

# Disaster alert! The role of physician-staffed helicopter emergency medical services

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*We examine the contribution of physician-staffed helicopter emergency medical services in major emergencies and the need for improvement in the major incident plan*

The first Australian helicopter rescue service originated in Sydney in 1973. Its medical capability was expanded in 1976 when volunteer doctors became regular crew members. From this time, the helicopter emergency medical services (HEMS) have been incorporated into the major incident plan for Sydney Airport.

Since 1989, Sydney has had two physician-staffed rescue helicopters. The Westpac Lifesaver Rescue helicopter is a BK 117 based at Prince Henry Hospital, and the NRMA Careflight helicopter is a Dauphin 365c based at Westmead Hospital. Both helicopters have an effective range of 400 km before refuelling and a maximum cruising speed of 240 km/h.

Each of the rescue helicopters has a crew of four comprising a pilot, a rescue crewman, a senior paramedic who is part of the NSW Ambulance Service's Special Casualty Access Team, and a doctor who is either a consultant or an advanced trainee in Emergency Medicine or Anaesthesia. The doctor and paramedic are available for rapid deployment by road ambulance or helicopter. Each service also has a doctor and paramedic available on rapid recall.

Doctors and paramedics undergo aircrew training in helicopter safety and aerial winch operations, with additional training in abseiling and rope skills relevant to accessing patients in difficult locations.

The medical crews of the two Sydney-based HEMS are senior in their respective fields, and specifically trained in rescue and prehospital operations. The presence of senior paramedics in the helicopter crew provides a ready inter-

## 1: Phases in responding to a major incident

**Rescue:** Often the most time-consuming phase; usually carried out by members of the emergency services who have been specially trained in rescue and extrication techniques.

**Treatment:** Patients are triaged to minimise morbidity and subsequent mortality of initial survivors. Doctors or paramedics start resuscitation and instigate life-saving procedures as quickly as possible at the scene. This may be incorporated into the rescue phase, as interventions such as delivering adequate analgesia may facilitate extrication.

**Transport:** Patients are triaged to centres appropriate for their injuries with the transport resources available at the time. Distributing patients to numerous hospitals is important to prevent nearby institutions being overwhelmed with casualties.

face with the rest of the ambulance service, and their regular working relationship with the doctors allows the crew to assume complementary roles in response to operational demands. The two helicopter services are each staffed by a doctor 24 hours a day, independent of any hospital or clinical obligations, allowing them to respond immediately to emergency situations.

### Pitfalls in current planning

In a major incident, community infrastructure remains intact. However, its emergency systems may be transiently overwhelmed by the number of casualties needing treatment. Often the problems at a major incident are more logistical than medical. With continuing improvement in extrication techniques, an on-site surgical presence is rarely required.<sup>1,2</sup> Many casualties will be "walking wounded" who will proceed directly to the nearest hospital emergency department.<sup>3-7</sup> For others, prehospital management can be divided into three phases, as shown in Box 1.

Previous experience both in Aus-

tralia and overseas<sup>1-32</sup> has shown that certain specific factors commonly hamper medical operations at the site of major incidents. These factors are listed in Box 2.

Sydney's two physician-staffed helicopter emergency medical services are ideally placed to contribute to all three phases of prehospital management rapidly and effectively.<sup>33</sup>

### HEMS and the NSW Ambulance Service's major incident plan

The NSW Ambulance Service's major incident plan (July 1991) covers all locations not under the control of the Civil Aviation Authority. It recognises the need to deploy senior personnel to the scene quickly to assess the situation and avoid sending vehicles inappropriately. However, it states that medical rescue helicopters "... will be seconded as transport resources under the direct control of the disaster ambulance controller and will not respond directly to the site... Medical rescue helicopters are to be used for the possible transport of ambulance or medical commanders, which takes priority over the transport of medical teams, secondary transfer of patients and possible logistical support".

In the DC3 incident (see "The helicopter emergency medical services in major incidents" on the next page), the

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## The helicopter emergency medical services in major incidents

### The DC3 ditching

On 24 April 1994, a DC3 aircraft carrying 25 people ditched into the sea at Botany Bay after take-off from Sydney Kingsford Smith Airport. Of the 11 people injured, the most serious injury was a fractured wrist. The Civil Aviation Authority immediately dispatched the Westpac Lifesaver and the NRMA Careflight medical rescue helicopters to the scene and, within 24 minutes of the accident, the two services had deployed two doctors, two paramedics, two divers and liferafts. The aircraft floated for about 10 minutes before sinking in about 15 metres of water, during which time passengers and crew made an orderly escape into the water. Various pleasure craft brought the passengers ashore.

The absence of fatality or serious injury in this incident was probably due to factors including: pilot skill, clement weather conditions and passengers' ability to make a rapid, orderly escape in daylight into calm seas, with short immersion times. In other circumstances, the functions of the two HEMS may have been critical. The HEMS were equipped to establish lines of interservice communications through aircraft and portable radios and the aircraft mobile phone.



Figure 1: The rescue of survivors from the DC3 which ditched in Sydney's Botany Bay. Courtesy, The Australian.



Figure 2: The on-site HEMS medical response at the Vineyard derailment. Courtesy, Captain John Hoad, Careflight Pty Ltd.

The HEMS medical crew were able to perform a relaxant-assisted intubation plus an emergency transfusion at the site. The patient was unstable, with multiple lower limb and pelvic fractures, and was airlifted to the regional trauma service about 23 km away, bypassing the local community hospital.

Helicopters allow the smooth, rapid transport of unstable patients or those with spinal injuries, especially when access to an incident site is obstructed or difficult, because of local terrain or vehicular traffic.

### The Vineyard derailment

In February 1994 a Tangara commuter train derailed at Vineyard (north-west of Sydney) after colliding with a van at a level crossing. The derailed train brought down power lines, which then started a grass fire at the site. The Careflight HEMS was dispatched as a female passenger in the van was trapped upside-down in the wreckage by her legs.



Figure 3: The Vineyard derailment. Courtesy, The Sydney Morning Herald, Troy Howe, Fairfax Group.

NSW Ambulance Service's plan (unlike the CAA's plan) would not have routinely dispatched HEMS directly to the scene. The designated State medical commander was notified of the incident over an hour afterwards, demonstrating the potential delays before appreciable medical input even under "ideal" conditions. When doctors are required at the site, the medical commander requests designated hospitals to dispatch a team of two experienced doctors and four nurses. No allowance is made for diurnal variations in hospital staffing levels or for the problems which may arise if the team is taken from a hospital near an emergency scene, which could subsequently receive a large number of casualties with little or no warning.<sup>10,25</sup>

### Planning for future incidents

Taking into account current experience, the major incident plan needs to be modified:

1. *HEMS should be dispatched immediately to the scene of a major incident; designated medical commanders should be directly informed and stand-by HEMS staff recalled.*

Rescue helicopters can provide valuable aerial reconnaissance of large areas to achieve optimum distribution of available resources on the ground. An important component of this is the early identification of a helicopter landing site to ensure safe helicopter operations with minimal disruption to ground-based resources. The rapid delivery of experienced, equipped medical practitioners and paramedics to the scene of a major incident will help reduce morbidity and mortality.<sup>29</sup>

2. *Rural hospitals should incorporate HEMS into their response to a major incident, and call them when feasible.*

The medical crews and equipment of the rescue helicopters can rapidly augment local hospital resources.

3. *Hospital-based medical teams should be held in reserve, depending on the need for a structured escalation in the medical response to an emergency. The team composition should reflect the skills likely to be needed on site.*

Preparing, equipping and training hospital staff for a rare event is difficult and expensive. Important occupational health and safety issues are ignored in

## 2: Common problems at major incidents in the past

**Communications:** Rapidly establishing effective lines of communication is vital to any coordinated approach to a major incident. The most important links are between: the accident site and the triage area; and the triage area and both the receiving hospitals and other emergency services. Breakdown of communications is one of the commonest early problems. Often, emergency services have had to rely on shouted messages or "runners" to relay information.<sup>15,26,28,30,32</sup>

**Security:** Problems of identification often occur, causing unnecessary confusion. Members of the public have impersonated doctors and caused further confusion.<sup>11</sup> Doctors have been detained at the perimeter of an accident site by police due to lack of identification.

**Transport:** Transport problems posed by particular terrain are multiplied when there is an over-response of emergency services combined with an uncontrolled invasion by the media and spectators.

**Hospital-based medical teams:** These teams have often been made up of relatively junior members of staff, inexperienced in on-site emergency treatment. They are often poorly equipped and wear inappropriate clothing for an emergency.

the "boiler suit and wellington boots" attitude to providing safety and environmental protection for hospital medical team members. However, some studies have questioned the value and practicality of a hospital medical team, which is not regularly involved in medical rescue and retrieval, being dispatched to an emergency scene.<sup>7,19,21</sup> Trauma resuscitation is best carried out by those with relevant training and experience.<sup>34</sup> The regionalisation of trauma services has been identified as an objective towards optimising trauma care.<sup>35</sup> The use of HEMS in the primary response to an incident is a logical extension of this principle.

In conclusion, our experience has highlighted the need for a coordinated approach to major incidents, which should include the early deployment of physician-staffed helicopter emergency medical services. Properly organised rescue helicopters can overcome many of the problems associated with the management of a potentially large number of casualties in an uncontrolled and hostile environment.

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