

# Management of the mass casualty from the 2001 Jos crisis

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## Abstract

**Background:** We report our experience in the hospital management of mass casualty following the Jos civil crisis of 2001.

**Materials and Methods:** A retrospective analysis of the records of patients managed in the Jos civil crisis of September 2001, in Plateau State, Nigeria. Information extracted included demographic data of patients, mechanisms of injury, nature and site of injury, treatment modalities and outcome of care.

**Results:** A total of 463 crisis victims presented over a 5 day period. Out of these, the records of 389 (84.0%) were available and analyzed. There were 348 (89.5%) males and 41 females (10.5%) aged between 3 weeks and 70 years, with a median age of 26 years. Most common mechanisms of injury were gunshot in 176 patients (45.2%) and blunt injuries from clubs and sticks in 140 patients (36.0%). Debridement with or without suturing was the most common surgical procedure, performed in 128 patients (33%) followed by exploratory laparotomy in 27 (6.9%) patients. Complications were documented in 55 patients (14.1%) and there were 16 hospital deaths (4.1% mortality). Challenges included exhaustion of supplies, poor communication and security threats both within the hospital and outside.

**Conclusion:** Most patients reaching the hospital alive had injuries that did not require lifesaving interventions. Institutional preparedness plan would enable the hospital to have an organized approach to care, with better chances of success. More effective means of containing crises should be employed to reduce the attendant casualty rate.

**Key words:** Challenges, civilian conflicts, crisis, disaster, mass casualty, trauma, violence

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## Introduction

The complex nature of natural and man-made disasters poses multidisciplinary challenges of effective management of any local emergency medical services.<sup>[1]</sup> Disaster and mass casualty are often used interchangeably and refers to a situation where a large number of injured patients present simultaneously to an Accident and Emergency (A and E) unit of a hospital overwhelming its material and human resources. The idea of mass casualty management incorporates a single chain of events that involves field triage and resuscitation, transportation, hospital triage, immediate and continued management.

A laid down protocol based on the principle of advance planning and disaster preparedness is a necessity to

ensure a coordinated and optimal use of personnel and scarce resources. Earlier reports<sup>[2,3]</sup> from our center have shown how the use of a protocol could result in successful immediate management of mass casualty.

In summary, the Jos protocol proceeds as follows in our institution: once there is simultaneous presentation of more patients than our surge capacity of seven, a mass casualty situation is declared by the most senior doctor on ground in the accident and emergency unit. There is immediate mobilization of doctors and nurses from other parts of the hospital to the A and E with activation of the cascade callout system [Figure 1] to mobilize staff from outside the hospital

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and notification of the Hospital Management. A triage zone is set up and the most senior surgeon on ground carries out the hospital emergency room (ER) triage. Casualties are assigned triage categories of immediate, delayed, expectant or dead/walking wounded. All elective surgeries are suspended and two operative teams set up in the twin theater. Each is manned by a consultant or Senior Registrar supported by the anesthetists and scrub nurses. Patients in need of immediate surgery are assigned to either of the two teams. Depending on the magnitude of the incident, clinics may be stopped, personnel there redeployed to the A and E, wards evacuated and patients who can be managed at home discharged to make room for the influx of casualties. The consultant surgeon on call notifies the Chief Medical Director who mobilizes the top management to the hospital. The management will then coordinate the mobilization of all heads of the department to the hospital as well as coordinate with other agencies responding to the crisis such as the police, military etc., as may be required. The management also notifies the government at the state and national levels and coordinates collaboration with other hospitals involved in the response. Access to the media and information flow out of the hospital is centrally coordinated by the Public Relations department in conjunction with the office of the Chief Medical Director.

In civilian crises characterized by continuing hostility, the sense of insecurity of the attending personnel compounds the problem. On the 7<sup>th</sup> of September 2001, 4 days before the twin towers attack in New York on 9/11, a violent civilian conflict erupted in Jos engulfing the whole city resulting in the collapse of law and order with attendant loss of lives and property. It lingered until the 12<sup>th</sup> of September 2001. This paper reports our experience with the hospital

management of the mass casualty from this disaster with the aim of highlighting the difficulties encountered and improving future health care responses to conflicts in our environment and recommending ways of prevention.

## Materials and Methods

The Jos University Teaching Hospital (JUTH) is a 520 bed capacity hospital that provides tertiary care to Plateau State and the neighboring, Taraba, Nasarawa, Bauchi and Southern parts of Kaduna States in Nigeria. Plateau State is located in North Central Nigeria, occupies a landmass of about 30,000 km<sup>2</sup>, occupies a high altitude with a peak of about 1,829 m above sea level and has a population of about 3.2 million people from the 2006 estimates.

This is a retrospective review of the experience of JUTH in the management of the mass casualty from the Jos civil crisis of 7-11<sup>th</sup> September 2011. Patients were identified from the Accident and Emergency disaster records, the operating and admission registers and their case notes retrieved from the Hospital's Medical Records Department. Information extracted included demographic data of patients, mechanism of injury, nature and site of injury, treatment modalities and outcome of care.

### Hospital response

Following the first surge of the first series of injured patients to our center which exceeded our usual capacity to cope, a mass casualty situation was declared. The most senior surgeon on ground functioned as the mass casualty commander and the triage officer. Two operative teams were stationed in the operating rooms (OR) made up of surgeons,

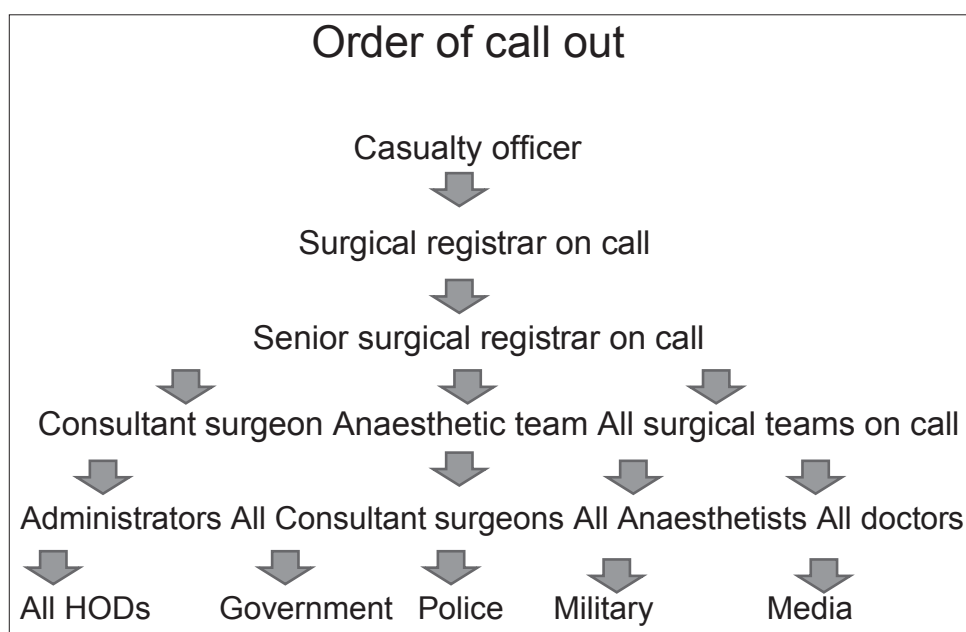


Figure 1: The cascade call out system

nurses and anesthetists and several smaller teams (made up of doctors, nurses, students and co-opted volunteers) in the ER. Following ER triage, patients were assigned to teams according to priority. Patients in need of urgent surgical operations were triaged to the OR whereas those who needed resuscitation or only minor procedures to stabilize them were triaged to one of the ER teams.

Initial care followed the advanced trauma life support protocol with primary survey and resuscitation followed by secondary survey. Laboratory investigations were limited to hematocrit and blood grouping and cross-matching. Radiological investigations were kept to a minimum, except where they were critical to decision making. Definitive treatment depended on the specific injuries found on evaluation in the ER or at exploration in the OR. Intravenous fluids, blood transfusion, tetanus prophylaxis, antibiotics and analgesics were instituted as indicated.

## Results

A total of 463 crisis victims (excluding the “dead on arrival” cases) were attended to over a 4 day period. Out of this, the records of 389 patients (84.0%) were available and analyzed. There were 348 males and 41 females (m: f = 8.5:1) aged between 3 weeks and 70 years with a median age of 26 years [Table 1]. Gunshot was the most common mechanism of injury in 176 patients (45.2%), machete/knife injuries were seen in 140 (36.0%), injuries from clubs and blunt instruments 51 (13.1%), impalements by arrows in 15 (3.9%) and burns in 10 (2.6%). Three patients had injuries inflicted by multiple mechanisms. Table 2 shows the distribution of the causes of injury by mechanism.

Table 3 shows the regional distribution of the injuries by mechanism. Irrespective of the mechanism of injury, head and neck were the most common regions affected, in 171 patients (44.0%), closely followed by extremity injuries in 168 patients (43.2%). 17 patients (4.4%) were poly-traumatized with a combination of head, neck and extremity injury accounting for 10 patients (2.6%), chest head and neck injuries in 2 patients (0.5%) and various other combinations in 5 other patients (1.3%).

Debridement with or without suturing was the most common surgical procedure performed in 128 patients (32.9%), exploratory laparotomy was carried out in 27 patients (6.9%), manipulation under anesthesia with or without Plaster of Paris (POP) casting in 22 patients (5.7%), eye surgery in 19 patients (4.9%), tube thoracostomy in 13 patients (3.3%), exploratory burr hole in 6 (1.5%) and miscellaneous procedures in 38 patients (9.8%). Some of these included fasciotomies, venous cut downs, suprapubic cystostomies, local wound explorations, tracheostomies and external skeletal fixation. The eye trauma is the subject of a different report by the ophthalmology unit of our hospital.<sup>[4]</sup> Table 4

shows the surgical procedures that the patients had. 11 patients (2.8%) received whole blood transfusions between 1 and 5 units with a median of 2 units.

A total of 55 complications were documented. Wound infection accounted for 35 (9.0%), joint stiffness and residual paralysis in 8 (2.1%), impaired vision or blindness without loss of globe 5 (1.3%) and other complications in 5 patients (1.3%). Duration of hospitalization ranged from 1 day to 5 months with a median of 15 days. There were 16 hospital deaths (4.1% mortality). Out of these, burns related

**Table 1: Age and sex distribution of casualties**

Age	Sex		Total	Percentage
	Male	Female		
<10	6	1	7	1.8
11-20	58	7	65	16.7
21-30	139	14	153	39.3
31-40	83	12	95	24.4
41-50	48	5	53	13.6
51-60	11	2	13	3.3
61-70	3	0	3	0.8

**Table 2: Mechanism of injury**

Mechanism	No.	Percentage
Gunshot	176	45.2
Machete/knife	140	36.0
Clubs/blunt instruments	51	13.1
Arrow	15	3.9
Burns	10	2.6
Total	389	100

**Table 3: Regional distribution of injuries by mechanism**

Mechanism	Head/neck	Chest	Abdomen/pelvis	Extremities	Total
Gunshot	46	26	46	85	203
Machete/knife	91	3	15	52	161
Clubs/blunt instruments	25	-	1	18	44
Arrows	6	-	-	8	14
Burns	3	1	3	5	7
Total	171	30	65	168	429

NB=Some patients had injury to multiple body regions while some had injury by multiple mechanisms

**Table 4: Surgical procedures done**

Procedure	No.	Percent
Debridement + suturing	128	32.9
Laparotomy	27	6.9
MU/POP	22	5.7
Eye surgery	19	4.9
Tube thoracostomy	13	3.3
Exploratory burr hole	6	1.5
Others	38	9.8

NB=Some patients had multiple procedures, MU/POP = Plaster of paris

causes accounted for 5, chest injuries, poly-trauma and bowel perforations accounted for 3 (18.8%) each, whereas head injuries and tetanus accounted for one each (6.0%).

## Discussion

A mass casualty situation is said to exist when there is the simultaneous presentation of sufficient numbers of injured patients to overwhelm the institutional capacity to cope.<sup>[5]</sup> Of importance to this definition is not only the absolute number of casualties, but the rate at which they present. Presentation of more numbers than the maximum, which the facility can comfortably handle at any given time (surge capacity) will imply a fall in the standard of care and qualifies as a mass casualty situation irrespective of the absolute number.<sup>[6]</sup> Prior to the 7<sup>th</sup> of September 2001, on the basis of our previous experience with the management of mass casualties from vehicular collisions we had established that in our institution, the JUTH, our surge capacity was limited to seven patients needing lifesaving care at the same time and any figure in excess of that constituted a mass casualty situation for us.<sup>[3]</sup> The presentation of 463 injured patients to our institution over 5 days (arriving in continuous surges at an average of nearly 100/day) well exceeded our capacity to cope and constituted a mass casualty situation.<sup>[2,3]</sup> All the same our response was based on our previous experience in the management of mass casualty from vehicular collisions, with the activation of our Jos protocol and our cascade callout system.<sup>[7]</sup> However, we had to modify several aspects of our protocol to meet the challenges occasioned by the ongoing nature of the hostility and the disruption of organized societal mechanisms for several days which characterized the crisis.

In this study, young adult males in their third decade formed the majority of the crisis victims and this is consistent with the epidemiology of trauma generally.<sup>[5]</sup> This preponderance of young males in our study was because these were the rioters in the first place and bore the brunt when the security agencies were called in to control the situation. Similar reports from Kaduna<sup>[8]</sup> and Calabar<sup>[9]</sup> support this demographic characteristic of victims of violent civilian conflicts in Nigeria.

The Jos crisis of 2001 was characterized by viciousness, horrendous attacks and excessive brutality. Although gunshot injuries predominated as a mechanism of injury (176, 45.2%), the initial weapons of offence were machetes, knives (140, 36.0%) and blunt instruments (51, 13.1%). Then gunshot injuries subsequently appeared and came to predominate as the most common mechanism of injury for two reasons. First was the fact that the combatants quickly armed themselves with firearms to gain the upper hand over their opponents and secondly, the military when drafted to control the situation used live rounds and caused a considerable number of injuries themselves. This accounted for the mixture of both high and

low velocity type of gunshot injuries, which we encountered. These demographics closely parallel the experience from Kaduna, following a civil crisis 1 year before ours.<sup>[8]</sup> Civilian gunshot wounds have been shown to be a common problem in post-civil war Nigeria as a result of the escalation of inter-personal, communal violence and civil upheavals and proliferation of small arms and light weapons<sup>[10,11]</sup> and rising ethno-religious hatred, intolerance and violence.

Regional distribution of the injuries indicated that the head and neck was the most common topographical area injured followed closely by the upper and lower limbs. These are injuries inflicted at close range and are quite similar to the experience from Kaduna.<sup>[8]</sup> The reason for this is that initial mechanism of injuries involved interpersonal violence at close range using sharp and blunt weapons. It is an indication of the lethal intent of the blows and the resulting defensive injuries hence the preponderance of head, neck and upper extremity injuries. Abdominal and chest injuries featured less prominently and were often from penetrating gunshot injuries. Reports from Benin<sup>[12]</sup> and Lagos<sup>[13]</sup> found the abdomen to be the most commonly injured body part in civilian gunshot injuries.

The most common procedure done was debridement with or without closure in 128 patients (32.9%). Fewer patients required laparotomies (6.9%), chest tube insertions (3.3%) and exploratory burr holes (1.5%). Majority of the patients did not require treatment beyond initial resuscitative care. This is in keeping with our previous experience and is similar to the experience from the crisis in Kaduna.<sup>[8]</sup> Most survivors of disasters generating mass casualties have non critical injuries.<sup>[14]</sup> In the Madrid terrorist bombing of 2004, out of 312 patients that presented to one hospital as part of the mass casualty, 29 were critically injured and only seven required life-saving emergency surgery.<sup>[15]</sup> This is the experience from several reports in the management of mass casualties irrespective of the specific etiology of the event. The challenge, therefore, in the management of mass casualties is identifying the few severely injured patients from the multitude that present following the disaster; a situation likened to looking for a needle in a haystack. This is the rationale for the necessity of a highly effective triage system that will sieve out patients that are critical, but salvageable.<sup>[16]</sup> Triage has to be done both in the field, to determine priorities for evacuation and destination and in the ER to determine priorities for care. The field triage in our experience was rudimentary, but we had in place an effective ER triage that identified critical but salvageable patients once they arrived in the hospital. Following triage, the definitive treatment was fairly straight forward and followed the standard care as would have obtained for isolated patients presenting under normal circumstances.

Complications were documented in 55 patients. Wound infection was the commonest complication encountered.



There were also two cases of tetanus one of whom died. Such infective complications are not unexpected for several reasons: First the wounds were sustained under contaminated or dirty circumstances in the field, several patients had significant delays before reaching the hospital due to disruption in public transportation and impassable roads from ongoing hostilities and use of antibiotics was erratic in the hospital, once initial supplies became depleted. Similar problems were encountered in Kaduna experience where some laparotomies were performed without antibiotic cover.<sup>[8]</sup> There were 16 deaths (4.1% mortality). This does not however reflect the true magnitude of mortalities from the crisis itself. A government panel report on this crisis a few years later put the death toll at over 1000.<sup>[17]</sup> This was a similar finding to the Kaduna study where the hospital mortality was low, but overall loss of lives was estimated to have been quite high. The low hospital mortality may be attributable to the possibility that most of the deaths occurred in the field where a natural selection process had taken place, those presenting to the hospitals in all likelihood had less severe degrees of injury and hospital response to these injuries was adequate. Most were discharged in less than 2 weeks after admission (median duration of stay was 15 days) while one patient had a compound comminuted tibial fracture from high velocity gunshot that required complex reconstruction and stayed for 5 months. We found the overall outcome of the management of our patients acceptable given the limitations we faced. This is mostly due to the fact that we had achieved some level of experience and preparedness in the management of mass casualties prior to this incident, our reference scenario having previously been mass casualties from road traffic collisions.

We faced several challenges due to the disruption of the normal functioning of society while the crisis lasted. Communication was a big challenge as there was no prior warning before casualties arrived. Transportation to and from the hospital was hazardous for staff, patients and the general public. Hospital supplies became depleted and could not be restocked and this occurred right from day 1. Mobilization of critical staff to the hospital became difficult by day 2 due to the ongoing hostility on the streets and difficulty with communication. By day 3, feeding became problematic and tensions arose among refugees on the hospital premises threatening to make the hospital itself another theatre in the crisis. This came to a head on day 4 when the hospital was invaded by hoodlums who were repelled by military personnel guarding the hospital. By day 5, enough order had been restored to the town to permit limited movement of personnel and equipment but certain neighborhoods remained hostile and impassable.

Whereas there was practically no pre-hospital care and field triage was crude, the military was very helpful in evacuation of the casualties to hospital as the roads were unsafe for civilians. Cooperation and coordination between

civilians and the military has been reported to facilitate the evacuation of the wounded in such mass casualties as occurred in the Bali bombings<sup>[18,19]</sup> and the war in Sudan.<sup>[20]</sup> We enjoyed no such privilege: The roads were hostile for the wounded, their rescuers and all else. Only the military, because they were armed, could venture out to rescue and evacuate the wounded.

We recommend that all hospitals develop a local disaster response protocol. Such a protocol should be based on the more frequently observed causes of mass casualty (a reference scenario) especially road traffic collisions but should make provision for challenges associated with unusual etiologies that disrupt organized societal mechanisms as occurred in ours. We also recommend greater restraint on the part of security personnel involved in the response to such crises. We were informed by some of our patients that their injuries were inflicted by security personnel. Such injuries inflicted by security personnel are commonplace in Nigeria in peacetime<sup>[9]</sup> and its occurrence during crisis is not entirely unexpected. In the aftermath of the crisis, there were several reports by media organizations and human rights groups of gross abuse of human rights and extrajudicial killings by security personnel in the crisis.<sup>[21]</sup> We recommend that more effective means of controlling rioting crowds should be employed by security agencies without increasing the casualty figures from the crisis. We opine that teargas, pepper/water spray and plastic bullets should be employed first before resorting to live ammunition.

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