

## **Pakistan: The new target of terrorism. Are Karachi's emergency medical response systems adequately prepared?**

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### **Abstract**

**Objective:** To assess the efficacy and preparedness of the pre-hospital and hospital emergency medical systems and post graduate trainees in the city to deal with a massive terrorist strike.

**Methods:** A cross-sectional survey of postgraduate trainees was conducted at Jinnah Postgraduate Medical Center and Civil Hospital Karachi from 21st July 2007 to 24th July 2007, to evaluate the preparedness and self identified deficiencies of doctors involved in massive trauma casualty management. To assess the pre-hospital care in Karachi, structured telephonic interviews were conducted of administrators of two private run charity based ambulance services.

**Results:** Out of the 90 respondents questioned regarding a self assessment of their training, only 3 (3.3%) of them were confident about their management of bomb blast victims. Eighty-seven (96.6%) of the respondents felt they required some further training (44.4%) or comprehensive training (52.2%). No simulated drills or courses had been conducted for disaster management in the emergency department of the surveyed Hospitals. Most of the ambulance drivers had no paramedic training. Ambulances are equipped with a stretcher and an oxygen cylinder only. No resuscitation measures are available in the ambulances.

**Conclusion:** With an increasing number of terrorist attacks in the country, massive influx of casualties in a relatively short time span has become a regular feature of the Pakistani hospital system. Lack of adequate training at pre-hospital and in hospital levels may translate into increasing morbidities and mortalities. It is imperative that training of junior doctors and paramedical staff be conducted regularly and an effective regional communication base established for efficient interdepartmental coordination (JPMA 59:441; 2009).

### **Introduction**

Terror has radically changed in the last six years with terrorist attacks making alarming headlines.<sup>1</sup> Increasingly adaptive methods have resulted in greater casualties besides testing the health care and emergency response system of the affected nations. Physicians and surgeons, must be prepared to deal with the large-scale injuries and loss of life left in the aftermath of such man-made disasters.<sup>2</sup> Though serious terrorist strikes have been witnessed in different nations of the world such as Spain, London and Indonesia,<sup>1</sup> a persistently increasing threat in Pakistan has resulted in a significantly greater number of terrorist attacks. Even though most of them did not account for massive casualties, but the frequency clearly suggests that the threat has certainly not diminished over the years. Instead the recent shift of the war on terror has made Pakistan the new front.<sup>3</sup> It can be safely expected that the threat is increasing and future terror strikes will be of increasing destructive power.

The existing systems for trauma care are elementary in nature, predominantly restricted to cities and semi-urban areas, without integration at regional or statewide levels. Statutory provisions to aid national and provincial planning and implementation of trauma-care systems, regardless of jurisdictional boundaries, are yet to evolve. In the absence of

guidelines, the workforce available for pre hospital and hospital-based critical care varies enormously. Available personnel and their skills often do not match the needs of the patients. According to Pakistan Institute of Peace Studies (PIPS) security report for 2007, a total of 1442 terrorist attacks, including 60 suicide attacks took place in the country out of which 1306 were done by the local Taliban.<sup>4</sup> The casualties amounting to 3448 persons were 125% and 497.1% higher as compared to 2006 and 2005 respectively.<sup>4,5</sup> With an average of 5 suicide bombings per month, the need for adequate training of prehospital and emergency medical personnel and physicians who are directly involved in transporting and treating the bomb blast victims cannot be ignored.

Karachi is the largest metropolitan city and the financial nerve line of the country. Consequently it is a highly lucrative target for terrorist elements. Out of the total 27 attacks occurring in the province in 2007, 17 occurred in the city causing >200 fatalities and about 550 injuries.<sup>4</sup> Thus any terrorist event besides delivering chaos and destruction also sends financial shocks across the country. The majority of the casualty cases in Karachi are seen by government run welfare hospitals. Although private medical institutions with level I trauma centers do exist, but in cases of bomb blasts or other terrorist incidents the admissions are limited mainly due to the financial

constraints and space limitations.<sup>6</sup> This study aims to assess the efficacy and preparedness of the prehospital and emergency medical systems and physicians in the city to deal with casualties of terrorist incidents.

## Subjects and Methods

A cross-sectional survey was conducted to evaluate the preparedness of doctors involved in the management of massive trauma casualties. (We also aimed to highlight the self identified deficiencies of our hospital and pre-hospital system.) The survey was conducted at two major government hospitals (Jinnah Postgraduate Medical Center and Civil Hospital Karachi) from 21st July 2008 to 24th July 2008. Both these institutes are tertiary care, welfare hospitals that cater to most of the trauma casualties in Karachi. These hospitals are major postgraduate teaching centers and as such primary responders of casualties are residents and House Officers (Interns) of these hospitals.

Our target population for the survey included all Surgical Postgraduate trainees and house officers (Interns) of the above said hospitals. It also included Emergency Casualty Medical Officers and Assistant Casualty Medical Officers working in the Emergency Department. Consultants and doctors who had finished their training were excluded from the survey.

A self constructed questionnaire was prepared by the researchers and administered to the target population. The questionnaire included questions pertaining to the experience of the individuals in managing massive casualties due to terrorist activities, the self assessment of their preparedness in such scenarios and training instilled in the form of classroom courses and simulated drills by the hospital management. A survey of specific training courses including primary trauma care, advanced trauma life support, basic life support, advanced cardiac life support or other similar workshops attended by the respondent was also made. The questionnaire also made a brief assessment of the basic knowledge of managing trauma patients, including primary surveillance. The respondents were asked to prioritize examination of various systems in a trauma patient. These included airway, respiratory system, cervical spine examination, pulse, B.P., examination of the head and abdomen. The respondent were requested to number these examination from 1-7, with one being the system examined first and 7 being the system examined last.

Researchers conducted the survey in the target population. The questionnaire was adequately discussed and pre-determined phrases were decided to reduce errors. The questionnaire was administered in all the major surgical wards and emergency room. The survey was conducted within three days to eliminate repetition and bias due to information spreading about the questionnaire content. A verbal consent was taken from each responder before the questionnaire was handed out. Any questions from the respondent were answered in a pre-

## RECOMMENDATIONS

- Setting up a dedicated Disaster Control Management department, with communication links to paramedic services, security agencies and all major hospitals, for better macro management and appropriate distribution of casualties.
- Accreditation of trauma centers and critical care units should be done and mandatory training of emergency physicians and surgeons ensured.
- Efforts to include private hospitals in the disaster management to reduce the overwhelming load on the public sector hospitals.
- Establishment of pre-hospital care and training of paramedics involved in onsite rescue. Training of hospital staff and establishment of a triage service with an appropriately trained doctor in charge for appropriate, comprehensive and timely screening of individuals
- Proper assignment of tasks and roles with simulated drills involving the health professionals for better efficiency and coordinated approach in times of chaos.
- Establishment of a central trauma registry so that reliable data could be obtained on trauma admissions as well as their clinical outcomes. This will help in carrying out more effective research work and thus aid in development and implementation of an effective public policy on trauma care.

determined manner. Confidentiality of the responses were ensured and maintained by the researchers.

To assess the pre-hospital care in Karachi, structured telephonic interviews were also conducted. The administrators of two private run charity based ambulance services of the city (Edhi and Chippa) were asked about the training of their staff in onsite handling of the victims, the implementation of pre-hospital triage and the medical facilities available in the ambulance. Questions were also asked about communication and control of the ambulances and the intended hospital where the patients were being delivered.

The data was collected and entered using EpiData 3.1 and then transferred to SPSS 13.0 for analysis. The variables were cross-tabulated to identify possible relationships.

## Results

Ninety doctors gave their consent to participate in the study. Two questionnaires were excluded from the study due to incomplete information. The study included 46 (51.1%) House officers, 32 (35.6%) Postgraduates and 6 (6.7%) Medical officers. Information about the designation was missing in 6 (6.7%) cases. 43.3% (39) of the respondents said that they had been involved in the management of terrorist bomb blast victims. Out of these only 65% felt that they were assigned any specific role in the event, while 76.9% felt it was a coordinated effort.

Out of the 90 respondents questioned regarding a self assessment of their training, only 3 (3.3%) of them were confident about their management of bomb blast victims. Forty (44.4%) of the respondents felt they required some further training. However, 47 (52.2%) of the respondents felt they required a comprehensive training.

Regarding training in management of victims of nuclear, chemical or biological terrorism, only 2 (2.2%) respondents were confident about their management skills, 32

**Table-1: Cross-tabulation of designation with understanding the concept of triage in Massive casualty.**

| in                                | Concept of triage in |                  |
|-----------------------------------|----------------------|------------------|
|                                   | Massive Casualty     | Massive casualty |
| House Officer                     | 21(45.7%)            | 25 (54.3%)       |
| Postgraduate and Medical Officers | 29 (76.3%)           | 9 (23.7%)        |

Medical officers have been merged with the postgraduate for statistical reasons. Data missing in six cases. (p=0.004).

(35.6%) felt they needed some training while 56 (62.2%) required comprehensive training in the management of such victims. A total of 67 (74.4%) respondents had received training in Basic Life Support. 19 (21.1%) in Advanced Cardiac Life Support and only 15 (16.7%) had received training in Advanced

41.1% of the respondents. Examination of the head was assessed as fifth (33.3%) and sixth (45.6%) in the priority listing. Examination of the trunk was given the last priority by 64.4% of the respondents. Cervical spine immobilization and examination was mostly assessed as 5th in the list by 20% doctors, 6th by 18.9% and 7th by 17.8% doctors. Four (4.4%) respondents did not attempt this question. Cross tabulation between the designation of the respondents and the priority of various examinations in a trauma patient, showed that house officers tend to give a lower priority to the respiratory examination than Postgraduates and Medical officers (p = 0.003) (Table-3). No other statistical difference was found in the results.

Results of the telephonic interviews, suggest that most of the ambulance drivers had no paramedic training and

**Table-2: The priority given in examining various systems by the respondents.**

|                               | 1st Priority | 2nd Priority | 3rd Priority | 4th Priority | 5th Priority | 6th Priority | 7th Priority |
|-------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Airway                        | 59 (65.6%)   | 11 (12.2%)   | 4 (4.4%)     | 4 (4.4%)     | 6 (6.7%)     | 2 (2.2%)     | ---          |
| Respiratory Exam.             | 4 (4.4%)     | 41 (45.6%)   | 23 (25.6%)   | 12 (13.3%)   | 5 (5.6%)     | 1 (1.1%)     | ---          |
| Cervical Spine Immobilization | 8 (8.9%)     | 8 (8.9%)     | 8 (8.9%)     | 11 (12.2%)   | 18 (20%)     | 17 (18.9%)   | 16 (17.8%)   |
| Pulse                         | 18 (20%)     | 8 (8.9%)     | 37 (41.1%)   | 21 (23.3%)   | 2 (2.2%)     | ---          | ---          |
| Blood Pressure                | ---          | 14 (15.6%)   | 14 (15.6%)   | 33 (36.7%)   | 19 (21.1%)   | 3 (3.3%)     | 3 (3.3%)     |
| Head/Neurological Exam.       | ---          | 4 (4.4%)     | 1 (1.1%)     | 7 (7.8%)     | 30 (33.3%)   | 41 (45.6%)   | 3 (3.3%)     |
| Trunk/Abdominal Exam.         | ---          | 1 (1.1%)     | ---          | 1 (1.1%)     | 6 (6.7%)     | 20 (22.2%)   | 58 (64.4%)   |

(n=90).

Trauma Life Support/ Primary Trauma Care.

Only 10 (11.1%) of the respondents were aware of an isolation room in their emergency department. No simulated drills had been carried out for bomb blast injuries, chemical exposure injuries, biological weapons exposure and nuclear radiation exposure in the emergency department of the surveyed Hospitals. Of the total, 42.2% respondents had no concept of a triage in massive casualties. Postgraduates and Medical officers were more aware of the triage concept than house officers (p = 0.004) (Table-1).

Regarding priority of examination in a trauma patient (Table-2), 65.6% respondents considered examining the airway as their first priority, 20% considered examination of the patients pulse as the first priority and 45.6% felt that examination of the respiratory system will be their second priority. Examination of the pulse was given third priority by

**Table-3: Cross-tabulation of designation with priority given in examining respiratory system.**

| 7th)                               | High priority (1st-3rd) | Low Priority (3rd-7th) |
|------------------------------------|-------------------------|------------------------|
| House Officer                      | 29 (69%)                | 13 (31%)               |
| Postgraduates and Medical Officers | 36 (94.7%)              | 2 (5.3%)               |

High Priority suggests respiratory examination conducted among the first three systems. Low priority suggests examination conducted among the last four systems

qualification. Ambulances are equipped with a stretcher only; some have an oxygen cylinder as well. No resuscitation measures are available. A scoop and run technique is adopted for transfer of victims. Despite availability of communication between ambulances of the same organization, no communication links are available between the ambulance services and intended hospitals.

## Discussion

The ability and effectiveness of a hospital to deal with disaster casualties is highly linked with the training and preparedness of its doctors, nurses and ancillary staff.<sup>7</sup> The chaos associated with such scenarios may not be totally avoidable, but a high degree of training and pre-assigned roles to the hospital staff has the potential to undertake an efficient rescue effort.<sup>8</sup> Simulated training drills and classroom courses both have a role in the preparedness of such scenarios.<sup>9</sup> As is evident from our research, a lack of such drills has greatly reduced the effectiveness of our response. Doctors (35%) with hands on experience in bomb blast victim's management felt they had no specific role assigned to them and approximately 23% did not find the effort coordinated by the hospital management. Such waste of hospital resources and lack of guidance only hinders the endeavors of the health personnel. Also all the participants denied participation in any emergency drills. Simulated drills create an inter-departmental exercise

which gives practical feedback on the deficiencies and problems encountered in real life. It is recommended that such drills should be conducted once every year.<sup>10</sup>

A self analysis of their training and confidence in the management of such casualties reveals the disastrous situation of our health system. An overwhelming 96% of the doctors felt they were deficient in their training and management of such scenarios. With the increasing number and intensity of terrorist attacks in the country, this lack of training will surely translate into increasing morbidities and mortalities.

It is also quite alarming to note the lack of training in trauma management and advanced cardiac life support management in our doctors. Several studies have proved the benefits of the Acute Trauma Life Support programme in reducing mortalities in developing countries.<sup>11,12</sup> These training courses are essential in the recognition of problems encountered during disaster management as well as the day to day scenarios encountered. Inclusion of such courses in the training programmes will provide the physicians with the knowledge to effectively deal with trauma patients,<sup>13</sup> while greatly decreasing the avoidable mortalities.<sup>14</sup>

Acute Trauma Life support and similar courses such as Primary Trauma Care provide a uniform simplified method for approach towards trauma. The concept is simple, and based on the mnemonic "ABCDE" order of which examination takes priority in the management of the injured patient: Upper Airway and cervical spine protection; Breathing (Respiratory Examination); Circulation (Cardiovascular Evaluation); Disability (Neurological Evaluation); and Exposure/Environment (a detailed examination of the remaining systems). The emphasis is on the critical "first hour" of care, focusing on initial assessment, lifesaving intervention, re-evaluation, stabilization.<sup>15</sup> It is noted that guidelines of Primary Trauma Care based in England differ slightly from the American Acute Trauma Life Support as it is more resource conscious;<sup>16</sup> however both systems of trauma management have placed the highest importance to cervical spine immobilization, however 68.9% of our respondents gave a low priority (4th priority onwards) to such measures. The role of cervical spine immobilization in preventing cervical spine injuries is irrefutable.

The wide spread responses of priority given to different examination as demonstrated by the respondents, highlights the lack of uniformity in the respondents which may significantly decrease the efficiency of the response. The lack of training among house officers was highlighted by the low priority given towards examining the respiratory system during trauma management in comparison to postgraduates and Medical Officers (Table-3). The importance of respiratory system examination being at the forefront of the trauma management response is underlined by the fact that acute life threatening

conditions such as tension pneumothorax are universally fatal if not addressed urgently.

In case of major bomb blast casualties, the faculty including the professors and associate professor of the surgical department are called to the emergency department providing much needed knowledge and experience to the rescue effort. However the house officers and residents of the hospital are the primary responders of victims and as such play a vital role until the seniors arrive. It is important to train them adequately and identify specific roles in the emergency management.

It is alarming to note that 42% of the respondents had no concept of triage in massive casualties; however postgraduates and medical officers seemed to have a better understanding when compared to house officers. It is imperative that knowledge of such important principles of trauma care be inculcated as early as possible to efficiently utilize the limited resources. The importance of placing specialist trauma physicians as triage officers has been repeatedly advocated.<sup>17,18</sup> The presence of experienced trauma physicians or surgeons is the most important resource in reducing preventable casualties.<sup>19</sup>

Usually, in a mass-casualty incident most of the fatalities are on site. To make an impact on survival, one must identify those who are severely wounded as quickly as possible and offer those patients optimal care.<sup>19</sup> Thus the impact of timely evacuation and triage on effectively dealing with a mass casualty event cannot be underestimated.<sup>20-22</sup> Sadly there are no existing national or regional guidelines for triage, patient-delivery decisions, pre-hospital treatment plans and transfer protocols. Absence of legislative provisions for the minimum qualification of ambulance personnel, the type and quality of ambulance equipment only compounds the problems faced. The scoop and run technique is usually applied for transfer of victims to the ambulances.<sup>23</sup> Except a stretcher the ambulances are not equipped with the necessary life saving equipment. Most of the victims are transferred by privately run charity based ambulance services and there is zero communication to the hospital to alert the trauma team prior to transfer.

The concept of a dedicated trauma team is still not accepted and orthopaedic surgeons lead the trauma response in most cases. The absence of clear perceptions of clinical responsibility often leads to ambiguity regarding clinical decisions and thus putting patients with multi-system injury at a greater risk. Although Pakistan has not yet experienced any biochemical or nuclear terrorist activity of significant proportions, but the future threats cannot be ruled out. It was revealed that only 11% of the total respondents were aware of the presence of an isolation room in the emergency department. All the hospital staff needs to be aware of the facilities and resources at hand. The accessibility of such resources should also be ensured by the hospital staff to avoid any bottle necks in

the management of victims.

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