

## POLICY AND SERVICE DELIVERY

### **Managing mass casualty events is just the application of normal activity on a grander scale for the emergency health services. Or is it?**

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Recent world events, such as 9/11<sup>1-6</sup> have increased our awareness for the need to prepare for large scale disasters and the potential for mass casualties.<sup>7-8</sup> Disasters, whether they are caused by natural events, infectious diseases, technological catastrophes or terrorist incidents have been increasing around the world and more and more people continue to be affected.<sup>9-12</sup> This paper will discuss the management of mass casualty events and consider whether the response generated is the same as normal activity but on a larger scale with a particular emphasis on emergency health services and the emergency department.

The world's population is increasing at a rate of about 78 million people per year<sup>13</sup> and the risk of disasters producing mass casualties is also increasing.<sup>10,13-15</sup> In 2009 the world population was 6.8 billion and by the end of 2011, the world's population is expected to reach 7 billion. The majority of growth will be located in the world's poorest nations where people live in areas that are vulnerable to hurricanes, floods and drought.<sup>9,13,16,17</sup> The potential for human impact from these hazards will grow accordingly<sup>13</sup> and authorities and disaster healthcare providers need to be prepared for these events.<sup>10, 11, 18-20</sup>

### **Mass Casualty Event**

Some believe that mass casualty events are just like daily emergencies only larger and for that reason they conclude that the best disaster response is an expansion of the routine emergency response. This response would include the mobilisation of extra personnel, supplies, hospital beds and equipment.<sup>13</sup> A mass casualty event can be described as any event that causes a large number of individuals to become ill or injured<sup>13</sup> overwhelming the resources of a given system at a specific point in time.<sup>10,21,22</sup>

Hospitals take care of emergencies every day, so what is different about managing a mass casualty event? For this to be true, hospitals must have adequate supplies, equipment and space as well as appropriately trained staff.<sup>23,24</sup> For the purpose of this paper several differences will be discussed from the perspective of the hospital setting and in particular the emergency department. Issues discussed will include surge capacity, triage and planning. It is recognised that communication and co-ordination provide a significant challenge during mass casualty events<sup>10,13,19,25-33</sup> and will not be discussed further in this paper.

Mass casualty events are not simply large emergencies and they are very different from routine, daily emergencies.<sup>9,13,34</sup> They pose unique problems that require different strategies and are often characterised by initial disorder and chaos.<sup>33,35</sup> The difference is more than just one of size as these situations cannot be adequately managed simply by mobilising more equipment, personnel and supplies.<sup>13,36</sup> Other significant differences include the number and

presentations of casualties (such as paediatric patients or those patients suffering from chemical, radiological or biological exposure);<sup>37</sup> there may be an initial lack of resources; the health system may have been affected and the infrastructure damaged<sup>38</sup> and there is often the need for multidisciplinary teams.<sup>33,35</sup> Organisations and their staff may have to work together for the first time during a mass casualty event and are often required to perform different non-routine procedures and to establish different priorities for action.<sup>33,38</sup>

### **Surge Capacity**

The majority of emergency medical systems (pre-hospital and in-hospital services) are stretched to their limits on a daily basis and the additional stress of an unexpected surge from a disaster or mass casualty event can be overwhelming.<sup>8,21</sup> Hospitals and in particular the emergency department represent a critical link in the disaster response system.<sup>24</sup> The emergency department plays a pivotal role in disaster preparedness because it offers a link between out-of-hospital (e. g., ambulance) and in-hospital resources (e. g., operating theatres and intensive care units).<sup>5</sup> It also provides essential emergent and urgent healthcare services during ordinary times and rapid response healthcare during times of crisis or disaster.<sup>39</sup> The frequently over-crowded emergency department<sup>24,39-51</sup> is expected to care for any patient, at any time and under any circumstance regardless of existing patient numbers, the severity of their illnesses and limited resources.<sup>39,41</sup> Most emergency departments will continue to experience increasing demand due to persistent growth in emergency attendances<sup>49</sup> with the added burden of little or no excess capacity available.<sup>21,51</sup> On a normal day the department is a complex and difficult environment in which to provide medical care.<sup>52</sup>

Surge capacity in medicine refers to a healthcare system's ability to rapidly expand beyond normal services to safely treat an abnormally large influx of patients in response to an event.<sup>30, 32, 40, 43, 44, 53-56</sup> Any disaster surge has the potential to severely challenge the capacity of the healthcare system.<sup>57</sup> It requires an increased demand for experienced personnel, equipment, supplies, facilities and services<sup>24,58-60</sup> and involves complex issues that are not encountered in the regular daily surge. For example, there is a shift from the daily goal in crowded emergency departments of identifying and treating the sickest patients first ("the most for the least"), to "doing the greatest good for the greatest number of patients" during a catastrophic event.<sup>37</sup> Hospitals will have to depart from their normal day-to-day operations and change the way they deliver healthcare<sup>58</sup> due to limitations in resources.<sup>38</sup> The main limiting factor in hospital capacity, if one is to provide optimal trauma care for immediate casualties, is not the number of available hospital beds, but the number of experienced trauma teams that may be organised and provide support to operate at any particular time.<sup>13</sup>

Creating a surge capacity may include the cancellation of hospital activities such as elective surgery or redesigning the current inpatient space to accommodate more beds when needed.<sup>8,61</sup> Patients may also receive treatment in non-traditional places within and outside the hospital<sup>38</sup> and treatment protocols may be changed so that patients may be discharged who under normal circumstances would not (also known as reverse triage).<sup>61</sup> Hospital capacity may be reduced by unpredictable events such as the loss of hospital facilities as a result of the disaster itself, (such as occurred in the flooded hospitals of New Orleans) or the loss of healthcare professionals because of illness (which will inevitably occur in an influenza pandemic).<sup>61</sup> These possibilities present distinctive operational challenges, such as the imposition of unpractised and unfamiliar routines in the context of a rapid demand for inpatient beds.<sup>8</sup>

Two other issues related to surge capacity include staffing and supplies. Lack of available and appropriately trained staff may be an issue during public health crises. Staff may be off duty due to illness caused by infectious diseases, as happened during the severe acute respiratory

syndrome (SARS) outbreak<sup>8</sup> and 2009 H1N1. Hospitals also store limited supplies on site. This “just-in-time” inventory creates a significant threat to a successful disaster response as many hospitals now do not have adequate supplies on site<sup>2,20,62</sup> as was evident during the recent 2009 H1N1 pandemic when supplies of personnel protective equipment (PPE) were in short supply or had run out. The provision of the “normal” standards of care may be difficult under disaster circumstances<sup>37,44,59,63</sup> and this raises ethical concerns which require further work and discussion.<sup>38,64,65</sup>

## **Triage**

Disaster triage is the process of allocating treatment and evacuation priorities to patients based on the severity of their injuries.<sup>10,66-70</sup> This course of action is usually outside the normal daily experience of most emergency healthcare providers<sup>13</sup> and can be very difficult.<sup>71</sup> Patients may present with injuries different from normal emergency department presentations.<sup>9,35</sup> Additionally, patients may present from different age groups (such as paediatric patients)<sup>5</sup> and emergency healthcare professionals may have limited experience in the triaging children.<sup>72</sup> Special expertise will also be required in triaging those patients who have been exposed to chemical, biological, radiological or nuclear insults.<sup>59,73</sup>

Compared to routine practice, triage principles during a disaster require an entirely different approach to evaluation and care and often run counter to training and ethical values.<sup>3,74,75</sup> Due to potential resource limitations,<sup>34,75</sup> mass casualty triage is aimed at ensuring that medical resources are directed at achieving the greatest good for the greatest number of people,<sup>3,19,33,45,66,67,69,70,76-78</sup> in an attempt to reduce mortality and morbidity.<sup>3,67,75,79</sup>

Regardless of the triage method used, during a mass casualty event, patients requiring triage are sorted into four categories: immediate, delayed, ambulatory and expectant. Immediate patients are deemed to be critically injured and require immediate intervention. Delayed patients are those who are injured but not expected to die within the first hour of care if not treated. Ambulatory patients can walk and are presumed not to be critically injured. Lastly, expectant patients are those patients who are presumed deceased or have catastrophic injuries and survival is not expected.<sup>37,66</sup>

When resources are inadequate triage undergoes the process of rationing where scarce resources are distributed in a prioritised manner to the most needy.<sup>70</sup> If a mass casualty event were to occur tomorrow, many people with clinical conditions that are survivable under usual healthcare system conditions may have to forego life sustaining interventions owing to scarce resources.<sup>3,18</sup> Triage of scarce resources is an extreme option, therefore, training and familiarity with the triage and allocation process is vital. This requires further consideration and is best accomplished prior to any mass casualty event.<sup>18</sup>

## **Planning**

Mass casualty events can be difficult to plan and train for because they are relatively rare events<sup>13,71</sup> and there are few planners who have had enough disaster experience on which to base realistic plans on.<sup>13,80</sup> Disaster plans should be tested,<sup>28</sup> simple and easy to understand,<sup>28,33,81</sup> be flexible and sustainable and applicable to all hazards.<sup>28,78,82,83</sup> Ideally, they ought to be based on the everyday routine<sup>81</sup> and training must be an integral part of major incident preparation.<sup>7,15,74,84,85</sup> Responding to a mass casualty event requires a different approach and this does not occur without appropriate planning and training.<sup>9,38</sup> Disaster response involves working with different people, performing different procedures, solving different problems, using different resources for routine emergencies and establishing

different priorities for action than for routine emergencies.<sup>9,13,33</sup> In addition, disasters frequently create tasks for which no organisation has clear cut responsibility<sup>33</sup> and there may be a loss of infrastructure<sup>35</sup> making them even more challenging, even for the most experienced responders.<sup>32</sup> One of the core concepts of disaster preparedness is to have straight forward plans and protocols that staff are familiar with and can automatically follow.<sup>84,86</sup> These plans should be consistent with normal arrangements wherever possible to minimise confusion and maximise compliance.

A great deal of work has been done to prepare the healthcare system to adequately respond to disasters, however, it is most likely that these plans will still be inadequate in managing mass casualty events with large numbers of critically ill patients.<sup>20</sup> In Australia there is a growing need for improved disaster health training in the fields of emergency medicine and emergency nursing.<sup>83</sup> In my experience, there is limited training for emergency healthcare personnel in regards to how to respond to disasters or mass casualty events, although there is certainly a greater interest since the Sydney Olympics and 9/11. In an ideal world, an efficient response to a disaster or mass casualty event would be part of our usual practice.<sup>86</sup>

### **Conclusion**

Managing mass casualty events is different from managing normal activities on a larger scale. It is not just about the enormity of the event, with an increase in patient numbers, but also about the different types of patients and a system under extreme stress. In addition, there are variances in the types of problems that must be handled, the tasks that must be carried out and the help that may be available. It requires a different approach which can only occur with appropriate training and preparation. Responding to a mass casualty event involves more than just mobilising additional numbers of emergency personnel or greater quantities of supplies as disasters often pose unique problems seldom faced in daily emergencies.

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