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The Charlotte Maxeke Johannesburg Academic Hospital *Fire*: Our Orthopaedic Surgery Disaster Management and Lessons Learnt

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Abstract

Purpose: This report aims to review the orthopaedic doctor's experiences and to provide insight for the formulation of response measures for similar incidents in the future.We further report on our orthopaedic surgery disaster management and lessons learnt

Methodology: A retrospective review of orthopaedic patients who were admitted at Chris Hani Baragwanath academic hospital (CHBAH) from the 01 April to 30 April 2021, the month of the fire incident. Data were obtained from the hospital casualty, inpatient registers, and outpatient registers. Data were compared before and after the fire incident.

Findings: Transfer was provided to 51 patients to CHBAH orthopaedic emergency unit. Forty-three (84.3%) were adult patients and eight (15.7%) were paediatric patients. There were fewer daily admissions to orthopaedic emergency unit in the last 15 days of the month of the disaster compared to the first 15 days, when the 51 cases from Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) were excluded (mean: 12.89 *versus* 13.26). The orthopaedic outpatient department doctor to patient ratio improved after the fire incident.

Recommendation: The four phases' disaster approach- preparedness, response, recovery and mitigation remain applicable to disaster management. Planning for emergencies the dedication of orthopaedic professionals and hospital employees can all contribute to the highest quality patient care.

Keywords: *Academic Hospital, Hospital* Fire, *Orthopaedic Surgery, Disaster Management, Lessons Learnt*

1.0 INTRODUCTION

A disaster is a disruptive event that exceeds a community's ability to satisfy healthcare demands due to its devastating impact [1]. Mass casualty occurrences are extremely unusual, and many hospitals and big trauma centres have never seen one [2]. On the 16th April of 2021, a terrible fire forced the evacuation of over 800 patients from Johannesburg's urban academic hospital [3]. Patients were quickly transported to sister hospitals in the province because of the fire, one of which was Chris Hani Baragwanath academic hospital (CHBAH). The evacuation of orthopaedic surgery patients and personnel went off without a hitch, with no one dying. The catastrophe response was simplified in accordance with the disaster management act's requirements [3,4,5].

Despite an increase in hospital challenges in African countries, there are currently few reports on hospital mass casualty events. We believe that by reporting on our orthopaedic challenges and strengths, one would learn from them and enhance their institutions.

This report aims to review the orthopaedic doctor's experiences and to provide insight for the formulation of response measures for similar incidents in the future. We further report on our orthopaedic surgery disaster management and lessons learnt.

2.0 METHODOLOGY

A retrospective review of orthopaedic patients who were admitted at CHBAH from the 01 April to 30 April 2021, the month of the fire incident was undertaken. Data were obtained from the hospital's casualty, inpatient, emergency theatres and outpatient registers.

All Orthopaedic patients admitted at CHBAH from Charlotte Maxeke Johannesburg Academic hospital (CMJAH) were included. Patients discharged before opening a file at CHBAH and none orthopaedic patients were excluded.

The CHBAH orthopaedic department has 225 beds with 48 beds allocated to the orthopaedic paediatric unit. The CHBAH orthopaedic emergency unit (OEU) offers services 24 hours a day, seven days a week, and sees patients of all age groups. The OEU is managed by two consultants, two registrars, a medical officer and two medical interns on call daily. At the beginning of April 2021, there were 70 orthopaedic surgery doctors in the orthopaedic surgery at CHBAH (21 consultants, 21 registrars, 10 medical officers, and 18 interns). CHBAH is in Soweto, 18.2 km from the CMJAH. South Africa was on Coronavirus disease -19 adjusted alert level 1 from 01 March 2021 to 30 May 2021at that point.

The data is a reflection of admissions in April at CHBAH orthopaedic department. We measured the rate of admissions before the fire incident and after the fire incident in the month of April 2021.The fire incident as reported occurred on 16 April 2021. The study focusses on admissions from orthopaedic emergency unit and total number of inpatients. Inpatients are further subdivided to orthopaedics department units namely: trauma, arthroplasty, sports and general, tumour and sepsis, spine, paediatrics and hands. Furthermore, this study looks at the departmental staff members who looked after the patients admitted in April 2021. The staff comprises of consultants, registrars, medical officers and medical interns. The study also looks at number of patients seen daily as outpatients in April 2021.

3.0 FINDINGS

3.1 Staff Members

The CHBAH orthopaedic department in April 2021 consisted of 70 staff doctors (21 consultants, 21 registrars, 10 medical officers and 18 interns) before the fire incident. After the fire incident, the 47 staff members (14 consultants, 16 registrars, 7 medical officers and 10

interns) from CMJAH orthopaedic department were merged with the CHBAH staff members. The total number of staff members increased (59.8%) from 70 to 117 after the incident.

3.2 Patients

Total number of inpatients on 17 April 2021 was 214 patients (**see figure 1**). CHBAH had admitted 190 cases before the fire and discharged 44 cases to accommodate the 68 new cases admission. The 44 discharged cases comprises of elective cases and post-operative cases.

3.3 Orthopaedic Emergency Unit

Figure 2 shows the daily number of patients admitted at orthopaedic emergency unit in April 2021. The day of the fire had a highest admission of 68 patients. CMJAH referred 51 cases out of the 68 cases and 17 cases were admitted at CHBAH directly. The highest daily case admission before and after the fire incident was 23 and 22 cases, respectively. The lowest daily case admission before and after the fire incident was six and seven patients. The mean daily admission before the fire event was 13.26. The mean daily admission after the fire incident was 16.26 and without the 51 cases directly from CMJAH was 12.89.

The total number of patients admitted at CHBAH in April 2021, including patients from CMJAH were 443 comprising of 199 (45%) admitted before the fire and 244 (55%) admitted after the fire. An overall 10% increase of admission rate was noted after the fire incident.

3.4 Communication

- WhatsApp played a huge role in communication throughout the disaster. As WhatsApp groups were formed, they made communication easier.

Orthopaedic Surgery Emergency Theatres

- Emergency daily orthopaedic surgery theatres (**see Table 1**)
- Theatre 10 is an emergency orthopaedic surgery theatre that runs 24 hours per day.
- Minor surgery theatre is an emergency orthopaedic surgery theatre that runs 24 hours per day.
- Theatre 07 is a surgical theatre used by all CHBAH surgical disciplines for mainly septic cases. It is a 24 hours theatre.
- Two extra theatres were utilised to assist with patient load. (**see Table 1**)
- St Johns theatre is a non-orthopaedic unit theatre. It was given to the orthopaedic surgery team on 18 April 2021 and it was used for performing surgeries that did not require fluoroscope. St Johns theatre was being run by a consultant or registrar with a medical officer and it ran from 8h00 to 16h00, Monday to Friday.
- Theatre 03 is an orthopaedic surgery theatre mostly used for elective cases. It was converted to an emergency theatre on the 17th of April 2021. Theatre 03 was being run by a consultant or registrar with a medical officer and it ran 24hours per day.

3.5 April Doctor-Patient Ratio

The orthopaedic outpatient department (OOPD) operates from Monday to Friday. In April 2021, 4130 patients were seen at OOPD, while 1072 patients were seen in the OEU. The doctor-patient ratio in April was 1:44.5 per month and 1:1.5 per day.

3.6 Lesson Learnt

Factors of Success

(i) Staffing

Both institutions had experienced medical staffs who are highly trained in trauma response. Immediately availability of medical staff assisted to reduce heavy patient load. The institutional staff where on high alert to evacuate the centre during the fire event. The community was also available to assist with movement of patients.

(ii) Communication

As a communication mechanism, the media and social media played a significant role. Regular hybrid meetings were held with a clear communication command. A teamwork system approach had a significant role with an effective leadership.

(iii) Resources

A relationship with receiving institutions and organizations was fruitful. Receiving institutions managed to admit and operate on patients who were awaiting surgery. The two institutions had highly qualified orthopaedic surgeons who were able to operate on complex cases without the need for additional assistance.

(iv) Planning

The evacuation strategy in place was critical, as was the choice made by the leadership team. Professors lead the orthopaedic surgery departments at both academic institutions, making it easier to plan and resolve the patient loads. During the disaster phase, the leadership of both institutions worked together to ensure that the preparation was carried out meticulously.

(v) Logistics

All patients were identified by their inpatient CMJAH wrist tags, which were accompanied by their documentation. Staff at the CHBAH orthopaedic emergency unit were able to quickly identify them. We did not have any orthopaedic patients that required Intensive Care or High Care units. Patients were triaged appropriately and some discharged home as seen fit. This reduced the number of patients who needed to be transferred to another facility. During the evacuation and transfer of patients, health care personnel provided continuous care.

(vi) Parents

Families were kept informed about their children's transition from CMJAH to CHBAH and were kept up to date until they were admitted. Some parents were able to come out and assist with their children's mobility. Staff members volunteered to use their cell phones to contact families with switchboard inundated with calls, making it impossible for the staff member to utilize the hospital phones.

Improvement Needed

(i) Staff

In crisis scenarios, occupational health services are vital, and debriefing should be offered to all employees. Post disaster counselling is necessary. Allied staff members should also be readily accessible to assist in a disaster event.

(ii) Academics

During disaster events, teaching must be adjusted for all candidates affected. Our two centres had orthopaedic surgery fellows, registrars, medical officers, medical interns, and

undergraduate students who were receiving their academics and it was affected by the disaster event.

(iii) Planning

Disaster drills and simulations are necessary at least once or twice a year.

(iv) Patients

For patient admission and tracking, a paperless and integrated provincial system is required.

4.0 DISCUSSSION

Our orthopaedic surgery approach was like that of Born *et al*[5].Disaster was addressed in phases (internal or external):

Phase 1: Preparedness

Both academic orthopaedic centres had qualified staff: professors, consultants, fellows, registrars, medical officers, and medical interns. Most of the staff members had done their Acute trauma life support training to render appropriate response to disaster management. The institutions had in place a disaster response plan. Both institutions had at least two consultants on cover afterhours daily. The receiving institution had three orthopaedic surgery theatres running on the night of the disaster event.

Phase 2: Disaster Response

The hospital incident command system was activated. Orthopaedic surgery doctors were called out to assist. Leadership was provided by orthopaedic surgery heads in both hospitals. On call teams communicated well with the staff offsite.

Orthopaedic emergency unit: CHBAH triage protocol was utilized to maintain the flow of patients.

Orthopaedic emergency theatre: theatres were added to assist with the cases load.

Orthopaedic wards: elective and post-surgery patients were discharged at CHBAH to free-up beds and accommodate patients from our sister hospital.

Orthopaedic staff: more senior staff members were available to cover trauma cases. *Orthopaedic communication system:* affordable WhatsApp groups communication system were created, and hybrid meetings were held.

Orthopaedic outpatient department: the CHBAH OOPD accommodated some patients from CMJAH not to disrupt their orthopaedic treatment.

Phase 3: Disaster Recovery

All CMJAH orthopaedic surgery patients were discharged from CHBAH wards two weeks later after receiving their orthopaedic care. After two weeks, several orthopaedic surgeons began operating on semi-urgent patients outside of CHBAH.

Phase 4: Disaster Mitigation

We did not have to use tent or temporary hospital to accommodate patients. Existing hospital theatre were used to operate on cases.

5.0 CONCLUSION

The best patient care was provided as a result of disaster planning, the commitment of orthopaedic professionals, and hospital staff.

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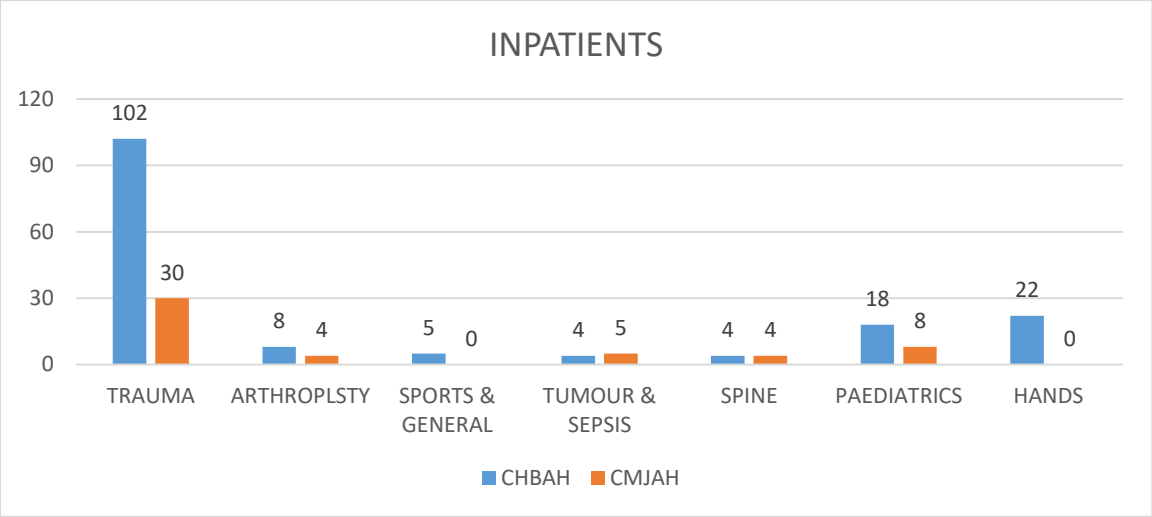

*CHBAH: Chris Hani Baragwanath Academic Hospital, CMJAH: Charlotte Maxeke Johannesburg Academic Hospital

Figure 1: Bar Graph Illustrating the Total Number on Inpatients

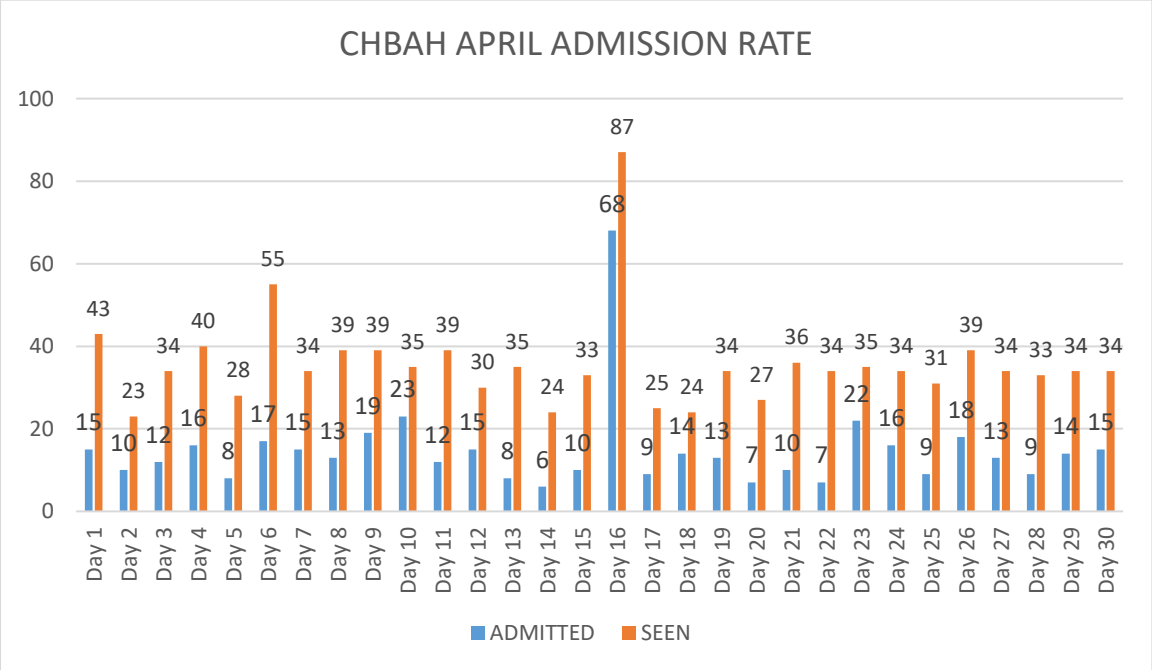

Figure 2: Bar Graph Depicting Daily Case Admissions

Table 1: Theatre Activities

	THEATRE 10 **(orthopaedic emergency theatre**	**THEATRE 7**	**THEATRE 3** **(extra theatre)**	**THEATRE (ST Johns)** **Extra theatre**	**MINOR SURGERY** **THEATRE**
Surgeon	Registrar /Consultant	Medical officer/ Registrar	Registrar /Consultant	Consultant/ Registrar/ Medical officer	Registrar/ Medical officer & Intern
Cases operated in this theatre	Emergency trauma cases	Septic cases	Emergency trauma cases	None fluoroscopy cases	Minor surgery cases