



## Two halves make a whole: Both first responders and experts are needed for the management and identification of the dead in large disasters



S. Cordner<sup>a,b</sup>, S.T.D. Ellingham<sup>c,\*</sup>

<sup>a</sup> Monash University, Australia

<sup>b</sup> International Programmes, Victorian Institute of Forensic Medicine, Australia

<sup>c</sup> Forensic Unit, International Committee of the Red Cross, Geneva, Switzerland

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### ABSTRACT

Catastrophic natural disasters are a regular global issue claiming thousands of lives and having severe and long lasting consequences for communities. Along with the rescue and care of survivors and the provision of basic services, managing the dead in a proper and dignified manner is one of the three pillars of disaster response. Since the 2004 Indian Ocean Tsunami, progress to facilitate better coordination in the management of the dead has been made. Two guidelines contributing to this positive trend are the Interpol DVI Guide, and the “Management of the Dead after Disasters – A Field Manual for First Responders”. The former is aimed at forensic specialists and emergency services, the latter at untrained first responders confronted with the management of the dead when specialist forensic services are not available. This paper sets out the complementarity of the two publications, illustrating that ideally, both first responders and experts are needed to properly manage and identify the dead following large disasters.

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“ . . . any man’s death diminishes me  
because I am involved in mankind;  
And therefore never send to know  
for whom the bell tolls;  
it tolls for thee . . . .”

### 1. Introduction

These words by Donne are a reminder of our shared humanity: what affects an individual affects the community; what affects one of us affects us all. Each individual can practice humanitarian action, and this extends to helping to take care of those who have died. Catastrophic events resulting in mass fatalities occur frequently and have international effects. Developing countries are particularly prone to such disasters and they typically lack well-equipped forensic services [1]. World-wide, between 1900 and 2004, there were 77 known tropical storms and cyclones causing over 1000 deaths each. 50 of these occurred in the developing countries of the Asia-Pacific region, and 16 in the Caribbean and Central America [2]. Between 1980 and

2000 tropical cyclones were responsible for an average of 11 800 deaths a year [2]. Developed countries such as Japan and the USA, although prone to tropical cyclones, rarely see deaths in such numbers. One notable exception was Hurricane Katrina in the United States in 2005, which killed 1836 people [3]. Similar patterns can be observed for earthquakes: between 1980 and 2002, India experienced 14 major earthquakes, killing 32 117 people, while the United States during the same period experienced 143 deaths resulting from 18 major quakes [3]. The link between a country’s lower socio-economic status and greater numbers of deaths from natural disasters has been widely recognized. The ability of wealthier countries to invest in preparedness and mitigation strategies such as warning systems, building codes and reinforcements, and the proper training of search and rescue professionals partly explain this link [4]. Table 1 summarizes all natural catastrophes since 2004 with a death toll greater than 5000 (The table does not include casualties from armed conflict, which have seen hundreds of thousand of civilians killed, or epidemics).

Understandably, public attention subsequent to a disaster is mainly focused on efforts to provide emergency relief: the rescue and care for survivors and the provision of essential services. With these, the proper and dignified management of the dead is regarded as the third pillar of the humanitarian response. Under International Humanitarian Law (IHL), the dead from armed conflict are recognized as a distinct category of victim, and as such

\* Corresponding author.

E-mail address: [Ellingham.sarah@gmail.com](mailto:Ellingham.sarah@gmail.com) (S.T.D. Ellingham).

**Table 1**  
Natural catastrophes since 2004 with a death toll greater than 5000.

| Catastrophe                              | Death toll    |
|--|---------------|
| Indian Ocean Tsunami, 2004               | 226 408 [5]   |
| Earthquake, Kashmir, Pakistan, 2005      | 73 338 [6]    |
| Earthquake, Java, Indonesia, 2006        | 5749 [7]      |
| Cyclone Nargis, Myanmar, 2008            | 138 366 [8]   |
| Earthquake, Eastern Sichuan, China, 2008 | 87 476 [9]    |
| Earthquake, Haiti, 2010                  | >137 000 [10] |
| Earthquake and Tsunami, Japan, 2011      | 15 891 [11]   |
| Typhoon Haiyan, Philippines, 2013        | >6300 [12]    |
| Earthquake, Nepal, 2015                  | ca. 8700 [13] |

their personal dignity must be protected [14–16]. From a humanitarian perspective, the proper management of the deceased following large disasters is of equally great importance, however the body of International Disaster Response Law (IDRL) is slowly evolving and is yet to address the matter of management of the dead [17,18]. The correct identification and subsequent return of the remains to their next of kin is a crucial aspect of addressing the psycho-social needs of the bereaved and in some cases of an entire community. This enables the remains to be laid to rest according to the family's cultural and religious practices. If families remain unaware of the fate of their missing loved ones, they are at risk from the so-called "Zeigarnik effect", a failure for them to "find closure" and move on with their lives [18–20]. In addition to this psychological significance, a positive identification can be a prerequisite for a formal documentation of death, without which the next of kin may not be able to claim life insurance, re-marry or may find themselves in lengthy legal disputes [21].

The importance of the dignified treatment and identification of remains is a universally accepted principle. The realities in large disasters, the context being addressed in this article, make it difficult to give effect to this principle: these are situations which overwhelm local capacities [22] and where basic services are often destroyed and where the authorities' ability to access the victims may be very difficult or even impossible.

Therefore the aim of this paper is to outline:

- the background to the development of practical guidance to manage the dead in large disasters,
- the complementarity of two main guidelines relevant to this task: the Interpol DVI Guide and the Manual for Management of the Dead after Disasters,
- the most crucial steps in the management of the dead after large disasters, in particular highlighting the crucial role played by first responders and
- what has been learnt from experience in management of the dead in large disasters over the last ten years.

### 1.1. The need for practical guidance to manage the dead in large disasters

One catastrophe in particular demonstrated the need for practical guidance on the management of deceased from large disasters and their identification: the Indian Ocean Tsunami, which struck on 26 December 2004, and killed approximately 220 000 people. Victims included 160 000 in Indonesia, 35 000 in Sri Lanka, 16 000 in India, 8195 in Thailand (about 2400 of which were nationals of other countries), as well as people in the Maldives, Malaysia, Myanmar, Bangladesh, Somalia, Kenya, Tanzania, the Seychelles and Singapore. No standard approach to managing the dead in such numbers existed at the time.

In Thailand alone, the tsunami killed individuals from 41 different countries. Many countries thus deployed their national

DVI teams to Thailand. This international operation was brought together under the Thai Tsunami Victim Identification (TTVI) process, however, by the time it was established, on January 13th 2005, 1151 bodies had already been released based on visual recognition [23]. This enormous international DVI operation, which involved 2000 personnel from 31 countries finished 13 months later on 26th February 2006. 1168 Thai nationals and 1841 non-Thai individuals were identified, with 508 bodies remaining unidentified. The identification of approximately 3000 individuals contrasted starkly with the responses elsewhere. In Aceh (Indonesia), and Sri Lanka authorities were completely overwhelmed by the number of deceased, leading to approximately 160 000 and 35 000 bodies respectively being buried in mass graves. In a subsequent review of the DVI operation, in the framework of the "Interpol Tsunami Evaluation Group", Interpol published 69 recommendations and concluded: "the present thinking for a massive death toll situation is not fit for purpose in delivering on principles of forensic identification and the South East Asian Tsunami of 2004 tells us it is in urgent need of revision" [24].

Without question, the Interpol DVI Guidelines have been invaluable since their launch in 1984. They filled an important gap: the absence of any systematic guidelines and standards on identifying the dead after a disaster of even a modest size. Most organized forensic services around the world, whether in well resourced or other contexts, have benefitted from them. A good example of the DVI Guide's continued and essential relevance is the central role it played in the response to the "Black Saturday" bushfires in Victoria, Australia in 2009, which killed 173 individuals. It took 3 months to complete the identifications in a well-resourced system with full governmental and community support [25]. However, when the number of dead exceeds a few hundred, the difficulties of mounting a full DVI operation begin to compound. This is particularly the case in contexts with limited forensic services, or when basic infrastructure is also impacted by the disaster, and/or as the scale of the disaster totally overwhelms the capacities to respond. Following the Indian Ocean Tsunami, as Interpol itself concluded, it became evident that another solution was needed.

Thus, in May 2005, the Pan American Health Organization (PAHO), the World Health Organization (WHO) and the International Committee of the Red Cross (ICRC) organized an expert meeting on lessons learned from the management of the dead, which was held in Lima, Peru. The meeting identified the need for, and began work on, practical and easy-to-follow guidelines for non-expert first responders, frequently members of the affected community, who are usually the first on site in the immediate aftermath of a disaster, prior to the arrival of forensic expertise. This is, in fact, the crucial time to manage the remains correctly and preserve information facilitating a future identification [26–28]. The result was the first edition of the "Management of Dead Bodies After Disasters: A Field Manual for First Responders" [29]. Since 2006, the MDB Manual has frequently been used as a basis for disaster planning and preparing for large disasters, even in countries with well-developed forensic services [27]. A decade after its first release, the Manual has been updated taking into account lessons learned from events such as the 2013 Typhoon Haiyan in the Philippines, 2014/2015 Ebola outbreak in West Africa and the 2015 earthquake in Nepal [30]. The second edition was launched in November 2016 [26,27].

### 2. The complementarity of the Interpol 'DVI Guide' and the WHO/ICRC Manual for the 'Management of Dead Bodies after Disasters'

The most important thing to understand about these two documents is that they complement each other. Table 2 sets out

**Table 2**

Complementarity of the Interpol DVI Guide and the WHO/ICRC Manual for the Management of Dead Bodies after Disasters.

| Interpol DVI Guide (2014)  |               | The Management of Dead Bodies after Disasters (2016) (MDB Manual)   |
|--|---------------|---|
| Intended for experts, DVI teams and strategic managers and planners  | TARGET/SCOPE  | Written for first responders, non-experts; to be implemented prior to the arrival of any forensic teams   |
| 135 pages – including annexes and PM forms   | LENGTH        | 65 pages – including annexes and PM forms   |
| 15 sides   | PM FORMS      | 4 sides (designed for first responders)   |
| Recommendations for the identification of disaster victims – 5 phases:   | AIMS          | To promote the proper and dignified management of dead bodies; and to facilitate their identification   |
| 1. Scene   |               | The MDB Manual is not a comprehensive framework for forensic investigations and does not replace the need for specialist forensic identification of victims   |
| 2. AM data collection  |               |   |
| 3. PM evidence collection  |               |   |
| 4. Reconciliation and identification   |               |   |
| 5. Debrief   |               |   |
| Disasters: an unexpected event causing the death of many people. It is not devised for all conceivable operational scenarios; special procedures which may be used in national emergencies or during wartime are mentioned but not discussed in detail (2008); the DVI guide does not discuss the first emergency response or how to efficiently manage the remains when the authorities or forensic capacities are not available or are overwhelmed.  | APPLICABILITY | Large disasters: the MDB Manual gives practical recommendations for non-expert first responders where forensic capacities are not available or overwhelmed  |
| Technical content designed for experts/DVI teams and higher management:  | CONTENT       | Low level technical content designed for a non-technical audience:  |
| <ul style="list-style-type: none"> <li>• Purpose</li> <li>• A cooperative approach</li> <li>• DVI command structure and responsibilities</li> <li>• Summary of the phases (as above)</li> <li>• Methods of identification</li> <li>• Priority considerations for DVI operations: legal, religious, families, planning, co-ordination, safety, logistics, communication, IT, security measures, human remains management, mortuary and storage, facilities, property, information and media management</li> <li>• Occupational health and welfare</li> <li>• Support for families</li> <li>• Training and equipment</li> <li>• 16 Annexes</li> <li>• (in 2008 Guide: Special Operations (II): Natural Disasters – earthquakes, floods, tsunamis)</li> </ul> |               | <ul style="list-style-type: none"> <li>• Planning and coordination</li> <li>• Health and safety including infectious disease risk</li> <li>• Allocating a unique code to the bodies</li> <li>• Taking photographs and recording data</li> <li>• Body recovery</li> <li>• Temporary storage of dead bodies</li> <li>• Traceable long-term storage</li> <li>• Support for families and relatives</li> <li>• Collection and management of information on the missing</li> <li>• Communications with families and the media</li> <li>• Frequently asked questions</li> <li>• 11 Annexes including: <ul style="list-style-type: none"> <li>- Dead body information form</li> <li>- Missing persons information form</li> <li>- Label for the dead body</li> <li>- Mass fatality plan checklist</li> <li>- Coordination plan flowchart for management of the dead: an example</li> <li>- Dealing with the bodies of persons who died from an epidemic or infectious disease</li> <li>- Cemeteries</li> <li>- Processes enabling the use of forensic DNA analysis in a large mass fatality disaster</li> <li>- The management of dead foreign nationals following a mass fatality disaster</li> <li>- Supporting publications</li> </ul> </li> </ul> |

this complementarity, giving an overview of the scope and content of both documents.

The 2008 version of the Interpol DVI Guide includes a 2-page “Special Operations (II) Summary”, which sets out recommendations for situations in which local infrastructure collapses after natural disasters, touching on subjects such as the fact that human remains generally do not cause epidemics, how to set out temporary mass graves, as well as how to allocate unique numbers and photographically document the remains [31]. The points made are entirely consistent and compatible with the Manual for the Management of Dead Bodies after Disasters. As this part of the DVI Guide does not represent practical advice, and as it is contained in a document aimed at experts and DVI teams (who in most cases of large disasters or catastrophes cannot implement such early responses), it represents a link to the MDB Manual.

### 2.1. The main steps in managing the dead following very large disasters

The MDB Manual addresses, in simple and easy-to-follow chapters, the main problems arising in the aftermath of large disasters. This includes guidance on how to maximize the collection and retention of information relevant for identification, whilst upholding the dignity of the dead.

Very large disasters by their very nature overwhelm the authorities or prevent their deployment in the affected areas. Necessary services have been destroyed or for other reasons are not present or will not arrive for some time, if at all. It is thus the local first responders, who in most cases are untrained, who are faced with the task of achieving some order in a range of domains in circumstances of chaos. Local command structures need to be set up, groups need to be established and responsibilities allocated. In relation to managing the dead, time is of the essence and responses need to be effectively coordinated as bodies decompose quickly. Having been recovered, each body, or body part, needs to be labelled with a unique code. This step is absolutely essential, as without it there can be no traceable records of the remains and the remains will be “lost”. The code suggested is a composite of:

- i) the name of the place where the body was found
- ii) the name of the team which located the body
- iii) a sequential number

It is this code, which must subsequently be included in all photographs and documents related to the remains, that allows specific bodies, perhaps with distinctive and potentially identifiable characteristics, to be located and retrieved at a

later time for further examination and possibly to be returned to their next of kin. The Manual includes a sample label incorporating both the code and the ability to record the chain of custody of the dead body.

The recognition of facial or other identifying features by family members, undertaken in controlled circumstances, is a common practice of human identification in all death investigation systems around the world. In principle, if the circumstances of such recognition can be controlled, this could also be part of the identification process after disasters. However, chaotic circumstances, trauma to the body as well as rapid decomposition can make visual recognition difficult and unreliable or even impossible. Therefore photographing the remains quickly, before the onset of decomposition if feasible, is essential to capture as many recognizable and potentially identifying features as possible. The manual provides simple guidance on the photographs it would be most useful to take to assist future identifications. At the time photos are taken, simple information about the remains should also be recorded. For this purpose, a short and simple Dead Body Information Form is included in the Manual. This having been completed, the labelled body or body part can be individually placed in a labelled body bag. The associated documentation needs to include the body's unique code and these records need to be kept and be accessible. Ideally, human remains should then be kept refrigerated at between 2 °C and 4 °C prior to formal identification. This may not be possible and temporary burial may be considered for storage. This is a respectful option, slows the rate of decomposition and keeps the remains protected from scavengers. Ideally the body should be buried in individual graves, however in some instances communal or trench burials can be an option. The location of each body as well as its unique code need to be recorded. There is provision to do this on the Dead Body Information Form.

There is a need to compile a list of names of all those missing in the disaster, as well as ante mortem (AM) information relating to these individuals. Without such a list, it will not be possible to achieve a significant number of identifications no matter how well post mortem data or samples were collected, as managing the task of obtaining AM information or DNA reference samples will be difficult. In very large disasters, the process of compiling a comprehensive list of the missing and AM information can take weeks or even months. This task is normally carried out by the authorities, however in some contexts there is a history of weak trust between the population and the authorities. For example, in communities affected by armed conflict, affected families may find it difficult to approach the authorities to report the fact of their missing relatives, let alone provide them with information. There may be real fear of deportation if the missing or their families are undocumented migrant workers. In many situations, the collection of AM information will therefore be undertaken by non-government or international humanitarian organizations. During this process, consideration of the next of kin is the primary priority, taking into account their needs, their culture and the context. Ideally a Family Assistance Center (FAC) should be established, where all families are given realistic expectations of the forensic process and briefed on developments prior to this information being disclosed to the media. If the number of individuals involved in large scale events exceeds the numbers logistically feasible for a FAC, media outlets such as newspapers, TV and radio can be used to communicate with the next of kin regarding general updates on the investigation process. It is important that designated media liaison personnel have regular briefings with the press in order to avoid inaccurate or premature reporting. These steps are necessary: without this work in the early phases of the response, future identification efforts, even if carried out by well-equipped forensic services, will not yield significant results.

## 2.2. What are some of the recent lessons learnt in managing the dead after large disasters

The fact that, generally speaking, the dead from natural disasters do not cause epidemics was a key message of the first edition of the MDB Manual. In 2014 in West Africa, the Ebola epidemic, assuming it is regarded as a natural disaster, was clearly an exception to this. In that crisis, the handling of the dead was one of the main modes of transmitting the disease. The virus is stable at room temperature and thus bodies remained highly infectious for long periods after death. It is vital to stress that in these circumstances, untrained first responders are not to handle the dead. In the Ebola crisis, well trained non-health care volunteer workers were the back-bone of the teams which managed the dead bodies. The occurrence of such epidemics has been incorporated into the second edition of the Manual.

An important potential contributor to human identification following a catastrophe is DNA analysis. However, achieving this contribution is much more difficult than commonly thought. It needs to be understood that such use of DNA is an additional element to the response to a catastrophe, not an alternative [32]. The use of DNA will only be effective if the basics of managing the dead have been implemented: that all the bodies have been labeled with a unique code, and that records of this have been made so the bodies can be traced. If photographs and other post mortem data are available, DNA-led identifications can be fast tracked or confirmed to a higher level of family satisfaction. The groundwork as laid by first responders is vital to the successful outcome of the analysis

## 3. Conclusion

In the wake of a disaster, the dignified management of the dead including their identification, is an important part of the emergency response. The Interpol DVI Guide is an indispensable resource setting international standards for scientific identification. However, its immediate implementation in disastrous events with many hundreds or thousands of casualties is usually not feasible. The Guide is designed for use by trained specialists who may simply not be available in the immediate aftermath of a very large disaster. The Manual for the Management of Dead Bodies after Disasters is not a comprehensive framework for forensic investigations or DVI responses. It does, however give lay personnel who find themselves confronted with the first response after a mass fatality the tools to manage the dead in a dignified, proper way, preventing them from becoming lost, and maximizing their chances of later identification. The approach lays the foundation for an orderly DVI type response, graduated over time and in accordance with available resources. If the approach outlined in the Manual is followed, sensible decisions can be made at a later time about how and in what timeframe to proceed with the identifications. The complementarity of the two approaches is yet to be fully translated into practical harmony, but strong foundations for this to become a reality have been laid. Ideally, both first responders and experts are needed to properly manage and identify the dead following large disasters.

## Conflict of interest

Stephen Cordner was involved as editor in both the first and the second editions of the MDB Manual. Sarah Ellingham was involved in the drafting of the second edition of the MDB Manual.

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