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RESEARCH ARTICLE

THE DISASTER MANAGEMENT PLAN: PUT TO THE TEST BY THE ACCIDENT

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ABSTRACT

Chingola sits at the intersection of the routes that lead to the new mining areas: The T3 to Chililabombwe the T5 to Solwezi and the T4 from Kitwe. These roads have, become very busy. The result is that road traffic accidents on these roads have become common place, thus a mass casualty incident is in waiting at all times. On 6th October 2007, two fully loaded mini buses coming from Kitwe going to Chingola and Chililabombwe respectively got involved with three heavy duty trucks. All the vehicles were said to have been traveling at high speeds. A confirmed multiple casualty incident of more than10 victims was observed and as a rule a Type I Alert was put in motion. This called for the activation of the full disaster plan. So Operation Actual Accident (AA) was activated. The first action was the mobilization of the medical staff followed by the mobilization of administration staff. There were fourteen victims who died on the scene of the accident, two died on arrival at Nchanga south hospital, the total number of the dead was 19(31%). The living victims were Triaged and were distributed to the health institutions in Chingola and Chililabomwe. The Triaged patient were put into Priority I , II and III patients. Of the Priority I patients, three died; two had injuries which were extensive and were not compatible with survival one died of thrombo-embolic phenomenon on the third day.

INTRODUCTION

On Saturday, November 28, 1942, at 10:11 PM, a fire started in the basement lounge of the Coconut Grove nightclub in the Bay Village neighbourhood of Boston. Approximately 1,000 occupants were crowded into the nightclub that night, 400 over the club's legal occupancy limit. A lit match used by a busboy to help him change a light bulb is thought to be the cause of this tragic fire, which soon engulfed the entire basement level, shooting rapidly into the upper floors. 492 patrons were killed in that fire (The Boston Public health commission, 1942). Mass casualty incidents like this one have happened and will continue to happen. Where as we can not stop these incidents from happening, we can ameliorate their effects by being ready to deal with them through planned responses. Indeed disasters can be curtailed in their evolution so that they do not progress from a small disaster to a major incident (Patkus and Motylewski, 2007). Chingola, Chililabombwe and Solwezi are urban areas in Zambia's copper mining region. They are a melting pot area with a mixture of people from all parts of the country as they are the fastest developing areas in Zambia.

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Three huge mining projects are being developed in these areas namely; Lumwana and Kansanshi in Solwezi and the Konkola Deep mine in Chililabombwe. Chingola which has a population of over 200 000 sits at intersection of the routes that lead to these new mines: The T3 to Chililabombwe the T5 to Solwezi and the T4 from Kitwe- the regional industrial city. These roads have in the last 4 to 5 years become very busy and congested. The roads are in good repair and so speeding is the order of the day. The result is that road traffic accidents on these roads have become common place; a mass casualty incident in waiting. The region also hosts the major international football matches because the two FIFA approved football stadia in Zambia are currently in Chingola and Konkola. The region has four medical facilities namely Nchanga South and Konkola mine hospitals run by Konkola Copper Mines Plc, Nchanga North and Solwezi general hospitals run by the Government of the Republic of Zambia. All these hospitals also have satellite clinics. In view of our situation, the KCM Hospitals put up a Disaster Plan in order to respond to anticipated disasters from: Mining operations, Social activities such us as riots during social events, accidents resulting from the use of the three busy roads and natural disasters. This document was managed by the major author who was the senior consultant Surgeon (David Cooper, 2006). It was effected in 2002 and it has undergone several revisions

so far. Disaster Drills have been conducted from time to time[2]. The last drill was in August 2007. During that drill the following negative lessons were learned:

- It took 25 minutes to Communicate to all the cadres, this was not good enough. We aimed at 15 minutes.
- The Mine Police were informed, there was quick response but only one mine police officer was sent to the hospital! Naturally control of the crowd was ineffective.
- There was no one detailed to direct the medical staff to various stations and the patients flow to the various prepared bays
- Whereas all the junior Doctors responded, not all consultants did.

These short falls were addressed and indeed two months down the line the real thing happened. Here is presented our experience in managing a mass casualty incident using the guidelines of a Disaster management plan.

Patients and methods

On 6th October 2007 between 1900 and 2000 hrs two accidents took place, one on T3 to Chililabombwe and another on T4 to Kitwe at distances of 13km along T3 and 5km along T4 from Chingola. Five vehicles were involved ;Two fully loaded mini buses coming from Kitwe, one going to Chingola and the other to Chililabombwe respectively got involved with three heavy duty trucks; the Chingola bound bus had a head on collision with a Kitwe bound truck and the Chililabombwe bus was sandwiched by two speeding trucks which were overtaking each other. All the vehicles were said to have been traveling at high speeds. The victims were taken to the nearby medical institutions after an initial triage at the scenes of the accidents by the medical officers and First Aid officers who rushed there: The severely injured were taken to Nchanga South hospital those who were deemed as having minor injuries were taken to Konkola mine hospital and to the Nchanga north general hospital. The walking wounded were taken to the Nchanga South health centre. The dead were taken to the nearest mortuaries at the Nchanga south hospital and Nchanga north general hospital. These victims were carried by ambulances, Police vehicles and good Samaritans' vehicles.
A type I Alert was put in motion since a confirmed multiple casualty incident of more than10 victims was observed. This called for the activation of the full disaster plan. . So Operation Actual Accident (AA) was activated.

First Wave of staff mobilization

The head of the Disaster management plan took charge. The operation centre was set up in the Chief Medical officer's office. All the available consultants were called. The Medical officers and Nursing staff also mobilized

Second Wave of staff mobilization

Laboratory, Pharmacy and administrative staff were mobilized. The mine police were called to control the crowds.

The Triage

Priority I: Casualties who were seriously injured and required immediate attention without which they would die.

Priority 2: Casualties with serious injuries, which may not have caused immediate death but required treatment within 24 hours.

Priority 3: Casualties with minor injuries and those with fatal injuries - these were the walking wounded and the brought in dead

Distribution of Casualties

The patients were distributed according to the seriousness of injury as observed during the triage.

RESULTS

2.1. First Wave of staff mobilization

The Response time was 20 minutes.

2.2. Second Wave of staff mobilization

The Technicians on call came within the hour together with the Mine Police who were brought in to man all the gates to the Hospital in order to control the crowds.

1. Distribution of the victims

A total of 55 people were involved in these accidents. The Distribution of the victims was as shown in Table 1.

Table 1. Distribution of patients

Medical facility	Brought in alive	Died on arrival	Brought in dead	Total
Nchanga South hospital	17	02	02	21
Nchanga North hospital	10	00	12	22
Nchanga South H/C	08	00	00	08
Konkola mine hospital	04	00	00	04
Total	39(70.9)	02(3.6)	14(25.5)	55(100)

RESULTS OF THE TRIAGE AT NCHANGA SOUTH HOSPITAL

The Table 2 describes the Triage at the Nchanga mine Hospital classifying the patients into Priority I to III

(i) The patient in the Resuscitation room Died
(ii) The Patient in the ICU needed Immediate Surgery

Retriage Results

The patients in the male and female wards were retriaged with the following result:

1. Five females and one male needed Immediate Surgery. These patients moved from priority II to priority I
2. Two females and three males were for discharge the following day. One male absconded; One female was discharged on third day.

All the priority III victims went home on same day.

Retriage Results of the Nchanga South Health Center

All the 08 patients were treated for minor bruises and discharged

Retriage Results of the Konkola Mine Hospital

All the four patients were discharged but one patient was readmitted and observed for abdominal pain

Triage Results of the Nchanga North General Hospital

Ten casualties were admitted. One victim had Head Injuries and One had Fracture mandible the same patient also had a le Forte III Injury. This patient was later transferred to the maxillofacial unit at the UTH in Lusaka. Eight victims had bruises and were discharged the following day. There were 12 casualties who were brought in dead.

Mortality

Three Of the Priority I patients died; one died while waiting for surgery despite all resuscitative measures and two died after surgery. Of the three, two males had injuries which were extensive and were not compatible with survival. The female died of a thrombo-embolic phenomenon on the third day.

This was a survivable condition. There were fourteen victims who died on the scene of the accident and were brought in dead. Two other victims died on arrival at Nchanga south hospital the total number of the dead was 19(31%).

Table 2. Triage at Nchanga South Hospital

Priority I	Priority II	Priority III	BID
Resuscitation Room=01 ICU=01	Male surgical ward =05 Female Surgical ward =08	Foyer 03 Male Medical ward =01	02
Total =02	Total =13	Total 04	02

Injuries Sustained

There were patients with Fractures and another group with abdominal injuries. These are shown in Table III and Table IV. In Table V there is record of patients with various wounds.

Table 3. Fractures

Injury	No.Pts	Rt	Lt	Open	Closed
Femur	4	1	3	2	2
Ribs	3	0	3	0	3
Pelvis	3	0	3	0	3
Maxillary	1	-	-	1	0
Mandible	2	1	1	1	0
Humerus	1	1	0	0	1
Cervical spine injury	1	-	-	0	0
Total	15	3	10	4	9

Table 4. Abdominal Injuries.

Injury	No. Patients
Liver Injury	1
Spleen Rapture	2
Retroperitoneal Haematoma	2
Total	5

Table 5. Other Injuries

Injury	No. Patients
Head Injuries	03 (Two died later)
Hand Injury	02
Lacerations	04
Bruises	25
Haemothorax	01
Total	35

The Management of Major Injuries

The patients were grouped into Priority I to III. Those who were the priority I patients were those who needed immediate surgery. Table VI describes this group.

DISCUSSION

When one thinks about it, one finds that Similar to the ABCs of trauma care, disaster response includes basic elements that are similar in all disasters. The difference is the degree to which these responses are utilized in a specific disaster, and the degree to which outside assistance is needed to perform the ABCs of disaster care[1]. As a hospital we did need the services of our sister Hospital the Nchanga North general Hospital otherwise we could have found it difficult to cope with the load on our own. It was fortunate that we had put up the document, though limited to hospital based disasters, and we carried trial runs or drills to see whether what we put on paper would work in the event of an actual disaster. It must be said these drills helped us to sharpen our focus on the various aspects of the Disaster plan which are the Medical concerns related to Mass Casualty Incidents; these included four elements namely Search and rescue, Evacuation from the scene of the incidence Triage and initial stabilization and Definitive medical care[1].In all these aspects our staff performed very well:

There were medical staff who went to the scenes of the accidents to search and rescue the victims, these teams were made up of medical officers and First Aiders from the Mine. The victims dead or alive were evacuated from the scenes of the accident using ground transport more like the 1942 Boston fire disaster where Police and fire fighters commandeered police cars, taxicabs, and newspaper trucks to serve as ambulances to move the victims to hospital[3]. At the hospital particularly the Nchanga south hospital where the severely injured victims were taken, there was a triage carried out and initial stabilization was done. The survivors were given definitive treatment. In our preparation of the document, we did anticipate that one day we would encounter a mining disaster because of our involvement with the mines, a social

Table 6. Patients who needed surgery

Patient	Injuries	Procedures Done
1.Male 20 yrs	Head Injuries, Fractures of mandible, Ribs,& Lt Acetabulum .Haemothorax Haemoperitoneum	ICD, Laparotomy Skeletal traction Kept in ICU Died on 4th Day
2.Male 42 years	Ruptured spleen, liver laceration, Fractures of Lt femor. Tib+Fib,Rt Humerus	Laparotomy + skeletal traction
3.Female 42yrs	Fracture Pelvis, Haemoperitoneum Dislocation, C 2,3	Skin traction Laparotomy Skull traction
4.Female 49yrs	Fracture Lt Femur Ruptured Spleen	Skeletal traction Spleenectomy Died suddenly on 3rd day
5.Female 32yrs	Open fracture Lt femur Hypheamor Rt eye	Skeletal traction and debridement
6.Female 35 yrs	Fracture Rt femur Degloving injury Lt hand	Debridement, Skeletal traction
7. Female 21 yrs	Lt Sacro-Iliac Disruption Fractured Ribs Rt side	Skeletal Traction
8. Male 45 yrs	Head Injuries GCS 3 Flail Chest	Died while waiting for surgery despite resuscitative measures

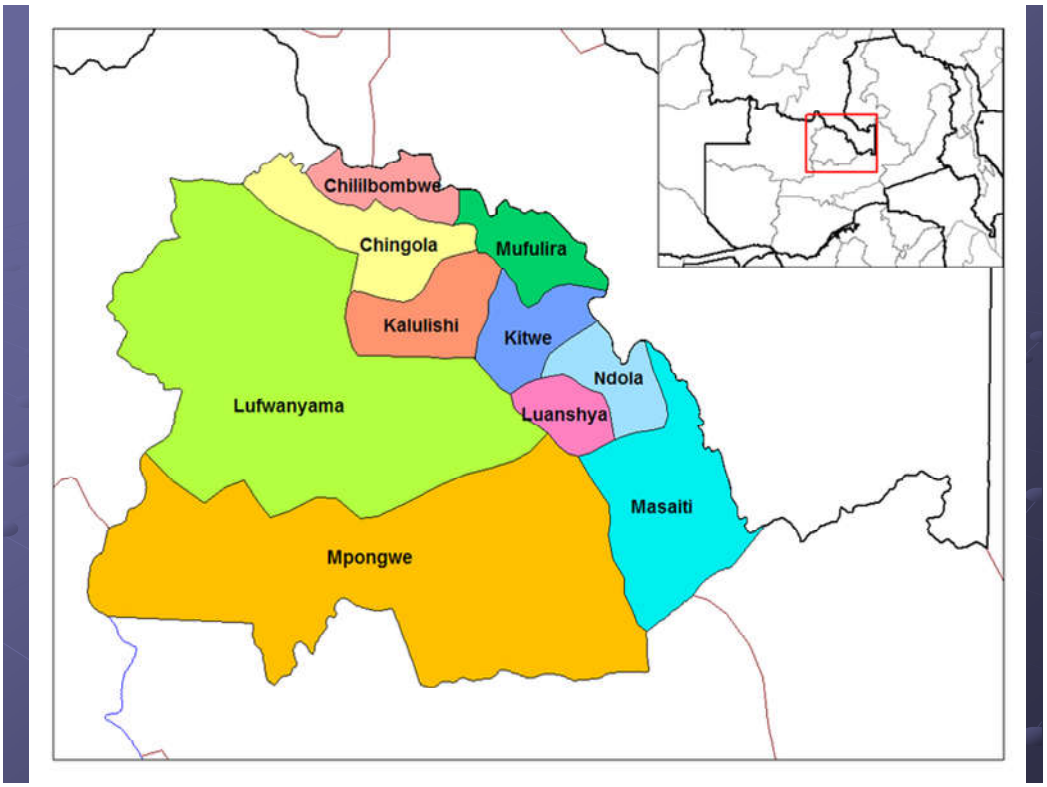

Figure 1. Region of the Copper Belt

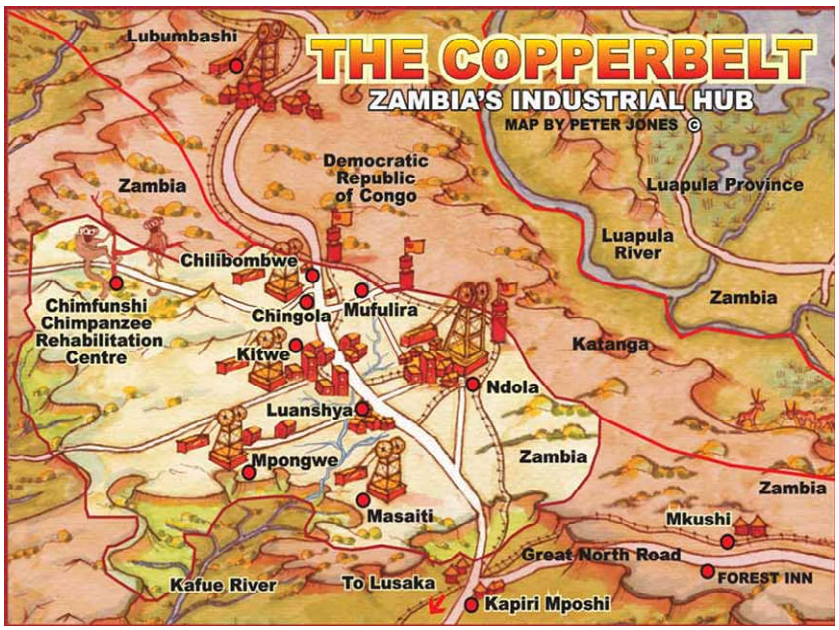

Figure 2. The Industrial Copper Belt region

Figure 3. The T3 Road Accident

Figure 4. T3 Road Accident

Figure 5. RTA Neck Victim

event disaster because of our having two very busy stadiums in our two towns-Chingola and Konkola, a public health disaster because we live in a developing country with the attendant public health issues and of course a road traffic disaster because of our position sitting at the intersection of the three major routes on the Copper belt. True to Murphy's Law one of these anticipations happened on the night of the 6th of October 2007. The quick mobilization of the medical staff was possible because of previous drills we had.

Figure 6. Hip Fracture patient

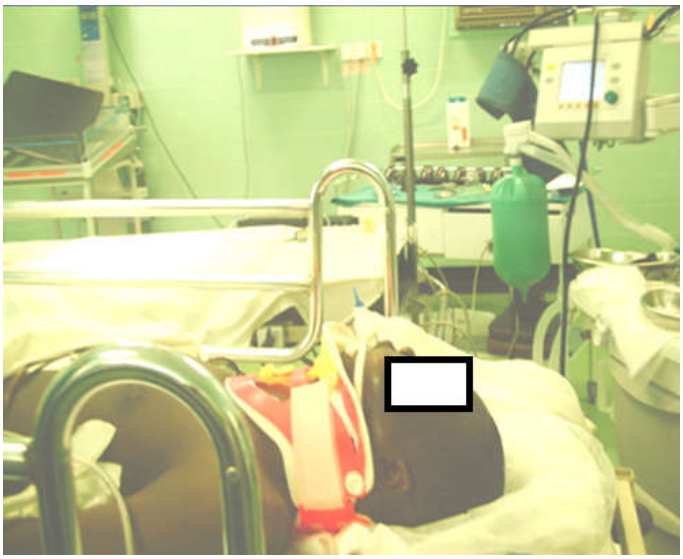

Figure 7. Head Injuries Victim

In most cases people were doing what they were expected to do, there was little confusion and panic. Later on the administrative staffs were also mobilized to attend to administrative issues which arose like transport, issuing of necessary materials and looking after the care givers[4]. It is our belief that the death toll would have been higher if we had been caught unawares. As it is only one patient died of a potentially survivable condition. The issue here is that we in developing countries can manage these incidents just like anywhere else if we put in place measures like a disaster plan document and carry out drills. This will attune our medical personnel to the idea of handling medical/surgical emergencies in a calm non panicky way. Most modern hospitals have made it their policy to write Disaster plans and carry out Disaster drills or simulations to prepare for these disasters[2]. Although this is the trend nowadays most health workers learn about mass casualty management by being caught in a mass casualty incidence without preparation (Patkus and Motylewski, 2007). In our case the results speak for themselves; This was a high impact accident looking at the number of people that died at the scene of the accident -14 out of the total mortality of 19, however of those that were taken to the hospital alive only three died; two had injuries not compatible with survival only one died of a potentially preventable condition the others

survived despite having very severe injuries. This was not a chance occurrence it was a result of the organized way in which they were handled. A review of the types of cases treated by the Australian medical team in Banda Aceh[5] were trauma and wounds (39%), respiratory disease/lung injury, In our situation 38.5% of the patients came in with fractures of various types (Table III) and 13% came in with abdominal injuries (Table IV) all of which were serious injuries and 74% came in with bruises and lacerations (Table V) In regards to surgical interventions in Banda Aceh, 80% involved debridement of wounds and dressings with very few primary closures or external fixation procedures in our case almost 90% needed some form of surgical intervention or other with 20.5% of the cases needing major surgical operations. An example of the types of injuries encountered during an earthquake is described in a comprehensive review following the Gujarat, India event in 2001[6].The most common injury was to the lower extremity (56%). The spine and pelvis were injured in 17% of cases, and the upper extremity in 13% of cases. Chest and/or abdominal trauma constituted <4% of cases. Crush syndrome was seen in less than 2% of cases. These examples are quoted to show the fact that mass casualty incidents present variously and the Injuries occasioned would depend on the nature of the incident. It is incumbent upon all of us in the health care giving services to prepare ourselves all the time to handle these situation which will come upon us from time to time.

Conclusion

"Prevention is better than cure" goes the old adage; even in the case of accidents it would be great if all accidents could be prevented. Unfortunately accidents do happen despite our best intentions to prevent them so it is incumbent upon us to be ready to deal with them when they do happen, remember also the other old adage which says " he who fails to prepare, prepares to fail". This was the underlying theme as we prepared our document on the management of disasters, the operative word was "readiness" one cannot be ready to handle these situations if one does not think about these situations in a structured way

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