Forensic Science International 205 (2011) 8–14

Contents lists available at ScienceDirect

Forensic Science International

journal homepage: www.elsevier.com/locate/forsciint

Mortuary operations in the aftermath of the 2009 Victorian bushfires☆

Jodie Leditschke [a,b,*], Sarsha Collett [a], Rebecca Ellen [a]

[a] Victorian Institute of Forensic Medicine, 57-83 Kavanagh St., Southbank, VIC 3006, Australia
[b] Department of Forensic Medicine, Monash University, Australia

ARTICLE INFO

Article history:
Received 6 May 2010
Received in revised form 3 November 2010
Accepted 5 November 2010
Available online 14 December 2010

Keywords:
Mortuary management
Disaster victim identification
Bushfire

ABSTRACT

On the day of the 2009 Victorian bushfires the Victorian Institute of Forensic Medicine activated its emergency plan. Within 48 h a temporary body storage facility was constructed adjacent to the existing mortuary. This temporary facility had the capacity to store up to 300 deceased persons. Pathologists, anthropologists, odontologists, police and mortuary assistants responded from all around Australia, New Zealand and Indonesia. The existing forensic mortuary and staff were divided into two areas: DVI (disaster victim identification) and "routine operations". A high priority for the mortuary was to ensure the casework of the "routine" deceased persons (those cases which were not related to the bushfires) was handled concurrently and in a timely manner. On admission each set of victim remains was given both a Coroner's case number in addition to the DVI number allocated at the scene. The case was CT scanned, examined by a pathologist, an anthropologist, and odontologist and in some instances a fingerprint expert. Where possible a DNA sample was taken. All processes, samples, labels and paperwork underwent a quality assurance check prior to the case completion. Regular audits were conducted. All of post mortem examinations were completed within 20 days of admission. Occupational health and safety issues of the staff were a high priority; this included correct manual handling, infection control and psychological debriefings. During the operation it was found that some remains were contaminated with asbestos. Procedures were set in place to manage these cases individually and each was isolated to reduce the risk of exposure by staff to asbestos. This overall mortuary operation identified a number of significant challenges, in particular the management of multiple parts of human remains for one individual. A new procedure was developed to ensure that all human remains, where possible, were reconciled with identified deceased persons prior to the release to the funeral director. It also highlighted the need to have well documented plans in place including plans for temporary mortuary facilities.

1. Introduction

The environment surrounding the response to any mass disaster is one of constant change. While the response to any mass disaster needs to be, and can be, well planned, anticipating everything is not possible, as is predicting the specific size, location, and cause of the disaster itself. Plans therefore need to accommodate flexibility. Previous experience should be built on to improve preparedness. Internationally, responses to the management of the dead in a mass disaster range from bulldozers digging holes, rapid mass graves and burials without identification or any records of the human remains; to fully operational temporary mortuaries equipped with pre-purchased structures and equipment which can be sourced from warehouses within hours of reported disasters, leading to identification of the deceased human remains following internationally recognised disaster victim identification (DVI) protocols [1–10].

On February 7th, 2009 the State of Victoria suffered its most deadly bushfire in documented history. This disaster triggered the activation of many emergency services and the implementation of disaster management plans, including the Victorian State disaster victim identification (DVI) plan.

Within the Victorian DVI plan, and indeed within the Australian plan, there are written protocols for the mortuary operation and a contingency plan for the construction of a temporary, fully operational mortuary. In Victoria the existing mortuary situated at the Victorian Institute of Forensic Medicine (VIFM) has the capacity to store 100 deceased persons; on any one day 80 deceased persons are stored. Therefore this facility does not have the space for any significant disaster. This paper details the plans and specifications of the temporary mortuary for the 2009 Victorian bushfires disaster.

☆ This paper is part of the special issue entitled "Forensic Medical Response to the 2009 Victorian bushfires diaster" Guest edited by Olaf H. Drummer and Stephen M. Cordner.

* Corresponding author at: Victorian Institute of Forensic Medicine, 57-83 Kavanagh St., Southbank, VIC 3006, Australia. Tel.: +61 3 9684 4151; fax: +61 3 9682 7353.
E-mail address: jodie@vifm.org (J. Leditschke).

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doi:10.1016/j.forsciint.2010.11.002

2. Management of mortuary operations

At the time of the 2009 Victorian bushfires, the body storage facilities at the VIFM were already fully utilized due to a marked increase in deaths associated with the heatwave experienced in the previous two weeks [11]. Initial reports of bushfire fatalities indicated that additional mortuary storage facilities would be required for possibly up to about 300 bodies.

2.1. The temporary body storage facility

A temporary body storage facility to house the bushfire victims was established adjacent to the existing forensic mortuary in Melbourne. The existing forensic mortuary was utilised for the post-mortem examinations. The reasons for this were:

- Melbourne was central to the location of deaths associated with the bushfires which were spread across the state of Victoria.
- VIFM has a well established mortuary with areas that can be divided into two distinct regions to perform DVI and non-DVI/routine work.
- The Multi-Detector Computed Tomography (MDCT) scanner at the VIFM was integral to the DVI response but was not mobile, and therefore could not be re-located.
- VIFM had previously installed three-phase power supply to the external wall of the building abutting the existing staff car park in preparation for a disaster, to allow for the installation of refrigerated containers.
- To establish the temporary body storage facility the equipment and services listed in Table 1 were sourced (Table 1; Figs. 1–3).
- In addition a recreational and catering tent was established with tables, chairs, food heating equipment, fridges and food was supplied by a catering company for breakfast, lunch and dinner for all staff working on the operation.
- The final set-up of the facility was completely covered from view from the public and media and secured by fencing, supported by a roaming police and security guards (Fig. 4).

2.2. Mortuary operations

2.2.1. Roles within the mortuary operation

During the response to a disaster, it is imperative that the 'routine' workload continues in tandem with the DVI work. To ensure adequate co-ordination of routine and DVI work in the aftermath of the bushfires, the following roles were allocated to senior experienced mortuary staff:

- *DVI Senior Forensic Technician*: Responsible for the daily co-ordination of DVI examinations in the mortuary.

Table 1
Essential logistics and resources to be considered when setting up a temporary body storage facility.

Service/equipment supplied in the aftermath of the bushfires	Issues considered when planning
Refrigerated containers: Within 18 h of notification of the disaster, six 40 foot refrigerated storage containers were delivered and installed in the staff car park. These were connected to the existing three phase power points	Size: Two choices – either 40 ft (fits racking for approx 30 deceased) or 20 ft (fits racking for approx 15 deceased). Source of power: Three phase power points installed on the outside of existing mortuary or Mobile generators which may be hired
Racks for containers: Local builders were briefed as to the size and type of racking required within the refrigerated storage containers similar to that in the existing mortuary fridges	Type: Sturdy and washable Design: Central aisle (greater number of bodies can be stored however they are difficult to manoeuvre in and out) or side aisle (less number stored however, bodies are easier to access) Height of racking: Needs to be consistent with local occupational safety standards which often dictates that the racking should not be above the average shoulder height of a mortuary worker [12] Use of body lift: Racking should accommodate a mortuary trolley or a body lift system Ramp: May be constructed by carpenters to assist with a access in and out containers
Tentage: A project officer was assigned to the site from a local catering hire company. Instructions included that the area containing the refrigeration units together with a large admission and triage area, was to be completely covered to maintain security and privacy. It was to include an undercover secure walk way leading to a side entrance of the mortuary	Source. Local catering/hire companies, defence departments or the major disaster management companies Design. Ensure: –All aspects of operation are undercover, including containers and area to receive funeral vans/vehicles. –Ability to be extended as changing demands. –Consistent with building regulations e.g. includes fire exit
IT support: Computers with bar-coding equipment were established in the temporary storage facility. The network was linked to existing system in the mortuary	Networked or stand alone system is required. The ideal situation will mimic existing systems already in place in the existing mortuary facilities
Lighting and plumbing: These were networked with the main building and enabled admission and release systems from the mortuary to be duplicated in the temporary body storage area	24 h lighting needs to be installed in all areas of temporary facility Guttering is required to prevent flooding when it rains
Signage: Biohazard signs and authorised personnel signs were erected at entrance to the temporary mortuary	Source from local printing or safety company
Mortuary equipment: Additional mortuary equipment such as Mortuary trolley, body lifts, cameras, personal protective clothing, hand sterilising gels, labelling equipment, body bag were supplied	Source of equipment may be from hospitals universities or major mass disaster management companies