



Impact of a predefined hospital mass casualty response plan in a limited resource setting with no pre-hospital care system



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ARTICLE INFO

Article history:
Accepted 8 August 2014

Keywords:
Mass casualty event
Disaster response
Disaster plan
Terrorism
Trauma
Low-middle income country
Developing country
Resource limited

ABSTRACT

Introduction: Pre-hospital triage is an intricate part of any mass casualty response system. However, in settings where no such system exists, it is not known if hospital-based disaster response efforts are beneficial. This study describes in-hospital disaster response management and patient outcomes following a mass casualty event (MCE) involving 200 victims in a lower-middle income country in South Asia.

Methods: We performed a single-center, retrospective review of bombing victims presenting to a trauma center in the spring of 2013, after a high energy car bomb leveled a residential building. Descriptive analysis was utilized to present demographic variables and physical injuries.

Results: A disaster plan was devised based on the canons of North-American trauma care; some adaptations to the local environment were incorporated. Relevant medical and surgical specialties were mobilized to the ED awaiting a massive influx of patients. ED waiting room served as the triage area. Operating rooms, ICU and blood bank were alerted. Seventy patients presented to the ED. Most victims (88%) were brought directly without prehospital triage or resuscitation. Four were pronounced dead on arrival. The mean age of victims was 27 (± 14) years with a male preponderance (78%). Penetrating shrapnel injury was the most common mechanism of injury (71%). Most had a systolic blood pressure (SBP) >90 with a mean of 120.3 (± 14.8). Mean pulse was 90.2 (± 21.6) and most patients had full GCS. Extremities were the most common body region involved (64%) with orthopedics service being consulted most frequently. Surgery was performed on 36 patients, including 4 damage control surgeries. All patients survived.

Conclusion: This overwhelming single mass-casualty incident was met with a swift multidisciplinary response. In countries with no prehospital triage system, implementing a pre-existing disaster plan with pre-defined interdisciplinary responsibilities can streamline in-hospital management of casualties.

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Introduction

Hospital-based response to mass casualty events (MCEs), particularly in the absence of a pre-hospital care system, relies on planning, protocols, and actions that should be in effect and tested well ahead of time. However, in order to realize those planning needs, planners must take into account the critical challenges that hospitals will face in responding to catastrophic events. Many a time, sudden violent MCEs serve to teach important lessons to trauma centers responsible for dealing with such events [1,2].

Fraught with social, political and economic instability, the South Asian subcontinent has witnessed its fair share of acts of violence and war in recent years. Pakistan have also suffered from a significant number of MCEs from terror bombings alone. Most recently, the events of devastation that followed the bombing of a densely populated residential township in spring of 2013 left the port city of Karachi mourning the dead and injured. A powerful car bomb containing close to 150 kg of explosives leveled two apartment buildings leaving 48 people dead and more than 140 injured (<http://www.geo.tv/article-90635-Karachi-48-dead-over-140-hurt-in-Abbasi-Town-blast>). The incident took place in a closed residential community on the outskirts of the city of Karachi. This “remote detonated improvised explosive device” was planted at the entrance of the township, close to a bustling market street and busy roadside restaurants, in order to produce a maximum number of casualties [3].

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With acts of mass terror on the rampage in this part of the globe, it is imperative that lessons be learnt in the optimal management of sudden influx of casualties. Most of the deaths resulting from any reportable terrorist attack can be attributed to explosives. In Pakistan, the number of deaths from terrorism-related incidents surged from 2722 in 2006 to 6129 in 2009. Pakistan also witnessed a staggering escalation in suicide bombings from 4 occurrences per year to 57 incidents per year over a five-year period. Casualties resulting from these tragic occurrences were predominantly civilian [4].

Pakistan's fragile health care infrastructure precludes availability of a pre-hospital emergency medical service [5]. Private ambulance services run by philanthropic organizations are often quick to arrive on the scene, but lack trained paramedical staff and are unequipped with first aid or basic life support [6]. Patients are often indiscriminately loaded onto makeshift ambulances and transported to the nearest hospital [7,8]. Also, many a time, the wounded are seen walking in through the doors of emergency departments or are brought to the hospital by relatives or by concerned onlookers [9,10]. A hospital-based algorithm of care for massive terror-related incidents in the absence of a pre-hospital emergency system in low-middle income healthcare setting is the need of the hour.

The purpose of this study is to share the experience of a tertiary care facility in a low-middle income healthcare setting in dealing with a full range of trauma victims from a blast tragedy, where the wounded were triaged on arrival and were managed accordingly with considerable success. Consequently, we also attempt to suggest more practical ways of dealing with such MCEs in the absence of field triage.

Methods

Study site

With a population of 15.5 million, the port city of Karachi stands as the most populous city in Pakistan and a hub of cultural, political

and socio-religious activities [11]. The following study was a retrospective review of all blast victims presenting to the Aga Khan University Hospital's (AKUH) Emergency Department (ED) in Karachi on the eve of March 3, 2013. All trauma patients unrelated to the event and presenting to the ED on the aforementioned date were excluded. The medical records of these patients were reviewed by a senior surgical resident, who was actively involved in the management of casualties.

Disaster response

The Aga Khan University Hospital (AKUH) is a tertiary care facility with an experienced trauma team at its disposal. In the absence of field triage, the emergency room's front desk served as a triage counter, where patient care was prioritized based on injury severity. All available hands were present on deck and the hospital waiting area served as an extension of the ER, where medical teams attended to patients with minor injuries (such as closed fractures, lacerations and contusions), while the severely wounded (major blast injuries, massive internal bleeds, head trauma etc.) were resuscitated in the ED or rushed to the operating rooms (ORs). All elective surgical procedures were canceled to accommodate the incoming victims of the tragedy. The on-call trauma team managed patients accordingly.

Anticipating a heavy influx of casualties, a pre-designed disaster plan (Fig. 1) was put into effect as soon as news of the blast reached the hospital. This AKUH disaster plan has been adopted from the North American trauma care system, but modified for the resource limited healthcare setting based on past experiences [12,13]. This hierarchal disaster response model was designed to compensate for the lack of on-site triage and to prevent over and under triage, in-hospital. It also permitted optimal mobilization of resources in dealing with casualties based on extent of injuries and derangement of physiological parameters. It differs from most North American systems in that the hospital does not send clinical teams to the site of the incident for

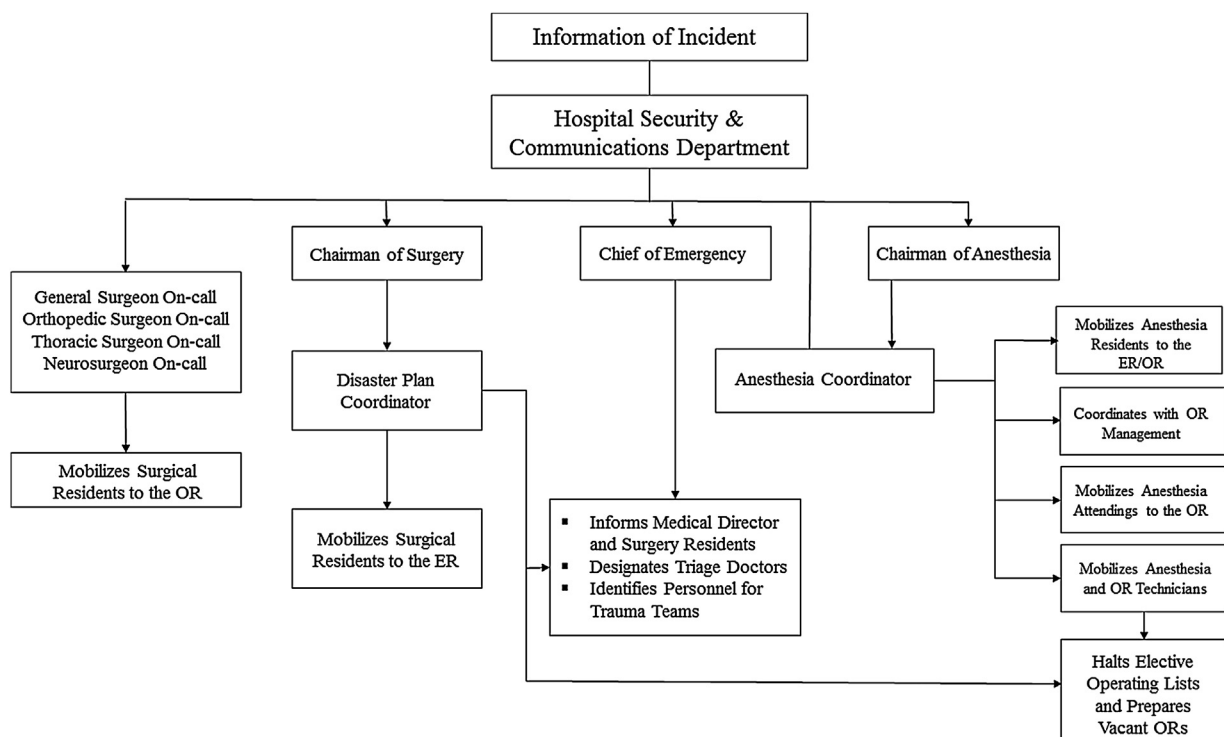


Fig. 1. Flow of information and resource mobilization based on the in-house disaster plan.

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