

**Effect of the Covid-19 Lockdown Regulations on the Severe
Trauma Burden in an Urban Trauma Centre in Johannesburg,
South Africa**

This is a research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Masters of Medicine in Surgery.

Student:
Dr Nadia Guidozi
MBBCh, MRCS

Supervisors:
Prof Maeyane S Moeng
MBBCh, Dip PEC(SA), H Dip Surg(SA), FCS (SA)

Dr IM Joubert
MBChB, MMed(Surg), FCS (SA), Cert. Trauma Surgery(SA)

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DEDICATION

To all those affected by the Covid-19 pandemic.

DECLARATION

I **Dr Nadia Guidozi 305 749** as a postgraduate student registered for a MMed at the University of the Witwatersrand declare the following:

- I am aware that plagiarism is the use of someone else's work without their permission and or without acknowledging the original source.
- I am aware that plagiarism is wrong.
- I confirm that this written work is my own work except where I have stated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or if I have failed to acknowledge the ideas or writing of others.

I declare that this research report is my own work. It is being submitted in partial fulfilment of the requirements for the degree of Master of Medicine in the branch of Obstetrics and Gynaecology, at the University of Witwatersrand, Johannesburg. This work has not been submitted for any degree or examination at this or any other University.

Name: Nadia Guidozi

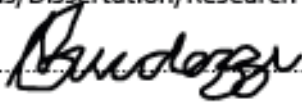
Signed:



25 May 2024

DECLARATION: STUDENTS CONTRIBUTION TO THE ARTICLE AND AGREEMENT OF CO-AUTHORS

I, Nadia Guidozi, student number 305749 declare that this Thesis/Dissertation/Research Report is my own work and that I contributed adequately towards research findings published in the article(s) stated below which are included in my Thesis/Dissertation/Research Report .

Signature of Student  Date 11/09/2023

Name of Primary Supervisor Professor MS Moeng

Signature of Primary Supervisor  Date 12/09/2023

Agreement by co-authors: By signing this declaration, the co-authors listed below agree to the use of the article(s) by the student as part of his/her Thesis/Dissertation/Research Report. In cases where the student is not the 1st author of a published article, the primary supervisor must explain (under comments) why the student is entitled to use the paper for his/her degree purposes.

Article 1: Title: Effect of Covid-19 Lockdown Regulations on the Severe Trauma Burden in an Urban Trauma Centre in Johannesburg, South Africa

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Authors	Name	Signature	Date
1 st author	N Guidozi		11/09/23
2 nd author	IM Joubert		12/09/2023
3 rd author	MS Moeng		12/09/2023

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ABSTRACT

Background

During the Covid-19 pandemic, the South African government introduced stringent lockdown restrictions. Social restrictions affected patient presentation to hospitals with non-Covid related illnesses.

Objectives

The aim of this research was to investigate the effect of lockdown on major trauma presentation in a level one trauma centre in Johannesburg, as well as to assess how lockdown affected emergency and semi-emergency trauma surgical procedures.

Method

This is a retrospective data analysis of major trauma patients presenting to Charlotte Maxeke Johannesburg Academic Hospital between 26 March and 13 July in 2020 and 2019. The Medibank records of priority one patients presenting to the hospital over these time periods were reviewed, and data were analysed per level of lockdown- patient demographics, day of the week on presentation, mechanism of injury and patient discharge destination from casualty were recorded. Index Severity Scores (ISS) were calculated based on presenting injuries, imaging and intra-operative findings. All emergency and semi-emergency procedures over this time were also analysed. The 2019 and 2020 data were compared, and statistical differences were calculated. A p-value of <0.05 was considered statistically significant.

Results

An analysis of 1060 patients split between 595 patients in 2019 and 465 in 2020 was made. Level 5 lockdown in 2020 had statistically significantly fewer priority one trauma case than 2019 ($p=0.000$), Level 4 had no statistically relevant change in patient number presenting to hospital, and Level 3 had statistically significant more priority one patients presenting in

2020 compared to 2019 ($p=0.000$). Penetrating trauma was the most common mechanism of injury in both years, with a statistically significant reduction in train-related injuries in 2020 ($p=0.011$) and slightly more 'fall from heights' in 2020 ($p=0.033$). Fewer weekend and public holiday major trauma presentations occurred during lockdown in 2020 ($p=0.003$ and $p=0.001$ respectively) compared to 2019. Less emergency/ semi-emergency trauma surgeries were performed in 2020 in contrast to 2019 ($p=0.000$).

Conclusion

The results show a decline in major trauma presentation during the most limiting lockdown restrictions (Level 5) with a rebound increase in trauma during more relaxed lockdown regulations (Level 3). Lockdown shifted the presentation of major trauma to predominantly weekdays. There was a decline in surgical emergency and semi-emergency procedures but no change in overall ISS. The data highlights the diversity and complexity of trauma in Johannesburg, with difficulty in identifying primary prevention strategies.

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JOURNAL ARTICLE

Effect of the Covid-19 Lockdown Regulations on the Severe Trauma Burden in an Urban Trauma Centre in Johannesburg, South Africa

Authors

Dr N. Guidozzi

MBBCh, MRCS

nadiaguidozzi@gmail.com

0603716209

Dr IM Joubert

MBChB, MMed(Surg), FCS (SA), Cert. Trauma Surgery(SA)

imjoubert@yahoo.com

Professor MS Moeng

MBBCh, Dip PEC(SA), H Dip Surg(SA), FCS (SA)

Maeyane.Moeng@wits.ac.za

Author Affiliation:

Dr N Guidozzi

Department of General Surgery

University of Witwatersrand

Johannesburg

South Africa

Dr IM Joubert

Department of Trauma University of Witwatersrand

Trauma surgeon Charlotte Maxeke Johannesburg Academic Hospital and Milpark Hospital

Johannesburg

South Africa

Professor MS Moeng

Professor of Surgery University of Witwatersrand

Academic Head of Trauma University of Witwatersrand

Head of trauma unit Charlotte Maxeke Johannesburg Academic Hospital

Trauma surgeon Charlotte Maxeke Johannesburg Academic Hospital and Milpark Hospital

Johannesburg

South Africa

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Honest Muchabaiwa (statistics)

Charlotte Maxeke Johannesburg Academic Hospital Department of Trauma

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The results show a decline in major trauma presentation during the most limiting lockdown restrictions (Level 5) with a rebound increase in trauma during more relaxed lockdown regulations (Level 3). Lockdown shifted the presentation of major trauma to predominantly weekdays. There was a decline in surgical emergency and semi-emergency procedures but no change in overall ISS. The data highlights the diversity and complexity of trauma in Johannesburg, with difficulty in identifying primary prevention strategies.

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Introduction

On 05 March 2020, the first case of Covid 19/ SARS-CoV-2 infection was confirmed in South Africa. Ten days after this diagnosis, the South African Government declared a National State of Disaster ^[1]. The anticipated healthcare burden that the virus would cause globally, especially in developing countries, was predicted to be calamitous. This led to a levelled lockdown, where the government implemented various social restrictions.

Lockdown ranged from level 5 to 1 with restrictions on movement, trade, social gatherings and the prohibition of alcohol and tobacco sales. Level 5 was 'hard lockdown' with more relaxed restrictions at lower levels.

The fundamental social restrictions over this period included the following level limitations: Level 5 (26 March to 01 May): a ban of all alcohol and tobacco sales, opening of essential services exclusively, retail of essential goods and prohibition of travel. There were also limitations on the transport capacity of passengers and a ban on rail and air travel.

Level 4 (01 May to 31 May) relaxed certain parameters, including the softening of the stay-at-home order and the return to work of some industries such as mining. A curfew was implemented between 20h00 and 05h00, and exercise was permitted exclusively between 06h00 and 09h00. Group gatherings of up to 50 people at a funeral were approved. Rail travel at partial capacity was also re-introduced.

June and July 2020 saw the introduction of Level 3 (01 June to 13 July) with the easing of many limitations, followed by a premature cessation of predicted freedom and the re-introduction of strict restrictions from 13 July. The initial Level 3 lockdown criteria included exercise between 06h00 and 18h00, the return to educational facilities, a resumption of alcohol sales from Monday to Thursday between 09h00 and 17h00, greater freedom of movement and a residual prohibition of tobacco sales ^[2-4].

The government deemed these restrictions crucial to stop the spread of the virus and reduce the burden on hospitals to facilitate the care required to treat patients infected with Covid-19. This research contemplates the effect that the restrictions had on the major trauma presentation at a level one trauma centre in Johannesburg during Level 3-5 lockdown. This time frame was chosen as the trend of alcohol sales related to trauma could be easily studied.

South Africa, notoriously, has a high burden of trauma that is multifactorial in origin^[5]. According to the 2018/2019 South African crime statistics, 170 979 cases of assault with intent to commit grievous bodily harm and 162 012 common assault cases were recorded^[6]. In 2019, 2180 fatal motor vehicle accidents were documented in Gauteng alone, with pedestrians and passengers identified as being most at risk of death^[7]. Therefore, it is understandable that trauma strains an already overloaded South African healthcare system.

This study took place at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH), a 1088 bed tertiary level state hospital. The hospital is a level one trauma centre serving communities in Gauteng and the surrounding provinces ^[8].

During the lockdown period, anecdotal reports of reduced priority one trauma patient presentation to CMJAH were noted. The trend of trauma presentation seemed to vary with each level of lockdown, a phenomenon that was observed across the world ^[10,18].

As such, the aim of this study was to compare the volume, characteristics and outcomes of trauma priority one patients presenting during the early phases of the Covid-19 lockdown in Johannesburg (Levels 3-5) to the corresponding time period from the previous year.

Objectives

The lockdown period offered a unique social experiment on potential primary prevention strategies for trauma. The hypothesis was that there was a reduction in significant trauma (priority one patient) presentation and associated surgery over the fifteen-week period where stringent restrictions were placed on the country.

Method

This study was a retrospective descriptive study where data were collected from all priority one patients seen in a single level one trauma facility, spanning the time frame 26 March to 13 July in 2019 and the same period in 2020. Data were collected using Medi Bank forms which are hospital paper records completed at the time of presentation for all patients deemed to be priority one.

Patient demographics, day of the week on presentation, mechanism of injury and patient discharge destination from casualty were analysed per level of lockdown for Levels 5-3. Index Severity Scores (ISS) were calculated based on presenting injuries, imaging and intra-operative findings.

All emergency trauma surgery operations performed over this period were also included in this study (excluding orthopaedic and neurosurgery procedures). Emergency surgery was regarded as immediate or urgent surgery as per the National Confidential Enquiry into Patient Outcome and Death (NCEPOD1 and NCEPOD2); semi- emergency procedures were based on expedited surgery (NCEPOD3) classification ^[9]. Trauma operations performed in 2019 were compared to 2020 data, and procedures performed during each level of lockdown were assessed.

The Wits Human Research Ethics Committee as well as the CEO of CMJAH approved the research. 2019 Data was used as the control group as no social restrictions were yet in place. (Ethics number: M200825 Med 20-05-122)

The data were analysed using SPSS version 25. P values were calculated to determine statistical significance.

Results

The population group studied was predominantly made up of males with a mean age of 32. The sample was based on an analysis of 1060 priority one trauma cases split as 595 cases (56.1%) recorded in 2019 and 465 cases (43.9%) recorded in 2020 over the allocated time period. There was a significant decline of 21.8% in the number of priority one cases presenting to the unit in 2020, as indicated by a p-value of 0.000.

The results revealed that statistically fewer Lockdown level 5 priority one cases presented (83 patients out of 465, 17.8%) in 2020 compared to 40.5% (241 patients out of 595) of cases in 2019 ($p=0.000$). Level 4 restrictions showed no statistical difference in major trauma patient volume comparing 2019 and 2020. There were significantly more Level 3 priority one cases in 2020 than in the pre-Covid era in 2019 (63.4% and 39% $p=0.000$) (Table 1, Figure 1).

Overall, penetrating trauma was the main mechanism of injury in 2019 and 2020, with the average ISS recorded between 11 and 13 for both years. Mode of injury broken down further indicated that stab wounds made up the majority of injuries in both 2019 and 2020 (222 patients in 2019 and 151 patients in 2020), followed by gunshot injuries (122 patients in 2019 and 101 patients in 2020) (Table 1).

In 2020, there were considerably more cases reported on weekdays (63.4%), and significantly fewer cases reported on weekends (32.7%) and public holidays (3.9%) compared to 49.2%, 41.7%, and 8.9%, respectively for 2019 ($p\text{-value} < 0.05$) (Table 1).

There were significantly less train-related cases in 2020 with 0% recorded compared to 1.3% in 2019 ($p\text{-value} = 0.011$) and slightly more “fall from heights” recorded in 2020 ($p\text{-value} = 0.033$). There were no significant differences for the rest of the variables, including the ISS score, injury mechanism, disposition from casualty, age or gender (Table 1, Figure 2). There were, however, fewer patients stepped down to lower levels of care in 2020 compared to 2019.

The results showed that there were significantly less total emergency / semi-emergency general surgeries performed in 2020 (34.3%) compared to 2019 (65.7%) ($p\text{-value} = 0.000$). Of the patients requiring surgery, 28% of priority one patients required emergency procedures in 2020 as opposed to 37% in 2019. There were no significant differences in the types of surgery performed: laparotomies/ laparoscopies, thoracotomies, damage control surgery and relooks by year. Of the procedures performed in 2020, a greater proportion were emergency procedures than semi-emergent procedures when compared to 2019 (89% in 2020 compared to 78% in 2019) (Table 2)

Discussion

The planned strategies instituted by the South African Government during the lockdown periods were such that if social interactions and movement were limited, the spread of the SARS-COV-2 virus could be curbed. The added benefit to society would be a reduction in patients attending hospitals with non-Covid related pathology, draining precious resources and straining an already burdened healthcare system. There was a clear incentive for national primary prevention of trauma, presumably resulting in a decline in potentially avoidable injuries and, therefore, fewer unnecessary hospital admissions.

From the data collected in this study, Johannesburg experienced an initial decline in major trauma in Level 5 followed by a substantial rise in trauma in Level 3. Multiple studies have evaluated trauma trends over various lockdown intensities in different countries ^[10-12]. Local studies from Cape Town and Kwa-Zulu Natal have shown similar trends as seen in this study; a significant reduction in trauma initially, followed by a rise in trauma as restrictions eased ^[10-12]. The causes of these local findings are probably multifactorial, with a sobering reminder of how complex the South African trauma burden is.

Alcohol Prohibition

The main contributor to local trauma decline is likely due to the prohibition of alcohol sales. South Africa was one of a handful of countries worldwide that implemented an alcohol ban during the Covid-19 pandemic. Alcohol misuse and trauma have been evaluated in much research. In 2004, Bowley et al. showed that 59% of trauma patients from our hospital's catchment area had raised alcohol blood levels, attributing much of our local trauma burden to concomitant alcohol use ^[13]. Stockwell et al. explored many of the social repercussions related to alcohol misuse and the demand this places on the healthcare system, praising South Africa for restrictive measures ^[14].

Chu et al. convincingly showed how rates of trauma presentation were directly related to alcohol prohibition during Covid-19, proving that even mild relaxation of sales caused trauma presentation to increase,^[15] reflecting the results seen in our study. Chu et al. identified alcohol prohibition as the most effective restrictive measure in reducing hospital trauma presentation during Lockdown ^[15].

Factors causing a Decrease in Trauma

Other factors to consider when assessing the reduction in trauma presentation initially include the fact that Level 4 and 5 lockdown occurred during the infancy of the pandemic; as such, one should consider the element of fear surrounding Covid-19 infection at this time^[16]. It could be surmised that fear of the SARS/COV 2 virus infection and hospital admission during a pandemic, as well as fear of legal repercussions if restrictions were ignored^[17] may have had a role in maintaining social distancing and minimising trauma.

The impact that Lockdown Level 5 had on our community may well have been due to the radical restrictions or a “buy-in” by the community, with a view to being compliant with government strategies. A United Kingdom University College London Jill Dando Institute of Security and Crime Science report noted that compliance to restrictions during lockdown might have been driven by an individual’s ethical compass to ‘do the right thing’ and help others. The UK repeatedly coerced good behaviour based on the premise that restrictions would assist healthcare workers during the highest burden of Covid-19 disease^[17]. According to the same report, adherence to lockdown protocol was also based on a desire to conform to social norms at the time, in this case, maintaining social distancing^[17].

Morris et al. suggested that decreased numbers of vehicles and pedestrians on the road added to the reduction in trauma seen in Kwa-Zulu Natal during lockdown^[10]. A significant decline in motor vehicle-related trauma is not a trend well demonstrated in our study. As such, we cannot draw the same conclusion that transportation restrictions added to the reduction in trauma presentation in Johannesburg, however this could be looked into in more detail in the future.

Exploring the decline in trauma experienced during parts of lockdown, one must mention that despite significant restrictions, major trauma was not totally eliminated. It may be that other mechanisms of injuries, such as, stab wounds and gunshot injuries account for the numbers that persist. At our hospital, stab wounds and gunshot injuries were the two most common causes of injury in 2019 and 2020. Zsilavec et al. showed an increase in gunshot wounds in Kwa-Zulu Natal during lockdown^[11]. This finding is different compared to research published in Spain, New Zealand and the UK, where the most common mechanisms of injury were motor vehicle collisions and falls^[12,18]. Penetrating trauma was not independently dealt

with during lockdown in South Africa, which may have been why major trauma persisted during this time. This may be a major factor to address when recognizing primary prevention strategies.

Level 3 Rise in Trauma

The rise in major trauma experienced in Level 3 during 2020 is a trend documented across most of South Africa, although this is not mirrored internationally. The increase in trauma seems to be directly related to the re-initiation of alcohol sales, especially permission for off-site consumption during Level 3 ^[18]. Cape Town reported a 107% increase in trauma post Levels 4 and 5 lockdown, citing the re-sale of alcohol as a contributory factor ^[12]. As compelling as the data are, one must be mindful that other restrictions were lifted simultaneously in Level 3, therefore, this study cannot accurately draw a direct causal relationship between alcohol and trauma, but the inference is there.

The rebound increase in major trauma seen in this study may also be related to an increased public understanding of the virus, which dispelled some of the fear surrounding viral spread and disease progression. This may have led to a sense of security and less pressure to conform to social restrictions. The opposite may have also occurred, with individuals experiencing a sense of worsening fear due to social media exposure, resulting in a failure to trust government strategies to safeguard the country, failure to adhere to restrictions, and subsequent high-risk behaviour resulting in major trauma ⁽¹⁹⁾. This is explored in an article by Islam et al. assessing how the Covid-19 infodemic affected people and their behaviour based on rumours, stigmas and conspiracy theories. The article highlights the importance of accurate information dissemination on public platforms and emphasizes the ease at which some people blindly follow misinformation ^[19].

Weekday Predominance

Trauma presentation related to the day of the week was audited in a 2016 Cape Town study^[20]. The audit showed a 130% increase in patient hospital attendance following interpersonal violence during the day on weekends compared to weekdays^[20]. This weekend trauma surge is often noted anecdotally by emergency unit personnel. During lockdown, this predicted pattern of trauma presentation was not identified. In 2020 there was a reduction in

trauma during the weekend, with a similar patient volume during the week compared to 2019. As a proportion of major trauma presentations, the 2020 patient volume during the week is statistically significant. This variation may be a result of people not working due to closure of many non-essential jobs, resulting in an increase in vulnerability to trauma during weekdays. It may have also been due to alcohol being sold during the week and not over the weekend, predisposing to high-risk alcohol-related behaviour on weekdays. A noteworthy concept brought up by Navsaria et al. suggested that the increase in domestic interactions during lockdown fuelled trauma presentation based on people being unsafe in their homes ^[12]. This sentiment is echoed by Zsilavec, who demonstrated a rise in female trauma presentation during lockdown, thought to be related to domestic violence ^[11].

Surgeries During Lockdown

The reduction in trauma surgeries performed in 2020 suggests that fewer patients required surgery for the injuries that they presented with. The decrease in semi-emergency procedures is in keeping with a hospital policy to minimise non-emergency procedures during critical periods of the pandemic. The number of surgical procedures performed at each level of Lockdown are in keeping with the volume of trauma presenting at each level. Worldwide similar reductions in trauma surgery were seen, reporting between a 21%-66% reduction in emergency surgery, with most papers reporting the effect of Covid-19 on orthopaedic trauma surgery ^[21].

Internationally the decline in trauma surgery was overwhelmingly due to the ‘stay at home order’ reducing motor vehicle-associated trauma, which is one of the leading trauma mechanisms of injury in many countries ^[21]. In this study, orthopaedic surgery was excluded. At our institution, laparotomies were consistently the most common emergency/semi-emergency procedure performed in 2019 and 2020. This may be related to penetrating injuries being the most common mechanism of injury locally. There was no statistical difference between the number of damage control surgeries, implying that significant restrictions may impact on the total number of patients seen with severe trauma. Still, they do not significantly impact on the severity of trauma presentation. This finding is further substantiated by a similar ISS in major trauma patients in 2019 and 2020.

Study Relevance in South Africa

The South African experience during Covid-19 Lockdown offers a unique insight into the Johannesburg trauma profile. It is a convenient occasion to assess the role of primary prevention in trauma. The findings in this study suggest that only the most stringent social limitations and restrictions reduce the major adult trauma experienced in South Africa. This study and the data from Cape Town by Navsaria et al. and Stellenbosch by Cho et al. support the notion that partial lockdown measures may worsen the country's major trauma burden^[12,15].

The study is relevant from a trauma primary prevention perspective. The data proves that there may be social factors (transportation and alcohol) that can be addressed to reduce the amount of severe trauma experienced in South Africa, and as a result, ease some of the burden of this nefarious disease in our hospitals. Mahoney et al. suggest visible policing as well as alcohol restrictions as possible prevention strategies^[22]. Primary prevention with tighter gun laws and possible "stop and search" protocols may also assist with violence prevention. Other measures to consider may include harsher punishments for possessing illegal weapons and the role of gunshot injuries being made notifiable, as explored by Navsaria et al ^[12].

The data clearly shows that major trauma in Johannesburg is multifactorial, and that even the most restrictive measures only partially reduce trauma presentation. Current government initiatives fall short of protecting the city from significant trauma. Mahoney et al. highlight that young working-class males are the most vulnerable to trauma, and their loss to society may also have detrimental socio-economic effects on the country ^[22]. As such, a deeper investigation into governance and policing is urgently required to fully explore whether primary prevention against trauma is feasible in South Africa.

Limiting factors to consider in this research are that only priority one patients from a single centre were analysed, and orthopaedic and neurosurgical operative procedures were not included in this study. Moreover, the study was retrospective, relying on accurate information documentation at the time of patient presentation.

Conclusion

The findings of this research support the hypothesis that during the Covid-19 pandemic, strict social restrictions, as imposed during the beginning of Lockdown, reduced the number of patients presenting with major trauma to Charlotte Maxeke Johannesburg Academic Hospital. Overall, restrictions did not impact the severity of trauma or the mechanism of injury in priority one patients. There was also no significant change in patient disposition from casualty between 2019 and 2020, except for fewer down referrals during lockdown. Severe restrictions led to higher admissions during weekdays compared to weekends, a concept that is the opposite during periods of no restrictions. Reduction in trauma volume during Lockdown is a social construct observed internationally. However, this data would suggest that only strict social restrictions reduce the burden of significant trauma hospital presentations in South Africa and that relaxed restrictions with variable alcohol sales, curfews and travel constraints may worsen priority one trauma presentation.

This research shows some support for the government initiative to implement rigid social restrictions to protect the public from trauma and potentially reduce the caseload of patients seeking medical assistance for non-Covid related ailments during critical points of the pandemic. However, the social implications of enforcing a national lockdown compared to the benefit of fewer major trauma admissions has not been explored further.

This study does provide important information with a view to the changing patterns of trauma presentation noted, but it does not provide any plausible sustainable solutions. Although the restriction imposed by Lockdown Level 5 were beneficial, they would be very difficult to maintain effectively long term. More surprising, though, was why the more lenient but still present restrictions imposed by Lockdown 3, adversely impacted major trauma numbers, presentation and the need for surgical intervention.

Table 1.

Data comparison from 2019 to 2020

Variable	Option	Year		Total	P-value
		2019	2020		
Total		595 (56.1%)	465 (43.9%)		0.000
Age	N (Mean)	592 (32.81)	456 (32.74)	1048 (32.78)	0.898
Gender	Female	37 (6.2%)	36 (7.7%)	73 (6.9%)	0.332
	Male	558 (93.8%)	429 (92.3%)	987 (93.1%)	
Worst BP (systolic)	N (Mean)	593 (117)	464 (120)	1057 (118)	0.065
HR	N (Mean)	593 (97)	465 (96)	1058 (97)	0.309
ISS	N (Mean)	594 (12.7)	465 (11.4)	1059 (12.1)	0.130
Injury mechanism	Penetrating	344 (57.8%)	257 (55.3%)	601 (56.7%)	0.417
	Blunt	250 (42%)	205 (44.1%)	455 (42.9%)	0.532
	Other	1 (0.2%)	3 (0.6%)	4 (0.4%)	0.325
Level	Level 3	232 (39%)	295 (63.4%)	527 (49.7%)	0.000
	Level 4	122 (20.5%)	87 (18.7%)	209 (19.7%)	0.485
	Level 5	241 (40.5%)	83 (17.8%)	324 (30.6%)	0.000
ISS Category	ISS <15	405 (68.1%)	332 (71.4%)	737 (69.5%)	0.253
	ISS 16-75	177 (29.7%)	121 (26%)	298 (28.1%)	0.191
	ISS >75	12 (2%)	12 (2.6%)	24 (2.3%)	0.541
	ISS unknown	1 (0.2%)	0 (0%)	1 (0.1%)	1.000
*MOI	Stab	222 (37.3%)	151 (32.5%)	373 (35.2%)	0.106
	Assault	66 (11.1%)	53 (11.4%)	119 (11.2%)	0.922
	Burn	13 (2.2%)	17 (3.7%)	30 (2.8%)	0.191
	FFH	30 (5%)	39 (8.4%)	69 (6.5%)	0.033
	GSW	122 (20.5%)	101 (21.7%)	223 (21%)	0.649
	MBC	11 (1.8%)	9 (1.9%)	20 (1.9%)	1.000
	MVC	68 (11.4%)	47 (10.1%)	115 (10.8%)	0.551
	PVC	48 (8.1%)	24 (5.2%)	72 (6.8%)	0.066
	Train related	8 (1.3%)	0 (0%)	8 (0.8%)	0.011
	Unknown	1 (0.2%)	3 (0.6%)	4 (0.4%)	0.325
Day of week	Weekday	293 (49.2%)	295 (63.4%)	588 (55.5%)	0.000
	Weekend	248 (41.7%)	152 (32.7%)	400 (37.7%)	0.003
	Public holiday	53 (8.9%)	18 (3.9%)	71 (6.7%)	0.001
	Unknown Day	1 (0.2%)	0 (0%)	1 (0.1%)	1.000
Outcome	Admission	318 (53.4%)	263 (56.6%)	581 (54.8%)	0.320
	D/C	202 (33.9%)	171 (36.8%)	373 (35.2%)	0.364
	Refer	59 (9.9%)	12 (2.6%)	71 (6.7%)	0.000
	RHT	6 (1%)	7 (1.5%)	13 (1.2%)	0.577
	Death	9 (1.5%)	12 (2.6%)	21 (2%)	0.268
	Unknown	1 (0.2%)	0 (0%)	1 (0.1%)	1.000

*Breakdown of most common mechanism of injury only

(ISS= injury severity score, FFH= fall from height, MBC= motor bike collision, MVC= motor vehicle collision, PVC= pedestrian vehicle collision, D/C= discharge, RHT= refuse hospital treatment)

Table 2.

Surgical procedures recorded in 2019 and 2020

Procedures	Year		Total	P-value
	2019	2020		
Total surgery	278 (65.7%)	145 (34.3%)	423 (100%)	0.000
Total emergency procedure	219 (78.8%)	130 (89.7%)	349 (82.5%)	0.005
Total semi emergency procedure	59 (21.2%)	15 (10.3%)	74 (17.5%)	0.005
Laparotomy	166 (59.7%)	80 (55.2%)	246 (58.2%)	0.406
Laparoscopy	1 (0.4%)	0 (0%)	1 (0.2%)	1.000
Thoracotomy	34 (12.2%)	13 (9%)	47 (11.1%)	0.334
DCS	15 (5.4%)	14 (9.7%)	29 (6.9%)	0.108
Relook	60 (21.6%)	30 (20.7%)	90 (21.3%)	0.901

Figure 1

Priority One Patient Presentation to Charlotte Maxeke Academic Hospital in 2019 and 2020 based on Lockdown Levels

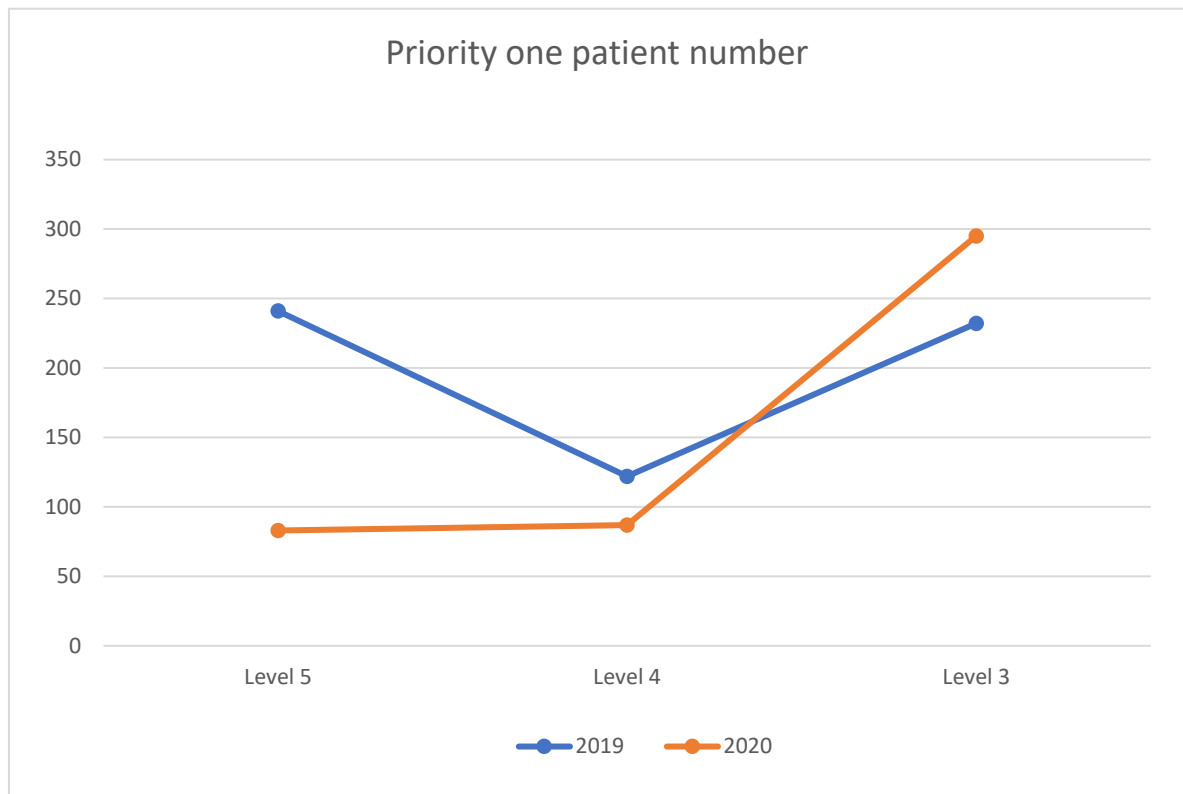
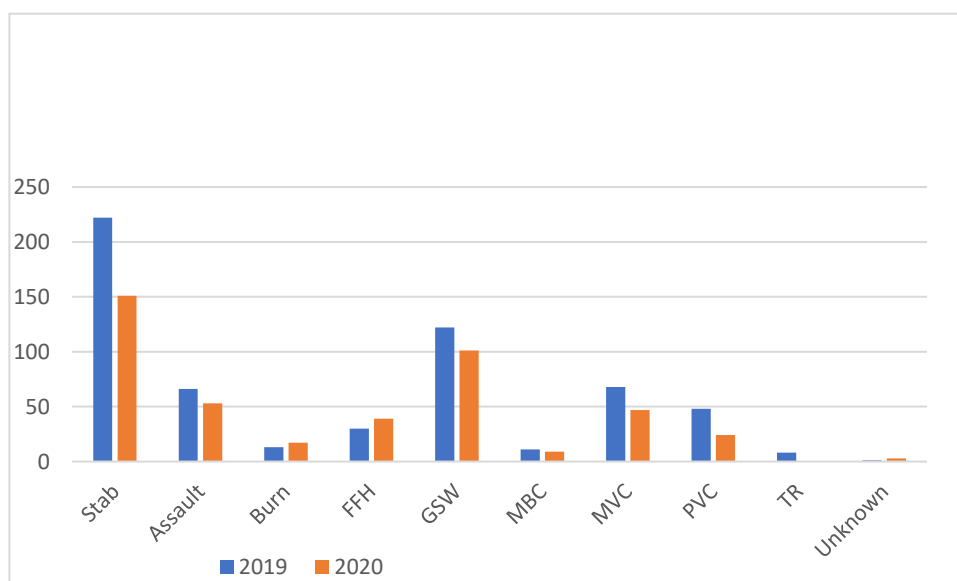


Figure 2

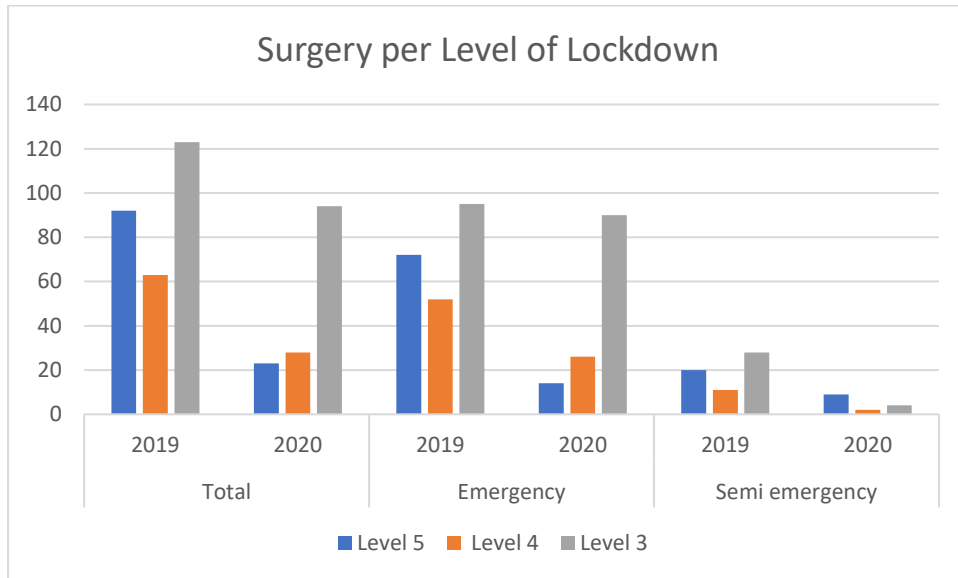
Most Common Mechanism of Injury in Priority One Patients in 2019 and 2020



FFH: fall from height , GSW: gun shot wound, MBC: motor bike collision, MVC: motor vehicle collision, PVC: pedestrian vehicle collision, TR: train related

Figure 3.

Surgical procedures per Lockdown level



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APPENDIX A: Approved Research Protocol

University of Witwatersrand
Faculty of Health Sciences
School of Medicine
Department of Surgery
Protocol 1.0

Effect of the Covid-19 Lockdown Regulations on the Trauma Burden in an Urban Trauma Centre in Johannesburg, South Africa

Assessment of the trauma burden experienced by a Level One Equivalent Trauma Centre in Johannesburg, South Africa during the Covid- 19 national lockdown

Nadia Guidozi

Student number: 305749

Supervisors:

1. Prof MS Moeng. Professor of Surgery University of the Witwatersrand, Trauma surgeon, Director of Trauma Surgery at CMJAH, MBBCh, DipPEC, HDipSURG, FCS
2. Dr IM Joubert. Trauma Consultant, MBChB, MMed(Surg), FCS (SA), Cert. Trauma Surgery(SA)

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1. Introduction

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) was declared a pandemic by the World Health Organisation on the 11th March 2020 (1). The single stranded RNA virus, originated from Wuhan City in China, likely from a zoonotic reservoir associated with bats. The virus emerged as a global concern in December 2019, with a suggested incubation period of four to five days and a propensity for droplet spread as well as aerosol spread during certain invasive procedures (2). The anticipated healthcare burden that the virus would cause globally, especially in developing countries, was predicted to be calamitous.

On 5 March 2020 the first case of Covid 19/ SARS-CoV-2 infection was confirmed in South Africa (3). Ten days after this diagnosis, a declaration of a National State of Disaster was made by the South African Government (4). Following this announcement, several restrictions were imposed by the government with regards to public gatherings and closure of educational facilities. These guidelines implemented were based on global trends. On 23 March 2020, with 402 confirmed Covid-19 cases in South Africa, a more stringent national lockdown was instituted.

The South African level five lockdown limited social interaction, purchase of alcohol and tobacco products, and freedom of movement. All non-essential services were suspended and the retail industry was limited to the sale of basic goods and medical supplies. These restrictions were enforced by the National Police Force with support from South African National Defence Force (5). The restrictions were proposed to be implemented in a graded structure (level one to five) based on national risk and disease burden. The most rigid constraints occurred between the 26 March 2020 00h00 and ultimately ended on 01 May 2020 00h00 with an extension implemented during lockdown. Level four lockdown, which had some limitations relaxed, occurred from 01 May 00h00 until the 01 June 00h00. Level three lockdown which had fewer restrictions, including the re-introduction of alcohol sales,

occurred between the 01 June 00h00 and the 13 Jul 00h00 2020. On the 13 July 2020 alcohol sale prohibition and strict curfews were re-implemented.

The impact these limitations had on the South African economy was predicted to be devastating (6). The trauma burden experienced nationally was, anecdotally, significantly less than annual predictions during this period, with an associated decline in reported deaths from non-natural causes (7). Therefore, the aim of this study is to compare the trauma burden experienced in an Urban Trauma Centre in Johannesburg during part of the level three, four and five national lockdown, with the corresponding time period from the year before.

At the time of writing this protocol, only one published audit on the effect of Covid-19 associated lockdown on trauma presentation exists. The article focussed on a New Zealand level one trauma centre in the first 14 days of a level 4 lockdown - their highest level. There was a confirmed 43% decrease in trauma patient admission pre and post lockdown, with an observed reduction in moderate severity injury when compared to the year before. Falls were identified as the most common mechanism of injury (8). These results must be interpreted with caution due to the small cohort of patients studied (195 in total), which impacted on the statistical relevance of many parameters. The study was also only conducted over a short period of time. It is important to note that the findings from New Zealand cannot be readily inferred in a South African context on several grounds. South Africa has a completely different trauma profile and patient volume which has a multifactorial social and economic basis. The local national lockdown prohibited the sale of alcohol and restricted outdoor movement and social interaction, while New Zealand continued to sell alcohol and had less severe social restrictions in place (9). Significantly, South Africa also had a military and police presence to enforce the lockdown restrictions, which was not implemented to the same degree in New Zealand.

Other countries have commented on a reduction of general emergency admissions, including trauma, over their lockdown period. Several hypotheses have been suggested to explain the phenomenon including reduced vehicle related trauma as fewer people are using the roads, less people seeking medical help due to concern of hospital patient burdens or for fear of being exposed to the SARS-CoV-2 virus, and more people seeking medical help from general practitioners instead of the hospital directly. Of concern, however, is an increase in reported domestic violence (10).

South Africa's trauma burden is notorious. Research indicates that the country's trauma cohort is predominantly males under the age of 40 (11). Data collected from a Pietermaritzburg hospital over a five year period proved that more than half of trauma related injuries were secondary to assault, primarily stabbing or gunshot wounds (12). Interpersonal violence and motor vehicle related injuries are consistently highlighted as the top contributors to the trauma load seen in South Africa (11, 12). Evidence from the Western Cape suggests that alcohol use is implicated in at least 30% of presentations associated with trauma (11). Many trauma triage systems have been developed to identify high risk patients in the pre-hospital setting as well as on presentation to the emergency department. Charlotte Maxeke Johannesburg Academic Hospital has a protocol for identifying patients who should be managed in a resuscitation area. The resuscitation bay has constant monitoring and nursing, providing intensive care for the very unwell or patients at risk of decompensation. The protocol identifies significant mechanism of injury, at risk cohorts of patients, anatomical location of injury and clinical findings on examination and then stratifies a patient's risk for decompensation (13). Patients are separated into priority one, two or three. Those who are considered priority one require immediate care, priority two patients have injuries that are not an immediate threat to life and priority three patients are ambulatory with minor injuries.

The severity of injury is another factor to consider when triaging a trauma patient on presentation. The Injury Severity Score (ISS) has been developed to assist with predicting the significance of injuries. As the ISS increases, so does associated patient mortality (14). The scoring system has weaknesses of inaccuracy when assessing penetrating injuries and may underestimate trauma severity by considering one injury per body area. However, the ISS scoring system allows for comparison of data internationally, and as such, will be used in this analysis to help identify the injury patterns experienced during lockdown.

Three national public holidays fall between the 26th March and the 1st May. This time period is historically associated with mass group gatherings as well as extensive travel for religious purposes. An audit from the Western Cape confirmed that interpersonal violence and trauma associated with motor vehicle collisions peak over public holiday periods (15). As such, it would be a safe assumption that this particular period of time would be incredibly busy in trauma departments.

This research is an audit of a Johannesburg trauma centre's experience during the Covid-19 lockdown. The aim of the research is to prove the significant reduction in trauma presentations and associated surgery over the fifteen week period where stringent limitations were placed on the country. The trauma pattern experienced with social distancing and effective policing may be relevant to other situations where a National State of Disaster is declared. This research may assist with financial planning, resource distribution, management of essential workers and economic recommendations, should such an event occur again. The findings may also assist with primary prevention of trauma, identifying perpetuating factors behind the trauma burden in Johannesburg.

2. Study Objectives

All study objectives are applicable to Charlotte Maxeke Academic Hospital from 26 March 00h00 to 13 July 00h00 in 2019 and 2020. The objectives compare data over the 109 day lockdown period during 2020 to the corresponding period of time in 2019.

1. To compare the number of priority one patients (patient's fulfilling resuscitation criteria) presenting to the trauma unit, including their demographic details (age and gender) and the day of the week on presentation (weekend, weekday or public holiday).
2. To evaluate the trauma mechanism's experienced by patients presenting to the unit over this period of time separated into two categories; either an external cause of trauma (motor vehicle accident, pedestrian vehicle accident, fall from height, burns) or interpersonal violence (assault, gunshot injury, stab).
3. To assess if there was any difference in the Injury Severity Score (ISS) of priority one patients presenting to the trauma unit.
4. To evaluate the discharge destination from the emergency department (admission to hospital or discharged home).
5. To compare the number and type of trauma operative procedures performed on priority one patients during this period separated into the categories of laparotomy, thoracotomy, damage control surgery, relooks or other procedure.

3. Methods

3.1 Study Design

This is a retrospective descriptive study

3.2 Setting

The study will occur at the Trauma Unit Charlotte Maxeke Johannesburg Academic Hospital.

3.3 Study population

Inclusion criteria:

- All trauma patients presenting to CMJAH hospital between 26 March 00h00 and 13 July 00h00 2019 and 26 March 00h00 and 13 July 00h00 2020.

Exclusion criteria:

- All priority two and three patients presenting to the trauma department over the study period.
- All patients under the age of 18 years

3.4 Sampling

Sample size is dependent on patient presentation over the time period specified. Using the average weekly departmental statistics, the predicted patient numbers over this 109 day period would be around 1020 resuscitations, 360 admissions and 210 surgeries.

Patients will automatically be enrolled into the study if, over the designated time period, they had a resuscitation form completed when they were seen in the emergency department.

Completion of a resuscitation form is hospital protocol. All priority one patients who underwent emergency trauma surgery during this period of time, and were recorded on the University of the Witwatersrand Redcap database, will be included in the study.

3.5 Measuring tool

All priority one patients presenting to the CMJAH trauma unit have a resuscitation form completed at the time of initial assessment. The forms are detailed summaries of the patient's injury mechanism, primary findings, and acute outcomes. The forms remain secured in the department for statistical analysis. These forms will be used to capture data from the patients in the study.

The Redcap database is used to collect information for morbidity and mortality meetings at CMJAH. The information, recorded weekly, includes details on all emergency surgeries

performed. The database has limited patient identifiers logged, is only accessible through a registered login and password, and spans the required period for this audit.

Data collection from resuscitation forms will include: patient demographic information, injury mechanism, discharge destination and day of presentation.

Data collected from the Redcap database will include: the number and type of surgical procedures performed.

The ISS score is a calculated parameter. It is based on the abbreviated injury score (AIS) and is calculated by scoring six body regions affected by trauma (external injuries, head and neck, face, chest, abdomen and limbs). These scores are then squared and the three highest scores are added together. A maximum score of 75 is possible, with a score above 15 being considered significant trauma. The score of 75 can be reached by three areas receiving a score of 5 or by any one system receiving a score of six. The AIS scores are easily accessible electronically, as a paperback or on an app. The scores classify injuries as minor, moderate, serious, severe, critical or maximal (untreatable).

3.6 Data Collection

All resuscitation forms that are completed over the designated time period will be evaluated.

-Forms will be analysed and the information surrounding the outcomes for the objectives will be recorded on an excel spread sheet

The following information will be recorded:

- Gender
- Age
- Mechanism of injury
- ISS score (to be calculated)
- Disposition/outcome of patient

- All data will be anonymised when transferred onto an audit excel spreadsheet.

- Day of the week of presentation to unit

-The Redcap database will be accessed using person specific login details

-All emergency trauma surgical procedures over the designated time will be analysed

-The spreadsheets will remain on a password protected computer, only accessible to the researcher and supervisors

-The data will then be evaluated using statistical analysis and outcomes will be recorded, analysed and written up

3.7 Sources of Bias

Only patients who were deemed ill enough to require resuscitation will be included in the audit. As a result, there is the potential that true trauma volume over this period of time is not captured. This will be a known limitation of the study. Identical data from 2019 and 2020 will be compared in attempt to reduce confounding factors.

4. Data Analysis

All statistical analysis will be carried out with the help of a professional statistician to ensure validity of the results. The latest version of Statistica (v.13.5) will be used for statistical analysis. The variables for statistical evaluation are:

1. Number of patients in 2019 vs 2020 (statistically significant difference: p value)
2. External injury mechanism vs interpersonal violence in 2019 vs 2020 (statistically significant difference: p value)
3. ISS score of patients between 2019 vs 2020 (statistically significant difference: p value)
4. Number of surgeries performed in 2019 vs 2020 (statistically significant difference: p value)
5. Type of surgical procedure: laparotomy, thoracotomy or other in 2019 vs 2020 (statistically significant difference: p value)

6. Relooks and damage control surgery in 2019 vs 2020 (statistically significant difference: p value)
7. Trauma patient number per day of the week (weekday and weekend and public holidays) in 2019 vs 2020 (statistically significant difference: p value)
8. Trauma incident associated with weekdays vs weekends and public holidays in 2019 and 2020 (relative incident of attendance expressed as incident rate ratios)

5. Ethics

Ethics clearance will be required for this study as the research is being conducted on humans.

This study is a retrospective analysis of data that has already been collected; it will have no influence on the management of the involved patients.

All clinical identifiers will be made anonymous when the data is collected and patient information will remain confidential. Therefore informed consent is not required from the patients. Consent will however be obtained from the gatekeeper of the data.

The data will be stored for a period of 15 years in the Trauma Unit at Charlotte Maxeke Johannesburg Academic Hospital.

The intention of this research is to publish the outcomes in a reputable journal.

The ethics clearance will be submitted while awaiting the outcome of the protocol assessment. No data collection will be conducted before ethics approval has been obtained.

6. Timing

	May	June	July	August	September	October	November
Literature review							
Preparing protocol							
Protocol assessment							
Protocol corrections							

Ethics application							
Collecting data							
Data analysis							
Writing up thesis							
Writing up paper							

7. Funding

There is no anticipated associated cost for this study to the institution or University. Costs for printing, transport and publishing will be covered privately by the researcher.

8. Problems

There are no anticipated problems. As this is a retrospective review, all data is already available for interpretation.

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Appendix A

Data collection sheet: Priority one patients

Patient number	Gender	Age	Injury Mechanism		ISS score			Patient outcome		Day of the week		
			External trauma	Interpersonal violence	15<	15-75	75	Admission	Discharge	Weekday	Weekend	Public Holiday

Appendix B

Data collection sheet: Surgical procedure performed

Patient number	Laparotomy	Thoracotomy	Other	Damage control surgery Y/N	Relook Y/N

APPENDIX B- Ethics clearance letter



R14/49 Dr Nadia Guidozzi

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M200825 MED20-05-122

NAME: Dr Nadia Guidozzi
(Principal Investigator)
DEPARTMENT: Surgery
Charlotte Maxeke Johannesburg Academic Hospital

PROJECT TITLE: Effect of the Covid-19 Lockdown Regulations on the Severe Trauma Burden in an Urban Trauma Centre in Johannesburg South Africa

DATE CONSIDERED: 28/08/2020

DECISION: Approved unconditionally

CONDITIONS:

SUPERVISOR: Dr Isabella Margarita Joubert

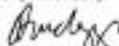
APPROVED BY: 
Dr C Penny, Chairperson, HREC (Medical)

DATE OF APPROVAL: 14/09/2020

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 301, Third floor, Faculty of Health Sciences, Philip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.** The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed August and will therefore be due in the month of August each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).


Principal Investigator: Signature

09/10/2020
Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX C- Letter of Approval from Hospital CEO



GAUTENG PROVINCE

HEALTH
REPUBLIC OF SOUTH AFRICA

CHARLOTTE MAXEKE JOHANNESBURG ACADEMIC HOSPITAL

Enquiries:
Ms. X Dhlamini
Office of the Clinical Director
Email: xolisane.dhlamini@gauteng.gov.za
Tel: (011) 488-3710
29 May 2020

Dear Dr. N Guidozzi

STUDY TITLE Effect of the Covid-19 Lockdown Regulations on the Trauma Burden in an Urban Trauma Centre In Johannesburg, South Africa

Permission to conduct the above-mentioned study is provisionally approved. Your study can only commence once Ethics approval is obtained. Please forward a copy of your Ethics Clearance Certificate as soon as the study is approved by the Ethics Committee for the CEO's office to give you the final approval to conduct the study.

☒ Supported / not supported

Dr. PN Africa
Acting Clinical Director

DATE: 03/06/2020

☒ Approved / not approved

Ms. G. Bogoshi
Chief Executive Officer

DATE: 05.06.2020

APPENDIX D- Letter of Submission for Examination



CERTIFICATE OF SUBMISSION FOR EXAMINATION OF MASTERS RESEARCH REPORT / DISSERTATION OR PHD THESIS SIGNED BY HIGHER DEGREES CANDIDATES

Full name	Nadia Guidozi		
Student number	305749		
Title of submitted Research Project:			
Effect of the Covid-19 Lockdown Regulations on the Severe Trauma Burden in an Urban Trauma Centre in Johannesburg, South Africa			
Contact no	060 371 6209	E-mail	nadiaguidozi@gmail.com

1. If you are likely to move in the next 6-12 months, please give the anticipated date of move:

2. I hereby submit my **Masters (research report)**
3. I have checked all copies of my research report / dissertation / thesis and declare that no pages are missing or poorly reproduced.
4. I have submitted 2 bound copies and 1 copies on CD
5. **I confirm that I have:**
 - a) A signed declaration indicating my understanding of the concept of plagiarism and a denial of plagiarism in my research document.
 - b) A report from "Turnitin" (or other approved plagiarism detection) software indicating the level of plagiarism in my research document included as an appendix.
6. **I confirm that I have:**
 - a) Not used either human or animal tissue or records **Yes**
 - b) If yes: I have included the ethics waiver letter pertinent to my research as an appendix **Yes**
 - c) Done research using animals **No**
If yes: I have included a copy of the animal ethics committee clearance certificate as an appendix in this document
 - d) Done research using human subjects, human tissue or patient records **yes**
If yes: I have included a copy of the human ethics clearance certificate as an appendix to the research document
7. I understand that I may not graduate unless my University fees have been paid in full.
8. My Supervisor(s) names, departments, telephone numbers and email addresses are as follows:

Name	Professor Moeng		
Department	Trauma Surgery		
Telephone	082 887 8621	E-mail	Maeyane.Moeng@wits.ac.za

Name	Dr IM Joubert		
Department	Trauma Surgery		
Telephone	082 920 0262	E-mail	imjoubert@yahoo.com

List all publications, which you have published in peer-reviewed journals from your postgraduate research report/dissertation/thesis during the course of your studies in the Faculty of Health Sciences (Include authors, year, title of paper, name of journal, volume number and page numbers). This information is mandatory.

1. Guidozzi N, Joubert IM, Moeng MS. 2022. Effect of the Covid-19 Lockdown Regulations on the Severe Trauma Burden in an Urban Trauma Centre in Johannesburg, South Africa. Journal of Surgery; 7(16) 1-8. DOI: www.doi.org/10.29011/2575-9760.001665

Signature of candidate: _____



Date: September 12, 2023

APPENDIX E- Change of Title

UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG



FACULTY OF
HEALTH SCIENCES

APPLICATION FOR CHANGE OF TITLE OF APPROVED RESEARCH REPORT, DISSERTATION OR THESIS

Student Surname and Initials: Nadia M Guidozzi Student Number: 305749

Degree: Master in Medicine Department: Surgery Telephone: 060 371 6209 E-mail:

nadiaguidozzi@gmail.com

Current Title: Effect of Covid-19 Lockdown Regulations on the Trauma Burden in an Urban Trauma Centre in Johannesburg, South Africa

New Title: Effect of Covid-19 Lockdown Regulations on the Severe Trauma Burden in an Urban Trauma Centre in Johannesburg, South Africa

Motivation / Reason for title change: Only significant trauma is being looked at in the study (patients who are deemed priority one patients with significant trauma injuries), as such, it does not necessarily equate to the entire trauma burden experienced over this time, only the significant trauma burden experienced.

Approvals / signatures:

Student Signature: _____

Date: 2020/08/01

=====

Supervisor 1 – Name & Surname: Professor MS. Moeng

Department: Surgery

Supervisor Telephone: 082 887 8621. Supervisor E-mail: drmoeng.trauma@gmail.com

Supervisor Signature: _____

Date: 13 August 2020

Supervisor 2 – Name & Surname: Dr IM Joubert

Department: Surgery

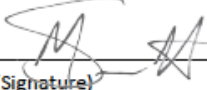
Supervisor Telephone: 082 920 0262 Supervisor E-mail: imjoubert@yahoo.com

Supervisor Signature: _____

Date: 02 September 2020

=====

HEAD OF DEPARTMENT / HEAD OF SCHOOL: **(Where the HOD is Supervisor, the HOS must sign)

MD Smith		3/09/2020
_____ (Name and Surname)	_____ (Signature)	_____ (Date)

APPENDIX F- Plagiarism Declaration



PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I Nadia Guidozzi (Student number: 305749) am a student registered for the degree of Master of Medicine in the academic year 4.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.
- I have included as an appendix a report from "Turnitin" (or other approved plagiarism detection) software indicating the level of plagiarism in my research document.

Signature: 

Date: 11 September 2023

APPENDIX G- Turnitin Report

Final mmed submitted article-2.docx

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APPENDIX H- Author- Publisher Agreement

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Cape Town, South Africa

AUTHOR-PUBLISHER AGREEMENT FORM

Corresponding Author: Nadia Guidozzi (the "Author")

Co-Authors: Prof M. Moeng and Dr I.M Joubert

Corresponding Author Email: Maeyana.Moeng@wits.ac.za
imjoubert@yahoo.com

Manuscript Number:

Re: Manuscript (final typeset PDF) entitled: (the "Work")

Effect of the Covid-19 Lockdown Regulations of the Severe Trauma Burden in an Urban Trauma Centre in Johannesburg, South Africa

For publication in: South African Medical Journal (the "Journal")

Published by: Health and Medical Publishing Group (the "Publisher")

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The Author agrees to the above, and has obtained the necessary permission from all other authors to execute this Agreement on their behalf.

Author's signature:



Date: 30 May 2022

APPENDIX I- Letter of Approval for use of Trauma Database



Charlotte Maxeke Johannesburg
Academic Hospital
Trauma Unit



27 May 2020

Nadia Guidozzi (Principle Investigator)
89th Avenue Houghton
Johannesburg

Dear Nadia Guidozzi

I have received your request to conduct your MMED (Surg) entitled "Effect of the Covid-19 Lockdown Regulations on the Trauma Burden in an Urban Trauma Centre in Johannesburg, South Africa" in the Trauma Department at Charlotte Maxeke Johannesburg Academic Hospital.

Your request to conduct the research in the Trauma Department has been granted.

The research is a retrospective study over the time period 26 March to 01 May 2019 and 2020. The principle investigator will access trauma resuscitation forms (Medi Bank forms) from the Trauma Department. Patient demographic information, injury mechanism, discharge disposition and surgical procedures will be recorded.

Sincerely



Professor MS Moeng
Head of Trauma Department
Charlotte Maxeke Johannesburg Academic Hospital

APPENDIX J- Letter of Approval for Redcap Database



University
of the Witwatersrand
Johannesburg



Department of Surgery:

Charlotte Maxeke Johannesburg Academic Hospital

Post: net Suite #235, Private Bag, #2500, Houghton 2041 • Telephone +27 (0)11 488-3373 • Fax +27 (0)11 488-4322 • Email: Thembekile.mthembu@wits.ac.za

2nd June 2020

Ms. G Bogoshi
Office of the CEO
Charlotte Maxeke Johannesburg Academic Hospital

Dear CEO

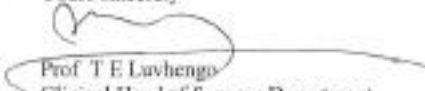
RE: PERMISSION TO ACCESS THE RED DATA AT CMJAH.

Good day. This is to inform you that Dr Nadia Guidozi is planning to conduct a study titled:

Effect of the Covid-19 Lockdown Regulations on the Trauma Burden in an Urban Trauma Centre in Johannesburg, South Africa

We are aware of the study and fully support it. There will be no cost implication to the Hospital. The Department grant permission to use the data for ethical approval from the Human Ethics Committee of University of the Witwatersrand.

Yours sincerely


Prof T E Luvhengo
Clinical Head of Surgery Department
Charlotte Maxeke Johannesburg Academic Hospital