



Research Article

The Effect of COVID-19 Lockdown, Riots and A Hospital Fire on the Trauma Patient Load in Johannesburg

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Abstract

Introduction: Trauma remains pandemic in South Africa despite the ongoing healthcare burden from communicable and non-communicable diseases. During the Covid-19 pandemic, social behaviour was governed by changing rules and regulations depending on the peaks (waves) and troughs of the infection rate. This behaviour led to a change in the demographics and clinical characteristics of patients frequenting emergency departments. We aim to describe how the trauma profile was affected by the Covid-19 lockdown, a hospital fire and riots at the two Trauma Centers in Johannesburg.

Methods: A retrospective audit of the Medibank database, Morbidity and Mortality meetings data and Emergency Department patient registry for the week of 9 - 16 July 2019, 2020, and 2021 at Chris Hani Baragwanath Academic Hospital (CHBAH) and Charlotte Maxeke Johannesburg Academic Hospital (CMJAH). Variables assessed included the number of patients seen in Trauma Emergency Unit (TEU) (Priority 3 (P3)) and Trauma resuscitations (Priority 1 (P1) and Priority 2 (P2)), mechanism of injury and surgical procedures done. STATA version 17 was used for descriptive analysis. A p-value of less than 0.05 was considered significant. Ethics clearance was sought from the University's human ethics committee and the Hospital management.

Results: A significant increase in overall trauma was noted, with a predominance in penetrating injury. Young males were affected in more than 79% of the cases. There was an increase of 14.7% to 24.8% of P1 cases in the study. Penetrating trauma was the predominant mechanism of injury, with a significant increase in Gunshot Wounds (GSW) in the study period. None of the above significantly affected the Covid positivity rate.

Conclusion: These events resulted in an increased number of patients seen with no effect on the gender, age or Priority distribution of patients. However, a predominance of GSW translated to more surgical procedures being performed. National and international events highly influence the Trauma profile, and therefore, all policymakers should consider its gravity.

Keywords: Covid; Fire; Riots; Trauma profile

Introduction

Trauma remains pandemic in South Africa despite the ongoing healthcare burden from communicable and non-communicable diseases, resulting in a quadruple disease burden [1,2]. During the Covid-19 pandemic, social behaviour was governed by changing rules and regulations dependent on the waves of the infection rate. This behaviour led to a change in the demographics and clinical characteristics of patients frequenting emergency departments. Most studies conducted globally compared these newfound statistics to the year 2019 as a control group or the troughs of the infection rate as a pre-lockdown vs a lockdown during a wave of the infection rate [3-14]. The United Kingdom (UK) showed a decrease in overall trauma by 35% [3]. However, the mechanisms of injury had changed to an increase in self-harm and domestic violence-related injuries and a reduction in interpersonal violence attributed to the rules of staying at home and social distancing during the various levels of lockdown [3]. With isolation at home and a lockdown of the economy, psychological stresses increased due to financial stress, unemployment, and alcohol consumption [3]. Healthcare facilities were not frequented due to the fear of contracting the virus; therefore, mental health diseases went uncontrolled, and victims of domestic violence had no safe haven; thus, the trauma profile changed [3,4,11]. The increase in domestic violence is echoed by other centres, with a 7 - 27% increase in reports at police departments [4].

In contrast to the UK, the United States of America (USA) showed a decrease in overall trauma but an increase in penetrating trauma during their lockdown periods with a statistically significant increase in GSW [7,8]. The rates of assaults and self-inflicted injuries increased as well [3,9-13]. Orthopaedic trauma decreased in the Iranian and French pediatric populations [5,14]. While the Indian study showed a decrease in Traumatic Brain Injuries (TBI) during lockdowns [6]. One recognizes the trend in the trauma profile changed globally but with conflicting evidence dependent on the country of origin and the mechanism of Injury.

However, the city of Johannesburg in Gauteng, South Africa (RSA) is unique in that its trauma profile was influenced by multiple

international, national, and local events. In July 2021, RSA was experiencing its 3rd Covid 19 wave and was in an adjusted level 4 lockdown. This translated to the prohibition of alcohol sales, curfew from 9 pm to 4 am, restaurants to only do take-aways, all social gatherings prohibited, masks, sanitizing, and social distancing were mandatory [15]. At the same time, there was a national civil unrest resulting in riots and looting with the addition of a fire at the neighboring Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) Trauma Centre, deeming this centre closed from the 16th April 2021. As a result, the only functional Level 1 trauma centre, Chris Hani Baragwanath Academic Hospital (CHBAH), had to navigate the above events and the changing trauma profile. We aim to describe how the trauma profile was affected by the Covid-19 lockdown, a hospital fire and riots at the two Trauma Centers in Johannesburg.

Methods

A retrospective audit of the Medibank database, Morbidity and Mortality meetings data and patient Emergency department registry for the week of 9 - 16 July 2019, 2020, and 2021 at CHBAH and CMJAH. The study dates were determined by the unusual riot period experienced in the country. Variables assessed, included the number of patients seen in TEU (Priority 3 patients -P3) and Trauma resuscitations (Priority 1 (P1) and Priority 2 (P2) patients), mechanism of injury and emergency surgical procedures performed. The data over the three year similar periods were compared to assess the similarities and differences in each period. Patients' mechanisms of injury that included burns were excluded from the study. Categorical variables are reported as frequencies and percentages. The chi-squared test was used to assess statistical significance. STATA version 17 was used for all statistical analysis. A p-value of less than 0.05 was considered statistically significant. Ethics approval was given by the Humans Research Ethics Committee (Medical) of the University of the Witwatersrand (M220247) and the relevant hospital authorities.

Results

Both hospitals over the years show a similar patient demographic with a predominance of young males susceptible to traumatic injury, as shown in Figures 1 and 2.

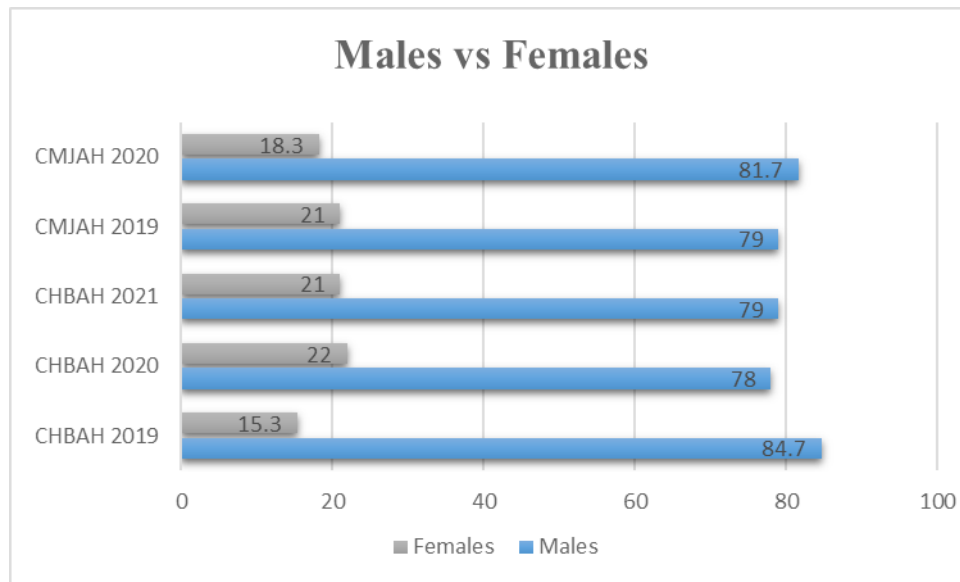


Figure 1: Gender distribution. The horizontal Axis is Percentage, and the Vertical Axis shows the Hospital name and year. CHBAH (Chris Hani Baragwanath Academic Hospital). CMJAH (Charlotte Maxeke Johannesburg Academic Hospital).

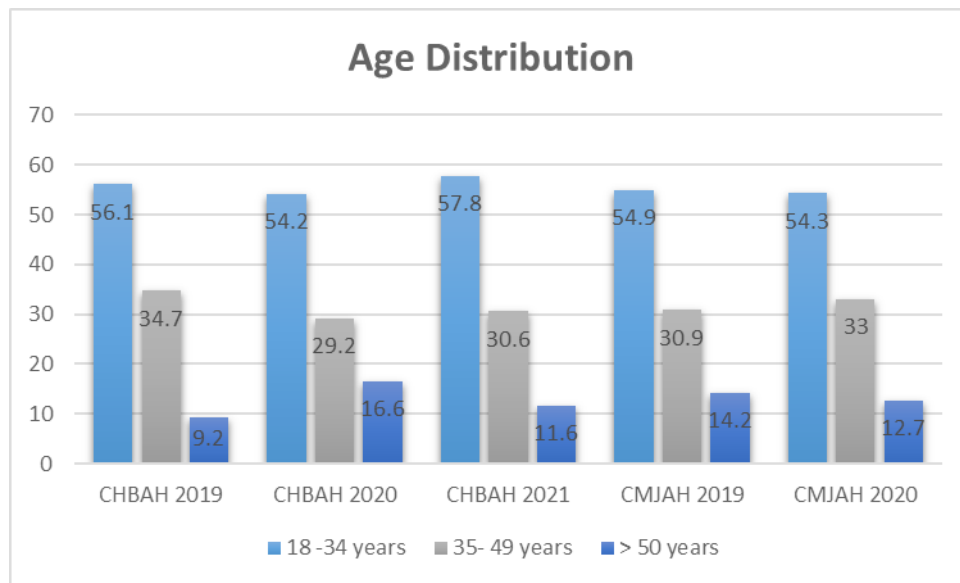


Figure 2: Age distribution. The Vertical Axis is Percentage, and the Horizontal Axis shows the Hospital name and year. CHBAH (Chris Hani Baragwanath Academic Hospital). CMJAH (Charlotte Maxeke Johannesburg Academic Hospital).

Table 1 shows the number of patients seen at each hospital during the relevant week in 2019 (control), 2020 (Covid 19 lockdown) and 2021 (riots). No patients were seen at CMJAH during that week in 2021 as the hospital was closed due to the fire, and all major Trauma in the region were referred to CHBAH. As per Table 1, in CHBAH 2019, the TEU (P3) patients seen accounted for 85.9% (550 patients), whereas in 2020 and 2021, this decreased to 75%. The Resus (P1+P2) patient ratio remained unchanged between 2020 and 2021 at 25%, with a lower percentage seen in 2019 (14.1%). A statistically significant difference was only noted between the CHBAH 2020 (Covid 19 lockdown) and CHBAH 2021 (riots) groups compared to the control in 2019. The resuscitated patients at CMJAH include only P1 patients.

Year	TEU	RESUS	P values
CHBAH 2019	550 (85.9%)	92 (14.1%)	CHBAH 2019 vs CHBAH 2020 p = 0.001
CMJAH 2019	190 (82.3%)	41 (17.7%)	CHBAH 2019 vs CMJAH 2019 p = 0.215
CHBAH 2020	138 (75%)	46 (25%)	CHBAH 2020 vs CHBAH 2021 p= 0.945
CMJAH 2020	82 (65%)	44 (35%)	CHBAH 2020 vs CMJAH 2020 p = 0.059
CHBAH 2021	532 (75.2%)	175 (24.8%)	CHBAH 2019 vs CHBAH 2021 p = 0.000

TEU (Trauma emergency units Priority 3 (P3) patients), RESUS(Priority 1 and 2 (P1and P2) patients, CHBAH(Chris Hani Baragwanath Academic Hospital), CMJAH (Charlotte Maxeke Johannesburg Academic Hospital)

Table 1: Number of patients seen in the Trauma Unit expressed as frequencies (percentage).

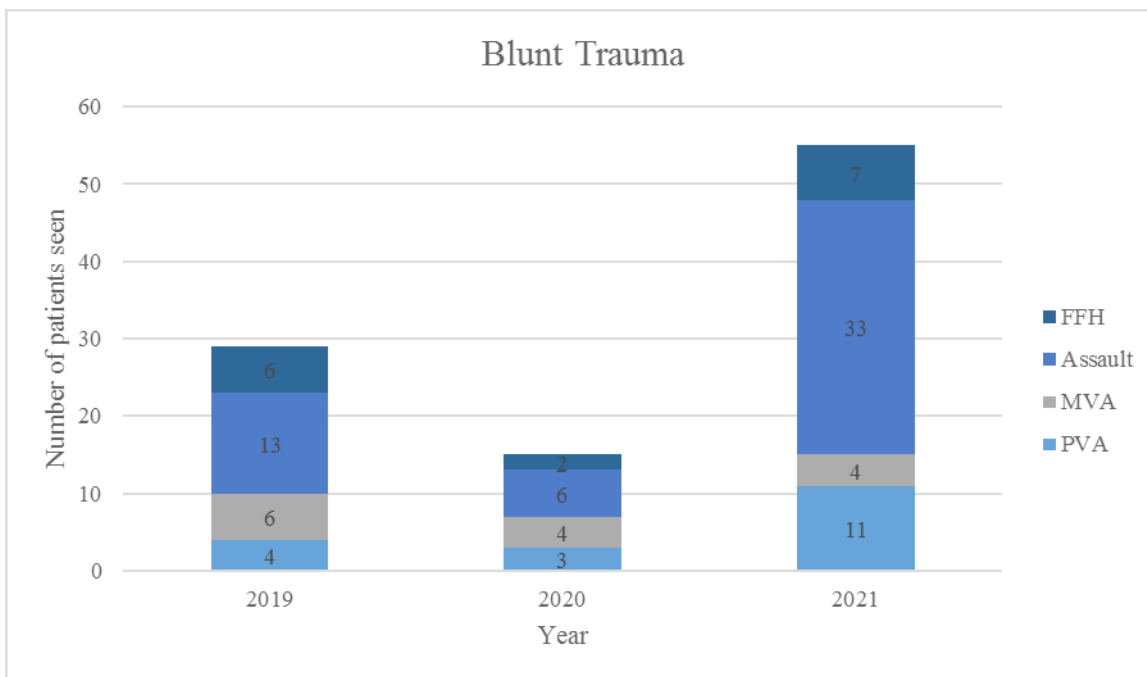
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Admissions	2019	2020		2021	P-value
		CHBAH	CMJAH		
Admissions 9 - 16 July	49 (0 ICU)	39 (2 ICU)	40 (3 ICU)	121 (5 ICU)	
Admission rate	24%	21.2%	31.7%	17.1%	
Covid positive	0	2	5	11	p = 0.43 (CHBAH)
Positivity rate	Not applicable	5% (Average nationally 24.8%)	12.5%	9% (Average nationally 29.1%)	
Mortalities	4	2	2	6	

ICU (Intensive care unit, CHBAH (Chris Hani Baragwanath Academic Hospital, CMJAH (Charlotte Maxeke Johannesburg Academic Hospital)

Table 2: Admissions and Covid-19 Positivity rates 9 - 16 July 2019, 2020, and 2021.

The mechanisms of injury were only assessed in the Resus (P1 + P2) group, Figure 3. Blunt trauma accounted for 31.5%, 32.6% and 31% in 2019, 2020 and 2021, respectively. Assaults increased from 14% (13 patients) in 2019 and 13% (6 patients) in 2020 to 18.9% (33 patients) in 2021. Penetrating trauma accounted for 36% in 2019, 60.8% in 2020 and 62.8% in 2021, see Figure 4. Stab wounds were the most common in 2019 (39% vs 13%) and 2020 (43.5% vs 17.4%), with a significant increase in GSW in 2021 of 37.1% vs 25.7%. Explaining the statistical significance when comparing the 2021 (riots) to 2020 (Covid 19 lockdown) and 2019 (control), p < 0.05.



MVA = Motor vehicle accident, PVA = Pedestrian vehicle accident, FFH = fall from height

Figure 3a: Blunt mechanism of injury breakdown in P1 + P2 patients.

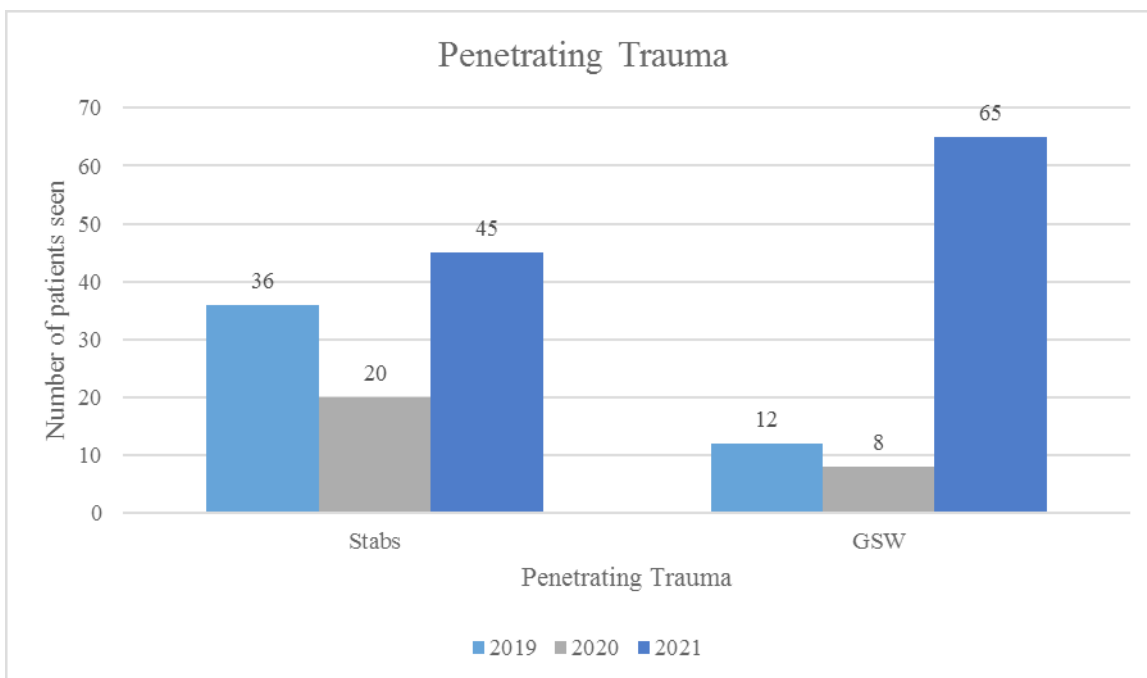


Figure 3b: Penetrating mechanism of injury breakdown for P1 + P2 patients GSW 2019 vs 2021 p = 0.000 and GSW 2020 vs 2021 p = 0.004 GSW (Gunshot wounds).

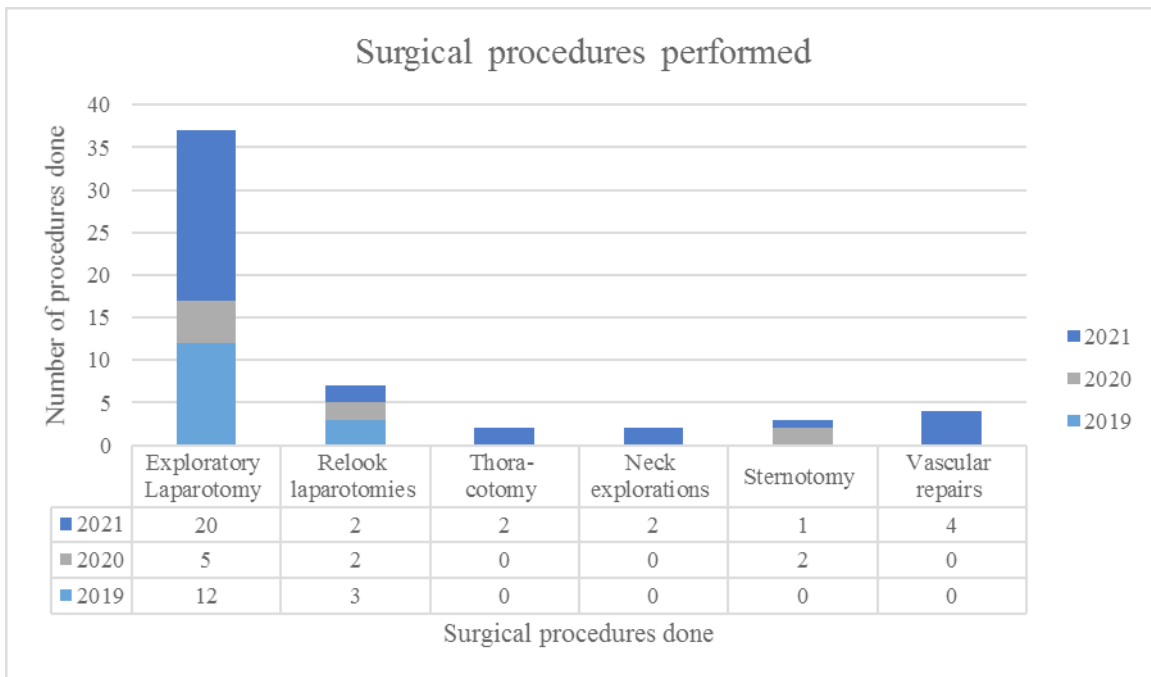


Figure 4: Surgical procedures performed, where the y-axis is frequency, and the x-axis is type of procedure.

With regards to surgical procedures done, 2021 had all cavities explored, whereas 2020 did not do neck, chest, or vascular repairs, and 2019 had the same as 2020 with the addition of no sternotomies done.

Discussion

The general trend from the study period in 2019 and 2021 is a predominance in penetrating trauma, with stabs being the most common mechanism except for 2021, where GSW is predominant. This is explained by the riots and looting that occurred, in which it has been said that guns and ammunition were also looted, allowing for easier access [17]. The only other national events seen in RSA in which GSW predominated were during the emergence of our democracy and the xenophobic attacks of 2008 [18-20]. Aside from these events, an audit spanning from 2011 - 2016 in the same unit showed a predominance of penetrating trauma, namely, stab wounds [21]. Although the absolute numbers of P3 patients seen during Covid lockdowns decreased significantly, the overall percentage (75%) was similar to that of 2021. The statistical significance of 2020 (Covid 19 lockdown) and 2021 (riots) to the control year 2019 shows that national and international events can significantly change the trauma profile. This changing trauma profile with regards to the pandemic is evident in many studies, as well as the effect of civil unrest previously experienced in RSA, where some studies showed a predominance of injuries related to self-harm and domestic violence and others an increase in GSW [3,4,7-9,18-20].

The only other country to show a similar trauma profile of GSW predominance during riots and a Covid lockdown is USA. Braun et al. showed increased use of the MTP (massive transfusion protocol) for violent trauma (GSW and stabs) during the civil unrest post the George Floyd death in 2020. GSW was the most common mechanism and used 16 components of the MTP compared to 8 components of the MTP used in stab wounds [22]. GSWs are higher velocity compared to stab wounds and result in more destructive injury along their path compared to stab wounds. Therefore, it is unsurprising that GSWs will require more blood and blood product transfusions, thereby activating the MTP more often [23]. A common disadvantage during the Covid 19 pandemic experienced internationally was its effect on surgical resident training [24]. The decrease in trauma patients in our unit during 2020 translated to a reduction in surgical procedures. One benefit the riots did bring was registrar training. Surgical procedures included those not commonly done in the preceding 2 years, namely, thoracotomies, neck explorations and vascular repairs. The amount of experience gained surgically within 1 week is incalculable, not to mention the experience of mass casualty and triage, which is not new to the CHBAH Trauma Unit. During the Covid 19 pandemic, our Trauma Unit, namely the resuscitations (P1 + P2 Patients), emergency unit (P3 patients), theatres and our wards, were all person under investigation (PUI) areas, with adherence to Covid 19 Personal Protection Equipment (PPE) protocols.

Airway interventions are commonplace in a trauma resuscitation area. It is reassuring to note that despite mass casualties, our unit Covid positivity rate was only 9% during the riots, which was below the national average of 29.1% [16]. Trauma resuscitation protocols require PPE even before the Covid 19 pandemic. Of note, only two of the fifty staff members tested positive for Covid during this time, which is still a significant reduction in our workforce but most likely unavoidable.

Although the riots increased the number of patients seen, especially P1 and P2, it did not significantly impact the Covid 19 positivity rate. The positivity rate was 9%, lower than the national average at that time of 29.1% in 2021 and 24.8% in 2020 [16]. Despite being in the same Covid 19 lockdown level 4 in 2020 and 2021, where alcohol sales and social gatherings were prohibited, rioters did not abide by these laws and the Covid positivity rate increased from 5% to 9%, which was not statistically significant. Besides the accessibility of weapons, alcohol also plays a key role in the trauma profile of RSA with specific reference to CHBAH [21]. International, national, and local events play a crucial role in the trauma profile regardless of the laws imposed.

The limitation of this study

This is a retrospective study with the study-period dictated by the riots, prone to potential bias. The fire affected the functions at CMJAH with possible diversion of patients to other secondary hospitals; thus, the total number treated might have been underrepresented. No subset analysis was done regarding self-harm and domestic violence during this Covid 19 study period as the numbers were small.

Conclusion

A fire at CMJAH, the Covid-19 lockdown and riots influenced the remaining functional Level 1 Trauma centre's (CHBAH's) patient load and profile. These resulted in an increased number of patients seen with no effect on the gender, age or Priority distribution of patients. However, a predominance of GSW translated to more surgical procedures being performed. The Covid-19 positivity rate was similar in the 2020 and 2021 periods. South African trauma can be influenced by national and international events. This should be considered by all policymakers when addressing preventative trauma strategies

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