

Aspects of forensic responses to the Bali bombings

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RECENT ARTICLES IN *ADF Health* have described the initial medical response to the Bali bombings of 12 October 2002 and the aeromedical evacuation of Australian casualties undertaken by service personnel, including Reservists.^{1,2} This article describes the subsequent work of ADF forensic dental and medical personnel in identifying the victims of the bombings.

The word “forensic” comes from the Latin *forensis*, “of the forum”. In Roman times the forum was the public place where official announcements were made, public meetings were held and some legal processes were demonstrated. Hence the term has come to refer to those aspects of medicine and dentistry which are applied to the needs of the law.

In cases of unexpected death, the crucial function of forensic sciences is determining the who, when, where and how of death. Forensic evidence can facilitate the prosecution of people responsible for criminal or grossly negligent acts, and can inform improvements in medical treatments, personal protective equipment, occupational health and safety procedures and many other aspects of the human environment.

In South East Asia, victims of accidents/incidents have often been identified visually, even in the case of disfigurement after high-speed accidents or fires. These visual identification procedures were not carried out to internationally recognised standards. When one of the authors was the Scientific Vice Chairman of the Interpol Disaster Victim Identification (DVI) Standing Committee, a South East Asian



Site of the Bali bombings, two days after the explosions, looking from the Sari Club across Jalan Legion to Paddy's Bar. The first, smaller, bomb was carried by a suicide bomber and exploded inside Paddy's Bar. The second bomb was contained in a vehicle parked outside the Sari Club.

Interpol regional meeting was organised in conjunction with the Indonesian police and held in Makassar, Sulawesi in January 2000. Most of the Indonesian regional police chiefs attended this meeting and therefore were cognisant of the international DVI standards before the Bali bombings.

The main device outside the Sari Club was assessed by both Australian and Indonesian explosive experts to be equivalent to about 100 kg of TNT. The Indonesian investigators subsequently found that the bomb actually contained 1000 kg of chlorates. Because of ineptitude in the bomb manufacture, it was actually a “dud” and exploded at only one-tenth of its potential power (personal communication, Indonesian Police Inspector General I Made Mangu Pastika).

The disaster victim identification (DVI) process — post-mortem investigations

The DVI process is conceptually simple but complex in execution. The elements of the process are:

Recovery: Bodies or body parts are confirmed as human, photographed and mapped *in situ*, then transported to a designated mortuary. This may be in a local hospital, regional forensic facility or temporary mortuary. The principle is that all remains are stored and examined in one place. Deciding the storage location is influenced by politics, usually with input from the medical, dental and technical personnel responsible for implementing that decision, as it may have



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profound implications for the conduct of the investigation.

If bodies are moved or removed without their initial location being charted, all information that could have been gained from their position relative to (say) the centre of blast in the case of explosions, wreckage in the case of aviation accidents, or machinery spaces in the case of vessels, will be lost. The dictum is to record everything photographically — “shoot your way in, shoot your way out”.

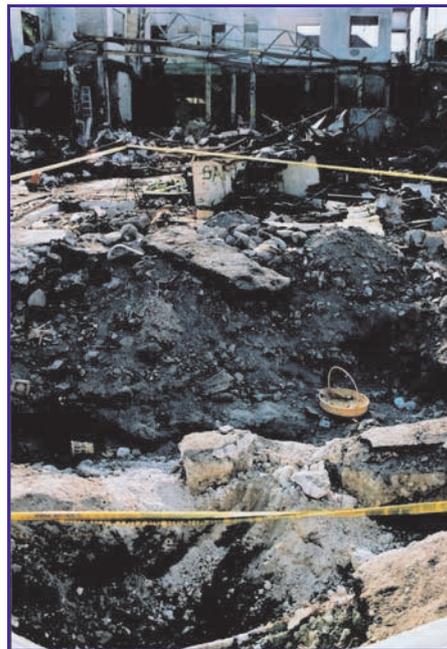
Property examination: Clothing and “witness” marks on clothing caused by projectiles or other objects, property, including wallets and their contents, keys, spectacles, and jewellery are all examined, photographed and recorded. In the civilian jurisdiction this function is the responsibility of police officers working for the Coroner, in conjunction with the forensic pathologist.

External examination: Injuries, marks caused by contact with objects, objects embedded in the body, and old scars, tattoos and anatomical anomalies are photographed and recorded. Fingerprints and large x-ray films to verify the identity of an object entering the body via an external wound may be taken at this stage.

Internal examination: In the case of a disaster such as Bali, where there may be dismemberment and mutilation as well as extensive burning, the forensic pathologist may be unable, or not required, to formulate a specific cause of death apart from a catch-all term such as “multiple injuries”. Nevertheless, these injuries must be described and recorded. In an aviation accident, the identification and detailed examination of the body of the pilot (in the Bali case, that of the bomber) is pivotal. DNA samples are best taken at an early stage.

Dental examination: Depending on decisions as to the approach to the DVI process, the jaws of victims may be exposed and the mandible disarticulated. Using standardised Interpol forms and protocols, a dental chart is compiled and a full mouth survey is made using 14 dental x-ray films. Polaroid photographs are then taken at various magnifications to record any dental anomalies or unique features. The “hard” copies of the radiographs, photographs and the dental charting are then reconciled to ensure that no errors have been made in recording the post-mortem dental evidence.³ The dental autopsy is the slowest in the identification process, and because of the effect on facial structures it is the last of the investigative procedures. Degloving of the facial soft tissues is required for adequate access to the mandible.

Dental autopsies after the Bali bombings were further complicated by the friable nature of teeth and supporting bone after prolonged or intense burning, and the fragmentation and commingling of remains.



Bomb crater outside the Sari Club, where the main bomb exploded.

The DVI process — ante-mortem investigations

The most timely, ethically sound and accurate post-mortem data recording is of little use in DVI unless it can be reconciled with adequate ante-mortem data about the victims. This element of the DVI process is largely beyond the control of the dental or medical forensic practitioner. Forensic dentists, in particular, depend on the availability and quality of records generated during life. This is not a problem in relation to ADF personnel, where the quality and thoroughness of medical and dental records is consistently high, but the quality of records generated by civilian practitioners varies, and, since the advent of fluoridation of most Australian water supplies, young people (such as many of the Bali victims) may have had little or no dental work on their teeth. However, they may have had orthodontic treatment (braces), a prescription mouthguard for sport, or suffered a chipped tooth.³ A

characteristic pattern of crooked or spaced teeth may be revealed in a smiling photograph.

A past medical history of broken bones, surgery or disease, a tattoo or scar, if adequately recorded, may all contribute to the building of an ante-mortem data set for later comparison with post-mortem findings. Ante-mortem data collection is under the control of the various Australian state police missing persons units, which will often have a dental practitioner as part of their team.

The DVI process — reconciliation phase

The reconciliation of ante-mortem and post-mortem data, the third phase of DVI, fulfils the aim of the mission — the accurate identification of deceased people. This crucial phase has been likened to dental and medical detective work.

With all ante-mortem and post-mortem data compiled according to Interpol protocols and recorded on standardised Interpol forms,⁴ the two sets can be compared. The Interpol DVI Standing Committee has recommended that this can be done as a sort of “bingo”, where a single ante-mortem record is compared with many post-mortem records. This standardisation has led to the development of several software packages to capture possible matches, with operator control over recognition thresholds and allowances made for charting errors in ante-mortem dental records.

The DVI process — reconciliation board

Interpol recommends that a reconciliation board be comprised of a Senior DVI Police Officer, a forensic odontologist and a



Smashed vehicles in Jalan Legion, the street of the bombings.

forensic pathologist. This format was used by the Indonesian DVI Commander. The board reviewed the victim identifications suggested by the forensic specialist. The presenting specialist, usually the forensic odontologist, systematically demonstrated the points of concordance between ante-mortem and post-mortem dental evidence. In the Bali bombing case this evidence was based on matching of dental radiographic evidence. When all members of the Board agreed with the findings the Indonesian DVI Commander would then confirm the identification. Relatives could then be informed, a death certificate generated and the body repatriated.



Shocked disbelief on the faces of Balinese people on seeing the wreckage left by the bomb blasts.

Course of events

The Australian Federal Police (AFP) codenamed the mass casualty DVI operation and the murder investigation after the Bali bombings Operation Alliance, alluding to the international cooperation the task required. Two themes underpinned the success of this operation. Firstly, personal relationships built up over years with Indonesian officials allowed positive decisions to be made on a rational basis, and enabled the process to proceed with mutual goodwill. Secondly, the requirement to brief senior officials, politicians, the media and the relatives of the deceased in the early phases helped greatly to optimise outcomes.

These themes are best illustrated by a brief chronology of events of the first few days following the explosion on the 12 October.

Sunday 13 October

It became apparent from early morning media reports that among the victims of the previous night's explosion were

many Australians. Eventually 202 were confirmed dead, including 88 Australians, the remainder being Indonesians, Europeans, British, North Americans, Japanese, Koreans and Taiwanese.

The chairman of the ADF Forensic Consultative Group contacted the Director General of the Defence Health Services (DGDHS), Air Commodore Tony Austin, to ascertain whether the ADF would require assistance from members of the Forensic Consultative Group. The chairman was informed that the request for assistance from the ADF was limited to aeromedical evacuation.

The Federal Government assigned the dual role of incident investigation and DVI to the AFP. The Department of Foreign Affairs and Trade was the assigned lead agency in compiling a list of missing persons. A national disaster victim response was initiated, involving Superintendent Andy Telfer of South Australian Police in his capacity as Chairman of the National DVI Committee.

Monday 14 October

An initial DVI team was organised by Telfer (working for the AFP), and equipment was located, assembled and readied for air transport. Professor Chris Griffiths, Professor John Hilton and three AFP agents were the first of the DVI contingent to arrive in Denpasar, just before midnight. Most of the DVI team did not arrive until Wednesday morning, as their RNZAF aircraft was delayed by mechanical faults in Darwin.

Tuesday 15 October

After an early morning briefing, Griffiths and Hilton, in the company of the small



Paddy's Bar, showing the bar and pillar where DNA of the alleged suicide bomber was recovered.

AFP team, went to the explosion site. This by now had been secured and sealed by the Indonesian authorities, although it had been open on Sunday and much of Monday. This initial lack of site security resulted in bodies in body bags lying in the street with relatives and friends wandering among the chaos attempting to identify victims.

Having been denied access to the crime scene at that time (as the Indonesian army had reacted to previous criticism by allowing no access to the site) Hilton and Griffiths proceeded to Sanglah Hospital, where they met the Indonesian DVI Commander, Colonel Eddy Saparwoko, and a senior Indonesian forensic odontologist, Lieutenant Colonel Peter Sahelangi. The personal relationships that had been forged with these men over many years were crucial to establishing a harmonious team effort between the Indonesian and Australian DVI personnel. The Indonesian DVI Commander asked Griffiths and Hilton to help him manage the identification process, and to do so in accordance with Interpol DVI protocols.

As the DVI developed, the Indonesian DVI Committee shielded the work of the international team from political pressures. Various local and international authorities demanded preferential treatment. A senior Indonesian politician wanted to ship all the bodies in containers to Jakarta. The Indonesian press wanted to know why more Europeans were being identified than Indonesians (the Indonesian Committee explained that this was because more Australians and Europeans had ante-mortem dental records including radiographs).

Tuesday was crucial in terms of briefing key people. Griffiths spoke with Prime Minister John Howard and assured him that Indonesian authorities were correct in resisting attempts by the families of Australian victims to have bodies released on visual identification. The Prime Minister was advised that the Indonesians were conversant with the internationally agreed standards of Interpol and that these standards were to be applied. Hilton and Griffiths had already examined a representative sample of the bodies being held at Sanglah Hospital and concluded that they could not all be identified using fingerprint and dental evidence. The Prime Minister was advised that DNA techniques would also have to be used. Mr Howard responded with an undertaking that the Australian Government would sponsor the DNA testing of all victims, irrespective of apparent nationality, and would meet all associated costs.

Griffiths was asked by the Australian Consul General, Ross Tysoe, and the AFP Field Commander, Graham Ashton,



Family member of Indonesian victims praying at the bomb site.

to address the relatives of the dead and missing at the Hard Rock Hotel in Kuta. The relatives were advised that visual identifications were inappropriate in these circumstances and that past experience showed that one in five visual identifications could be incorrect. The identification process needed to be carried out in accordance with international best practice. The relatives were assured that appropriate resources from Australia would be provided; and that contrary to some press reports, the Indonesians were being extremely helpful and co-operative. The Prime Minister provided similar cautions and reassurances in the Federal Parliament to the Australian people.⁵

Tuesday also saw the setting up of appropriate lines of communication with the Consular Corps in Bali. Formal links were put in place with the volunteers who were looking after the relatives of the dead and missing. It is important to recognise the contribution of these volunteers. This was a heterogeneous group of Indonesians, expatriate Australians and Europeans and visitors to the island. They worked long and selflessly to help the survivors and the relatives. They had untrained, inexperienced and self selected leadership, and they achieved much that was worthwhile. Inexperience caused them to adopt *ad hoc* methods of identification, which are recognised among DVI experts as highly unreliable and therefore in the formal sense, unacceptable. This resulted in some initial misidentification of some victims. The practice of showing grieving relatives photographs of burned or blasted bodies and inviting identification on this basis was discouraged. Uncontrolled access by volunteers to bodies at the mortuary ceased.



The mortuary at Sanglah Hospital, showing victim's remains under bags of ice.

Before a preliminary sorting into male and female, the bodies had been stored in refrigerated containers supplied by the British Consulate. The volunteers helped with sorting these bodies, laying them out in body bags in a screened, covered walkway. The dangers of treble handling and mis-sorting militated against their return to the refrigerated containers. The bodies were kept in a remarkably good state of preservation by these volunteers, mostly young Balinese Red Cross workers, constantly carrying crushed and block ice from trucks to the mortuary area and laying the ice around the body bags. The victims were at all times treated with respect and indeed tenderness by the Indonesian volunteers.

Wednesday 16 October

With the arrival of the rest of the Australian DVI team from Darwin, the full DVI process began.

By this time some representatives of the Australian news media had spoken with Hilton and Griffiths and now recognised the magnitude and difficulties of the task of identifying and repatriating the dead, that it was an Indonesian responsibility and that this responsibility was being discharged in a competent and compassionate manner. This defused much of the harm generated by previous misinformation and unrealistic expectations of an early resolution to the DVI process.

Thursday 17 October

A Swedish DVI group arrived on Wednesday evening, followed by teams from Japan, Hong Kong and Taiwan. There was difficulty in directing their efforts into agreed channels. Understandably, some groups wished to focus on identifying their own citizens. Again, the personal relationships and trust between Dr Saparwoko and the Australian team enabled them to convince the newly arrived international teams that their intended focus on their own citizens was not feasible due to the condition of the bodies.

In the early phase of the Bali operation there were delays because of an insufficient number of trained dentists to carry out the forensic odontological examinations. The Prime Minister had agreed that a request could be made to the Australian Defence Force for a team of four military forensic odontologists to join the AFP team in Bali. This meant that 6 ADF Permanent and Reserve personnel were among the 17 Australian forensic odontologists working in Bali. Other ADF personnel provided logistic, communications and language skills.

That afternoon the Prime Minister, Deputy Prime Minister John Anderson and Leader of the Opposition Simon Crean and their immediate advisors flew into Bali. At the airport they were given a short briefing on the progress of DVI by



The Indonesian disaster victim identification team, with Group Captain Christopher Griffiths (fifth from left). The Indonesian team leader, Brigadier General Eddy Saparwoko, is sixth from the left.

Griffiths and Hilton. The group then attended a moving and emotionally charged memorial service, before a more detailed conference. Among other things, the need to involve Australian Coroners in the investigation was discussed.

Coroners Acts in each Australian State and Territory require the local Coroner to make findings as to time, place, manner and cause of death, and the identity of any body lying in, or having a sufficient connection with, that State or Territory and where death has been caused by violence. Only when the Coroner is satisfied may he/she order the release of the body for burial or cremation. This process had to proceed in a humane but legally sound fashion to avoid immediate or later problems with probate or insurance.

Friday 18 October

The Australian Coroners Society happened to be holding its annual meeting that week. Hilton flew back to Sydney overnight and briefed the Coroners *en masse* on Friday morning. The Prime Minister's suggestion that a Coroner should go to Bali was welcomed and subsequently the Victorian and New South Wales State Coroners flew to Denpasar to offer guidance and assistance.

The post-mortem examination of the victims continued at the Sanglah Hospital mortuary. Australian state police fingerprint teams, property recorders, photographers, civilian forensic anthropologists, pathologists, odontologists, mortuary technicians and mortuary managers from various states, all worked in a co-operative manner with a common aim. Again this interaction was facilitated by personal relationships with key people.

The DVI reconciliation board met for the first time and confirmed the identity of some victims so that death certificates could be issued. Thereafter, the remains of victims began to be repatriated to Australia.

The local volunteers continued the transportation of ice, body handling assistance and constant cleaning of the mortuary.

The facilities in Sanglah Hospital mortuary had not been designed to cope with a mass casualty and fatality disaster. The hospital staff made every effort to allow the DVI teams full use of what was available in the way of buildings, material and personnel. Offices were provided, air conditioning units were installed. Indonesian authorities and volunteers responded to the extraordinary circumstances with great courtesy and diligence.

Later phase

The DVI process continued until early November. Interestingly, in a world of rapidly advancing DNA technology, over half of the victims were identified within the first two weeks using forensic dental evidence.

The bomb blast outside the Sari Club travelled at about 5000 metres per second. Because of the particular manner in which the bomb was constructed (almost certainly not by intention), it achieved less than its potential blast effect but produced a prolonged burning phase. This incineration, the commingling of bodies by blast and later in haphazard bagging of remains during the early recovery phase created problems. The conditions for DNA sampling were less than ideal and this, coupled with the extreme sensitivity of the DNA amplification process, complicated the application of that technique.

Fingerprints, odontology and DNA are the only stand-alone methods of identification recognised by Interpol. In the case of the Bali attacks, all three methods were used.

Lessons learned

It is a useful experience for ADF Health Service personnel to have exposure to disaster victim recovery and identification, as the circumstances are similar to those that can arise in military conflict.

Responding to the Bali bombings tested the relationships between Australian and Indonesian officials and demonstrated the value of international professional contact. It confirmed the value of establishing and maintaining relationships with colleagues in our geopolitical region. Whether it be in relation to DVI or other matters with military relevance, maintaining relationships should involve attendance and active participation at regional conferences by ADF members.

In managing DVI, it is vital to have immediate and unimpeded access to senior officials, politicians, the media and the relatives of the deceased. The technical requirements of recovery and identification are not automatically appreciated by these non-experts, who are understandably anxious to manage these processes speedily. The need to follow



Wreaths to the victims of the Bali bombings from the Indonesian people. Beyond are damaged buildings standing opposite the Sari Club.

established Interpol protocols and allow adequate time for this purpose must be emphasised.

The Bali experience reinforced the efficacy of the Interpol DVI protocols. They represent best practice and are widely used within the Australian States and Territories. Of the 18 visual identifications of victims by relations in Bali, only 9 were correct.

If we had released bodies on visual recognition then nine families would not have had their relation returned to them.

The use of a reconciliation board proved to be pivotal in the peer review of the identification process. The specialists from each area who presented to this board were not the same personnel who carried out the initial matching procedures in their area of expertise. This allowed a devil's advocate approach as a final filtering mechanism to avoid misidentifications.

To avoid ill-informed decisions being taken in the immediate period following a mass casualty incident, experienced trained people are needed on the ground as early as possible. The ADF Forensic Consultative Group can provide a forensic odontologist and forensic pathologist, to be available at four hours notice, to join an initial reconnaissance team in the event of a major disaster involving Australian interests.

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