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Are we ready? Healthcare preparedness for catastrophic terrorism

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Introduction

In the event of any terrorist attack in the Australian homeland there will be enormous political and media interest, combined with community reaction, about the adequacy of our healthcare response.

The modern phenomenon of jihadist terrorism is defined by attacks that are calculated to cause mass casualties. These attacks generally employ improvised explosive devices against civilian targets.¹

A mass casualty incident is a single event or simultaneous events where the normal incident response of healthcare assets must be augmented by extraordinary measures to maintain an effective response.² Mass casualty incidents are distinguished from lesser events by their greater scale, duration and intensity. They are often complicated by the temporary loss of essential services and infrastructure. They involve large numbers of fatalities (tens) and other casualties (hundreds), and adversely impact the lives of many others.

The general community expectation in Australia is for the healthcare system to be well prepared and able to deal comprehensively with the effects of mass casualty terrorism.

Australia has a first rate healthcare system. Important steps have been taken in recent years to improve the preparedness of this sector for mass casualty incidents.³ Senior Australian Government health planners believe that at a national level we would cope with an incident similar to the 2004 Madrid bombings—2050 injured (80 critically) and 191 killed.

There are, however, deficiencies in physical and human resources needed for mass casualty care in Australia. In a mass casualty event our healthcare system could be overwhelmed. But we can't be certain. We lack relevant publicly available information on the preparedness of this sector for mass casualty terrorism. And we have not undertaken tough and realistic testing of existing health assets to see how they would cope with the aftermath of a mass casualty terrorist attack on Australian soil. The Bali bombings were not a real test of our ability to deal with a mass casualty incident within Australia.

Australia's healthcare system must play a vital part in our overall national capability for counter-terrorism response and recovery. This paper examines the current state of healthcare preparedness from a strategic perspective. It identifies factors that hinder

vital response and recovery capabilities and offers suggestions on how healthcare preparedness may be improved.

Mass casualty incidents present a significant change in the demands that are made on all parts of the healthcare system. When assessing the preparedness of this sector for mass casualty terrorism the entire healthcare system must be viewed holistically.⁴

National command arrangements

The states and territories are responsible for the management of mass casualty incidents within their jurisdiction, but can seek formal assistance from the Australian Government through Emergency Management Australia (EMA).

All states and territories have disaster plans. They define the roles and responsibilities of particular government and non-government agencies in response to a mass casualty incident. All jurisdictions have multi-agency disaster committees with representatives from state health departments.

The states and territories provide the substantial component of critical care infrastructure, including hospitals, staff and assets necessary to deal with the effects of mass casualty terrorism. A large-scale incident resulting in a significant number of casualties will require national coordination.

The Australian Health Protection Committee (AHPC) is the highest level health disaster management group. The membership of the AHPC includes the Australian Chief Medical Officer, chief health officers of the states and territories, EMA, Department of Defence and representatives from disaster medicine, environmental health, communicable diseases and laboratory national committees. It also includes experts in disaster medicine, trauma and mental health. However, hospital, ambulance and other pre-hospital emergency services are not represented on the AHPC.

When the need arises, the AHPC will meet by teleconference and give advice in terms of health needs. The AHPC develops national disaster health policy. It's supported in this role by the Office of Health Protection within the Department of Health and Ageing (DoHA). Overseas assistance is coordinated through the Department of Foreign Affairs and Trade, which acts as the lead Australian Government agency.

The National Emergency Incident Room was established within DoHA after 11 September, 2001 in order to bring a range of expertise together to provide a coordinated, national health response to emergency incidents, including pandemic planning, under the guidance of the Chief Medical Officer. It's permanently staffed by a team of emergency management and infectious diseases specialists.

DoHA is a permanent observer on the Australian Government National Counter-Terrorism Committee which is responsible for the coordination of the Australian Government's role in operational aspects of the national counter-terrorism arrangements. DoHA regularly participates in meetings of the National Crisis Committee that would be convened in a terrorist incident to coordinate information exchange within the Australian Government and with the states and territories.

Hospital requirements

While hospitals are part of the community's broad response assets, each hospital must have some degree of self-sufficiency to enable independent operations should outside assistance be unavailable.⁵ This is very important in the early stages of response, especially if people can't be contained at the scene and where, as is often the case, large numbers of casualties will self-present for treatment. International experience indicates

that 50–80% of people acutely injured in a mass casualty disaster will arrive at the closest medical facilities, normally within ninety minutes after the event.

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The US Centers for Disease Control and Prevention predict that terrorist bombings using conventional weapons produce one-third of patients critically injured, dead or dying and two-thirds of patients requiring minimal intervention.⁶

Surge is an important concept here—the ability of a hospital to enhance patient care capacity in order to absorb sudden, unexpected increases in demand for services in a disaster situation.⁷ It includes the ability to receive, stabilise, provide definitive surgery and transfer patients for ongoing care.

Preparedness ranges from sound planning and understanding within the hospital system, the development of standard operating procedures for mass casualty events at each hospital, to stockpiling supplies at accessible locations to match the needs of casualties. Preparedness requires educating hospital workers about the various agents—both conventional and nonconventional—that might be used in an attack, their clinical effects, and implications for medical management.

There must be in place incident management procedures to undertake triage and ensure speedy admissions. A casualty clearing station needs to be established. For the most severely

injured victims who survive the immediate impact, help must be provided at the very earliest opportunity. Triage, inter-hospital communication and coordination and speedy victim transport arrangements are key issues in the first hour after an incident.

At the disaster scene there will be a need for close cooperation between emergency healthcare personnel and police undertaking forensic investigations. Many victims will make their own way to hospitals unassisted, although most of the Madrid and London casualties were evacuated by ambulance. The location of an incident will clearly have an effect on how patients are transported. They are less likely to flee the scene if the incident occurs in a remote locality, compared to one in a central business district (CBD).

In the event of a major attack, the hospitals would need to be coordinated centrally. Health departments would need to liaise with other emergency services and so need to have a good understanding of hospital capabilities and resources within their jurisdiction. Frontline staff will need an understanding of their place in the command and control arrangements.

The hospital would need to cooperate and collaborate with first responders and deal with the media to share information with the public. Hospitals will need secure boundaries and internal security measures in place in the event of a mass casualty incident. Hospitals are generally porous institutions and will be converged upon by an influx of patients with minor injuries who self-present for assistance, often before serious injuries arrive. There will also be the ‘worried well’ seeking reassurance. The usual presentations from the community will continue to occur, so hospitals will need secure boundaries to manage surge. Even setting up a simple boundary system will be challenging.

The role of volunteer aid associations, such as St John Ambulance and the Red Cross, would be important to administer first aid and provide reassurance to a large number of minor casualties and the uninjured. There could be significant delays in deploying such personnel to hospitals. Beyond the initial crisis, hospitals will need to plan for some victims to remain for months before transfer for rehabilitation.

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The kinds of wounds medical staff might confront are ones they would not usually see in a civilian population. The overwhelming majority of those seriously injured after a mass casualty bombing would survive. Many would require acute medical care for multiple trauma, including serious head, spinal and internal injuries, major fractures, severe burns and psycho-trauma and shock. In the longer term, victims may also suffer post-traumatic stress disorder, as the psychological reactions to a terrorist bombing are more acute than from road or industrial accidents. Stress management services would also need to be made available to hospital staff treating the injured.

Hospital staff and ambulances may face difficulties in getting to the hospital if roads are blocked. Medical staff may have to worry about secondary bombs timed to explode when responders arrive and also about direct threats to the hospital itself. Some staff may choose to stay with their families rather than leave them at such a time.

In the event of a chemical release, the hospital emergency department itself might

be compromised because the first victims presenting may be contaminated. If the release of a biological agent is witnessed or announced, such as a white powder incident, it may present like a chemical release with contaminated patients. Patients suspected of being contaminated should not be allowed into hospitals until they have been decontaminated.⁸

Constraints

Fortunately Australia has not yet been exposed to a significant terrorist attack or large-scale mass casualty situation on its own soil—but most importantly this means we have also had little practical experience of responding to these types of events. In developing our health recovery response to a major terrorist attack here we face a number of constraints.

Overstretched healthcare system

The hospital is the core functional unit of the healthcare delivery system in Australia. There were 759 public hospitals and 534 private hospitals operating in Australia in 2004–05.⁹ Only 88 of these hospitals have Emergency Departments (EDs) that are approved by the Australasian College for Emergency Medicine (ACEM) for advanced training.¹⁰ In 2003–04, 4.1 million Australians were treated in EDs. These EDs are, for the most part, located within large teaching hospitals in state capitals or base hospitals in more populous regional centres. The baseline overcrowding of hospital EDs is a pressing nationwide issue.

Most hospital services are overstretched on a daily basis. Overburdened operating theatres and intensive care units (ICUs), as well as medical and nursing shortages, would limit surge capacity for a large influx of the critically injured. The Royal Australasian College of Surgeons Trauma Committee warned in 2005 that in the event of mass casualties our

hospitals would be quickly overwhelmed, and that the establishment of integrated trauma systems here is in its infancy. The head of the committee noted that currently the average potentially preventable death rate in Australian trauma services is up to 30%. International benchmarks show that this potentially preventable death rate should be below 10%.¹¹

Surge requires knowledge and experience to respond to an entire spectrum of disasters. However, the threshold requiring surge capacity is different for a resource-rich environment, such as a state capital, than that for a regional area.

It would be misleading to suggest that Australia's response to the Bali bombings of 2002 reflects our ability to respond to a mass casualty incident on our own soil.

Mass casualty incidents are unusual situations that few communities are prepared for. The 1977 Granville train disaster that resulted in 83 killed and 213 injured was the last mass casualty incident within Australia. It would be misleading to suggest that Australia's response to the Bali bombings of 2002 reflects our ability to respond to a mass casualty incident on our own soil. The first patients to reach Darwin arrived some twenty-three hours after the initial blast, allowing substantial time for preparations. The impact on the resources of the emergency health system nationally was relatively modest.¹²

The first comprehensive study to accurately assess the physical facilities available in Australian hospitals to receive and treat the victims of a mass casualty disaster according to established international benchmarks has just been published. It surveyed all emergency

department directors of ACEM-accredited hospitals, as well as private and non-ACEM accredited emergency departments staffed by ACEM fellows in metropolitan Sydney. It examined the number of operating theatres, ICU beds and X-ray machines in hospitals in Australia and New Zealand and used United States benchmarks and data on mass casualties to estimate the state of preparedness of hospitals in Australia and New Zealand for admission of mass casualties. The US Department of Health and Human Services set the benchmarks for hospital surge capacity for all US states to establish a system providing for triage, treatment, and disposition of 500 patients (suffering from acute illness or trauma requiring hospitalisation from chemical, biological, radiological, nuclear or explosive terrorist incidents) per million population above the daily staffed bed capacity.¹³

For Australia, the study found that between 59–81% of critically injured patients in Australia would be at risk of being denied immediate access to operating theatres, between 31–69% of critically ill patients were estimated to be denied immediate access to an ICU bed, and there was a shortfall of available X-ray machines of 38% for Australia. This study assumes that all operating theatres, ICU beds and X-ray machines would be free and available for use by the mass casualties. The study demonstrates that physical assets in Australian hospitals don't meet US hospital preparedness benchmarks for mass casualty incidents.¹⁴

Communications

Communications within and between the emergency services, health facilities and other relevant authorities are critical in the initial period after a mass casualty terrorist attack. Effective communications are of greater significance following multiple attacks at different localities. Communications

between each scene and command centres are vital in ensuring the deployment of vehicles, personnel and equipment and coordinating the dispersal of casualties to appropriate healthcare facilities (recognising the significant number who are likely to self-present). Management of the incident involves effective communications with affected individuals and the public at large.

The London bombings of July 7, 2005, identified failures in communication among emergency responders. Responders attending the underground bombings were not able to use their communication equipment. The Metropolitan Fire Service had to use runners to communicate between the platform and one train located at fifteen minutes distance from the Russell Square tube station. The London Ambulance Service's UHF and VHF network failed due to clogging of radio traffic. They also had to resort to using bicycles to pass on information on casualty numbers and classifications.

Telephone network congestion proved to be a significant problem to emergency communications, as many emergency personnel were reliant on mobile phones to communicate with their own command centres and other services. Many of these communications problems are likely to be experienced here in the event of a London-type incident.

One of the more positive aspects of the London bombings was the way in which police, fire, ambulance and rail authorities came together in managing the strategic communications process. This had been actively rehearsed, with no-notice exercises, to test the emergency and health services' response to a mass casualty incident in London. Some first responders believed they were reacting to another 'drill' on 7 July 2005, given the frequency of real-life exercising.

Burns capacity

The evidence from terrorist attacks that have involved conventional explosives indicates that 10–15% of casualties will suffer severe burns, in addition to multiple trauma. A severe burn injury is greater than or equivalent to 20% of total body surface area (TBSA) requiring tertiary burn care at a specialised burns unit.

To attain best practice outcomes it's preferable that patients with severe burns be managed in specialised tertiary burns facilities. Australia has only thirteen major burn units that are located in the six states.¹⁵ The Australian Government's 2004 AUSBURNPLAN Strategy Paper indicated that collectively these units have a 146-bed capacity.¹⁶ These are 'ward' beds for patients. A number of these burns patients will also require intensive care. However, a significant constraint is the very limited number of ICU beds in burns units.

A surge in severe burns management capacity must occur against a background of normal operations. Up to fifty severe burns admissions occur weekly across all jurisdictions. Following the Bali bombings of 12 October 2002, sixty-two burns patients were admitted across Australia and occupied all adult burn beds.

The prolonged and complex care required in the management of serious burn injured patients may require distribution of patients to other jurisdictions. This is necessary because of the high degree of specialisation of multidisciplinary staff and the sustainability of the burn workforce—a patient with 80% TBSA burns is expected to require acute hospitalisation for approximately 12–16 weeks with intensive multi-disciplinary care.

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An incident that produces more than twenty severe burns injured patients and/or more than 100 severe trauma cases would overwhelm the capacity of any one state or territory and would require transfer interstate. A worst case scenario of 2,000 live casualties with 300 severe burns injured cases would significantly challenge current national systems.¹⁷ Under the AUSBURNPLAN each state is expected to maintain a register of burns assets. There's no requirement on any state or territory, however, to provide extra physical or staff resources.

Pre-hospital care and transport of casualties

Pre-hospital emergency management must have sufficient resources to escalate, if necessary, and to rapidly deploy appropriate numbers of vehicles—both surface and air—staff and equipment to disaster scenes. Adequate numbers of ambulance assets will be a problem for some jurisdictions in the event of a mass casualty incident, for example Western Australia. There are no formal protocols between the states and territories for the deployment of ambulance assets between these jurisdictions in the event of a mass casualty event.

Air transport is the preferred mode of transport of mass casualties between jurisdictions. The capabilities of civilian agencies are, however, inadequate for distributing hundreds of severely injured patients to interstate acute care facilities following a mass casualty incident.

The states and territories collectively possess very limited aeromedical transport assets. These are generally only used for transferring small numbers of casualties within jurisdictions. This includes the capabilities of non-government organisations such as CareFlight and the Royal Flying Doctor Service that employ small fixed-wing and short-range rotary-wing aircraft.¹⁸ These can only carry one or two stretcher cases. They are inappropriate platforms for transferring critically injured patients over great distances. Similarly, Australian Defence Force (ADF) rotary-wing aircraft only provide a limited capability for casualty evacuation over relatively short distances.

A national response is required when casualty numbers from an incident increase to a threshold where the surge capacity of any one affected state or territory is overwhelmed. Initially, specialist personnel and equipment may be flown in from other states to assist. If these additional resources prove inadequate, the Australian Government will need to coordinate the aeromedical transport between jurisdictions.

Large-volume transport aircraft such as military C-130 Hercules and commercial Boeing 767-300 and 737-800 type passenger jets are the most practicable airframes for the transport of mass casualties over the great distances that separate Australia's major cities. Present arrangements for the interjurisdictional transfer of mass casualties are almost entirely dependent upon ADF air assets.

There's no guarantee, however, of availability at short notice, either of ADF aircraft and flight crews or the specialised aeromedical teams that must stabilise casualties during flight. Shortages of such personnel are the most critical shortfall in national casualty transport capabilities.

Arrangements for the use of civilian personnel to augment ADF aeromedical teams are not formalised. They appear to be based on a system of goodwill between the Australian Government and the states and territories.¹⁹

The problems encountered with the use of ADF air assets for aeromedical transport of civilian casualties within Australia are related to the priority accorded to war-fighting tasks. Military transport aircraft are currently heavily engaged in operational activity.

The time from a request for ADF assistance to the arrival of aircraft at a disaster scene can be in excess of 24–48 hours. While numerous air assets may be available in the event of a disaster most will not be suitable for this role. Apart from other tasking appointments, the availability of aircraft will be dictated by the serviceability of airframes, weather, crew/duty hours and medical staff availability.

Staffing and workforce planning

The greatest constraint on expanding capacity is not having sufficient trained staff available for disaster surge. The number of hospital staff having undertaken formal disaster training is extremely low. Australia has an overall health workforce shortage. This particularly applies to doctors and nurses with training and education in disaster medicine. Workforce planners must therefore consider the issue of staff burnout during prolonged periods of surge.

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Staffing problems would be exacerbated if transport networks were suspended after a mass casualty incident. Additional healthcare

staff may not be able to reach acute care facilities in a timely manner. Emergency services may experience a degree of staff absenteeism during catastrophic incidents.²⁰

The recent visit to Sydney by two large passenger liners demonstrated how traffic gridlock caused by an (expected) influx of sightseers can choke a capital city for many hours and impede the movement of emergency vehicles. What's of great concern here is that it's in the first hour or two following any catastrophic event that many otherwise preventable deaths would be likely to occur.

The fact that everyone in the Sydney metropolitan area will have a public holiday on Friday 7 September will enable emergency services to be more workable during the Asia Pacific Economic Cooperation (APEC) forum leaders' visit. This is not, for obvious reasons, an option to deal with probable blocked commuter routes following a major incident.

Not all state disaster committees have representation from the hospital system. There has been a lack of focus in such committees on practical logistic issues relevant to hospitals. It's not clear that hospital managers have a detailed knowledge of specific resources available at different sites. Very few hospitals have formal arrangements with other agencies to provide support following an incident and sometimes assume that first responders will simply arrive in the first few hours. This is unwise. Police, for example, may prefer to put their resources at the scene, rather than assisting hospitals.

Business continuity and security

Incident damage to critical infrastructure and services such as the electricity grid, telecommunications networks, water, sewerage, fuel supply, and waste-handling may severely impact healthcare processes.

To ensure business continuity hospitals must have large back-up generators, resilient communications, emergency fuel and water supplies and appropriate maintenance staff to operate those systems.

Few hospitals have formal arrangements in place to provide support for crowd and traffic control following an incident. Most hospitals have very few security staff on duty at any one time, let alone after hours. And they will be focused on securing the hospital from within.

ADF assistance

The Australian Government has established mechanisms for requesting assistance from the ADF in domestic contingencies.²¹ ADF personnel may be used to secure vital facilities such as hospitals in the event of a mass casualty terrorist attack. It may be some time, however, before the military could be deployed to hospitals and secure them. The ADF would not be suitable to assist in containing traffic gridlock. Soldiers are not trained to carry out this role and specialist military police are few in number.

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The armed forces would in fact have little relevance in the acute response phase. It can't be assumed that the ADF would automatically be available and/or trained to assist in a mass casualty incident. As noted earlier, Defence is experiencing a high operational tempo. Deployable field hospitals may increase capacity for surgical cases, but are not useful for long-term dependency. The ADF has very few permanent force specialist doctors. It's almost entirely reliant on

reserve force personnel to provide essential specialist medical capabilities and fewer doctors are joining. Long deployments place a considerable strain on the private practice of reservists.

The way forward

As with other areas of Australia's counter-terrorism arrangements, a great deal is occurring in the field of health sector preparedness. Further steps, however, need to be taken to meet our healthcare preparedness, response and recovery goals for mass casualty incidents. While recognising that some hospital resource issues would need a response by the states, there are significant steps that can and should be taken by the Australian Government. Indeed, this is what the AHPC is about—getting the jurisdictions to undertake measures with leadership coming from the Australian Government. Surge, in particular, requires a national response.

Convene a national summit on healthcare preparedness

In order to generate new ideas to improve our health preparedness and community recovery arrangements the Attorney-General and the Ministers for Health and Ageing and Families and Community Services should convene a national summit that would bring together experts from around Australia to discuss all areas of healthcare preparedness for mass casualty incidents.

A national summit could examine current policies and practices in the light of new evidence and research. It could consider ideas that don't cost much but that could save lives, such as installing a small number of collapsible stretchers in the ground floor of major city buildings and CBD transport hubs.

Establish a national crisis centre

We need improved governance in our committee structures to manage a crisis. Decision making in time of emergency must be rapid, relevant, integrated and multidisciplinary. The arrangements for command, control, coordination and communications (C4) for disaster healthcare should be well defined, direct and immediate.

A single, all-hazards, national crisis centre...should be developed as a matter of urgency.

To improve not only the vital health response arrangements in a terrorist attack, but overall crisis management, a single, all-hazards, national crisis centre for incident C4, that provides a common operating picture for all Australian Government agencies involved in counter-terrorism coordination, should be developed as a matter of urgency.

There are around thirty separate operations centres located in various facilities around Canberra. These should be rationalised and co-located in a single facility within the 'Parliamentary triangle'. It would link key national authorities with their counterpart operational jurisdictional agencies.

Improve communications

Robust and standardised communications systems that are networked between all emergency services should be in place. These systems must have built-in redundancy that allows uninterrupted emergency communications in all conceivable contingencies.

There should be a mechanism to limit general public access to mobile phone networks in order to guarantee communications between

emergency services personnel in the event of a disaster.²² These technical communications issues require further work in Australia.

We also require better information exchange between crisis and consequence management. Very few of our hospital leaders, doctors, ambulance professionals and social recovery specialists have had any contact with senior counter-terrorism and security professionals. The latter groups might conduct regular briefings involving key community and healthcare personnel on developments that may necessitate a surge in the healthcare system.²³ Capital-city lord mayors and other senior local government officials should also be included.

Enhanced disaster risk communications are required to guide the public and prevent unnecessary overburdening of the healthcare system during an incident. The Australian Government should make more use of the Internet to provide information on practical first aid, utilising advice lines and understanding that emergency services and hospitals will be overwhelmed for a time and that people may have to care for themselves.

The London ambulance service stopped taking 999 (emergency) calls for assistance for a while during its response to the underground bombings. Even in the most sophisticated settings immediate care may not be available. This kind of information is not given to the public on the Australian Government's national security website.

Undertake capability and preparedness audits

We need national capability surveys and analyses of all assets required in the continuum of healthcare for the treatment of serious injuries from a mass casualty incident. These include call receipt, ambulance and pre-hospital assets, scene response, ground transport and aeromedical assets, triage,

disaster scene treatment, resuscitation and emergency department capabilities and mortuary facilities. The specific identification of numbers of ground and air ambulances, ambulance vehicle types, ambulance officers, emergency physicians and nurses is vitally important.

Publicly available comprehensive government audits of national healthcare preparedness on a state-by-state for mass casualty terrorism must be conducted regularly. While the Department of Health and Ageing has apparently undertaken such surveys, the last as recently as late 2005, they remain embargoed.²⁴

A major study on Australia's ability to respond and recover from catastrophic disasters was presented to the Augmented Australasian Police Ministers Council in April 2006. The report contained thirty-two recommendations, but it's also embargoed. Surprisingly, it's understood that the study did not include terrorist attacks as part of its survey of catastrophic disasters.

Public accountability is the best way to ensure governments address these pressing consequence-management issues.

Counter-arguments that it would not be sensible to advertise our weaknesses or that releasing such audits may alarm the public should be rejected. A determined terrorist will already know or be able to identify our weaknesses. The terrorist mindset is about creating highly graphic and traumatic situations with many wounded and engendering panic and fear. Public accountability is the best way to ensure governments address these pressing consequence-management issues. Providing

public information about the strengths of certain states will allow other jurisdictions to know which states to turn to in guiding their own efforts on healthcare preparedness. The public deserve to know how well authorities are prepared for a mass casualty attack. It needs to know to ensure that its elected representatives are accountable for whether their own community is ready for a mass casualty incident.

Set national standards

National minimum standards for dealing with mass casualty incidents are essential. Hospitals would then know what they are reasonably expected to be able to cope with and could plan and resource appropriately. National standards for hospitals would make planning exercises easier. Hospitals would have a greater idea of the standards they are expected to meet. Exercises can then be tailored to test that level of response (see below).

National preparedness benchmarks should establish the surge capacity of healthcare assets. They might include the number of ambulances; adequate number of beds, (including beds for trauma and severe burn patients); isolation capacity; triage treatment and initial stabilisation at certain levels; appropriate numbers of disaster-trained health care personnel; pharmaceutical stocks; personal protective equipment; mortuary facilities; and communications and information technology. Benchmarks might include the number of exercises to be held in a certain time frame.

The Australian Government should mandate minimum disaster standards for the healthcare system. Setting standards would make clear the gap between what we are spending and what we need to spend to achieve the goals and strategy.

Strengthen research

Capability and preparedness surveys will inform research into levels of preparedness, response and recovery. Surge capacity of the healthcare system is one of the most important priorities for research. Other areas that require urgent attention include workforce requirements, suitable national standards and international benchmarking. To date there has been little evidence-based research in the area of Australian disaster medicine. Funding such research should be a priority. There is a need for a more collaborative national research effort in the area of disaster health, instead of the current approach across at least six Australian university centres.

Undertake realistic no-warning exercises

Field exercises offer a number of advantages over tabletop simulations in planning for mass casualty incidents. They are real-time and can focus on specific logistic difficulties. Our counter-terrorist exercises have had a strong input from the police and military, but little involvement from health care professionals.²⁵ The healthcare system should be drawn into the existing regime of exercises, which have focused heavily in the past on the role of security assets. Healthcare workers in a real emergency need to know who is in charge and what their role is.

Exercises should focus more strongly on consequence management with a no-warning, whole-of-CBD approach. They must cover from 'bomb to bedside'.

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no-warning, whole-of-CBD approach. They should cover from 'bomb to bedside'. There needs to be strategies in place to raise the level of engagement of individual hospital managements with state and national counter-terrorist response and emergency-management arrangements.

Debate about plans and arrangements for counter-terrorism will benefit from a thorough test and rehearsal of existing management capability to respond and recover from a London-type scenario with 60 deaths and 700 injured, 70% of whom require immediate care, rapid transportation and hospitalisation.

The community and decision makers need assurance from testing this under a no-warning situation in CBDs. This will either confirm planning, capability and surge arrangements or reveal key gaps and capacities that require urgent attention.

There may be considerable resistance from some jurisdictions to this suggestion based on public inconvenience and costs to business, the salary implications of staff overtime and rostering additional emergency personnel. Hospital administrators might object that such exercises will be too disruptive. Challenging exercises will, however, develop strong relationships between the agencies and individuals involved. Compared to the sums devoted to counter-terrorism agencies over the last five years, the funding for consequence-management agencies' involvement in exercises has been very small. We will not know if we are ready unless we really test the plans, arrangements, responsibilities and resource capability.²⁶

Fund disaster triage hospitals

In the immediate aftermath of a mass casualty terrorist attack, the lives of dozens of innocent victims will hang in the balance.

This period—the ‘golden hour’—is when many of the critically injured may be saved. The ideal is for patients to be triaged at the scene and then dispersed to hospitals. Many of those triaged at the scene won’t need to go to a hospital and so won’t clog the hospital system.

While it would make no sense for all patients to be transported from an incident and overwhelm a single hospital, it should be recognised that hospitals in our CBDs will often be the only accessible health facility in the first hour or so after a major bombing incident in a CBD. Traffic gridlock may frustrate speedy victim transport arrangements to other hospitals. The ‘walking wounded’ following any catastrophe will present at these CBD hospitals, regardless of the wishes of emergency response planners. Sydney Hospital, for example, is the only major healthcare facility in the Sydney CBD. There appears to be a strong case for increasing the critical mass of this hospital to focus on CBD emergency coordination and response to deal with a catastrophic emergency.²⁷

The Australian Government should consider providing funding to upgrade inadequate existing CBD healthcare facilities in our largest cities for them to function effectively as disaster triage hospitals.²⁸

Address large volume casualty airlift

The Australian Government should address inadequacies in national casualty airlift. This requires an assured capability for the transfer of mass casualties that is both timely and substantial in response to requests from the states or territories for assistance where an incident overwhelms their individual surge capacity. Aircraft must be able to deploy to suitable airports throughout Australia, and possibly to overseas destinations in our region.

This capability should be independent of the ADF, but may be augmented by ADF assets if and when they are available.²⁹ EMA is the best placed civil agency for the administration, resourcing and maintenance of this proposed national mass casualty airlift capability. EMA will need to draw on jurisdictional resources and commercial aviation assets to develop a minimum capability of two large-volume casualty aircraft.

The airlift component should be provided through contractual arrangements with one or more commercial carriers to supply suitably qualified flight crews and large passenger jets.

The airlift component could be provided through contractual arrangements with one or more commercial carriers to supply suitably qualified flight crews and large passenger jets.³⁰ These commercial airframes must be rapidly transformed into large-volume casualty transports by modifying them with critical-care stretchers and other life-support equipment. This capability will be optimised if the modular life support components are harmonised with equipment currently utilised by ADF aeromedical evacuation teams. Aeromedical equipment and supplies must be held in Perth and at locations in eastern Australia.

Permanent standing arrangements should also be developed between EMA and DoHA, and the relevant state and territory authorities, for the provision of specialist retrieval personnel who will comprise the aeromedical component of this capability. These personnel should be accredited and registered by DoHA, which would provide

ongoing training to ensure core competencies and currency in aviation medicine. The jurisdictions and individual personnel should be adequately compensated by the Australian Government for their participation in the national mass casualty airlift capability.

Expand the volunteer medical response

A key element of Australia's national surge capacity is having an adequate number of experienced disaster-health specialists, who are prepared to travel to other jurisdictions to assist in the management of critical-care casualties following a mass casualty incident. DoHA should maintain a comprehensive national database of healthcare personnel with expertise in trauma and burns management. The database would have to be a 'living document' that must constantly update contact information for key individuals, as well as their competencies and training. DoHA should also address the question of national registration for personnel who will be required to work in all jurisdictions to enhance national surge capacity.³¹

The states and territories should also maintain databases of volunteer healthcare personnel who could provide first aid to the 'walking wounded'.

The states and territories should also maintain databases of volunteer healthcare personnel who could provide first aid to the 'walking wounded' and reassurance to the uninjured following a mass casualty incident. These volunteers would consist of general medical practitioners and specialists with CBD consulting rooms and also allied health

professions such as dentists, nursing staff, physiotherapists and pharmacists. Issues that should be addressed here would include accreditation, registration, identity cards, disaster training and issues of indemnity and compensation. The maintenance of this volunteer database might be contracted to peak health organisations.

DoHA and EMA should also examine the United States Medical Reserve Corps (MRC) scheme as a good example of a structured approach to using volunteers. The MRC is sponsored by the Office of the Surgeon General of the United States. It consists of community-based teams of volunteer medical and public health professionals who donate their time and expertise to prepare for and respond to emergencies. Often they are retired or semi-retired healthcare providers. The MRC program provides the structure necessary to deploy medical and health personnel in response to an emergency, as it identifies specific, trained, credentialed personnel available and ready to respond to emergencies.³²

Strengthen disaster training and education

Three steps should be undertaken to strengthen training and education to improve our health preparedness goals. First, a 'Centre for Lessons Learned' should be established. This would act as a repository for emergency response information and would directly link to professional knowledge for all those involved in responding to mass casualty incidents, particularly healthcare professionals. The centre would assist current and future health response capability development. Its principal role would be to share such knowledge as is of benefit to all those who might be called upon to play a health-response role in the event of a mass casualty incident.

Such a centre should not be just a clearing house for people's observations. It should be capable of turning them into real improvements—the difference between a lesson and a 'lesson learned'. The Australian Government could facilitate the establishment of such a centre by committing funding for a defined period, subject to co-funding by the states and territories.

Second, while there are simulation systems such as the *Emergo Train*³³ that can test hospitals' ability to manage a sudden surge, an all-hazards national simulation centre would be of great benefit. It would involve selected groups of health and recovery professionals undertaking scenario planning and building their networks. Such a simulation centre, perhaps sponsored by EMA, could provide access to powerful simulation technology. It would be a very useful decision-support system to health and emergency responders in the area for health crisis response. Simulation centres and tools such as *Emergo Train*, however, should not replace the need for formal exercises.

Third, there is no short course in Australia designed for medical practitioners, emergency response personnel, as well as security and disaster management professionals and policy makers, who want to gain an understanding of the threats of terrorism, methods of response, and emergency preparedness. Such a tailored short course could be developed by EMA in association with relevant medical bodies and security experts. It might examine such subjects as medical response to chemical, biological and radiological agents; blast injury treatment; hospital surge; victim identification; interagency coordination; and media management.

Concluding remarks

There are many reasons to be proud of Australia's healthcare system. There must,

however, remain considerable doubt about its capacity to deliver critical care to large numbers of people in a catastrophic disaster. We lack solid, publicly available data on whether our hospitals could provide the necessary surge capacity to deliver critical care to large numbers of people in a catastrophe. In many ways, we know more about our military preparedness than the state of the nation's healthcare preparedness for a mass casualty incident.³⁴ Our health sector has never been tested in a no-warning, whole-of-CBD exercise to deal with a London-type terrorist attack. Without such rigorous testing, there's a serious risk of adopting a 'keeping our fingers crossed' approach.

There needs to be a much greater degree of official openness and candour about the state of our health preparedness.

There needs to be a much greater degree of official openness and candour about the state of our health preparedness. Data on healthcare system preparedness must be released. Since 9/11 Australians have been provided with almost no information on how well their respective jurisdictions are prepared for the medical consequences of a terrorist attack. This is especially the case in our ability to respond to a mass casualty incident on the scale of the London bombings.

National standards and capability benchmarks should be set and a minimum time to meet national standards should be put in place.

Disasters can't always be averted, but we must do all we can to prevent the adverse health consequences that are likely to flow from them.

Endnotes

- 1 There is no doubt that an attack using chemical or biological weapons should be considered a realistic possibility. Terrorist groups have expressly stated their intention to acquire these weapons. Unlike conventional attacks, chemical and biological attacks require specialised protective equipment and treatment capabilities. Issues related to detection, mitigation and surge to such attacks are not, however, covered in this paper and will be undertaken in future work by ASPI.
- 2 Adapted from United Kingdom Department of Health (DH) definition of a mass casualty incident. See: DH Emergency Preparedness Division, *Mass Casualty Incidents: A Framework for Planning* (DH London, March 2007): 19.
- 3 See *Protecting Australia Against Terrorism 2006*, Commonwealth of Australia, 2006: 71–73; Andrew G Robertson and David M Cooper 2007. 'Disaster surge planning in Australia: measuring the immeasurable'. *Medical Journal of Australia*, 186 (8): 388–389.
- 4 This would encompass pre-hospital emergency medical services, emergency departments, acute care facilities, nursing facilities, specialist expertise and equipment for chemical, biological, radiological and nuclear (CBRN) incidents and assets that support health and medical activity, such as communications, power and water.
- 5 See generally, Jeffrey V Rosenfeld, Mark Fitzgerald, Thomas Kossmann, et al 2005. 'Is the Australian hospital system adequately prepared for terrorism?' *Medical Journal of Australia*, 183:567–570.
- 6 See <http://www.bt.cdc.gov/masscasualties/capacity.asp>
- 7 A detailed discussion can be found in the proceedings of a conference on surge. See *Academic Emergency Medicine* 13 (11) 2006.
- 8 A biological release is more likely to be covert with people presenting for health care when they become sick, some days after the initial release. People are less likely to be contaminated by that time, although they may be infectious, making this more a public health issue rather than requiring a 'lights-and-sirens' acute response.
- 9 *Australian Hospital Statistics 2004–05*, Australian Institute of Health and Welfare, Canberra, 2006.
- 10 Other hospitals may provide a surge capability for emergency care.
- 11 Royal Australasian College of Surgeons *Not ready to deal with disasters* Press Release 6 November 2005.
- 12 See Nigel Brew and Kate Burton, *Critical, but stable. Australia's capacity to respond to an infectious disease outbreak*. Research Paper no. 3, 2004-05 Australian Parliamentary Research Service: 23-25.
- 13 Based on other traumatic events, 100–300 patients per million may be more accurate for burns or trauma. See Robertson and Cooper, note 1: 389.
- 14 Matthias Traub, David A Bradt and Anthony P Joseph 2007. 'The surge capacity for people in emergencies (SCOPE) study in Australasian hospitals' *Medical Journal of Australia*, 186 (8): 394-398. Operating theatres, ICU beds and X-ray machines were chosen because they represent a resource ceiling on treatment capacity in our hospitals to manage mass casualties. Of the 101 hospitals invited to participate in the survey, 88 ACEM-accredited hospitals (94%) and all Sydney private and non-ACEM accredited hospitals completed the questionnaires.
- 15 The ACT and NT don't have tertiary burns units.
- 16 A more recent figure on tertiary burn unit bed capacity is unavailable. The authority responsible for collecting health statistics—the Australian Institute of Health and Welfare—does not collect data on burn unit bed capacity. This is held by the individual state health authorities.
- 17 Australian Health Ministers Conference (AHMC) National Burns Planning and Coordinating Committee, *AUSBURNPLAN Strategy Paper: Australian Mass Casualty Burn Disaster Plan* (2004): 16
- 18 The Commonwealth Government announced on 16 April 2007 additional funding of \$154.4m over the four years to 2010–11 to the Royal Flying Doctor Service of Australia.
- 19 The ADF were, however, heavily involved in repatriating to Australia the victims of the Bali Bombings of October 12, 2002. Five Air Force C-130 transport aircraft, 1 P-3C maritime patrol aircraft, 12 flight crews and 5 ADF aeromedical evacuation teams were deployed. The timing of this operation did not conflict with the resource intensive ADF deployments in Iraq and Afghanistan. These deployments require dedicated intra-theatre transport and regular inter-theatre re-supply missions by C-130 aircraft.

- 20 Amy Kaji, Kristi Koenig and Tareg Bey 2006. 'Surge Capacity for Healthcare Systems: A Conceptual Framework', *Academic Emergency Medicine*, 13, (11): 1158
- 21 The use of ADF capabilities during natural disasters comes under Defence Assistance to the Civil Community arrangements. This includes the use of ADF aircraft and aeromedical assets for the transport of civilian casualties. Section 119 of the Constitution allows the states to request assistance from the Australian Government in situations where civil authorities are unable to cope, for example a major terrorist incident. This is addressed by Defence Force Aid to the Civilian Authorities arrangements.
- 22 The UK has a voluntary network management scheme that enables GSM mobile network operators to manage access to their networks, enabling access only to particular handsets with special SIM cards that are assigned to particular users, who are registered with the Cabinet Office.
- 23 The Health Sector Infrastructure Assurance Advisory Group forms part of the Attorney-General's Trusted Information Sharing Network for Critical Infrastructure Protection (TISN). The health sector TISN group only deals with the private health sector. It examines appropriate measures and strategies to mitigate risk in areas such as blood and medical supplies. It's currently examining private laboratory surge capacity in the event of an incident.
- 24 Access to this information from the audits is limited to the National Counter Terrorism Committee and a small number of decision makers in the states and territories.
- 25 State health authorities did, however, play minor roles in the two major multijurisdictional counter-terrorism exercises held to date.
- 26 In late February this year the government announced a further \$3.6 million in funding to extend Australia's counter-terrorism exercise program. The Attorney General referred to testing the counter-terrorism arrangements with government agencies and business. There was no mention of plans to test the health capability and response system. See *Counter-terrorism program gets \$3.6 million boost*. Press Release, Attorney-General, 26 February 2007.
- 27 There are roughly 500,000 people in the Sydney CBD during any working day and up to 70,000 people inside the CBD on any night.
- 28 There is a precedent here. The Australian Government is providing the Northern Territory Government with \$65.8 million over four years to establish a National Critical Care and Trauma Response Centre at the Royal Darwin Hospital to ensure Australia can receive and treat casualties at the first line of reception should there be another mass casualty incident in our region on the scale of the 2002 Bali bombings or natural disaster like the Indian Ocean tsunami of Boxing Day 2004. The facility is run by the NT Government under contract to the Australian Government.
- 29 The ADF is in the process of acquiring a significant strategic airlift capability. The first of four C-17 Globemaster III aircraft to be delivered to the ADF by mid-2008, is already heavily tasked with resupply missions. Similarly, the ADF's new fleet of five A330-200 multi-role tanker transport aircraft that are scheduled to enter service from 2009, will serve principally as force multipliers for the tactical fighter and strike capability.
- 30 The US Air Force Civil Reserve Air Fleet (CRAF) provides a good example of the use of commercial airframes to supplement capability. CRAF uses selected aircraft from US airlines that are contractually committed to support Department of Defense airlift requirements in emergencies when the need for airlift exceeds the capability of military aircraft. The aeromedical airlift segment of CRAF assists in the evacuation of casualties from operational theatres to hospitals in the continental United States. These aircraft are also used to transport medical personnel and supplies to the theatre of operations. Kits containing stanchions, stretchers and other aeromedical equipment are used to convert Delta Airlines and US Airways Boeing 767 passenger aircraft into large-volume air ambulances. This process takes approximately four hours.
- 31 Council of Australian Governments (COAG) announced on 13 April 2007 that it has agreed on arrangements for a new national system for the registration of health professionals and accreditation of their training and education programs for implementation by July 2008.
- 32 There are 475 medical reserve corps programs across the US. Members often volunteer to deploy outside their jurisdiction to supplement public health resources responding to major disasters.

- 33 The *Emergo Train* was developed in Sweden as an educational tool for training and testing preparedness for major accidents and disasters. It involves the use of magnetic symbols representing patients, staff and resources.
- 34 Since 2000–01 the Department of Defence has been divided into 28 'outputs' most of which are publicly reported in terms of three measures: preparedness, core skills and quantity.

Acronyms and abbreviations

ADF	Australian Defence Force
ADFA	Australian Defence Force Academy
ACEM	Australasian College for Emergency Medicine
AHPC	Australia Health Protection Committee
APEC	Asia Pacific Economic Cooperation
CBD	central business district
C4	command, control, coordination and communications
CRAF	Civil Reserve Air Fleet
DoHA	Department of Health and Ageing
ED	emergency department
EMA	Emergency Management Australia
ICU	intensive care unit
MRC	US Medical Reserve Corps
SCOPE	surge capacity for people in emergencies
TBSA	total body surface area
TISN	Trusted Information Sharing Network for Critical Infrastructure Protection

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