

Impact Of Covid-19 Healthcare Emergency On Trauma-Related Outcomes

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Abstract

Objective: To determine the impact of the Covid-19 healthcare emergency on trauma-related outcomes.

Study Design: Cross-sectional observational study

Duration and Place of Study: Emergency Department of Surgery and Allied of Pakistan Institute of Medical Sciences (PIMS) Islamabad from 1st March 2021 to 30th May 2021 for three months.

Patients and Methods: A comparison was made between the number of trauma patients admitted to the emergency department during the pandemic and the patients admitted during the same period of the previous year in the same center (data extracted from hospital records). Furthermore, we compared trauma-related disorders, patterns of injuries, and clinical characteristics of trauma patients in our hospital during a pandemic with those in a non-pandemic.

Results: The number of trauma patients in the pandemic was significantly lower than it was before Covid. Before Covid, 1520 (64.5%) were admitted to the emergency room (non-Covid group), whereas only 835 (35.5%) were admitted to the emergency room during the pandemic (Covid group). There was a 48 % reduction in total. Gender and age ratios did not differ much between the two groups. Between cohorts, there was a significant association between the mechanism of injury and the type of trauma ($p < 0.03$). Mortality rates decreased during the Covid-19 era (1.3% vs. 3.4%).

Conclusion: As a result of the Covid-19 outbreak, there was a 48% decrease in trauma patients admitted to hospitals and a decrease in their mortality as well. The findings of this study may open the new door to new ways of managing surgical emergencies without engulfing the already busy hospitals.

Keywords: Trauma, Emergency, Covid-19, Trauma care

Introduction

Over a year, the novel severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has triggered a pandemic in extreme healthcare demanding situations and socioeconomic results worldwide. Covid-19 compelled the modern healthcare systems to evolve right away to the growing call for respiratory and critical care support. Several healthcare facilities were allocated worldwide due to exponential growth in Covid-19 infections, especially in intensive care units' admission. *National Command Operation Center* (NCOC) applied countrywide measures to restrict the spread of the virus among the Pakistani population, particularly mass vaccination campaigns. Ultimately, a countrywide "smart lockdown" in July could save flooding of the countrywide healthcare crisis^{1,2}.

Besides general hygiene measures, social distancing, quarantines in case of symptoms, and recommendations to conduct business from home as much as possible, extra mandatory measures have been taken through the authorities. Keeping all wholesale shops, cafeterias, salons, athletic and fitness clubs, colleges, higher education institutions, and childcare facilities open, preventing events, nursing domestic visits, and restricting the number of individuals or households that can be served by outside or in-house agencies to a maximum of three. No curfew was applied to the country until now. Reports and experiences from pandemics, such as the SARS pandemic in 2003, already established a more significant reduction in emergency departments during the pandemic's peak^{3,4}. Moreover, the latest research concerning emergency admissions in Europe during the Covid-19 pandemic mentioned comparable results^{1,5,6}.

It is still unknown how much the Covid-19 pandemic and countrywide applied measures helped the diversity and control of patients with increasing trauma injuries in Pakistan during the pandemic. Furthermore, the clinical hallmarks and injury patterns of those patients continue to be elucidated, especially because trauma patients make up a primary emergency admission. Understanding the bulk of disorders of trauma patients during a pandemic is crucial as it allows expecting and consequently optimizing using hospital capacity, planning for a future catastrophic pandemic, and improving trauma-related outcomes.

It became hypothesized that ED admissions may lower because of the implemented measures; however, the necessity for admission and surgical intervention of trauma patients might lower to a lesser extent. The objective of this study is to assess the burden of trauma-related disorders, patterns of injuries, and clinical characteristics of trauma patients in our hospital during a pandemic, as compared to non-pandemic data.

Materials and Methods

This study was performed following the Declaration of Helsinki. All adult participants provided written informed consent to participate in this study. Participants were enrolled in surgery and the allied emergency department. Contributors' enrollment started on 1st March 2021, till 31st May 2021 for three months.

Patients presented to the ED during the study duration were enrolled in the study for the Covid group. Patients of all age groups with trauma were encompassed in the study. Patients were included in the study if they were presented with traumatic head injuries, burns, deep lacerations, thoracic and abdominal injuries (both superficial and deep), and vascular injuries. Patients having prior trauma injuries that resulted in intracerebral injury, superficial lacerations, abrasions, prior surgical intervention, or if the patient was transferred to another hospital during the study were all excluded. The data for the non-Covid group was extracted from the hospital electronic/manual database for the same time duration from March 2019 to May 2019 (the period even before the first case of covid was detected in Pakistan).

Characteristics analyzed were the patient's age, gender, medical background, injury characteristics, and consumption of healthcare facility and in-hospital mortality. According to the Triage Status (T1 - T5), medical attention was prioritized. T1 is the most severe trauma requiring immediate medical attention; on the other side, T5 is the mildest trauma requiring just late medical attention. The triage status (T1-T5) prioritized patients based on the urgency to receive medical care⁷. T1 is the most urgent category and concerns patients needing immediate medical care because of life-threatening injuries, whereas T5 represents non-urgent care that theoretically could wait until the next day⁸.

For the sake of convenience, traumas were divided into nine regions of the body: head and neck, face, thorax, upper and lower limbs fractures, and external injuries according to the Abbreviated Injury Score guidelines. Utilization of healthcare facilities was recorded in terms of the total number of patients admitted to the emergency, the number of days stayed in the hospital, and the total number of patients that needed follow-up.

All the data collected retrospectively for 2019 (non-Covid cohort) and 2021 prospectively for the Covid cohort was recorded and analyzed in Statistical Package for Social Sciences (SPSS) version 23.0. Descriptive analysis was presented as mean and standard deviation, while categorical data were presented as numbers and frequencies. A comparison between cohorts was made with the help of chi-square (for categorical variable) / student's T-test (for continuous variable). The p-value for statistical significance was set at $p < 0.005$. The results obtained were by the STROBE guidelines ¹⁰.

Results

A total of 835 patients were included in the study during the pandemic's three months, while 1520 patients were registered from the era before Covid, so there is a significant decrease in the number of trauma patients in the pandemic as in the same duration of time before Covid. A reduction of 48 % was seen between cohorts. Prior to the pandemic, the number of cases reported to the emergency was almost 80 on average daily.

The ratio between the age and gender of both groups did not differ much. The mean age of patients was 32.05 ± 8.98 years in the non-Covid group and 32.52 ± 9.05 years in the Covid era. The lowest age of patients was 23 years; the maximum age of patients was 45 years. Of all the patients, 60.1% of patients in pre-Covid times and 59.6 % in the pandemic were men; on the other hand, 39.9 % of patients in the non-Covid era and 41.1 % in the pandemic times were women, as shown in Table 1.

However, more psychiatric patients were recorded in the Covid-19 group (3.0% vs 3.9 %). Patients were admitted multiple times before the Covid, while this ratio decreased during the pandemic. The numbers of outdoor injuries like sports-related injuries, traffic accidents, or work-related injuries were seen to be decreased in the Covid group ($p = 0.033$). On the other

hand, indoor injuries due to domestic violence, burns, and stair falls increased during Covid-19.

The groups' medical histories seemed similar, and diabetes was the most common problem (38% & 38.3 %). No difference was recorded in the type of injury or the injury site in both cohorts. Even, the mortality rate decreased during the Covid-19 era compared to before Covid-19 (1.3 % vs. 3.4 %).

Table-1 Baseline Demographic Characters, Mechanism of Injury and Mortality Rate in Non-Covid and Covid Time.

Variables	Non-COVID Group (n= 1520)	COVID Group (n= 835)	P-Value
Age	32.05 ± 8.98	32.52 ± 9.05	-
Gender			
1. Male	914 (60.1 %)	498 (59.6 %)	0.98
2. Female	606 (39.9 %)	337 (40.4 %)	
Medical History			
1. Cardiac	411 (27 %)	226 (27.1 %)	0.259
2. Pulmonary	366 (24.1 %)	201 (24.9 %)	
3. Diabetes	577 (38 %)	320 (38.3 %)	
4. Dementia	120 (7.9 %)	64 (6.7 %)	
5. Psychiatric	46 (3.0 %)	24 (3.9 %)	
Triage Status			
➤ T 1	411 (27.0 %)	225 (26.9 %)	0.85
➤ T 2	363 (23.9 %)	200 (24.0 %)	
➤ T 3	576 (37.9 %)	317 (38.0 %)	
➤ T 4	122 (8.0 %)	66 (7.9 %)	
➤ T 5	48 (3.2 %)	27 (3.2 %)	
Multiple Admissions			
1. Thrice	576 (37.9 %)	318 (38.1 %)	<0.001
2. Four	49 (3.2 %)	16 (1.9 %)	
3. Five	18 (1.2 %)	3 (0.4 %)	
Setting of Injury			
1. Public	914	500	

Area	(60.1 %)	(59.9 %)	0.374
2. Indoor	606	335	
	(39.9 %)	(40.1 %)	
Mechanism of Injury			
1. Assault / Violence	411	226	
	(27.0 %)	(27.9 %)	
2. Self-Inflicted	366	202	0.033
3. Traffic Accidents	575	317	
	(24.1 %)	(24.2 %)	
4. Sports Related	46	24	
	(37.8 %)	(38.0 %)	
5. Work Related	121	65	
	(8.0 %)	(4.3 %)	
6. Simple Fall	46	24	
	(3.0 %)	(2.9 %)	
	1	1	
	(0.1 %)	(0.1 %)	
Type of Trauma			
1. Burnt	403	218	
	(26.5 %)	(26.1 %)	
2. Penetrating	353	189	<0.001
	(23.2 %)	(22.6 %)	
3. Blunt	563	305	
	(37.0 %)	(36.5 %)	
4. Superficial	135	79	
	(8.9 %)	(9.5 %)	
5. Other	66	44	
	(4.3 %)	(5.3 %)	
Death	52	19	
1. Onsite	28	9	
	(53.8 %)	(47.2 %)	
2. In hospital	24	10	0.26
	(46.2 %)	(52.6 %)	

Discussion

Despite introducing a "Smart" lockdown, we established that just 1.8 % lesser cases were received at the ED daily. The administration of Pakistan did not apply strict orders or curfews for people to stay at home. Due to this negligence, we observed an increase in the number of Covid patients, and still, no change in people's behavior was noted, which could have helped decrease the traumatic damage. Due to this reason, we could see a continuous rise in traumatic injuries resulting from traffic accidents and domestic violence. However, the study revealed a 48% decrease in trauma-related injuries. The results of our study were in harmony with the results of the previous studies done worldwide ^{9,10}. Hernigou J et. al. described a 32% reduction in ER burden during the Covid era ⁹.

Despite the decrease in ED admissions, the relative percentage of patients requiring hospitalization

climbed by 1.8 %. There are several explanations for these findings. First, there was a slight rise in the number of older patients who suffered severe injuries, as they were more likely to require hospitalization. Second, the proportion of patients who had traffic-related high-energy trauma or had injured themselves was higher. As a result of their more severe injuries, they have a higher admission rate. A similar pattern was noticed in the cases treated surgically; this turned out to be an unusual and remarkable finding. However, this information was incomplete and ambiguous in some cases as the number of patients under 18 was low.

Sheets et. al.¹¹ described that injury mechanisms between 2019 and 2020 differ significantly with fewer blunt injuries (89.64% vs. 88.39%, P .001), more burn injuries (1.84% vs. 2.00%, P = .021), and more penetrating injuries (8.58% vs. 9.75%, P .001). There is an overall decrease in all injury mechanisms in 2020 compared to 2019 until December when penetration trauma remains elevated. According to our study, blunt injuries were lower (37% vs. 36.5%), burn injuries were lower (26.5% vs. 26.1%), and superficial injuries were higher (8.9% vs. 9.5%) during the non-Covid era.

Our results are in line with the study of Qasim Z. et al¹², who describes an effective reorganization of the trauma system during the Covid-19 period, showing also a decrease of road-related trauma and an increase in trauma due to self-inflicted or interpersonal violence.

It was standard practice to treat trauma cases surgically as we weren't sure whether the fracture would proceed or not. Despite this, we did not record or register data regarding the type of fracture that occurred in our study. Ultimately, we noticed an increase in the number of patients with psychiatric diseases at the end of the study. It occurred due to the increase in the number of domestic violence injuries. Similar trends in psychiatric diseases were noted in the former studies during the Ebola and SARS pandemics ⁶⁻⁹. Due to the lockdown and stay-at-home restrictions, several studies reported an increase in the symptoms of psychiatric patients as people become frustrated and need refreshment from the situation created.

Our study is the first and one of its kind that addressed the burden of trauma on the crucial healthcare center of Pakistan during the pandemic. This research focused on the pressure on healthcare systems to understand the drawbacks and optimize

the use of the healthcare system to improve healthcare planning in the future.

Conclusion

During the Covid pandemic, trauma volumes decreased dramatically, and the mechanism of injury has also changed dramatically. Finally, it appears that trauma mortality has decreased during the Covid pandemic.

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