.

The first ambulance plane lifted from Adelaide at about the same time as the first Hercules plane landed on Bali, and the AME teams landed in Darwin at about the same time as the first Hercules plane had lifted from Bali on the way to Darwin.

Soon after, an additional five doctors arrived in Darwin on a commercial flight from Brisbane. They were specialists in air evacuations and also reserve military officers. The burn team from the hospital in Adelaide arrived after the specialists, as did the third C-130 from Richmond, outside of Sydney (see the section "Military resources"). At the time, the plan called for all of the doctors to fly with this plane to Bali.

Management at the hospital in Adelaide, however, decided that the air medical co-ordinator for the evacuation and one of his colleagues would remain in Darwin as reserves. From there, they would try to co-ordinate co-operation between personnel from the hospitals in Adelaide and Darwin.

EMA has evaluated the efforts

EMA is responsible for the evaluation of the crisis management efforts, and as early as 8 November, 2002, the agency gathered a number of representatives from other government agencies in Canberra for a review. Most government agencies at this time were still dealing with the repercussions of the bombing.

EMA arranged a second evaluation one year later, this time in Darwin. There the involved government agencies presented the results of their internal evaluations, and the most important conclusions were as follows:

- There is a need to clarify responsibility issues regarding incidents that occur outside Australia.
- Plans must be prepared, and exercises in management and co-ordination conducted prior to similar situations in the future.
- Deficiencies in information and communications must be remedied, for example, the dependency on mobile telephony systems, which proved to be insufficient and were overloaded.
- EMA and the Department of Health need to develop a central function for co-ordination of resources for air medical evacuations (AeroMedevac), burn injuries, etc.
- Access to trained personnel must be assured.
- The organisations' ability to deal with stress must be improved.
- The abilities to address the needs of the media and the general public must be improved.

The media were also obviously slow with their reporting. It appears to have taken until Sunday morning before the news was reported by the larger media channels, and the scope of the incident, and the number of dead and wounded, was drastically underestimated. At lunch time, the Australian media spoke of "up to 20 dead".

Military resources – Operation Bali Assist

The Royal Australian Air Force (RAAF) has previously evacuated casualties from abroad, such as in conjunction with military peacekeeping operations and after tidal waves hit Papua New Guinea in 1999.

The air force was informed by the armed forces headquarters at 04:05 EST (02:05 on Bali) the day after the explosions. At 07:00 EST (05:00 on Bali) an order was received from Headquarters Air Command by the duty officer at the base in Richmond to send a C-130 Hercules to Bali for evacuation of Australian citizens injured in an explosion during the night.

Information, however, was very sparse, and the injuries were said to have occurred when a gas tube exploded. It was estimated that five patients were seriously injured, and two were in critical condition and had been intubated, possibly more.

An air medical team – consisting of one doctor, three intensive care nurses and three persons with skills equivalent to assistant nurses/medical assistants – was alerted. The team made the decision to load a C-130 Hercules with medical equipment for transporting two intubated patients as well as extra oxygen, 20 NATO stretchers and an extended disaster kit containing intravenous fluids, burn dressings, narcotic analgesics, intrasosseous needles, central vein catheters and certain surgical instruments.

The information situation and the response phases

When the alert was sent, CNN and other media began broadcasting news of the explosions on Bali and a terrorist action was mentioned. Throughout the

entire preparatory phase, however, no additional information was received from higher command levels in the military hierarchy. The air force itself decided what should be done and the response operation came to be called Operation Bali Assist. The military response operation was subsequently divided into two phases:

- *Phase 1* included alerting health care providers, the response on Bali with prioritisations and stabilisation of the patients, and air evacuation of 66 critically injured patients to Darwin.
- *Phase 2* included co-ordination in Darwin of air evacuations and the air evacuation of 35 patients from Darwin to hospitals in Perth, Adelaide, Melbourne, Brisbane and Sydney.

Flights to and from Bali

The first Hercules departed from Richmond at 10:45 EST, the morning after the attack, and landed for refuelling in Darwin at 15:30 CST. In Darwin, an update of the situation on Bali had been received – the number of very seriously or critically injured was now set at 15 and seriously injured at 20.

The air medical team was supplemented with a surgeon and an intensive care doctor from the army reserve, who both worked at the hospital in Darwin. They were also joined by a doctor and nurse from the air force in Darwin by order of the high command. Their duty was to primarily obtain a picture of the situation in Denpasar and transmit this information to RAAF headquarters.

The doctors from the hospital in Darwin realised that the medical equipment loaded in the first Hercules plane was insufficient. At their request, it was complemented with, among other things, surgical instruments and ten units of blood from the hospital. Three satellite telephones from the hospital's disaster stocks were also loaded before lifting off for Bali at 16:00 CST (14:30 on Bali).

The plane landed on Bali at 19:30 CST (18:00 on Bali). The order was to evacuate Australians. This was, however, later modified to also apply to casualties from other nations, but not Indonesians since the Indonesian authorities did not permit this. Government-owned aircraft must have diplomatic clearances to fly in and over the territory of other countries. There was no diplomatic landing clearance for Bali when the military aircraft lifted from Darwin. This was first obtained after intensive diplomatic contacts, with only about 20 minutes remaining of the flight to Bali.

While the first aircraft was en route, the second C-130 Hercules lifted off from Richmond at 14:30 CST, followed by a third plane at 18:00 CST.

Lockheed C-130 Hercules

The C-130 Hercules is a transport aircraft designed for various roles and is used by the Australian military for transports all over the world. It is mainly intended for carrying personnel and equipment during operations that can even involve airdrops of both personnel and materials. It also is used in humanitarian rescue operations and can thus be equipped for medical

transports. Medical transports, or so-called medevac transports, were conducted during the conflict on Timor in 1999 and after the terrorist action on Bali in 2002. The aircraft is also used in many other situations in supporting the public sector in Australia and the surrounding countries. There are two versions of the aircraft, the C-130 J and C-130 H.



Figure 4. Casualties from the terrorist attack on Bali on the way to the Hercules plane for medical evacuation to Darwin. PHOTO: BILL GRIGGS

Plans modified

The air force had planned the evacuation based on the assumption that the patients would be at the airport when the planes landed. A quick assessment of the casualties would then be made before boarding and flying back to Australia.

These plans were immediately upset. When the first Hercules landed on Bali, the crew was met by a representative from the Department of Foreign Affairs and Trade. The DFAT representative explained that a number of injured persons had recently been flown out on a private jet bound for Perth. There were no casualties remaining at the airport; the most seriously injured were at Sanglah General Hospital, a 40-minute drive from the airport.

The plans thus needed to be modified. A doctor and two medical assistants were assigned the task of setting up a casualty assembly point at the airport. The rest of the team drove 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 which had been brought from Australia, were given to the doctors so that they could maintain contact with each other, the hospital in Darwin and top ranking air force staff.

Comments: Injured persons can be spread out among several hospitals. This requires a special logistics system to locate the various hospitals so that medical care already being provided at these hospitals can be taken over. This also requires means of communication to maintain contact between the aircraft and the groups that set off to collect patients. With regard to the Swedish air ambulance service SNAM, this is an important issue.

A casualty assembly point is established

A casualty assembly point was established at the airport's fire station in one of the hangars. There was plenty of space, access to light and electricity (suitable adapters were, however, lacking) and good access for motor vehicles. From the casualty assembly point, there was direct access to the pad where the plane was parked, about 150 metres from the door.

As soon as the casualty assembly point was established, the casualties began to stream in from different hospitals and clinics on Bali. This was somewhat surprising since it had previously been stated that all casualties were at Sanglah Hospital.

When the team that went to Sanglah Hospital arrived, it encountered a large number of casualties with various types of injuries – burns, pelvic fractures that in many cases were complex, femur fractures, skull injuries, blast injuries and shrapnel wounds.

At the same time the permitted working hours for the air crew began to be a critical factor. Working hours may only in exceptional cases exceed 12 hours, and then only to 14 hours. This limit had already been extended. There was a risk that the plane would remain on the ground. The air force's commander faced two alternatives: Either park the plane for 12 hours on Bali so that the regulations could be complied with, or load the casualties in the plane and depart as soon as possible.

The commander chose the latter alternative and the first Hercules lifted at 22:10 CST. Onboard were 15 patients, of which eight were on stretchers and seven ambulatory. Of these, two cases were deemed as critical and the others stable. A medical crew consisting of three members from the air medevac team accompanied them. One of the patients with critical injuries died 90 minutes into the flight.

Patients stream in

At this point, patients began arriving at the airport from Sanglah Hospital. Ground transports were conducted with ambulances. There were enough ambulances, but medical equipment in the vehicles was lacking. The transports were co-ordinated by the DFAT representative and a large number of volunteers who helped to carry the injured.

The personnel on the air medical evacuation team at the casualty assembly point conducted a number of procedures on the patients who had been brought to the airport – intubation, needle insertion, venous cutdowns, fluid treatment, various surgical procedures (escarotomies, fasciotomies) and repositioning of fractures. This was done with insufficient and

continually decreasing access to analgesics and anaesthetics. At most, 30 patients were on the hangar floor.

This situation continued for 4.5 hours until the second C-130 landed at 03:00 CST with a new AME team.

Eighteen hours had now passed since the explosions, and the injured had not received fluids to the degree stipulated in treatment schedules for burn injuries, for example, Parkland's formula.

The evacuation continues

On Monday, 14 October, the following took place:

- *04:15 CST.* The second Hercules left Bali with 22 patients; 21 on stretchers and one ambulatory. Of the stretcher cases, two were in respirators and six were seriously injured.
- *05:35 CST.* The third Hercules arrived with three anaesthetists, nurses and equipment. Directly afterwards, the fourth Hercules landed with two anaesthetists and one air medical evacuation team, soon followed by the fifth plane with another four team members and equipment.
- *09:00 CST.* The third Hercules lifts with 16 patients.
- *10:00 CST.* The fourth Hercules lifts with 11 patients and some personnel. There were no injured persons remaining at the casualty assembly point.
- *10:00–14:00 CST.* The remaining 11 members of the medical team restocked equipment and cleaned, and two team members travelled to the chief town of Denpasar to ensure that no Australians or other foreign nationals were still at the hospitals or hotels. At the same time, the airline Qantas evacuated a large number of tourists from the civilian air terminal at the airport, and afterwards, the air force's teams sporadically helped to determine if more qualified medical transport was needed. Qantas had to primarily rely on its own resources and the volunteer doctors who were among the passengers. During the following hours, however, only two casualties arrived at the casualty assembly point.
- *14:00 CST.* The fifth plane lifted with the remaining health care providers, two injured and a few uninjured Australians.

All evacuated

The RAAF conducted five flights from Bali during 21 hours with four Hercules planes of the types C-130 J and C-130 H. A total of 66 casualties were evacuated to Darwin. One person died during the first flight.

The majority of the injured were Australians, but injured from South Africa, Germany, England, Hong Kong, Sweden, New Zealand and Canada were also evacuated.

Table 8 Evacuation of casualties from Bali to Darwin, Australia

From	To	Stable stretcher cases	Critical stretcher cases	Ambulatory	Total	Departure time, CST	Arrival time, CST
Bali	Darwin	6	2	7	15	13 Oct, 22:10	14 Oct, 01:30
Bali	Darwin	19	2	1	22	14 Oct, 04:14	14 Oct, 06:45
Bali	Darwin	16			16	14 Oct, 09:00	14 Oct, 11:00
Bali	Darwin	9		2	11	14 Oct, 10:00	14 Oct, 14:00
Bali	Darwin	2			2	14 Oct, 14:00	14 Oct, 17:30
					66		

The RAAF deployed five air medical evacuation teams consisting of a total of 13 doctors, 16 nurses, 12 medical assistants and two priests. The air force also flew in police and consular personnel, as well as special equipment, for instance, refrigeration equipment for morgues, an ambulance and an Australian forensics team. The ambulance, however, was not used as an ambulance due to a lack of geographic familiarity of the island.

RAAF experiences

The RAAF had a number of experiences that should be generally applicable in a wider context:

- Disaster kits should be ready and prepared for treatment of a maximum of 50 patients in an initial stage. The kits should, however, not be larger; this would complicate handling in emergency situations. For larger numbers of casualties, several kits should be used instead.
- A periodic training programme should be implemented so that concerned personnel know how the equipment is to be used.
- Power supply for devices and equipment must be assured, both in the air and on the ground. Battery power alone is not sufficient in situations such as this. Adapters for various types of outlets and power sources must be included in the equipment. Small portable generators should also be included. Headlamps should be included in health care providers' personal equipment.
- There must be a reliable access to oxygen. Adapters for connecting to various types of oxygen tubes and similar devices should be brought.
- Those involved in rescue tasks and management groups must have access to reliable means of communication on all levels. Everyone operating in the field should have tri-band mobile telephones. Satellite telephones are necessary for communication between different levels and primary functions, and when it is initially uncertain as to whether mobile telephone systems are available.
- The conditions for medical personnel communicating in the very noisy working environment onboard the Hercules C-130 must be

improved. These communications must also be separated from the air crew's internal communications.

- The air medical evacuation personnel felt that they needed more training – both in how more complex equipment, such as ventilators, is to be used, and in clinical training. In some cases training on the aircraft's equipment and safety, and mission command received previously was old. A general refresher course should be carried out every second year.
- Working hour regulations must be established for medical staff, in a corresponding manner as for other air crew.

Comments:

- *The evacuation – at least in its early phase – can be described as a number of initiatives by enterprising individuals rather than a co-ordinated national response.*
- *It is noteworthy how long it took before the extent of the attack on Bali became known. Although the media was quickly on the scene and began sending reports, and many Australians on holiday called government agencies and institutions in their home country, this information was not relayed.*
- *It is naturally impossible to afterwards reconstruct deliberations, discussions and decision-making processes in the early phase in Australia. The Department of Foreign Affairs and Trade was informed early but took actions as if the incident would not initially involve Australia's resources for medical care and medical evacuation. At first EMA did not seem to take any initiatives concerning medical response operations either. None of these government agencies has competence in emergency medical care.*
- *We have not been able to establish exactly how the Australian military authorities and the air force were brought in. It seems, however, only to have been after planning of the evacuation process had begun. The information for making decisions was still very scarce and the consequences of the incident were underestimated. Detailed planning of the scale and implementation of the operation was left to the air medical evacuation team.*
- *During the stopover in Darwin the evacuation team was reinforced with two doctors who ensured that the equipment was complemented with, for example, satellite telephones from the hospital's disaster stocks. It was only after the team began to use them for direct communications between Bali and the hospital in Darwin that the actual consequences of the attack became known to Australian medical care services.*
- *That the consequences of the attack were so substantially underestimated also entailed that equipment, personnel and transport capacity were insufficient. In the original plan, it was also assumed that the casualties would be at the airport so that they*

could be quickly loaded into the plane after landing. This did not turn out to be a viable assumption; the evacuation team had to improvise. Some established a casualty assembly point while others went to the hospitals to prioritise and organise evacuation of the casualties to the airport. This all contributed to a delay that, among other things, led to the air crew's hours of duty nearly being exceeded. This was resolved, however, by loading the casualties who were at the airport and departing as quickly as possible.

- *There are reports of patients with burns who had undergone emergency surgery (escarotomies) beginning to bleed again during the air evacuation, which the air medical evacuation team attributed to the vibrations onboard. All aircraft vibrate but the frequency varies, and it is not known if the vibrations from the Hercules C-130 (which has unusually powerful engines) are more injurious than others. While the problem of renewed bleeding during transport could be attributed to vibrations, another conceivable explanation could be the effect of low temperatures. The temperature during a flight is far from 37°C, perhaps 20°C at best, and this, combined with a long flight time, could very well lead to hypothermia in seriously injured patients, particularly those with burns and the associated major heat loss as a result of fluids evaporating from the damaged skin.*
- *The medical technical equipment entailed several problems. It was not adapted to the version of the C-130 used during the response. Nor did the equipment have the battery capacity for a protracted response such as this. There were no transformers to allow the equipment to run on electric power taken directly from the aircraft (this has, however, since been rectified). Furthermore, there were no adapters for the electrical outlets on Bali.*
- *It is conceivable that a rapid response team (RRT) with specific medical equipment could have been sent quickly to Bali by jet. This team might have been able to produce improved grounds for planning, and could have begun providing assistance and prepared the evacuation at the airport.*
- *From a Swedish perspective, and with SNAM as a future tool for evacuating casualties, important experiences have been gained during this evacuation. The SNAM concept is based on the casualties having been stabilised by the releasing hospital, but this can prove to be an incorrect assumption. It is therefore exceedingly valuable if a rapid response team can be sent out at an early stage to give SNAM the opportunity to supplement its equipment prior to departure from Sweden if different needs exist than those anticipated.*

Civilian flight operators

International SOS

International SOS is a private company oriented to arranging emergency medical care all over the world and transporting the sick and injured back to their home countries. The company has a fleet of ambulance aircraft stationed around the globe, and ambulance aircraft are also chartered as necessary. Operations are financed by insurance companies through individual travel insurance policies and through agreements with businesses, governments and other clients. The company's Asian headquarters are in Singapore.

This company should not be confused with SOS International – which is another assistance company headquartered in Copenhagen, owned by a number of Scandinavian insurance companies (see the section “Scandinavian involvement”) – nor SOS Alarm, which is the Swedish 112 emergency call centre. SOS International sometimes procures services from International SOS. After the bomb attack on Bali, for example, SOS International purchased flight capacity from International SOS in the form of space on the C-130s that were used (see below).

International SOS co-operates with intensive care units at several larger hospitals in Singapore and can mobilise mobile medical teams from there. In Singapore, there are also stocks of equipment, pharmaceuticals and stretchers that can be used in air evacuations. International SOS also operates a clinic on Bali and therefore has good knowledge of the island.

International SOS was contacted early by several ambassadors who requested help with attending to and evacuating their citizens who were at various hospitals in the area. From the office in Jakarta, personnel were immediately dispatched to Bali to gather information on and localise insured patients who were in need of air transport.

An administrative support function was assigned to handle transport logistics, for example, to contact receiving hospitals and relatives, arrange travel documents, ground transports, medical equipment, and payment for care on Bali and insurance for medical care teams. Control centres were established both in Singapore and on Bali to arrange this.

International SOS evacuated 16 patients. Two patients in critical condition were evacuated early by ambulance aircraft and the other 14 injured were flown out with a chartered Hercules C-130 that arrived on Bali early in the morning of 14 October, the second day after the attack. An additional three patients were evacuated by ambulance aircraft through the efforts of other companies.

Table 9 *Evacuation to hospitals outside Australia*

Date	Releasing hospital	Number	Destination
14 October	Kasih Ibu Hospital	4	Singapore (SOS C-130)
	Sanglah Hospital	3	
	Prima Medika Hospital	2	
	Dharma Usada Hospital	1	
	SOS Medika	1	
14 October	Prima Medika Hospital	3	Denmark (via Singapore with SOS C-130)
14 October	Prima Medika Hospital	1	England
14 October	Prima Medika Hospital	1	Greece
14 October	Surya Husada Hospital	1	New Zealand
15 October	Sanglah Hospital	1	Jakarta
15 October	Sanglah Hospital	1	Hong Kong
Total		19	

Qantas airline

Qantas is the major national airline in Australia. The airline has been very advanced for a number of years in providing medical care to passengers who become ill during flights. The company was, for example, the first (in 1991) to equip planes for long-distance flights with automatic defibrillators (AED). Cabin crews also undergo a two-day course in emergency treatment, which is unique among the world's airlines.

Contact can be established from the aircraft with the telemedical duty centre *Med Link* in the US for obtaining advice in emergency situations.

Planning of response on Bali

Qantas has an extensive scheduled service to and from Bali, and also has its own technical, operative and administrative staff on the island. Three staff members died in connection with the bombings.

As soon as Qantas became aware of the disaster, their safety department began co-ordinating response operations. Among other things, the company's medical department was ordered to organise a team that would fly to Bali and assist during the evacuation, and the government was notified that the company intended to begin response operations so as to contribute with transport capacity and medical expertise by all means available. The company also made a decision to not submit any financial demands to the government for its efforts, due to the scope of the incident.

The department at Qantas that is responsible for emergency planning has been substantially refined since 11 September, 2001. The airline anticipates being utilised by the Australian government in the event of incidents and disasters due to its substantial national presence. It does not, however, have any formal undertakings on behalf of the government.

Participated with seven planes

At 17:00 EST (15:00 on Bali), a Boeing 767 lifted from Sydney. There were two doctors and three nurses onboard from Qantas's medical department and extra medical equipment. The main purpose was to obtain a picture of the scope of the disaster and to determine the existing needs. Once they reached Bali, and the full scope of the disaster became apparent, Qantas' management in Sydney made a policy decision – everyone who wanted to leave Bali and had a flight ticket was to be offered space on Qantas's flights at no extra cost. This applied regardless if tickets were issued by Qantas or another airline. It was not anticipated that just a few extra flights would suffice; plans were made to use seven aircraft, primarily different versions of the Boeing 767.

It was only after 12 hours had passed since the first plane departed from Bali that the federal government contacted Qantas through EMA. The airline was asked if it could equip a few planes with stretchers for evacuation of the seriously injured. Qantas responded that although they had no access to stretchers, they had already begun evacuating passengers from Bali.



Figure 5. Boeing 767-338ER PHOTO: QANTAS

Four doctors from the company *Care Flight* and two paramedics departed with another Boeing 767 at 18:00 EST (16:00 on Bali). This plane also carried extra equipment, including a large quantity of burn dressings, analgesics and intravenous fluids.

Onsite before RAAF

Qantas contacted the airport authorities on Bali through its own organisation. Because of the chaotic conditions, it was requested that

customs and passport formalities be made less strict than usual, and the airport authorities complied with this request. The authorities, however, did not permit injured Indonesian citizens to leave Bali.

The first Qantas plane landed on Bali before the RAAF plane. The airline used its own health care providers primarily to gain a general picture of the situation. Hundreds of passengers were queued at the check-in counters, many with visible injuries. Qantas' staff arranged space for treatment in the departure hall, and triaging of the injured was begun.

Care was provided for lacerations and dressings were applied to injuries of the passengers who were to leave on the first plane. Doctors and nurses who were among the waiting passengers assisted. The medical assessments of the passengers were at times rather superficial because of the chaotic situation; passengers who could walk under their own power, for example, were deemed fit for travel.

Sorting casualties onboard

Initially, the amount of pharmaceuticals and medical equipment needed onboard was unknown. According to Qantas's personnel, there were consequently insufficient stocks of pharmaceuticals and other equipment onboard the first plane that arrived on Bali. When the next plane landed, with more equipment and personnel, medical staff could be sent with each plane that departed from Bali.

A doctor and a team of paramedics went directly from the second plane that landed to the first, which was now ready for takeoff for the return flight to Australia (Sydney). The team conducted a quick inventory of the number of injured who were onboard and the injuries they had. Over 20 casualties could be identified. This formed the basis for the decision on which equipment should be taken along and what could be left at the airport.

Once the plane had lifted, passengers with injuries were identified by casualty cards that were attached to the seat backs, so-called triage marking. The patients who were to be treated were moved to another part of the plane. Treatment was provided in the pilots' rest compartment where the door could be closed. One of the uninjured passengers was a doctor and was able to assist with treatment during the flight.

Since everyone was able to board without assistance, there were no critically injured onboard. Subsequently, the customary classifications of the triage colours were modified as follows:

- *Red* – Burns, dehydration, multiple injuries or severe pain (customary: life-threatening)
- *Yellow* – Stable patient with potential for worsening condition (customary: can wait)
- *Green* – Minor injury or mental anguish (customary: shall wait)

All burn casualties were re-examined in the air to obtain a correct understanding of the extent of the injuries. Some passengers had concealed their injuries out of fear of not being permitted to board. These injuries were only revealed after the first plane was airborne. When it became apparent as to how seriously many of the passengers were injured, the personnel were

surprised. Those with injuries that exceeded 20 percent received burn dressings, intravenous fluid and analgesics (Ketamin). Holders for intravenous bags were constructed from coat hangers which were attached to the baggage shelves above the seats.

Comments: By simple means, prioritisation was resolved in a manner that was both surveyable and in agreement with that which is customary. This is well worth considering as a model for any future evacuations.

Arrival in Sydney

Upon arrival in Sydney, the plane was met by ambulances and medical teams. The air medical team encouraged passengers with lesser injuries to consult these teams, or seek treatment at local hospitals or from family doctors.

Prior to the second flight to Sydney, the injured were re-examined in the departure hall but no seriously injured were found. The flight was therefore made with only one attending paramedic onboard; there was no doctor. Onboard the plane, there were 25 casualties with lesser burns and shrapnel injuries.

The health care providers from Qantas that had stayed at the airport in Bali examined the passengers once again before the remaining flights departed. Another 55 casualties were discovered in this manner, of which many had attempted to conceal their injuries so as not to be denied passage.

Nearly two days had passed since the explosions. Another five doctors and paramedics were sent from Sydney to the airport on Bali on Monday evening. This meant that all air evacuation flights that returned to Australia had access to medical staff onboard.

Qantas conducted a total of nine extra evacuation flights in addition to ordinary scheduled flights. More than two tons of medical equipment were flown to Bali. All ordinary airfreight to Bali was put on hold during the evacuation. The focus was instead entirely on the injured who had to be evacuated.

Internal evaluation

Once the operations were concluded, Qantas conducted an evaluation. The evaluation showed that there was medical competence within the company to lead its own medical operations in the field. However, the physical prerequisites and resources for the care of seriously injured patients were lacking.

According to the company's estimate, Qantas flew more than 7,000 extra passengers from Bali during the evacuation period. Qantas bases its estimate on 7,000 seats being added to the 2,000 seats normally available. Of these passengers, 99 percent were people who just wanted to leave Bali in the quickest possible manner, and only one percent had physical injuries. Of the injured flown out with the first plane, 30 percent had burns.

Continuing developments

The evacuation after the explosions on Bali was also followed up on the national level. It is Qantas' understanding that the federal government plans to use the RAAF's C-130s and some older Boeing 727s owned by the government in future air medical evacuations. Qantas has not been asked to participate. The airline is nonetheless investigating as to whether it should expand its medical capacity. Qantas is the major national airline and they consider it unacceptable not to participate on the level shown to be necessary by the experiences from Bali.

Comments: Qantas reacted swifter than the national authorities to the information received from its own personnel on Bali. Based on this information, an extensive evacuation was immediately initiated. People who were unhurt, as well as a larger number of more or less seriously injured, were evacuated. The company's own personnel, reinforced with other health care providers from Australia, made their own assessment of the passengers' injuries before they boarded the planes that were to depart from Bali. Many passengers had concealed their injuries out of fear of not being permitted to board.

SAS

SAS also had a part in the evacuation of Scandinavians from Bali. This is described in the section "Scandinavian involvement".

Airport operations

Ngurah Rai on Bali is a modern international airport, served by scheduled flights operated by 15 foreign airlines. Each day, there are approximately 120 aircraft movements, i.e. arrivals and departures. During the period of the evacuations, there were no difficulties in handling scheduled flights or the additional flights operating because of the bomb attack. Internal airport security was heightened however, after the bombings (see the section "Police work"). After the attack, the airport authorities co-operated with the RAAF and Qantas; or rather co-operation was conducted between the doctors who participated in the airport emergency operations and the air medical evacuation team. This resulted in, among other things, a certain relaxation of departure formalities.

During the four days immediately after the bomb attack, 24 air medical evacuations and 140 other extra flights were made from Ngurah Rai Airport without traffic disturbances. Within six days after the incident, 29 000 tourists had left the island while the influx of new tourists drastically declined.

In general, the total number of passengers drastically declined through reduced tourism as a result of the bomb attack. Prior to the bombings, the total number of air passengers per day was about 6 000–7 000, which dropped to 2 500–3 000. A weak recovery trend could be discerned after about six months, but thereafter an epidemic SARS (Severe Acute Respiratory Syndrome) broke out and the figures dropped again. At the

beginning of 2004, however, the number of passengers had increased to about 5 000 per day. It was primarily passengers from Asian countries who accounted for the greater part of the increase.

Care in Darwin

Planning of the reception

Unclear conditions

Early in the morning of 13 October, a young man sought medical care for a minor burn at the emergency ward of the Royal Darwin Hospital (RDH). He told the examining doctor that he had been at a nightclub in Kuta Beach on Bali the previous evening when a violent explosion demolished the entire building. He described the bomb site as an inferno with body parts torn away by the blast strewn around the ruins. He managed to escape through the collapsed roof, ran to the airport and bought a ticket on the last flight of the day – the Qantas flight from Bali at 00:55 (local time) to Sydney with a stopover in Darwin at 05:00 CST in Darwin. The doctor on duty received this information at about 07:45 and called the medical director just after 08:00. The medical director called the management group to a meeting at 09:30. Attempts had then been made to obtain additional information via radio, TV and from the central authorities, however, without success.

Furthermore, no requests from other government agencies or organisations had been received for the hospital in Darwin engaging itself in the incident. The management group, however, assessed that it was likely that the hospital would be needed. At about ten, the first step of the hospital's disaster plan was therefore activated.

At the same time, a telephone query was received from the armed forces in the Northern Territory on what the hospital knew of the situation. Two hours later, the hospital's control centre was staffed and all of the hospital's key functions prepared for the coming response operations.

The hospital in Darwin receives the assignment

At about 13:00, the medical director, along with representatives from government agencies, under the leadership of the territory's prime minister, participated in a meeting with the disaster committee for the Northern Territory. The meeting was held at the police station in Darwin.

During the meeting, contact was made with corresponding government agencies in other states/territories. To a direct question from the territory's prime minister, the medical director responded that the hospital in Darwin could handle the influx of patients. At 15:30 CST, the decision was made on the federal level that the hospital in Darwin would be the receiving hospital for the casualties from Bali.

Information at this point was still very uncertain. According to the Department of Foreign Affairs and Trade, it was a matter of 30–40 injured and it was not known if it was a gas explosion or terrorist bombing that had occurred. There was, however, a rumour that a smaller nuclear charge had been detonated.

The hospital in Darwin does not have a burn ward and lacks the capacity to care for many seriously injured patients and treating them until they are returned to health. It was therefore clear from the start that the patients would have to be transferred to other hospitals in Australia. Those with burns would be transferred to Australia's burn centres in Brisbane, Adelaide, Sydney, Melbourne and Perth. If feasible, the casualties would be transferred to hospitals as close to their homes as possible. It was later shown that this was successful in 95 percent of the cases.

The medical director's decision to recommend that all patients should pass through the hospital in Darwin was based on his trust in the staff's knowledge, engagement and capability to co-operate. He also believed that the hospital's supply functions and administration would be able to provide medical staff with the necessary service.

Preparations are made

During the afternoon, 600 staff members were called in. A brief course was held on the treatment of patients with burns and on the hospital's organisation in the event of disaster alerts. The storerooms were filled with linens and pharmaceuticals, disaster files were supplemented with burn schedules and plans were made for receiving the injured.

Five extra secretaries were brought in to maintain correct documentation from the onset. Furthermore, some equipment was requisitioned from a nearby private hospital, including respirators. After these preparations were made, some personnel were sent home. They were instructed to be available by telephone but to not call the hospital.

Comments: Sending home some of the personnel was a wise decision. This permitted them to rest prior to going on duty, and at the same time, the hospital was not burdened with redundant personnel during the period of waiting. The instruction to not call the hospital, but to instead await calls, also seemed to have been a wise decision since the hospital's switchboard and personnel would otherwise likely have had to receive innumerable calls during a period when no information could be provided on when the caller's duties were to begin.

Throughout the afternoon, operations were interrupted by countless calls from outside parties. Information regarding casualties was still vague and contradictory. When the first Hercules landed on Bali at 19:30 CST, however, the doctors onboard could provide a more realistic assessment of the situation, and via satellite telephones, they established contact with the hospital in Darwin.

The total number of dead was estimated at between 90 and 200, and they were said to be of many nationalities. The situation was described as chaotic, with many patients not receiving the care they needed.

At this point, the hospital in Darwin emptied two of its wards with 100–120 beds. The nearby private hospital received 24 patients and 20 were released. All planned appointments and operations for the coming week

were cancelled. The general public was asked, via radio, to not go to the hospital for care except in cases of extreme emergency.

Emergency ward rearranged

The upcoming work in the emergency ward was planned in detail. Three larger rooms were reserved for receiving the disaster victims and one area for other emergency cases. In each room, a chief physician was appointed as a co-ordinator. The emergency ward's collected activities were led by an experienced chief physician. This person made decisions on how the resources would be prioritised when conflicts arose. The intensive care unit had considerable unused capacity – just one out of eight beds was occupied. Preparations were also made for six temporary intensive care beds.

At the earlier meeting at the police station, the ambulance organisation was also represented. The ambulance resources were reinforced during the afternoon by calling in extra ambulances from within a 300 kilometre radius of Darwin.

At midnight, word was received from Canberra that the first plane was on its way with 15 patients, all with burns but none in critical condition. Most of the injured, 27 casualties, would come with the next plane.

Arrival of casualties at the airport

The first Hercules landed in Darwin at 01:15 CST, Monday morning, and was met at the airport by a team from RDH. The group consisted of two anaesthetists, two intensive care nurses and two doctors from the air medical evacuation team. The head of the hospital's anaesthesiology department was in charge. He was able to maintain contact by mobile phone with an ambulance officer who checked that empty ambulances arrived at 3–5 minute intervals. The doctor also had contact with the head of the emergency ward at the hospital to report on the type of casualties on the way in.

Comments: The organisation for reception at the airport can be cited as a good example of how logistics and communications ought to be conducted. This model is well worth incorporating into Swedish disaster plans.

The crew was asked about the situation on Bali in general. The crew members could not, however, provide any answers since they had only been at the airport.

After the RAAF's air medical evacuation team had turned over the patients and been debriefed, the hospital team took over. This team accompanied the most severely injured patients in the ambulances with a police escort to the hospital in Darwin. The first arrived at 01:45 CST. The group then supervised care of the patients at the hospital so as to reduce the need for additional transfers.

At about the same time, the third Hercules lifted from Darwin for Bali. Doctors were onboard who had flown in from the thermal injury hospital in Brisbane, as well as an ambulance.

The second Hercules landed in Darwin at 06:15 with 22 patients on stretchers, of which two had been intubated, and one who was ambulatory. Two burn patients were assessed to be in sufficiently good condition that they could be transferred immediately. They were flown to Adelaide with a Learjet 35 air ambulance. Other patients were sent on to the hospital in Darwin by ambulance. The plane was empty within an hour.

Treatment at Royal Darwin Hospital

Reception

Upon arrival at RDH, the casualties were met by the head of the emergency ward and a nurse. After a quick assessment of the injuries, the decision of where to send each patient was made and documented.

At the emergency ward, there was space for emergency care of 18 patients. Disaster patient files and numbers were used in identification of the injured. The files were packed in complete sets for each patient and this worked very well. Work was conducted in six teams in four separate areas of the emergency ward. Besides ordinary staff, there were reinforcements in the form of medical students.

One of the two patients embarking in Bali in critical condition that arrived with the first Hercules had died during the flight. The other patient had 75 percent burns and had undergone emergency surgery (escarotomy), and was now bleeding severely. He had no pulse in his arms or legs and had been unconscious since the explosion (degree of consciousness according to the Glasgow Coma Scale, GCS = 5). To stop the bleeding, amputation of at least three extremities was deemed necessary. Such a procedure would require an estimated transfusion of at least 30 units of blood. At the time, the hospital had fewer than 100 units of all blood groups in stock.

This, in combination with the patient having suffered severe brain damage, resulted in the decision to wait and see. The patient died within a few hours. This was the only patient who was treated solely for alleviation of pain, so-called palliative care.

Of all the patients who arrived at RDH, four were immediately sent to the intensive care unit. This was because 18 of the beds in the emergency ward were already occupied. No one needed to be operated on immediately. The accompanying patient file documents from Bali and the RAAF were assessed as incomplete.

Comments: One of the dilemmas that is trained for in Swedish disaster medical care is the ability to make the ethically difficult decision to not do everything possible – both for the patient's best and to utilise available resources in the most efficient manner. There is reason to further clarify this in disaster training in Sweden and to address the problem from both an ethical perspective and from an efficiency perspective so as to provide as many survivors as possible with optimal care.

All patients dehydrated

All patients had received insufficient amounts of fluids according to what is specified in standard works (Parkland's formula) on the treatment of burns. More than 24 hours had passed since the explosions, and there were examples of patients with 50 percent burns who during this period had only received one litre of fluids.

During the reception at the emergency ward, intravenous treatment was initiated according to established principles. The patients were then transferred to a nursing ward or the intensive care unit depending on their needs. Upon arrival at the nursing ward, a surgical team assumed responsibility and re-examined the patients. In just two cases were the patients further transferred to the intensive care unit, which indicates that the first assessments were correct.

It was apparent at an early stage that the surgical teams were overloaded. The hospital's internal medicine specialist and experienced general practitioners were therefore called in. They formed four groups (*metabolic teams*) with the duty of monitoring continuing intravenous treatment.

Late that evening, a burn group arrived from RAH. They worked 24 hours straight.

Some patients were further transferred by air

By late Monday afternoon, 15 patients were being treated in respirators and more patients were expected at the hospital. Due to this, the head of the intensive care unit called EMA at 07:30 and requested help in evacuating patients to other hospitals in Australia.

The Royal Flying Doctors Service in Queensland called at 10:00 CST the morning of the same day and stated that they would send two air ambulances with an estimated time of arrival of 15:00–16:00 CST.

One patient could be evacuated from Darwin at 13:00 CST with an air ambulance. Several air ambulances were parked at Darwin Airport although these could not be used before the crews had taken their stipulated rest periods.

During the afternoon, an additional three Hercules planes arrived with 15, 11 and two patients, respectively. The RAAF had now conducted a total of five evacuation flights from Bali.

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

Type of injuries

Of the 61 patients received by RDH, 28 fulfilled the criteria for being classified as so-called *major trauma* (Injury Severity Score, ISS > 15).

ISS – a method that takes consideration to multiple injuries

When a person has multiple injuries, it is difficult to sum up the situation. Injury Severity Score (ISS) is a method that takes consideration to multiple injuries. The method is based on the individual injuries having first been rated on the Abbreviated Injury Scale (AIS). How this can be conducted is shown in Table 10. An assessment is first made within six different body regions of how serious each injury is. Each region is rated from 1 to 6, with 6 being a fatal injury. Only the highest AIS score in each body region is registered. Scores for the three most seriously injured body regions are squared and the products added together.

The overall sum, the ISS score, can vary between 0 and 75. An ISS score greater than 25 entails, for example, less than a 50 percent chance of survival and is classified as a very serious injury. When an injury is assessed as leading to death, the ISS score is immediately set at 75.

Table 10 Example of calculations for an injured person's Injury Severity Score (ISS)

Region	Injury description	AIS	(AIS) ²
Head/throat	Concussion	3	9
Face	No injury	0	
Thorax/chest	Multiple rib fractures	4	16
Abdomen	Liver contusion	2	
	Spleen rupture	5	25
Extremities	Thigh fracture	3	
External	No injury	0	
			ISS=50

During the response operation, 20 patients were admitted to the intensive care unit in Darwin of which 18 were transferred immediately from the emergency ward and two via the nursing wards.

Fifty-five escharotomies were performed at the emergency ward and in the intensive care unit, 20 patients underwent 43 operations and the combined operation time was 50 hours. A total of three patients required dialysis.

Only three patients were intubated immediately upon arrival at the hospital. Within an hour after arrival, however, an additional 12 patients were intubated – two at the emergency ward, six at the intensive care unit and four at the operation ward. 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 according to the established guidelines for the care of burns.

Comments: It is possible that fluid replacement according to Parkland's formula produces a side-effect in the form of significant swelling in the respiratory system, which can be very difficult to handle in a transport situation. This raises the point of considering administering 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 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 ought to be the subject of further evaluation.

The supply situation

From the hospital in Darwin, blood, anaesthetics, burn dressings, opiates and other pain-relieving pharmaceuticals were sent with the Hercules planes that stopped over before departing for Bali. The hospital had no problems in immediately replacing its depleted stocks with new deliveries. There were no problems either in sterilising used instruments.

Additional personnel were called in to work the telephone switchboard in order to handle the large amount of calls from relatives and the media. Many calls were also received from embassies and consulates. An estimated 30 to 40 percent of the injured could state their identities. In other cases, help was received from the federal police, the Department of Foreign Affairs and Trade and customs authorities.

More than 50 journalists soon gathered outside the hospital. Press conferences were held regularly, and the medical director, along with two other specially designated persons, handled contacts with the media. Hospital management had already decided at an early stage that financial matters were entirely subordinate to response operations, which entailed that issues related to compensation for personnel and resources were resolved later.

The hospital's personnel were offered psychosocial support (so-called defusing) on 15 October, the third day after the explosions.

61 persons in 62 hours

During a period of 62 hours, the hospital in Darwin received 61 patients of which four died – one person in Darwin (see above) and three persons after transfer to other hospitals:

- One patient with a blast injury to the brain (cerebral blast injury with free intracranial gas) never regained consciousness and died after three weeks.
- One young woman with a thigh amputation, penetrating abdomen injuries and 65 percent burns died after three weeks due to decreasing kidney function.
- One 23-year-old man with 85 percent burns died after three weeks from septicaemia (general blood poisoning).

In February 2003, one patient was still in hospital while the remaining 56 had been released. With consideration to the complexity of the injuries, the results were assessed as better than what could have been expected.

Comments:

- *The incident on Bali occurred at an appropriate point in time, when just one patient was being cared for at the intensive care unit. Moreover, a training meeting was being held in Darwin for anaesthetists, which meant that qualified staff was easy to obtain. They also had 12 hours to make preparations, from the time of the decision to help until the first patients arrived. This time was used for refresher training along with planning and preparations for the work ahead. Sustainability was also achieved by sending home some of the staff to rest. This was not done, however, for the hospital management group and other key staff members. One of the older surgeons operated for 22 consecutive hours and the medical director spent 60 consecutive hours at the hospital.*
- *Information to the hospital was initially inadequate. It was only after Australian personnel had landed on Bali that the scope of the incident became clear and one could begin to trust the information received. The information channels, however, were not as planned – they went directly from Bali to RDH, and not via the police’s command centre as was planned.*
- *The manner in which the emergency ward was organised proved to be very effective. Through a balanced mixture of various professional categories with varying degrees of experience, it was possible to make optimal use of the more experienced personnel. In this way, sustainability was achieved. Prioritisations and information flows also worked well.*
- *It was a wise decision to consistently use disaster identification numbers when requisitioning blood instead of names, even if this was not fully complied with. There was always blood in sufficient quantities at the hospital.*
- *Letting specialists in internal medicine and general practitioners monitor and follow up the fluid balance of the patients lessened the burden on surgeons and anaesthetists. At the same time, the feeling that everyone at the hospital was involved in the efforts was reinforced.*
- *E-mail functioned poorly for communications within the hospital since that requires a constant presence in front of a computer. Telephone, fax and orderly communications were more reliable.*
- *Of the patients received by RDH, 10–15 received care there alone. These patients were surgery and orthopaedic cases without needs for burn care.*
- *Routinely conducted cultivations from all burn patients showed that they were colonised with several different types of multi-resistant bacterial strains. It was therefore afterwards speculated at the hospital as to whether the bombs were intentionally infected. The infections, however, never caused any major clinical problems.*

Air evacuation from Darwin

Co-ordination of the operations

Need of additional burn facilities

On Monday, 14 October, EMA held a series of teleconferences with representatives from the hospital in Darwin, medical care in the various states/territories and on the federal level. The purpose was to inventory the number of beds for burn patients that could be attained. EMA's representatives experienced a clear difference in the attitude of many of those involved when it came to receiving burn patients. Some saw no limits at all, others did not want to accept more than a few patients.

When the distribution of patients to the various burn centres was completed, the patient files were faxed from Darwin to the receiving hospitals.

At 13:00 CST, a request was sent from the hospital in Darwin via EMA to the RAAF to conduct four air evacuations from Darwin to other hospitals during the evening.

Civilian air ambulances become available

On Monday, various civilian air ambulance operators arrived at Darwin Airport, including the Royal Flying Doctor Service. According to the Royal Darwin Hospital, they came on their own initiative, without liaison.

In several cases, the crews of the civilian air ambulances attempted to take command of efforts at the airport; for example, they wanted to transfer patients directly from the Hercules plane from Bali to civilian aircraft for further evacuation south. For this reason, on two occasions there were confrontations between the civilian air ambulance crews and the team from RDH. There were direct transfers in only two cases, both of patients who were assessed as being in a stable condition.

At about 15:00 CST, another teleconference was held with representatives from the federal department of health, the state/territorial health departments, RDH, the co-ordinator from the hospital in Adelaide and the armed forces. The same morning, EMA had appointed an aeromedical evacuation co-ordinating officer, charged with co-ordinating civilian and military resources.

Comments: The situation that arose at the airport in Darwin could very well arise anywhere in the world, including Sweden or anywhere Swedish air ambulances are involved abroad. The co-ordinator role is very important in such contexts and the role ought to be filled at an early stage by an experienced person who is trained for the assignment and who has insight into both air operations and medical matters.

Triage of casualties

When the first planning meeting was held at 16:00 CST with personnel from RDH, the number of patients that would be flown to the respective hospitals and with which priority was discussed. One difficulty was that many casualties were still subject to stabilisation or surgery, and the final prioritisation was therefore not known. A decision in principle was made, however, to use civilian air ambulances for transporting ventilator patients. At the time of the meeting, 15 patients needed to be moved but there was only space for 12 patients in the air ambulances. Capacity was thus lacking for three intensive care patients.

A list was compiled of the 12 patients, of which two were ventilator cases that would be evacuated to Perth. They had 5 to 40 percent burns combined with shrapnel injuries. The RAAF was asked the same evening if they could transport 30 to 40 patients. They offered to fly one plane to the east and one to the west.

When transport of the injured from the hospital to the airport was to have begun, it was found that the ambulance organisation had not been notified of this need. The ambulance organisation had meanwhile reduced its resources and had to call in personnel anew.

The more seriously wounded were transported in standard ambulances and the less seriously in an ambulance bus borrowed from the air force. The bus was loaded, driven and unloaded by volunteers from the air force under the supervision of health care providers.

The planning and preparation of the transport from Darwin took five to six hours.

Air force evacuates with four planes

The air force's (RAAF) evacuation did not begin until the night between 14 and 15 October, and four planes were then deployed instead of the originally promised two.

At 01:50 CST, the RAAF's first flight departed with 14 injured, of which two were intubated patients. It flew westward to Perth (see Figure 3) and took six hours. Two hours prior to landing, one of the intubated patients suffered a cardiac arrest, which could be treated with defibrillation.

During the flight, it was discovered that battery capacities of the medical technical equipment were insufficient. There were no converters (adapters/transformers) onboard and power could consequently not be taken from the aircraft either. The length of the layover in Darwin was obviously not sufficient to fully charge the batteries. Moreover, during the flight a monitor and a ventilator stopped working. ECG monitoring could be conducted with the defibrillators that were onboard, but the lack of monitors for maintaining a watch over intra-arterial blood pressure could not be compensated for.

At 03:05 CST, the second Hercules lifted on its way south towards Adelaide and Melbourne. Onboard were six patients with 15–50 percent burns, two patients with shrapnel injuries and two relatives. Also on this flight were three members of the evacuation team from the hospital in

Adelaide (*Adelaide Hospital Retrieval Team*). They had worked at Darwin's airport for 24 hours.

At 05:30 CST, the third Hercules lifted for the trip eastward towards Brisbane with seven casualties. There were four anaesthetists onboard who had been called in as reserves.

At 11:00 CST, the fourth and final flight with eight patients and personnel lifted, bound for their homes in Sydney. Most personnel who were flown out from the airbase in Richmond, outside Sydney, were on this plane. The plane landed at 18:00 CST. Within 24 hours, the RAAF had evacuated 37 patients, of which two were intensive care patients undergoing ventilator treatment, with four flights. In addition to this, another 14 patients undergoing respirator treatment were evacuated on a total of nine civilian air ambulance flights. During the following days, another three patients were evacuated to different burn centres on civilian ambulance flights.

Table 11 Evacuations conducted by the RAAF from Darwin (times specified in CST)

Start time	Destination	Landing time	Number of injured	Others carried
01:50	Perth	06:00	12 + 2*	
03:05	Adelaide	07:50	1	RAH team
	Melbourne	10:40	7	2 relatives
05:30	Brisbane	10:50	7	
11:00	Sydney	17:05	8	AME team
Total			35 + 2	

*ICU patients

Summary

The RAAF evacuated casualties with a total of four aircraft of the type C-130 Hercules and five air medical evacuation teams were deployed consisting of 13 doctors, 16 nurses, two medical assistants and two priests. During the final phase of the response, personnel displayed obvious signs of fatigue. They had worked an average of 34 hours with only brief breaks for sleep.

Certain equipment had been transported to Bali, for example, five refrigeration containers and one ambulance. The ambulance was only used, however, as a temporary morgue at the airport due to a lack of knowledge of the locale.

Scandinavian involvement

Swedish consular work

Initial responses

Sweden has an embassy in Jakarta and an honorary consulate on Bali. At the embassy, one of the diplomats is always on call.

The first indication that bombs had exploded on Bali came via a call from a reporter at the Swedish newspaper Aftonbladet, two hours after the incident. The reporter requested the embassy's confirmation of the incident after having read a bulletin about the explosions from the Reuters news bureau. By calling friends in Kuta, the consulate's assistant on Bali was able to confirm the incident. There was soon also information on the international TV channels.

Consular personnel first tried to find out if any Swedish citizens had been injured or killed by the explosions. The hospitals were searched and contact was made with all hotels and hostels at which Swedes might conceivably be staying. This was begun Sunday morning at 04:00 (Bali time) on 13 October.

Two Swedish diplomats from the embassy in Jakarta flew to Bali with the first flight of the day. The embassy had staff onsite for two weeks and was still engaged four months later.

Two seriously injured Swedish citizens were discovered at hospitals. Consular personnel were involved in them being quickly evacuated to Singapore (by International SOS) and to Australia (by the RAAF) respectively. An uninjured Swedish woman, a friend of one of the casualties, was also evacuated to Australia.

Another Swedish citizen was at an early stage evacuated to Australia, but for a time, neither his identity nor nationality was known.

Many questions and highly set demands

A substantial amount of time was spent answering questions from concerned relatives in Sweden and from the Swedish media. The embassy personnel onsite also served as contact persons in co-ordination of the evacuation of the injured, and eventually, the deceased as well.

Another task was to take care of valuables and other property belonging to the Swedes who were evacuated or deceased, and to make arrangements for their transport back to Sweden.

A Swedish identification commission was sent to the scene on assignment from the Swedish Ministry of Foreign Affairs. The embassy participated in facilitating the import of the commission's equipment.

Unwarranted criticism

The media criticised embassy personnel and the Ministry of Foreign Affairs for not being able to immediately arrange home journeys for all Swedish citizens who so wished. There seemed to be a widespread belief – not the least among concerned relatives in Sweden – that this was the embassy’s duty.

This criticism is unwarranted since it is based on the Swedish state’s assumed obligation to bring home travellers at no cost in the event of these types of incidents, which is a misconception.

The responsibility for arranging journeys home for persons who are ill, injured or who have died abroad lies with the insurance companies that have provided travel insurance, which is often included in householders’ comprehensive insurance policies. A person who is not insured must pay for the trip home. A Swedish embassy or consulate can help to fund a trip home if relatives in Sweden have provided economic guarantees. The money the embassy pays out is subject to repayment. That one can travel home at an embassy or consulate’s expense is thus not a correct description of the applicable routines.

Scheduled air travel from the Denpasar airport on Bali was maintained throughout the period and there were unoccupied seats on departing flights during the days immediately after the bomb attack. Most youths had, however, purchased the cheapest possible air tickets, which could not be rebooked. Because of economic considerations, they could therefore not leave Bali.

The two Swedes who died on Bali did not have travel insurance. The expenses for handling the bodies of these persons were in one case paid by the parents, and in the other case by the home municipality.

Assistance companies handle home transport

SOS International

SOS International A/S is an assistance company with its headquarters in Copenhagen. The company provides technical and medical assistance to persons who become ill or injured when travelling. The company is owned by a large number of insurance companies in Sweden, Norway, Denmark and Finland. The requirement for receiving assistance is that the person in need has valid travel or homeowners’ comprehensive insurance with one of the approximately 110 insurance companies that are joint-owners. The alarm centre is staffed 24 hours a day. Accidents or illnesses are reported via telephone, e-mail or fax. The company annually arranges 800–900 home transports with medical attendants. This entails that the ill or injured are flown home with scheduled or chartered flights, accompanied by health care providers dispatched by SOS International. The company also arranges about 200 home transports with special ambulance aircraft that are leased for this purpose.

Swedish diplomatic personnel in Jakarta and on Bali experienced contacts with SOS International as cumbersome. The alarm centre wanted insurance policy numbers, to speak directly with “attending physicians”, to have

information faxed, etc. They thus displayed an insufficient understanding of the chaotic situation at the hospitals after the terrorist action, according to the consulate.

Euro-Alarm

The alarm centre Euro-Alarm A/S is owned by Europeiska Reseförsäkringar A/S and annually assists more than 110,000 travellers. The alarm centre co-operates with over 40,000 hospitals and 10,000 doctors worldwide. The company is a member of the International Assistance Group, which is an organisation consisting of independent assistance companies in 13 countries. Their joint network provides good relations with local government authorities and hospitals all over the world.

Norwegian and Danish youths flown home

SOS International chose SAS to Oslo

At the time of the incident, there was a large group of Norwegian youths on Bali who were taking part in a study programme. No one from the group was in the vicinity of the explosions. For psychological reasons, it was nonetheless deemed necessary to evacuate the youths.

All 138 persons in the group were insured. More than 60 of them were insured with SOS International, another 60 or so with Euro-Alarm and the remaining with other companies.

On Friday, the morning of 18 October, the airline SAS received an enquiry from SOS International as to whether the company could conduct an evacuation flight from Bali to Oslo. SAS immediately began to make plans for this, and a Boeing 767 was able to be quickly reassigned without any significant consequences for other traffic. SAS had namely already begun to replace this aircraft type with the Airbus 330/440 series.

Of those who volunteered, a crew was selected consisting of four pilots and eight cabin crew. SAS applied for an exemption with the air safety authorities to be able to exceed normal duty hours because of the long flight time and this was granted. Pilots and cabin crew were assigned, as well as mechanics and load masters. Because SAS does not normally operate at the airport on Bali, there was no staff there. The SAS station manager in Singapore therefore flew to Denpasar to arrange the practical issues prior to the arrival. Less than 24 hours after the query, 07:00 local time, SK7019 departed for Bali from Kastrup, Denmark. Onboard the plane were doctors and personnel from SOS International. After 14 hours and 55 minutes, the plane landed on Bali. It thus became the longest non-stop flight made by a Scandinavian regular airline. During this time, SOS International's contacts on Bali assembled the group and provided information about the flight. Several were hesitant to travel home; the impulse to remain was strong.

The plane left Bali with the Norwegian youths on the morning of October 21st and landed in Oslo the same evening after a scheduled technical stopover in New Delhi.

With Euro-Alarm to Copenhagen

A group of 35 Danish youths was also on Bali as part of a study programme. It was at an early stage obvious to Euro-Alarm that this group had been seriously affected. Many were in the vicinity when the bombs exploded and had to search for their friends among the dead and injured. The three Danes who died and several of the injured Danes were from this group. These youths needed to leave Bali immediately and were at the centre of the incident.

In co-operation with the Danish embassy, the travel company Star Tours and Euro-Alarm, a Boeing 757 was chartered to fly this group from Bali, initially to Bangkok. The unoccupied seats on this plane were sold at the scene for an amount corresponding to DKK 5,000. In Bangkok, Euro-Alarm met the group with a response team consisting of two psychiatrists and two psychiatric nurses, and later, another psychiatrist. Three of the youths were admitted to hospitals in Bangkok during the wait for the continued journey home.

It was very difficult to find appropriate aircraft for the remaining part of the journey home to Copenhagen. Several alternatives were investigated and this took time. Finally, an MD 82 was chartered from a Ukrainian airline – a plane that had previously been owned by SAS. The aircraft type is not really appropriate for long flights, but it was the best that could be obtained.

Early in the morning on 18 October, the long flight was begun with technical stopovers in Karachi, Dubai and Kiev. The plane arrived at midnight, Danish time, after a 10,500-kilometre flight. Two patients were carried on stretchers that were secured in the aisle of the aircraft.

Alarm centres' experiences

After the disaster on Bali, several large alarm centres have joined to benefit from the experiences and to further develop co-operation. In dialogues primarily with the Danish Ministry of Foreign Affairs, a proposal has been prepared for improved disaster preparedness. The intention is to conduct more effective joint response operations with improved co-ordination. Besides incidents such as what occurred on Bali, where many Scandinavians were involved, this can also apply to natural disasters or bus, airplane and train accidents in areas where medical care resources are limited.

The proposal includes making three groups available utilising joint resources:

- A medical team that is sent out within eight hours. This would include intensive care and trauma doctors who would assess the need of evacuation and be able to conduct prioritisation and sorting of the injured at the scene.
- An emergency management team consisting of doctors and psychologists with emergency management experience that could begin working at the scene and accompany evacuees on journeys home.

- A technical team for providing support to other teams in order to, for example, alleviate difficulties that can arise due to limited capabilities at the scene.

Comments:

- *The financial aid that Swedish consular missions can provide to Swedish citizens abroad is rather limited and repayment is usually demanded from those receiving such aid. Assistance companies only help those who have travel insurance through an affiliated company. There is thus no general obligation to help Swedish or Scandinavian citizens.*
- *The staff at the Swedish consulate expected that SOS International would act more swiftly and with less bureaucracy as the situation was chaotic. The fact that the company's name is similar to our domestic alarm centres may be the cause. Swedes can be misled to believe that the service is free and can be utilised by all Swedish citizens in distress abroad. There is obviously a need to inform both the general public and consular personnel of the conditions for receiving assistance from the assistance company.*

Swedish National Air Medevac (SNAM)

The Swedish National Air Medevac (SNAM) was at the time when the incident occurred, not ready to be deployed, but in the event of a similar incident in the future, SNAM will be highly appropriate to utilise. The flight time to Bali, however, is sufficiently long that one would probably have to plan on two refuelling stops, but once onsite, SNAM could have conducted operations in the area and with evacuations to hospitals in Australia in a similar manner as were made by other organisations. Home journeys for Swedish patients are also feasible, but the flight time in this case was so long that access to oxygen would be a limiting factor unless oxygen was brought along for replenishing or oxygen replenishing was possible at the airports where stopovers would be made.

SNAM

Swedish National Air Medevac (SNAM) is an emergency management resource for qualified air medical evacuations of injured or ill persons. The resource is national, civilian and non-commercial. The predecessor to SNAM was a procedure of equipping regular airliners at SAS of the type MD 80/90 with military stretcher racks intended for use in times of war.

The SNAM concept involves an ordinary SAS aircraft of the type Boeing 737-800 being converted into an ambulance aircraft within six hours after an alarm is received and with no previous modifications. Such a plane will be able to transport six intensive care patients, six stretcher patients with lighter injuries and 23 seated patients (relatives or other passengers). The medical crew consists of 19 persons – seven doctors, 11 nurses and one medical technician. Four such crews have been trained. The plane is to be able to fly at least 3,000 kilometres without stopovers and transport the patients to the most suitable care location within or outside the country. Patients who require intensive care are transported using special intensive care stretchers that have been developed within the project. The stretchers include the medical technical equipment that can be needed.

SNAM is administered and led by the Swedish Civil Aviation Administration in co-operation with the National Board of Health and Welfare and SAS, and is financed by emergency preparedness funds. The resource can be deployed in the event of larger accidents, disasters or terrorist attacks when society's ordinary resources are insufficient, and in international humanitarian aid missions. SNAM is placed at the disposal of the government through the Swedish Civil Aviation Administration to the head of health care services, foreign governments or international organisations. Missions are funded by the ordering entities. The SNAM project was completed and became operable during 2006. It was utilised, however, in a simplified form during the air evacuation from Thailand in 2005, during which SNAM-trained crews were deployed.

Police work

The organisation and co-operation of the police

The formal relationship between Australia and Indonesia has at times been very strained. The police authorities in the respective countries, however, have co-operated smoothly for many years. Exchange has been carried out in several different areas; many Indonesian police commanders have, for instance, taken courses in Australia. There was thus a good co-operative climate at the time of the incident on Bali and many of those engaged in emergency operations knew each other.

In the event of a major accident or disaster in Indonesia, it is always assumed that the police will take overall responsibility for co-ordination. At the time of the attack, the Indonesian police force consisted of 300,000 men, of which 10,600 were stationed on Bali. This means one policeman per 300 inhabitants.

In Australia, the police consists of a federal or country-wide part, the *Australian Federal Police* (AFP) that is responsible for incidents that concern all of Australia. In addition, each state has the *State Police*, a police force that handles local and regional police work.

The Australian Federal Police maintain a constant presence in Indonesia through the unit stationed at the embassy in Jakarta. Similar units are stationed at 32 of Australia's embassies and consulates. These police units' duties include co-operating with the host countries' police organisations in the event of, for example, Interpol investigations. Another duty is to co-ordinate training courses.

Australian police's initial responses

The Australian Federal Police (AFP) received its first information about the incident from an Australian policeman on holiday on Bali. The policeman heard the explosions and assisted in the rescue work. He immediately informed the Australian embassy in Jakarta and the AFP headquarters of the incident.

This information led to Bali's governor and the Australian embassy co-ordinating police work at an early stage through a letter of understanding. This letter was signed just hours after the explosions.

The day after, Sunday, 13 October, 14 experts from the AFP flew to Bali with an RAAF plane. A control centre was established to co-ordinate operations with the Indonesian police.

The Australian police were from the beginning aware of the risk that they might be regarded, on Bali, as taking over. The AFP tried to counteract this by emphasising, to all police officers travelling to Bali, that they were there as "guests" to help the local police. In other words, they were not allowed to take over work from the local police. All commanders were also instructed

to ensure that this manner of conduct was complied with. No conflicts or rivalries arose. One contributing factor was that many of those involved, especially senior commanders, were acquainted with one another.

The Australian police were given the responsibility of identifying the dead according to *Disaster Victim Identification* (DVI) – a system established by the permanent identification commission at Interpol. A Swedish identification commission eventually arrived under the command of an official from the Swedish National Police Board. An information centre was established at a hotel. Initially, work was carried out using a paper-based system but a computer-based system was later implemented.

Relatives were informed of the situation on a daily basis. An official was later stationed on Bali to aid visiting relatives.

Cultural expressions concerning identification

The inhabitants of Bali, including the local police, wanted to quickly clean up at the site of the explosions. Such actions would naturally have made a careful investigation more difficult or even impossible. This, however, was not perceived as a sign of insufficient knowledge on the part of the police on Bali. The Australian police rather saw it as a cultural expression of the need to cleanse the site where an atrocity had occurred. After a discussion between the parties, cleaning was stopped.

There was also a wish on the part of the Balinese to quickly bury the dead. For this reason, relatives were initially permitted to enter the areas where the bodies were stored so that they could be identified. The local police had also photographed the deceased with Polaroid cameras. The photographs were used as a basis for identification.

The risk, however, of incorrect identifications was great since many of the deceased were disfigured or severely burned. Of the 18 identifications made with this method, nine proved to be incorrect; this method was therefore quickly abandoned. According to reports, only one body was released after having been identified in this inadequate manner.

An international identification commission was instead established that worked in accordance with DVI. The Australian Federal Police assumed all costs for the expensive DNA analyses.

Practical difficulties

Some of the practical difficulties were formal, for example, as to how evidence such as bomb remnants and DNA samples would be transported over international borders. The Australian embassy took part in this by setting up routines that facilitated the paperwork.

The AFP also noted that certain details could be decisive for efficiency. For instance, it became necessary to buy or lease a lot of equipment such as vehicles, photocopiers and sun hats onsite, but there was not enough cash on hand to pay for this.

Telecommunications were a problem –no satellite telephones were available and the mobile network was overloaded. There were also problems with confidentiality due to the media having access to the control centre

during the early stages. Moreover, interpreters were needed for the Balinese and Australian police to be able to co-operate, but these were initially unavailable.

One realization after the response was that functioning administrative routines are more important than previously thought. After the response on Bali, the AFP therefore developed special equipment for use in rapid responses so as to be able to resolve a number of the problems mentioned above.

Legal proceedings continue

The police investigation led to all suspects for the bombing on Bali being identified and on 5 November, the main suspects could be apprehended. More than 100 persons have subsequently been arrested for terrorism of which 34 for direct participation in the Bali bombing. At the same time, 51 other bomb cases, that had previously been carried out in Indonesia, have been resolved.

A series of legal proceedings was conducted from April to September 2003 but some of the suspects have been released due to lack of evidence. The person identified as having the main responsibility was sentenced to death in the autumn of 2003. Another two death sentences have been carried out, two persons have been sentenced to lifetime imprisonment and others to prison sentences of between four and eight years. The verdicts were appealed and are now subject to new legal proceedings.

Local deficiencies have been corrected

In the analysis of the disaster efforts made after the bombing, several organisational deficiencies were revealed. The fact that the electrical power supply at the incident site had gone down made rescue work significantly more difficult. There was no portable lighting but emergency services in Kuta Beach have since acquired such equipment.

Before the bombing, the police were not represented in the security committee of the airport on Bali and in practice therefore had no access to the airport area. This has also been changed. The airport has become more secure by vehicles no longer being able to freely drive up to the terminal building or park in its vicinity.

The police unit at the airport has been expanded from 30 to 117 police officers and X-ray equipment has been procured for examining all goods, not just passengers' hand luggage. Since the bombing, the police have put three times more resources into intelligence operations than before. A special beach police unit has also been established and the control of people travelling to Indonesia is more rigorous.

The police have also invested in anti-terrorism training. Mobile response forces with special training and equipment have been established, and staff at larger hotels has been trained in security routines. This is all intended to create increased trust in Bali and Indonesia as a safe society, not the least for tourists. Advisors from both Japan and the US have assisted. However,

warnings are still issued by both the US and Australia concerning travel to Indonesia.

Bali after the bombing

From a humane perspective, the bombing was a tragedy for the Balinese society, with a very large number of dead and injured persons. The terrorist action also entailed extensive economic consequences, both for individuals and for the society as a whole.

Bali's economy is mainly based on revenue from tourism, which decreased by 80 percent the year after the bombing. The average occupancy at the hotels was about 70 percent before the bombing but fell to about 20 percent afterwards. In tourism-related commerce, such as hotel, restaurant, travel agency and automobile rental businesses, personnel have been laid off.

Indirectly, the economic decline has led to reduced tax revenues, which has affected the entire public sector.

December through January, which is normally the peak period, was in 2002 very quiet. Many bars and discotheques closed after the bombing and remained closed for six months.

Muslims behind the attack

The weeks after the bombing, fear was noted among the local population when in the vicinity of westerners, i.e. the target of the bombs. There was also suspicion of people from other parts of Indonesia and outrage over the bombing's effects on tourism and other business activities.

At the same time, the population had a feeling of collective guilt. According to prevalent religious thinking on Bali, things do not happen at random; they are the result of how people have behaved. "What have we done wrong to be inflicted by such a tragedy?" people asked themselves.

When the suspects were apprehended at the beginning of November, it became apparent that there was a Muslim fundamentalist connection to the terrorist action, and because Bali is primarily populated by Hindus, the choice of bombing target was completely logical from the terrorists' standpoint. Both of the affected entertainment establishments were mostly frequented by tourists from the west (the Sari Club was even off limits to the local population). They were known as establishments where large volumes of alcoholic beverages were consumed and where extramarital affairs were initiated.

The collateral damage that the bombs would inadvertently cause among the local population would primarily affect Hindus. Should a faithful Muslim be inadvertently killed, there was the possibility of declaring the person concerned a martyr, who therewith would be in paradise.

There was thus the risk that violence would break out between vindictive Hindus and the Muslim minority on Bali. However, the situation never developed in this manner. One reason for this was that the rescue efforts conducted by the police chief and his Muslim group during the night of the

bombing became widely known. Moreover, a police chief who was a native of Bali, and for who the Balinese had great respect, was appointed to lead the police investigation. He was appointed four days after the attack and called a meeting with the religious leaders a few days later with the purpose of gaining support in warding off the dangerous situation.

Aid based on voluntariness

The charitable organisations co-operate

Many Indonesians sustained injuries to the degree that they could no longer work and families lost their incomes when fathers died. There is no social security net in the form of a state-financed welfare system in Indonesia, so several charitable organisations and private persons involved themselves in the relief work.

During a period of three weeks, there was mutual rivalry between the organisations. Unfortunately, a number of fake organisations were formed whose only purpose was to divert collected funds directly into their pockets. An umbrella organisation was later formed that tried to co-ordinate operations – Bali Recovery Group.

A few examples of aid contributions

Bali Haiti is a politically independent Balinese organisation that was founded in 1993 with the goal of helping children and youths on Bali to obtain an education. After the bombing, the organisation started a programme to assist the 117 Balinese bomb victims with money from, among other sources, the Australian Red Cross.

The organisation provides economic, medical and psychosocial support and it has a team consisting of doctors and nurses who make house calls. The organisation also has a centre in Denpasar where patients can live in connection with treatment.

Bali Haiti also has funded later corrective surgery for 11 Indonesians at Australian burn centres. Bali Haiti also works to bring Australian burn surgeons to Bali to conduct follow-ups on burn patients. The organisation provides temporary economic support to 98 affected families. At the same time, individual family members are helped to start businesses on a smaller scale, with the goal of future self-sufficiency.

The Indonesian government has engaged itself in aid programmes for the benefit of the affected children. The government has also participated in programs for building up local health centres and a burn clinic at Sanglah Hospital with staff that will be trained at the Royal Perth Hospital.

The Red Cross in Australia and on Jakarta has donated money to rebuilding after the bombing. The Australians have, for example, financed both the purchase of three ambulances and a modernisation of the blood bank on Bali. However, it took a year before the money collected reached the recipients. Moreover, Red Cross personnel on Bali have been trained in disaster management.

Help through donations

The organisation *Yayasan Kemanusiaan Ibu Pertiwi* (YKIP) was formed directly after the bombing to help people who were affected, directly or indirectly. YKIP conducts several different aid projects through donations. Among other things, it has financed a part of the establishment of a burn unit at Sanglah Hospital and a clinic for women. The organisation also funds the manufacture of artificial limbs for bomb victims.

The Kuta International Disaster Scholarship (KIDS) is a sub-section of YKIP that supports the 50 children who lost one or both of their parents during the bombing. KIDS also supports the 80 children with parents who were so severely injured that they became unemployable. Because all schooling in Indonesia is financed through fees paid by families, these children's education is in danger. The KIDS organisation therefore finances scholarships for each affected child that will guarantee them education until they become adults. The annual cost for this is calculated at 200 US dollars per child.

Directly after the bombing, KIDS received donations of large quantities of pharmaceuticals, but the expiry dates had already passed for 70 percent of these. A foundation has also been established in memory of one of the Swedish victims (*The Annika Lindén Foundation*). Among other things, the foundation has donated money to various educational investments on Bali.

Individuals provide help

The student organisation Jaringan Relawan Kemanusiaan Bali (JRKB) has as its goal to help Indonesians and is activated when something happens. The university is quite close to Sanglah Hospital and many of the students volunteered to help. JRKB distributed necessities to the Indonesians who were on the hospital grounds and helped to establish an information centre for Indonesians. Moreover, they followed up affected families two to three months after the incident.

According to JRKB, the actual number of dead was probably higher than the official count of 202. The organisation states, for example, that 19 prostitutes were missing after the attack. Moreover, those involved in the sex trade in Indonesia often use false names, which makes investigations more difficult. Other trade categories also involve travel within Indonesia with various casual jobs and these people often do not maintain regular contact with their families.

JRKB also took part in following up volunteers in February 2003 and of teachers who teach the affected Indonesian children during the autumn of 2003. There is also some contact between Indonesian and Australian youths with burn injuries.

Comparison with the tsunami in Thailand

Work with aiding the Swedes who were in Thailand and were affected in conjunction with the tsunami disaster during the Christmas holidays in 2004 will be the subject of a separate KAMEDO report (KAMEDO 90). There is, however, reason to relate this incident to the bomb attack on Bali.

Both on Bali and in Thailand, tourists were substantially affected. Neither Australia nor Sweden had a national plan for how citizens were to be evacuated in the event of a serious incident occurring when the citizens were abroad. The expectation was that the resources that assistance companies and insurance companies can provide would be sufficient also in such situations.

It is now clear, however, that these resources are insufficient in the event of major disasters. Civilian commercial air ambulance companies can provide aircraft able to carry one to three prone patients. Aircraft with larger medical evacuation capacities are nearly always a military resource, which can make their use difficult due to diplomatic considerations.

The possibility to charter aircraft in the civilian market in the event of major disasters is very limited because the various parties compete for these resources. It naturally also takes time to reach agreements of this type. Therefore there is the need for a national, civilian air evacuation resource that can be rapidly deployed. In this respect, the Swedish National Air Medevac (SNAM) fills an obvious need that cannot be satisfied in any other way. This mainly applies to Swedish interests, but the resource can upon request to the Swedish government, be used by other countries or organisations.

Both on Bali and in Thailand, the media were quickly on the scene covering the events. Even so, it took a relatively long time for the respective governments to obtain an accurate picture of the situation and to make decisions regarding response.

The question of how information can be gathered should be further studied. Perhaps a reconnaissance team that could be quickly mobilised is a solution. Co-operation with assistance companies that already have contact persons onsite is another way.

It is obvious that in the event of incidents like those that occurred on Bali and Thailand, commercial and national resources must co-operate – both civilian and military.

Summary of Australian experiences

Proposed improvements

Persons in charge at central Australian government agencies have, in conjunction with a joint evaluation regarding the air evacuation from Bali and the subsequent activities in Australia, in an internal report, submitted proposals for how similar situations can be better handled in the future.

It was determined that the following are required:

- A national disaster plan.
- Better equipment and better training within the air force.
- Expanded hospital capacity.
- Better management structure for responses abroad.
- Rapid response teams.
- Capacity to relieve personnel.

Federal disaster plan

A nation-wide disaster plan should be prepared in which one clarifies the interaction between civilian and military resources, and how the central co-ordination of evacuation teams should be conducted. Communication channels between involved government agencies also need to be clarified, as well as which means should be used.

Better equipment, more training

The groups (AME teams) within the Australian air force (RAAF) that work with medical evacuations need to be reinforced, both regarding equipment and personnel.

- Disaster equipment should be prepared in advance to initially treat a maximum of 50 patients – no more than this so as to be logistically manageable in emergency situations. For larger numbers of casualties, several kits should be used instead. A periodic training programme should be implemented so that concerned personnel know how the equipment is to be used.
- The power supply for medical technical devices and equipment must be assured. Battery power alone is not sufficient in such situations, neither in the air during flights nor on the ground. Adapters for various types of contacts and power sources in different countries, and small portable generators should be included in the equipment, and headlamps should be included in health care providers' personal equipment.

- Reliable access to oxygen is a key factor. Adapters for connecting, for example, to various types of oxygen tubes should be brought along.
- Communication between those concerned at various levels and between levels must be assured. Everyone operating in the field should have tri-band mobile telephones. Satellite telephones are necessary for communication between different levels and between primary functions, and when it is initially determined that the availability of mobile telephone systems is unreliable.
- The ability for health care providers to communicate in the very noisy working environment onboard the Hercules planes must be improved. Moreover, their communication must be held separate from the air crew's internal communications.
- The air medical evacuation teams feel that they need more training in the use of complex equipment, such as ventilators, as well as clinical training. General refresher exercises are needed every other year.
- Working hour regulations must be established for health care providers' duty hours, in a corresponding manner as to that already in existence for air crew.

Expanded hospital capacity

The ability to reinforce smaller hospitals, alternatively, quickly be able to fly in a military field hospital to an incident site, should be investigated.

EMA

Emergency Management Australia (EMA) is the federal agency that is responsible for planning and co-ordinating response operations in the event of major accidents and disasters. In Sweden, there is no exactly corresponding agency with the same mandate. The agency has access to experts of various types, for example, in regard to earthquakes and technical emergency services. The medical expertise at one's disposal, however, is primarily on the administrative level; experience in the applied practise of medicine and clinical knowledge is lacking.

The agency seems to be more oriented to planning and training than to operative command of a collected response. Moreover, it does not seem to have anticipated that an incident beyond the country's borders would involve Australian resources to the degree that now occurred.

A management structure is needed for responses abroad. Within EMA, the following needs have been noted:

- To clarify responsibility issues regarding incidents that occur outside Australia.
- To plan and exercise command and co-ordination of similar situations in the future.

- To rectify communications and information deficiencies that were, among other things, the result of a heavy dependence on mobile telephony systems, which were overloaded.
- To develop a central function for co-ordination of resources for air medical evacuations, burn injuries, etc.
- To improve accessibility to infrastructure for transports, both civilian and military.
- To assure access to trained personnel to the degree required by the situation.
- To improve the organisations' capabilities to deal with stress.
- To develop the ability to fulfil the needs of the media and general public.

Groups for rapid responses

The need for a rapid response team or rapid needs assessment team should be investigated. What this refers to is a group of people with qualifications and equipment adapted to quickly be able to form a perception of the aid requirements and be able to initiate an appropriate response. If such a group had been quickly dispatched to the disaster site on Bali by jet, one would have had better grounds for planning of response operations. At the same time, the group could have begun assistance operations and prepared the evacuation at the airport.

Capacity to relieve personnel

The capacity to relieve personnel must also exist for management staff and other key persons. This applies not the least to air medical evacuations, where the air crew is subject to rigorous directives while the health care providers, however, in certain cases worked for more than 50 hours in succession.

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