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# The Strategy of the Surgical Team At Combined Military Hospital Peshawar During Mass Casualties In the Year January 2017 to April 2018

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## ABSTRACT

***Objective:*** to study the surgical and managerial management of mass casualties at CMH Peshawar.
***Study design:*** Retrospective longitudinal study
***Place and duration of study:*** CMH Peshawar, Pakistan from Jan 2017 to Apr 2018.
***Methodology***: We used patient documents to collect the data. When a mass casualty disaster arises, rapid communication between the forward medical team and CMH Peshawar, the number of victims, and the nature of injuries reaching CMH Peshawar are analysed. Surgical and anaesthesia teams organised themself to function in shifts so that the operation theatre could operate round the clock before the arrival of causalities. When the casualties are received, triage is performed, followed by trauma room examination and resuscitation of patients. Our team conducted Laboratory investigation, X-rays, FAST scans, and Doppler ultrasound in a trauma centre or ICU. We carried out lifesaving surgeries first, followed by limb saving surgeries.
***Results:*** There were 12 mass casualties crises during 16 month period under study, with a total number of 218 casualties. The mean age was 34.46±12.06 years, with the youngest patient being 12 years old, and the oldest was 67 years old. There were 203(92.7%) males and 15(7.3%) females. In triage, 156(71.6%) were in the red area, 41(18.9%) in the yellow zone, and 21(9.7%) in the green zone. Lower limb injuries 83(38.1%) were the most predominant, followed by upper limb (48, 22.0%), chest (45, 20.6%), and abdomen 29(13.3%) in that declaration. The surgical team performed 327 operations in the first 24 hours on 12 occasions.

***Conclusion:*** Mass casualty incidents (MCI) result in an unexpected influx of patients, requiring extraordinary administrative measures to organise these patients. There is a tremendous strain on hospital reserves in a restricted period. Lessons comprehended at each MCI should be disseminated with others to boost the community preparedness when such antagonistic events occur in the future.

**Keywords:** Mass casualty, Lifesaving, Resuscitation, Triage, Trauma

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## INTRODUCTION

Mass casualty incident (MCI) is an infrequent occurrence that requires organised action under time restraint.[1] In mass casualties, there is a high volume of patients who require equal medical and surgical treatment in a restricted time frame. Mass casualty incidents impose a lot of stress on medical personnel and available hospital resources.[1] MCI implicates stepwise treatment and chain of evacuation from the incident scene to the forward surgical team and then to the base hospital. In the base hospital preliminary triage trauma rooms association overstrain radiological and laboratory facilities management of intensive care unit bed capabilities and running operation room list which is another require remarkable surveillance skills.[2,3]

MCI management pertains to preplanning by the hospital personnel and setting up standard operational procedures. This type of rehearsal is essential to cater to great healthcare necessities. The abrupt influx of patients and their relatives presents a logistical challenge to the hospital administrative system.[4]

Insufficient data is available about administrative planning and applicable resource disbursement so that each patient gets the best treatment that can be rendered under everyday situations. The study aims to analyse surgical and administrative management of

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mass casualties received by CMH Peshawar between January 2017 and February 2018. This data will help in future planning and unified resource management of civil and military hospitals for managing mass casualties.

## METHODOLOGY

We performed this study between January 2017 and April 2018 at CMH Peshawar Pakistan. We compiled data from patient documents. We have to interpret MCI as receiving five or more critically injured casualties at one time who need multi-modality procedures and multiple surgeries. We found 12 occurrences in the duration under study. CMH Peshawar received a total number of 218 casualties. The maximum number of casualties received was 40, and the minimum number was 5.

**Inclusion Criteria:** We included five or more critically injured patients admitted at one time who require two or more surgeries and must be seen by various specialists.

**Exclusion Criteria:** We excluded the following from the study; If we receive less than five critically injured causalities at a particular time, patients need to be seen by a sole specialist, and patients requiring a single surgery

When a mass causality crisis arises, the surgical team creates a brisk communication between the forward medical team and itself to gain a first-hand understanding of the number of casualties coming to CMH Peshawar and the character of their injuries. The hospital director/commandant and senior medical and surgical consultants meet to plan how to manage these causalities. Before the casualties reached, we made surgically and anaesthetist teams work in shifts and operation theatre could operate round the clock. We alerted Laboratory and radiological personnel. Head of department surgery assigned beds for causalities in Main ICU, surgical ICU and trauma ward. Hospital administration designated a coordinating/communicating officer. His job is to reconcile efforts between different hospital staff, share the existing state of the patient to the higher headquarters and organise various visits that happen during the time frame. The Hospital administration Appointed a liaison officer. His job was to enlighten the families and the parent unit about the current condition of the patients. Whiteboard illustrating the state of the patient and their ward whereabouts for the attendant was present outside the surgical tower. A nursing NCO updated this board hourly.

The surgical team performed primary triage and a trauma room evaluation after receiving casualties. We resuscitated Serious patients in the main ICU and surgical ICU. The surgical team resurrected less critical patients in the trauma centre. Tetanus toxoid tetanus immunoglobulin, antibiotics and analgesics are delivered in the trauma centre. The radiologist performed Doppler ultrasound, Fast scan and Xrays in a trauma centre or ICU. How do lab technicians perform laboratory tests also in a trauma centre or ICU. However, radiologists performed CT scans in their department if required. We performed lifesaving surgeries initially, followed by limb saving surgeries. As the patients improved, they lowered from the main ICU to surgical ICU and then to the ward. From the ward, the patient was discharged with follow up plan or sent to the rehabilitation ward.

Head of department surgical team calls for a multimodality team meeting if critical decision making was required in which all the stakeholders were present, including are rap from hospital administration. A couple of doctors counselled the relatives of the critical patient about the considerable nature of the injuries in the counselling room next to the main ICU. Special consent, like that of amputation, was taken from relatives in the counselling room.

The data was analysed and evaluated using Statistical Package for the social sciences (SPSS) version 20:00. Descriptive analysis statistics pertained to the data. Frequency and percentages exemplified the categorical variables.

## RESULTS

There occurred 12 mass casualties incidents from January 2017 to April 2018 (16 months), with 228 casualties. The fragment is shown in Table-I.

The mean age was 34.64±12.06 years, with the youngest injured patient being 12 years and the oldest being 67 years. There were 202 (92.7%) males and 16 (7.3%) females with a male to female ratio (13.5:1).

In triage, there were 156(71.6%) in the red area, 41(8.9%) in the yellow area and 21(9.7%) in the green area. The whole body was divided into nine regions. The detail of the injuries part wise is shown in Figure-I.

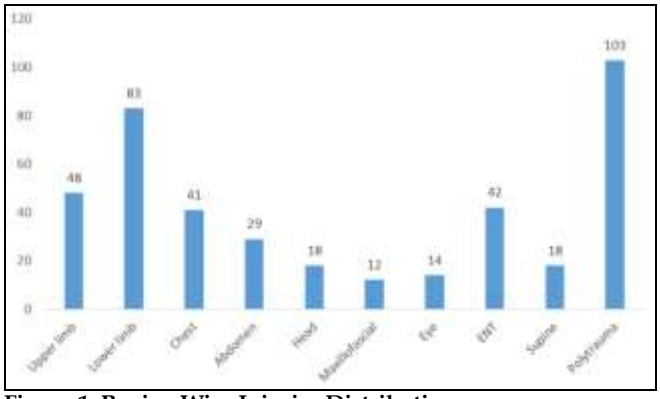


**Figure-1: Region Wise Injuries Distribution**

**Table-I: Episode Wise Volume of Casualties**

| Date | Incident | Number of Casualties |
|---|---|---|
| 21 January 17 | Parachinar bomb blast | 26 |
| 31 May 17 | Parachinar bomb blast | 36 |
| 20 April 17 | Parachinar bomb blast | 8 |
| 19 May 17 | Machni grenade blast | 9 |
| 23 June 17 | Parachinar bomb blast | 27 |
| 11 August 17 | Bajour agency blast | 6 |
| 6 October 17 | RTA wana | 16 |
| 13 November 17 | Bajour agency Ops | 40 |
| 1 December 17 | Agricultural directorate | 6 |
| 3 February 18 | Swat suicide attack | 23 |
| 8 February 18 | Bajour agency mine blast | 4 |
| 4 April 18 | Kurram incidence | 17 |

The intermediate stop of the patient in the hospital was 37 days with a span of 2 to 92 days. 61(28.0%) were directly admitted to the main ICU, and 67(30.7%) patients were admitted to the surgical ICU. The typical stay of patients in the main ICU was 17 days, ranging between 6 to 38 days. We were able to move 14 patients from the main ICU to the ward; the rest were lowered to surgical ICU and then shifted to the ward. The usual stay in surgical ICU was 14 days with a breadth of 1 day to 25 days.

The detail of the blood transfusion incident wise in the first 48 hours is given in Table-II.

The detail of surgeries in 1-12 hours, 12-24 hours and 24 to 48 hours occurrence wise is given in Table-III.

162(74.3%) victims were discharged from the ward, while 56(25.7%) patients were transferred to the rehabilitation ward for proper treatment. The picture of war injured person before and after treatment shown in Figure-2.

**Figure-2: A Picture of Injured Person Before and After Treatment**

## DISCUSSION

All-out efforts are being formulated by the security agencies, police and Pakistan armed forces to stave off adverse events like bomb blasts or IED blasts. However, the function of the healthcare sector is to minimise the loss after the events cannot be dissuaded.

A terrorist bombing in Madrid 2004 and London 2005, with about 2700 victims and 245 deaths, accentuate the implication of being prepared for such

**Table-II: Number of Blood Transfusion in First 48 Hours**

| Date | Incident | Casualties | Blood transfusion | FFP | Platelets |
|---|---|---|---|---|---|
| 21st January 17 | Parachinar bomb blast | 27 | 26 | 8 | 6 |
| 31st March 2017 | Parachinar bomb blast | 37 | 25 | 10 | 12 |
| 20th April 2017 | Parachinar bomb blast | 9 | 19 | 6 | 8 |
| 19th May 2017 | Machni grenade blast | 10 | 8 | Nil | 4 |
| 23rd June 2017 | Parachinar bomb blast | 29 | 49 | 18 | 15 |
| 11th August 2017 | Bajour agency blast | 6 | 24 | 12 | 10 |
| 6th October 2017 | RTA WANNA | 17 | 46 | 22 | 16 |
| 13th November 2017 | Bajour agency OPS | 40 | 37 | 14 | 18 |
| 1st December 2017 | Agriculture directorate | 6 | 15 | 6 | 6 |
| 3rd February 2018 | Swat suicidal attack | 24 | 41 | 16 | 12 |
| 8th February 2018 | Bajour agency mine blast | 5 | 12 | 4 | 4 |
| April 2018 | Kurram incidence | 18 | 29 | 9 | 12 |

MCIs.[5,6] Therefore, hospital planning for management cannot be ad hoc. Instead, a well-rehearsed strategy addresses mitigation, alertness reposit, and revitalization of activities for major mass casualty incidents. It should encompass available hospital resources, including medical personnel, ICU bed capacity, and the number of emergency operations that can be accomplished in 24 hours.

**Table-III: Number of Surgeries In First 48 Hours**

| Surgeries | 1-12 hours | 12-24 hours | 24-48 hours |
|---|---|---|---|
| Laparotomy | 15 | 4 | 5 |
| Thoracotomy | 2 | - | - |
| Chest tube | 29 | - | - |
| Vascular repair | 14 | - | - |
| Craniotomy | 8 | 3 | 2 |
| Spinal fixation | - | 2 | - |
| Maxillofacial surgeries | 3 | 3 | - |
| Debridements | 123 | 85 | 109 |
| Exfix | 43 | 11 | 19 |
| Amputation | 8 | 5 | 14 |

Allocation of responsibility is the rationale for maintaining the eminence of care during patients' quick arrival in mass casualty incidents and promptly returning to normal when the event is over. In this hour of need, paramedics and doctors/consultants have to accomplish duties beyond their conventional comfort zone. We in CMH Peshawar boosted the number of surgical teams by utilizing seniors of speciality surgeons like orthopaedic surgeons, plastic surgeon neurosurgeons and urologists who had general surgery postgraduate experience and qualifications before evolving into their subspecialties. Pulmonologists and intensive care doctors assist in resuscitation. Administration staff can function as liaisons, communication and security officers. Another significant phase is to expand the indoor capacity.

During the acute episode, the elective operations have to be cancelled by a prompt discharge of patients to increase indoor capability and enhance operation theatre space. Therefore, ICU bed space is carved by down strolling the suitable patients. In addition, we use operation room recovery space for supplementary ICU beds.

Initially, in MCI, the focus is on triage, resuscitation and lifesaving surgeries. There is an enormous influx of patients in limited time, so the stress is on lifesaving surgeries. Non-essential components like documentation in the secondary and tertiary survey are initially lacking. When the initial spurt is over, these patients are reaccessed, imaging reevaluated. If compelled, new imaging is done, and all entries are carefully documented to make a reasonable follow-up arrangement. Munificent use of imaging is proposed in the unusual mechanism of injury like air crash.[7] Retained objects in hurriedly closed wounds required reexploration, removal of foreign bodies washed out and secondary closure. Changing lines like NG tube intravenous line assessment of thromboembolism is an essential reassessment component. This approach was crucial to ensuring all 243 patients treated at the MGH after the Boston bombing left the hospital alive.[8]

Media and VIP visits are a distraction in these MCIs. They start calling upon the hospital when the influx of patients increases. These hinder patient care management. Therefore, we appointed a separate communication officer to conduct the VIP visit and disseminate a press release to the media about the patient's present condition and management. The rest of the doctors were not authorized to talk to the press.

In case of mass casualty incidents, hospital administration should ensure these health care professionals are not working to exhaustion. Treating these critically injured patients takes a lot of physical and emotional toll on the health care professionals. For example, 30% of the surgical residents who served at the ORMC during the Pulse nightclub shooting experienced burnout, major depression or post-traumatic stress disorder lasting six months after the catastrophe had ended[9]. The desire to protect a squad fresh for assuming clinical duties met compelling employees to sleep, eat and relax even when they may be stimulated to keep working. It can be done by establishing teams working 8 hours shifts.

The musculoskeletal lower limb (83) was the most established region involved, followed by the upper limb (48), chest (41) and abdomen 29 in that declaration. There were 103 cases of multiply injured patients. In a study performed by Turegano-Fuentes *et al.*[10], body regions primarily affected were the face (56.8%) followed by the chest (38.9%), extremities (3.9%) and abdomen (5.5%). The distribution of injuries after the terrorist bombing attack documented by Peleg *et al.*[11] also alters from ours. They report 30.8% head injuries, 30.8% thoracic, 19.2% abdominal injuries and 19.2% combination. However, in his study from 2004, Peleg *et al.*[12] focused on gunshot and explosion injuries describing injuries as extremely

frequent, followed by injuries to the head, chest and abdomen, which is analogous to ours.

We performed 327 operations in 12 separate occurrences in the first 24 hours. Campion EM7 performed only nine surgeries in the first 24 hours of the Asiana airline crash. The emphasis is on damage control, especially in cases of abdominal trauma.[13,14]

Abdominal injuries (OR 4), low haemoglobin concentration (OR 3.4) and shock on admission (OR 3.1) are common forecasters for emergency life-saving surgeries. Chest tube insertion was a minor intervention and did not account for life-saving emergency operations. Injuries to the appendages are limb-threatening rather than life-threatening. Lipsky et al. report prehospital hypotension to predict the need for an emergency operation in trauma patients showing normal blood pressure on hospital admission.[15]

Availability of blood products is another precious life-saving resource that imposes prompt action by hospital administration. Donors should be made available as soon as the tragic event occurs. We transfused 331 packed RBCs, 125 FFP and 121 platelets in the first 48 hours. We used balanced resuscitation to reduce the need for blood transfusion, as shown by Kautza BC.[16] Our packed RBCs to patient ratio of 1.5 is agreeable with other International Studies that have a proportion between 0.8 to 1.5.[17-19]

## CONCLUSION

Mass casualty incidents result in abrupt inpouring of patients who need incredible administrative skills to manage these patients with ultimate care and put tremendous pressure on hospital reserves in a restricted period. Each MCI has its inimitable dilemma, but most of the features are mutual to most of them. They include hospital resources triage, trauma room resuscitation, blood product requirement, radiological and laboratory investigation management of ICU beds and operation room list. Each such incident teaches us some new lessons, which should integrate into standard operational procedures after thorough deliberation. Dry rehearsals should be conducted keeping in view the new classes to expand disaster management readiness. Sharing of knowledge with civilian counterparts will further modify the community preparedness in such an antagonistic event.

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**Authors' Contribution**

Following authors have made substantial contributions to the manuscript as under:

EAM: & MZ: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

RHJ: & SM: Data acquisition, data analysis, approval of the final version to be published.

SA: Critical review, concept, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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