



The Effect of Stay-at-Home Order on Orthopedic Trauma in Chicago: Experience of a Level I Trauma Center

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Introduction

State authorities issued the stay-at-home order to mitigate the rapid spread of the novel Coronavirus Disease (COVID-19). While recent evidence suggests the usefulness of stay-at-home order in flattening the epidemic curve [1], less is known about the impact of such a measure on orthopedic trauma.

In the U.S, stay-at-home orders have resulted in restrictions of social gatherings and community events. A silver lining to such mass quarantine was predicted to be a decreased incidence of traumatic injuries, which might be favorable in allocating scarce health care resources to acute care patients. On the other hand, the American College of Surgeons (ACS) proposed a triage guideline for elective cases to optimize resources for emergency surgical procedures [2]. The purpose of this study was to determine whether the state-imposed COVID-19 stay-at-home order affected the incidence and early clinical outcomes of patients who sustained orthopedic injuries.

Methods

In this retrospective cohort study, we included patients with orthopedic injuries (ICD10: S40.00-S99.99) treated at a Level 1 Trauma center in Chicago. Data were analyzed for patients evaluated during the stay-at-home order in Illinois (3/21/2020 to 5/28/2020) and compared with cases of the same period in 2019. Based on ACS triage guidelines, only acute trauma patients were scheduled for surgery [2]. The primary outcome was in-hospital mortality. The hospital Length of Stay (LOS) and time to procedure for Open Reduction and Internal Fixation (ORIF) or Intra Medullary Fixation (IMF) were secondary outcomes.

Categorical and continuous variables were analyzed by Pearson's chi-squared test and Mann-Whitney U test, respectively. The variables of age, sex, and TRISS were added to the regression models to adjust for potential confounders. Statistical significance was set at a 2-tailed P value <0.05. Data analysis was performed using STATA version 15.

Results

A total of 502 patients met the inclusion criteria (Table 1). The frequency of orthopedic injuries dropped from 283 cases in 2019 to 219 cases in 2020. Compared to 2019, the rate of blunt trauma decreased (59.71% vs. 48.85%), while penetrating injuries escalated (40.29% vs. 51.15%), (p=0.006). Similarly, during the stay-at-home order, the accident rate decreased (55.47% vs. 42.66%), but more assaults occurred (39.92% vs. 51.83%, p=0.03). In a subgroup analysis, gunshot trauma was the predominant mechanism of injury in both years (27% vs. 36%), and motor vehicle collision was the leading mechanism of blunt trauma (21.05% vs. 17.35%, p=0.05).

The overall median hospital length of stay in 2019 and 2020 was one day, and the mortality rate was 4.96% and 4.57%, respectively. In 2020, the median time to procedure increased (ORIF: 11.86 h vs. 14.3 h, IMF: 6.98 h vs. 10.45 h). However, on regression models, these findings did not reach significance (Table 2).

Discussion

In our study, the stay-at-home order was correlated with an overall lower frequency of orthopedic injuries. During this period, blunt trauma decreased across the board, but assaults and gunshot violence did not plummet. A possible explanation for this is that serial offenders are more likely to breach the stay-at-home orders [3]. The comparatively higher incidence of gunshot trauma

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Table 1: Patients Characteristics.

Characteristics ^a	2019 (N=283)	2020 (N=219)	Total (N=502)	p-value
Age, median (IQR) ^b	31 (23-46)	27 (21-39)	30 (22-44)	0.03
Gender, N (%) ^c				
- Male	214 (75.61)	172 (78.54)	386 (77)	0.44
- Female	69 (24.39)	47 (21.46)	116 (23)	
Injury Type, N (%) ^c				
- Blunt	169 (59.71)	107 (48.85)	276 (54.7)	
- Penetrating	114 (40.29)	109 (51.15)	223 (44.2)	0.006
Injury Mechanism, N (%) ^c				
- Fall	48 (16.84)	30 (13.70)	78 (25.5)	
- GSW	79 (27.72)	80 (36.53)	159 (31.5)	
- Knife or other sharp object	30 (10.53)	30 (13.70)	60 (11.9)	
- Motorcycle	11 (3.86)	6 (2.74)	17 (3.3)	0.048
- MVA	60 (21.05)	38 (17.35)	98 (19.4)	
- Pedal Cycle	5 (1.75)	3 (1.37)	8 (1.6)	
- Pedestrian on foot	17 (5.96)	7 (3.20)	24 (4.76)	
Injury Intention, N (%) ^c				
- Assault	113 (39.92)	113 (51.83)	226 (45.1)	0.03
- Accident	157 (55.47)	93 (42.66)	250 (49.9)	
- intentional self-harm	5 (1.75)	3 (1.37)	8 (1.6)	
ISS median (IQR) ^b	5 (1-9)	4 (1-6)	4 (1-9)	0.03
TRISS ^c	0.994 (0.984-0.996)	0.994 (0.99-0.996)	0.994 (989-0.996)	0.65
Diagnosis, N ^c				
- Fractures (Upper and lower limbs)	114	80	194	0.44
- Dislocation of joints (Upper and lower limbs)	16	7	23	

GSW: Gunshot Wound; MVA: Motor Vehicle Accident; ISS: Injury Severity Score; TRISS: Trauma Injury Severity Score

^aResults of categorical variables are presented with frequencies and percentages, continuous variables reported by a median, and Interquartile Range (IQR)

^bMann-Whitney U test

^cPearson's chi-squared test

Table 2: Multivariate analysis of patient outcomes^a.

Outcomes ^b	2019	2020	2019 vs. 2020, Effect Estimate (95% CI)	
			Unadjusted	Adjusted
Time to procedure ^c				
Time to ORIF in hours	11.86	14.3	0.92	0.97
Median (IQR)	(7.75-20.63)	(5.25-18.01)	(0.60-1.4)	(0.58-1.6)
Time to IMF in hours	6.98	10.45	1.2	1.4
Median (IQR)	(4.8-10.38)	(7.9-16.23)	(0.84-1.76)	(1.0-2.0)
Hospital LOS in days ^d	1	1	0.84	0.79
Median (IQR)	(1-2)	(1-2)	(0.63-1.11)	(0.59-1.07)
Mortality ^d	14	10	0.92	0.72
N (%)	-4.96	-4.57	(0.40-2.13)	(0.2-12.1)

ORIF: Open Reduction and Internal Fixation; IMF: Intramedullary Fixation; LOS: Length of Stay

^aLogistic regression was used to estimate the relative likelihood of mortality. Time to procedure and LOS were right-skewed; hence gamma regression with a log link was used

^bAdjusted for age, gender and TRISS

^cTime to procedure (ORIF or IMF) is reported based on 22 procedures in 2019 and 28 procedures in 2020

^dHospital LOS and Mortality are reported as an overall estimate of the study period of corresponding years

in our study is similar to the data from the Police Departments of Chicago, New York City, Baltimore, and Los Angeles [4]. Although there is a paucity of research that can explain such person-on-person violence, increased sales and consumption of alcohol [5] and a higher

unemployment rate may have played a role [6]. The current study also found that despite the relatively limited healthcare equipment supply during the COVID-19 pandemic, similar clinical outcomes ensued from the adoption of triage guidelines. This study is limited by its

retrospective nature and small sample size.

Author Contributions

Conception and design: Saadat and Bokhari. Acquisition of data: Saadat. Statistical analysis of data: Mazhar. Interpretation of data: Saadat, Qureshi and Mazhar. Drafting of the manuscript: Saadat, Qureshi. Critical revision of the manuscript for important intellectual content: Bokhari. Final revision of the version to be published: All authors administrative, technical, or material support: Bokhari. Supervision: Bokhari.

Additional contributions

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