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Original Article

Terrorist bombings: Medical response in a developing country

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Abstract

Objective: To evaluate the process of transport and immediate Emergency Department (ER) management of mass casualties following the recent bomb blasts in Karachi and review in detail the medical response and management of victims undertaken in these two incidents.

Methods: Eyewitness accounts of the victims, medical personnel and newspaper clippings were used to understand and identify difficulties faced during the rescue process. Data regarding presenting injuries and their outcomes was also collected from all victims presenting to the emergency department at Aga Khan University Hospital.

Results: Seventy nine individuals died and over 250 victims were injured in the two incidents. All victims and dead bodies were shifted to the nearest public sector hospital overwhelming the health care facility. Subsequently all victims were evacuated to private sector hospitals creating similar difficulties. Over half of the victims presenting at the emergency department had minor injuries and did not require admission. Most patients requiring admission needed orthopaedic intervention.

Conclusion: A comprehensive disaster plan with a centralized command and control system is required for the city of Karachi, involving all stake holders including charity ambulance services, security agencies, and trauma management facilities. Training courses and exercises for health care personnel should also be made mandatory to achieve professional excellence.

Keywords: Terrorist Bombing, Mass Casualties, Disaster management (JPMA 61:561; 2011).

Introduction

Globally, terrorism has reached new heights. Pakistan in particular, has suffered tremendously as a front line state in the "war on terror". In the year 2009 alone there were 500 terrorist bombings, 2586 terror related incidents with 3021 deaths and 7334 casualties.¹ Despite all out efforts to curb this situation, the number of bomb blasts and resulting fatalities continue to rise exponentially, year after year. The terrorists have been constantly evolving in their techniques and targets, thus causing deadlier results. Consequently, with the given lack of organizational framework to deal with disasters of this frequency and magnitude, problems arising as a result of each one of these events have been unique for the health care and emergency response system of the country.

Karachi, the largest city of Pakistan is also one of the

biggest and most densely populated cities of the world. The city is spread over 3,530 square kilometers (1,360 square miles) in area, housing an estimated population exceeding 17.5 million. It is the financial, industrial and trade capital of Pakistan. These facts make the city a lucrative target for terrorist elements.² This paper describes two incidents with three terror related bombings. The first bombing incident occurred on December 28th 2009, at around 1613 hours when a religious procession was hit by a planted bomb. The tragic incident claimed 45 deaths and over 120 individuals were left injured.^{3,4} The second incidence on February 5th 2010 had two separate bombs, both planted on motorbikes. The first blast at around 1500 hours targeted a bus carrying civilians to a religious procession. Most of the victims were shifted to a major public sector hospital, which itself became a target of

the second bomb blast outside its Emergency Room (ER) at 1645 hours.⁴ Overall 34 individuals died and 133 were injured in the two incidents.^{5,6}

The purpose of our study was to review the process of transport and immediate ED management of victims, undertaken in these two incidents in relation to the inherent problems of a developing country. Karachi lacks a central command and control center. Pre-hospital care and on the scene triage is non-existent. The city is unique as it does not have a government run ambulance service, while the three largest charity ambulance services in the city work independent of each other and without a central dispatch center.² The city also lacks a proper central disaster response plan and majority of casualties are directed to either the three major government run tertiary care hospitals or to private medical institutions with mass trauma management facilities.

Methods

The study evaluated the process of transport and immediate ER management following these two incidents using interviews of health care personnel, newspaper clippings and review of patients presenting at the Aga Khan University Hospital (AKUH), in Karachi. The Hospital received 49% of the total injured in the two incidents. All injured victims of the incidents, whether secondarily transferred from other hospitals or directly evacuated to AKUH were included in the study. Data obtained from the victims included general demographic variables such as age, gender, mechanism and details of injuries sustained as well as the outcomes of their management. Informal interviews of the victims were also conducted to reconstruct a sequence of events using eyewitness accounts.

AKUH has a working disaster management plan with a capacity to handle 50 simultaneous casualties. The plan has been put into practice on numerous occasions and has been modified based on our experience with such events.⁷⁻⁹

Results

In the first incident (Ashura: December 28th 2009) a bomb blast struck the Ashura procession on M.A. Jinnah Road at around 1615 hours. Initially it was reported as a suicide attack but later investigations concluded that the bomb was planted in a box. According to investigators, the explosives weighed approximately 16 kilograms and also included nuts, bolts and ball bearings to maximize casualties.^{4,10} Shortly after the incident security officials, scout personnel and ambulance services accompanying the procession immediately started evacuating the dead and injured. Most of the victims were taken to Civil Hospital Karachi, a government operated tertiary health care center. No system of triage was present at the bomb blast site which resulted in a chaotic influx of severely injured intermixed

Table-1: Nature of injuries presented by the victims requiring admission.

Nature of Injuries	1st incident	2nd incident
	December 28th 2009	February 5th 2010
Orthopaedics	13	16
Orthopaedics and Vascular	02	1
Abdominal (Solid/Visceral)	03	1
Others (including sclera tear and tympanic membrane perforation)	10	21

with dead bodies and victims with minor injuries. Reports also suggest that the presence of volunteers and attendants in the emergency room hindered rescue efforts of medical personnel.¹¹ The initial casualties arriving there included 12 dead patients, which led to choking of the casualty, prompting the health minister to announce treatment at government's expense in private hospitals. This resulted in immediate transfer of almost all patients to AKUH.

The first evacuated patient arrived at AKUH at 1650 hours. According to official reports, 44 people died while 120 were injured in the incident. The total casualties presented to AKUH were 54 out of which 28 were admitted while 26 walking wounded were discharged from the ER after providing necessary treatment. Twenty three victims were brought to AKUH within an hour of the incidence and remaining casualties were transferred to the hospital over the next 12 hours.

Majority of the patients had shrapnel lacerations and multiple fractures. Two patients had associated vascular injuries, which included a posterior tibial artery laceration in one patient and a near total transection of the femoral vein in the other. Table-1 summaries the various injuries presented

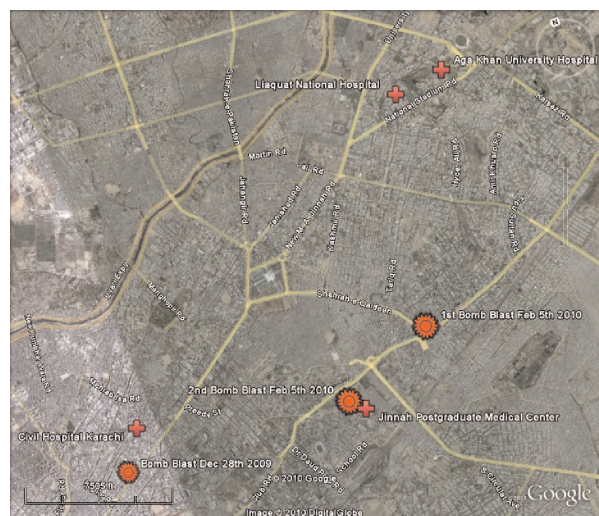


Figure: Map of Karachi,²⁵ depicting major trauma centers and bomb blast sites.

Table-2: Summary of bomb blasts.

Date Of Incident	December 28th 2009	February 5th 2009	February 5th 2009
	Preparation Time		
Time of bomb blast	1615	1500	1700
Distance from the nearest public sector hospital	One km	3 Kilometers	NA
Distance from AKUH	18 km	7 Kilometers	10 Kilometers
First arrival at AKUH	35 minutes	60 minutes	27 minutes
	Transportation Issues		
Resuscitation during transfer	None	None	None
Transfer prioritization	None	None	None
	Nature of Injuries (Details in Table-1)		
Walking wounded coming to AKUH	26	31	
Patients with major injuries requiring admission	28	39	
	Administrative and Security Issues outside the Hospital		
Crowd management strategies	Scouts and volunteers participated in controlling mob.	Some issues	Some issues
Crowd control	Good	Poor	Poor
	ER Management Issues		
Crowd management strategies	Hospital security and religious leaders participated in controlling mob.	Some issues	Some issues
Crowd control	Good	Poor	Poor
	Surgical Requirements		
Major trauma burden	Orthopaedic	Orthopaedic	Orthopaedic

by the victims who required admission at AKUH. The mean age of victims who were admitted was 17 years (range 10-40 years) of which only one was female. Two mortalities occurred at our institute; one was an early mortality due to tension pneumothorax and hypovolaemic shock, while the other late mortality was due to septicaemia.

The second incident (Chehlum: February 5th 2010) occurring exactly forty days later, included twin bomb blasts. This incident targeted a health care facility where injured were being treated, thus raising questions about the security of the medical and paramedical staff involved in rescue efforts. The terrorists first targeted a bus at Shahrah-e-Faisal carrying civilians on their way to a religious (Chehlum) procession at 1500 hours. Fourteen individuals were killed while 60 were injured in the blast.¹² Charity ambulance services were quick to respond and started evacuating the dead and injured to the nearest public sector hospital and AKUH. At 1635 hours the public sector hospital itself became a victim of terrorism when another blast occurred yards away from the casualty leading to utter chaos and second wave of casualties. Most of the injured were relatives of the first blast victims, with a few paramedical staff and media personnel also involved in the incident. Overall 13 deaths were reported in the second blast while over 50 individuals were injured.¹³ The presence of a blast in close proximity to the emergency department paralyzed the relief efforts and all victims from the two blasts were shifted to AKUH irrespective of their injury severity.⁵

Due to a lack of command and control, a sudden and overwhelming influx of patients occurred at AKUH,

necessitating temporary closure of the main hospital gate for half an hour, in order to force ambulances to shift patients elsewhere. This diverted further casualties to Liaquat National Hospital.⁵

As the hospital staff was busy managing the rapid influx of victims, the emergency department became increasingly filled with relatives of the victims and volunteers. A total of 70 patients presented in the emergency room of AKUH, some came directly after the first blast while others were shifted to AKUH after the relief efforts had halted at the primary managing hospital. Out of those 70 patients, 39 were admitted under various sub specialties of surgery while 31 with minor injuries were managed and discharged. Two deaths on arrival were also noted in the ER. Two mortalities occurred at our institute, the first one was an early mortality secondary to hypovolaemic shock, while the other a late mortality was due to septicaemia and ensuing multi organ failure. Summary of the bomb blasts are shown in Table-2.

Discussion

Pakistan has been increasingly targeted by terrorists in the form of suicide bombings involving bombers exploding suicide vests or carrying large loads of explosives in vehicles, as large as a ten wheeler dumper truck.¹⁴ The nature and intensity of these attacks change and these two incidents consisted of improvised explosive devices (IED) custom made with a central core of chemical explosives surrounded by a large collection of nuts and bolts.⁴ These were high energy explosives namely C4, which produces a high intensity sub sonic blast wave. The brunt of this blast wave is borne mostly by the victims closest to the explosives

especially in closely packed crowds as in our incidents. These victims mostly die on the spot, with wide scatter of their mutilated bodies. Victims further away tend to receive secondary and tertiary blast injuries of lesser severity.

While most of the earlier attacks targeted security forces and law enforcement agencies, in 2009 the terrorists opted to strike softer civilian targets.¹ The hospitals to some extent have developed plans to deal with sudden influx of casualties. Unfortunately, up till now, no centralized plan has been established to minimize mortalities associated with such attacks. Much more importantly the ambulance service are devoid of a central command and are in a rush and competition to take all casualties to the hospitals in the shortest span of time. The following text discusses the issues as stage of scene command and control, pre-hospital care and effective ER management.

Scene Command and Control and Pre hospital Care:

Karachi, like other major cities of the country does not have a disaster management plan. The provincial government has recently notified Provincial Disaster Management Authority (PDMA) with a mandate to form such a plan. PDMA has conducted a workshop after the second incident to bring stake holders together.¹⁵

The city has a unique situation of completely private and charity based ambulance service. Therefore a central command and dispatch does not exist and each major ambulance service has its own command. Despite availability of communication between the ambulances of the same organization, no communication links are present between various ambulance services, intended casualty receiving hospital and the security agencies.² It has also been observed that the bulk of the victims are dumped at the nearest designated trauma center without taking into account the capacity of the hospital.

Although the ambulance services are quick to respond and reach disaster sites within minutes, the drivers lack any paramedic training and there are no en-route treatment facilities other than providing oxygen.² The absence of scene commander and triage leads to arrival of dead bodies in the casualty of the government hospitals first converting the casualty into a morgue.¹¹ This was highlighted in the first bombing incident, where the first to reach the hospital were the dead, rendering the health care facility nearly ineffective.

A system of command and control and scene triage will result in dead being transferred to a morgue and walking wounded to be treated away from the main hospitals, thus decongesting designated trauma centers. Such measures would greatly improve patient care and outcome of severely injured victims. A possible reason why there has been

difficulty in correcting these problems is that in Karachi, ambulance services are run by philanthropists and social workers with no government owned or directed Emergency Medical Service (EMS) to date. We therefore suggest that in order to achieve maximally effective disaster response, philanthropy and charity ambulance services requires better coordination.

It is imperative that a centralized coordinated disaster plan should be developed immediately. Pre-hospital management should be an integral part of this plan, which addresses problems of communication, security and onsite triage of the victims. Simultaneous multiple bombings as that occurred on February 5th 2010, present unique challenges to the rescue efforts. Any disaster management plan should take into account such scenarios. A centralized command and control center should be established with communication links to paramedic services, security agencies and all major hospitals. Individuals, preferably trained doctors should be providing leadership at the disaster site. These experts would help to establish an onsite triage, identify potentially savable severely injured victims requiring immediate medical attention and create a temporary morgue at the site. The role of triage and timely evacuation cannot be underestimated.^{16,17} Formal paramedic training should be established to enhance the pre hospital management of victims.

ER Management:

In a city which lacks a disaster management plan and on the site triage such as Karachi, the ER is the first point of triage and is thus inundated with many casualties that do not belong to it. This problem is compounded even further by the arrival of relatives and Good Samaritan volunteers in the ER. Most hospitals at present have not devised effective information centers to cater for the needs of media and concerned relatives. It is essential that such centers should be established at every major trauma facility. These centers should be located at a certain distance away from the emergency department, to divert the influx of the concerned relatives who inadvertently hamper the efficiency of medical personals.

Since both the incidents took place on public holidays and involved religious processions; large emotionally charged crowds were present in and around the ER. This led to a breakdown of security barriers, not only making it difficult for the ER to provide care but also making it a soft target for casualty generation, as witnessed in the second incident of 5th February 2010. Such incidents paralyze the relief efforts⁵ as the rescuers themselves become victims of terrorism.

Typically the situation is also compounded by disruption of mobile phone services, paralysis of public

transport, traffic jams and worst of all, immediate initiation of city wide violence and anarchy.¹⁰ In all of these events, health providers within the hospital were not only overwhelmed but were also under a constant risk of violence from the emotionally charged crowds. It becomes impossible for a typical hospital security staff to control a mob situation and in both the incidents hospital security utilized religious or political leaders to control and pacify crowds.

Such mob formation which is frequent in our part of the world, not only hinders rescue efforts, but also results in damage to expensive equipment. The control of emotionally charged crowds cannot be overemphasized.

The bombing of a hospital has raised many questions about the security of health care personnel as these facilities are soft target for the terrorist and make a bad situation worse.¹⁸ We feel that any disaster management plan should incorporate provision of an effective security at the bomb blast site and the receiving medical facilities.

The effectiveness of a hospital to deal with a mass casualty incident (MCI) is greatly dependent on the training and preparedness of the health care providers.¹⁹ This is especially true for the resident and house officers who due their continuous presence in the hospital are the first to respond and thus receive the initial casualties. A recent study analyzing the relief effort of junior doctors in a mass casualty incident at public sector hospitals in Karachi found that 52% of the doctors felt they needed to undergo a comprehensive training programme. In addition, 35% of the respondents in that study felt they were not assigned any specific roles in the previous MCI rescue effort.² With the ever increasing threat of terrorism in our country, it is essential that the training of doctors and paramedical staff should be initiated as early as possible. Mandatory participation in simulated drills and classroom courses should be ensured as they play a fundamental role in preparedness for such scenarios.²⁰ It has been recommended that simulated drills should be conducted at least once a year; as such exercises provide practical feedback on the deficiencies and problems encountered in real life.

Appointment of specialist trauma physicians as triage officers has been consistently emphasized.^{21,22} Studies have suggested that this may well be the most important factor in reducing preventable mortalities.²³ As illustrated in our study, most of the victims in terrorist bombings had sustained minor injuries. These victims may arrive at the emergency department by themselves and subsequently overwhelm the ER capacity. This chaotic scenario may not be totally avoidable although few papers have suggested dividing the ER into three areas designated as a mild injury site, moderate casualty site and severe casualty site.²⁴ Such an approach is likely to streamline the management of victims, allowing greater focus on the care of those requiring urgent

intervention, especially under circumstances such as ours where walking wounded flood the ER.

Currently three major public sector hospitals in Karachi have been designated as primary trauma centers. Private teaching hospitals with trauma management facilities do exist in the city, and these centers should be properly integrated into the disaster management plan to help decrease the load of public sector hospitals.⁷

Conclusion

It is imperative that a comprehensive disaster plan is made for the city of Karachi, involving all stake holders including charity ambulance services, security agencies, public and private sector hospitals. Training courses for paramedics and doctors should be made mandatory to achieve professional excellence. A central command and control system also needs to be established to efficiently manage any future threats to the city.

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