

Original Contributions

Trends in Lower Extremity Injuries Presenting to Emergency Departments During the COVID-19 Pandemic

J. Alex Albright,* Edward J. Testa,[†] Joseph W. Testa,[‡] Stephen Marcaccio,[†] Ozair Meghani,[†] and Brett D. Owens[†]

*Brown University, [†]Department of Orthopaedic Surgery, Brown University, Warren Alpert School of Medicine, Providence, Rhode Island, and [‡]Department of Emergency Medicine, University of Connecticut, Farmington, Connecticut
Corresponding Address: J. Alex Albright, BS, Brown University, 222 Richmond Street, Providence, RI 02903.

Abstract—Background: During the emergence of the SARS-CoV-2 (COVID-19) pandemic, there were substantial changes in U.S. emergency department (ED) volumes and acuity of patient presentation compared with more recent years. **Objectives:** The purpose of this study was to characterize the incidence of specific lower extremity (LE) injuries presenting to U.S. EDs during the COVID-19 pandemic and to analyze trends across age groups and rates of hospital admission compared with previous years. **Methods:** The National Electronic Injury Surveillance System database was queried to identify patients who presented to U.S. EDs for a LE orthopedic injury between 2016 and 2020. **Results:** These queries returned 252,656 cases, representing a total estimate of 9,740,514 injuries presenting to EDs across the United States. The mean incidence of LE orthopedic injuries was 596.8 injuries per 100,000 person-years (95% confidence interval [CI] 594.9–598.7), with the greatest annual decrease in incidence occurring between 2019 and 2020 (24.96%). The largest number of estimated hospital admissions occurred in 2020, with a total 181,671 admissions (95% CI 178,032–185,311), a 25.74% increase from the average number of admissions between 2016 and 2019. **Conclusion:** The COVID-19 pandemic has placed immense stress on both emergency medical services and hospital systems around the United States. While there were decreased rates of ED utilization for LE orthopedic complaints during the first year of the pandemic, there was a concomitant increase in both the number and proportion of these injuries admitted to the hospital from the ED. This places an additional burden on already stressed emergency medicine services and overall

hospital systems that could slow down the management of medical emergencies. © 2022 Published by Elsevier Inc.

Keywords—COVID-19; epidemiology; hospital admission; lower extremity; musculoskeletal

Introduction

The COVID-19 pandemic has caused substantial disruptions in orthopedic surgery, trauma surgery, and emergency department (ED) workflows and resource allocation techniques around the world (1). The response to the COVID-19 pandemic has required creative allocation and distribution of health care resources to provide optimal patient care, particularly in larger tertiary trauma centers. As musculoskeletal (MSK) conditions account for a significant proportion of consultations, ED visits, surgical procedures, and hospital discharges (>602 million consultations before the COVID-19 pandemic), the quarantine period significantly impacted the opportunity for patients to receive both elective and emergency orthopedic services (1–3). Kalem et al. investigated the effect of various curfew practices on orthopedic ED visits and hospital admissions at their tertiary trauma center and found a decrease in hospital admissions by >50%, with a significant increase in low-energy injury mechanisms when compared with the same population in the period before

COVID-19 quarantine restrictions (4). Similar data have been reported from tertiary centers around the world (5–7). In addition, similar results have been reported from studies across other subspecialties, including pediatrics and acute care surgery (7–9).

The purpose of this study is to investigate the trends in lower extremity (LE) injuries presenting to EDs in the United States during the COVID-19 pandemic compared with data acquired from previous years. This data were used to calculate incidence rates, proportion of injuries, and disposition status. We hypothesized that there would be an overall decrease in both incidence rates and hospital admissions for LE injuries in the United States, with an overall unchanged proportion of injuries presenting to EDs during the COVID-19 pandemic.

Methods

This is a retrospective, cross-sectional epidemiologic study using the Consumer Product Safety Commission's (CPSC) National Electronic Injury Surveillance System (NEISS), a public database containing deidentified data not requiring institutional review board approval (10). The NEISS includes consumer product-related injuries and is generated via a complex probability model of all-injury data from a nationally representative, stratified sample of 100 hospital EDs around the United States and its territories. Each injury is assigned a weighted value based on the inverse probability of being selected, allowing for national estimates of injuries treated in all U.S. EDs. Each year the CPSC generates a new 100-hospital sample, selected from both children's and adult hospitals and from rural and urban hospitals to ensure accuracy. A full description of the database, including design and utilization, is publicly available (10). The NEISS serves as a public resource for epidemiologic studies and has been used in many studies (11–16). The NEISS database has also been used recently to examine changes in the COVID-19 pandemic (17–19).

We performed annual queries from 2016 to 2020 to extract all LE MSK injuries data from the 4 years before and the first year of the COVID-19 pandemic (2020). According to the NEISS Coding Manual, the *Body_Part_2* and *Diagnosis_2* numeric fields were added in 2018. We used fields to augment the data extraction for 2018 through 2020. These queries extracted all patients with ≥ 1 identified LE injury, including those injuries that present in addition to other diagnoses. ED visits for LE injuries were identified using the codes within the numeric fields *Body_Part* and *Body_Part_2* (37: ankle, 83: foot, 35: knee, 36: lower leg, 93: toe, and 81: upper leg) and *Diagnosis* and *Diagnosis_2* (53: contusion or abrasion, 54: crushing, 55: dislocation, 57: fracture, 64: strain or sprain,

and 61: nerve injury). These queries returned 252,656 cases that fit the above criteria, representing a total estimate of 9,740,514 injuries presenting to U.S. EDs. Cases were then divided into 5 separate age groups: 0 to 20 years, 21 to 40 years, 41 to 60 years, 61 to 80 years, and ≥ 81 years of age.

We used U.S. census data from 2016 to 2020 as the denominator to assess incidence rates of LE injuries in U.S. EDs per 100,000 person-years. We used χ^2 testing to analyze the incidence rates and patient disposition across age groups before and during the COVID-19 pandemic. We used *z* test column proportion post hoc analysis with Bonferroni adjustments to analyze for significant differences between proportions of injuries and disposition across age groups and time. We used logistic regression to calculate odds ratios (ORs) and 95% confidence intervals (CIs). To account for the weighted sampling methodology underlying NEISS, we specified the weight numeric field as an importance weight before statistical analysis. We used $p < 0.05$ to determine statistical significance. We completed all analysis using SPSS software (version 28; SPSS Inc., Chicago, IL) and Stata (version 15.1; StataCorp, Durham, NC).

Results

An estimated 9,740,514 LE MSK injuries presented to U.S. EDs from January 1, 2016 to December 31, 2020. The mean incidence of LE MSK injuries was 596.76 injuries per 100,000 person-years (95% CI 594.85–598.66). The year with the greatest incidence of injuries was 2016, with 665.71 injuries per 100,000 person-years, while 2020 had the lowest incidence, with 452.00 injuries per 100,000 person-years (Figure 1). There was a total decrease in incidence over the 5-year period of 32.10%, with the greatest percent decrease occurring between 2019 and 2020 (24.96%).

The 3 most injured LE body parts presenting to U.S. EDs from 2016 to 2020 were: ankle (192.24 injuries per 100,000 person-years [95% CI 191.16–193.33]), knee (143.11 [95% CI 142.20–144.02]), and foot (97.15 [95% CI 96.39–97.92]). A similar pattern was observed for each year individually; 2020 had the lowest incidence for all body parts except the upper leg (Figure 1).

Regarding patient disposition from the ED, the estimated largest number of hospital admissions from U.S. EDs occurred in 2020 with an estimate of 181,671 admissions (95% CI 178,032–185,311). Figure 2 shows the trend in the raw number of estimated admissions from the ED and the trend in the proportion of the estimated number of LE injuries presenting to EDs that resulted in hospital admission each year during the study period. The proportion of patients with LE MSK injuries present-

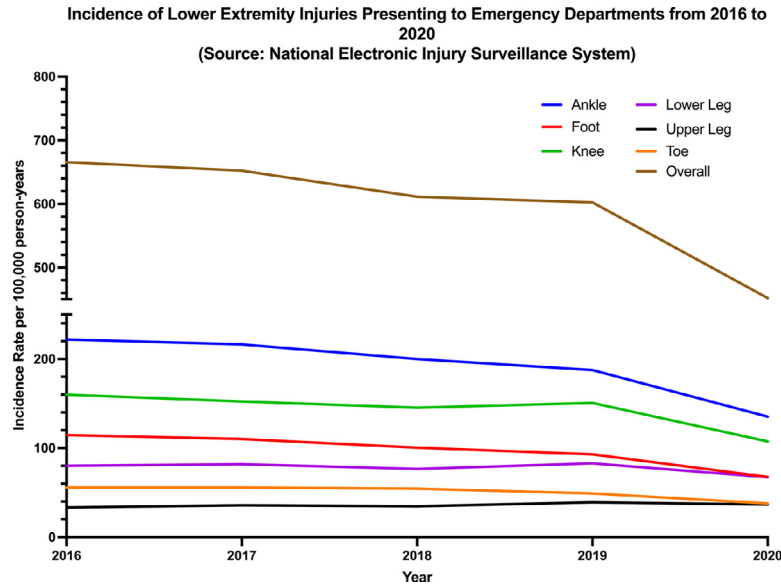


Figure 1. Trends in the incidence of lower extremity musculoskeletal injuries presenting to U.S. emergency departments between 2016 and 2020. This figure shows both the overall incidence of lower extremity musculoskeletal injuries and the incidence of injuries broken down by body part presenting to U.S. emergency departments.

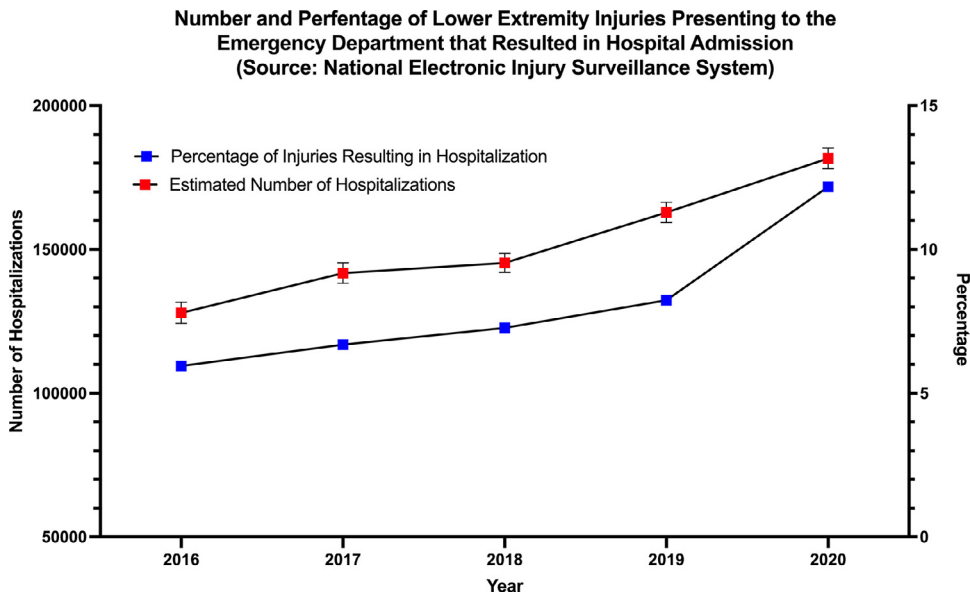


Figure 2. Trends in hospital admission for lower extremity (LE) musculoskeletal (MSK) injuries presenting to U.S. emergency departments. The left y-axis represents the trends in the number of LE MSK injuries resulting in hospital admissions between 2016 and 2020. The upper and lower 95% confidence intervals are depicted representing the 95% confidence interval of the total (estimated) number of LE MSK injuries leading to hospital admissions between 2016 and 2020. The right y-axis represents the changes in the proportion of LE MSK injuries that resulted in hospital admission between 2016 and 2020. The figure provides a trend line of the proportion of LE MSK injuries resulting in hospital admissions for each respective year within the study period. The upper and lower 95% confidence intervals are too small to be seen on the graph.

ing to EDs who were admitted was 8.23% in 2019, then increased 48% to 12.18% in 2020 (Figure 2). The ORs regarding the likelihood of a patient being admitted to the hospital in 2020 compared with 4 years earlier, broken down by age group and injury type, are available in Table 1. Overall, there was a statistically significant in-

crease in the likelihood of being admitted to the hospital for a LE MSK injury after the start of the COVID-19 pandemic (OR = 1.84 [95% CI 1.83–1.85]). The injured body part yielding the highest odds of being hospitalized in the 0- to 20-year-old age group was the knee (OR = 3.56). For the 21- to 40-year-old age group, it was

TABLE 1. Odds Ratios Comparing the Likelihood of Admission to the Hospital for a Specific Injury Within an Age Group During the COVID-19 Pandemic Versus Before the Pandemic

Age Group	Body Part	OR	95% CI	<i>p</i> Value
All ages		1.84	1.83–1.85	<0.001
0–20 years of age	Overall	2.09	2.06–2.13	<0.001
	Ankle	2.75	2.64–2.88	<0.001
	Foot	2.50	2.27–2.76	<0.001
	Knee	3.56	3.33–3.80	<0.001
	Lower leg	1.38	1.33–1.42	<0.001
	Toe	2.42	2.16–2.70	<0.001
	Upper leg	1.75	1.68–1.81	<0.001
21–40 years of age	Overall	2.06	2.03–2.09	<0.001
	Ankle	1.87	1.81–1.92	<0.001
	Foot	2.16	2.03–2.31	<0.001
	Knee	2.66	2.53–2.76	<0.001
	Lower leg	1.93	1.88–1.99	<0.001
	Toe	2.77	2.56–3.00	<0.001
	Upper leg	1.66	1.58–1.74	<0.001
41–60 years of age	Overall	1.56	1.54–1.58	<0.001
	Ankle	1.42	1.39–1.46	<0.001
	Foot	1.55	1.47–1.63	<0.001
	Knee	1.62	1.57–1.67	<0.001
	Lower leg	1.37	1.33–1.40	<0.001
	Toe	2.09	1.93–2.26	<0.001
	Upper Leg	1.45	1.40–1.50	<0.001
61–80 years of age	Overall	1.51	1.49–1.52	<0.001
	Ankle	1.24	1.21–1.27	<0.001
	Foot	3.00	2.87–3.13	<0.001
	Knee	1.72	1.68–1.76	<0.001
	Lower leg	1.44	1.41–1.47	<0.001
	Toe	1.83	1.71–1.96	<0.001
	Upper leg	1.17	1.14–1.20	<0.001
≥81 years of age	Overall	1.25	1.23–1.27	<0.001
	Ankle	1.24	1.18–1.29	<0.001
	Foot	1.04	0.95–1.14	0.427
	Knee	1.14	1.10–1.17	<0.001
	Lower leg	1.46	1.40–1.51	<0.001
	Toe	0.86	0.76–0.98	<0.001
	Upper leg	1.00	0.97–1.02	0.624

CI = confidence interval; OR = odds ratio.

Note: Before the COVID-19 pandemic includes 2016 through 2019; during the COVID-19 pandemic includes just 2020.

the toe (OR = 2.77); for the 41- to 60-year-old age group, it was the toe (OR = 2.09); for the 61- to 80-year-old age group, it was the foot (OR = 3.00); and for the ≥81 years of age group, it was the lower leg (OR = 1.46). The only injured body part that had decreased odds of being admitted during the pandemic was the toe in the ≥81 years of

age group (OR = 0.86). The data used to calculate the ORs in [Table 1](#) can be seen in Supplemental Table 1.

Analyses of specific diagnoses (i.e., contusion, fracture, dislocation) are available in [Table 2](#). There was a significant difference between the proportion of specific LE injuries admitted to the hospital before and during

TABLE 2. Change in the Proportion of Patients Presenting With Specific Injuries Requiring Admission to the Hospital Before the Start of the COVID-19 Pandemic and During the Pandemic

Body Part (N Before COVID-19/N During COVID-19)	Diagnosis	Pre-COVID-19, n (%)	COVID-19, n (%)	OR	95% CI	p Value
Ankle						
103,018/19,913	Contusion	1057 (1.0)	662 (3.3)	3.32	3.01–3.67	<0.001
991/253	Crush	55 (5.6)	17 (6.7)	1.23	0.66–2.19	0.475
12,857/3844	Dislocation	3028 (23.6)	1146 (29.8)	1.38	1.27–1.50	<0.001
546,879/123,204	Fracture	106,891 (19.5)	30,454 (24.7)	1.35	1.33–1.37	<.001
2,026,933/299,131	Sprain	4472 (0.2)	1022 (0.3)	1.55	1.45–1.66	<0.001
Foot						
627/102	Amputation	331 (52.8)	26 (25.3)	0.30	0.18–0.49	<0.001
528,641/80,406	Contusion	2671 (0.5)	1533 (1.9)	3.84	3.60–4.09	<0.001
14,483/2695	Crush	238 (1.6)	78 (2.9)	1.79	1.37–2.34	<0.001
2471/539	Dislocation	437 (17.7)	269 (49.9)	4.64	3.78–5.68	<0.001
410,680/81,847	Fracture	16,212 (3.9)	5620 (6.9)	1.80	1.74–1.85	<0.001
405,167/57,573	Sprain	647 (0.2)	110 (0.2)	1.20	0.97–1.48	0.077
Knee						
18/16	Amputation	18 (100)	0 (0)	N/A	N/A	N/A
758,487/154,530	Contusion	33,941 (4.5)	10,375 (6.7)	1.54	1.50–1.57	<0.001
426/245	Crush	0 (0)	0 (0)	N/A	N/A	N/A
127,087/24,379	Dislocation	3654 (2.9)	1380 (5.7)	2.03	1.90–2.16	<0.001
142,710/41,722	Fracture	38,505 (27)	15,218 (36.5)	1.55	1.52–1.59	<0.001
952,946/133,503	Sprain	7992 (0.8)	1926 (1.4)	1.73	1.65–1.82	<0.001
Lower leg						
208/48	Amputation	75 (36.2)	48 (100)	N/A	N/A	N/A
349,900/69,938	Contusion	11,796 (3.4)	4910 (7)	2.17	2.09–2.24	<0.001
1965/725	Crush	223 (11.3)	95 (13.1)	1.18	0.90–1.53	0.219
375/113	Dislocation	112 (29.9)	16 (14.2)	0.39	0.21–0.71	0.001
524,988/124,658	Fracture	122,782 (23.4)	37,021 (29.7)	1.38	1.37–1.40	<0.001
170,344/26,391	Sprain	1693 (1)	367 (1.4)	1.40	1.25–1.57	<0.001
Toe						
3869/1289	Amputation	1829 (47.3)	482 (37.4)	0.67	0.59–0.76	<0.001
226,823/35,521	Contusion	1464 (0.6)	824 (2.3)	3.65	3.35–3.99	<0.001
12,659/1962	Crush	135 (1.1)	5 (0.2)	0.24	0.076–0.57	<0.001
184,13/4415	Dislocation	417 (2.3)	105 (2.4)	1.05	0.84–1.31	0.649
386,660/73,287	Fracture	5882 (1.5)	2224 (3)	2.03	1.93–2.13	<0.001
51,512/8551	Sprain	117 (0.2)	0 (0)	N/A	N/A	N/A
Upper leg						
86,526/19,106	Contusion	2181 (2.5)	1461 (7.6)	3.20	2.99–3.43	<0.001
326/114	Crush	55 (17)	76 (66.9)	9.89	5.92–16.56	<0.001
144/156	Dislocation	80 (55.3)	73 (46.8)	0.71	0.44–1.14	0.131
274,028/83,530	Fracture	204,930 (74.8)	63,324 (75.8)	1.06	1.04–1.08	<0.001
105,609/17,932	Sprain	3892 (3.7)	802 (4.5)	1.22	1.13–1.32	<0.001

CI = confidence interval; N/A = not applicable; OR = odds ratio.

Note: Before the COVID-19 pandemic includes 2016 through 2019; during the COVID-19 pandemic includes just 2020.

the pandemic. Contusion injuries overall were more often admitted to the hospital after the pandemic began, while crush injuries, dislocations, fractures, and sprains varied by body part. The change in the rate of hospitalization for amputations was inconsistent and not found to be significant (Table 2).

Discussion

Since March 2020, the devastating impact of COVID-19 has profoundly shaped the landscape of emergency medical care accessibility throughout the world, with operational trends in orthopedic surgery departments in tertiary care institutions shifting significantly (20,21). Because of the unprecedented nature of the COVID-19 pandemic, it is paramount to observe volume trends in EDs over the last several years to allocate resources properly for high-volume medical fields such as orthopedics. In this study, we used a national database to compare trends in LE injury presentation during the pandemic to prepandemic levels. Our findings describe substantial epidemiologic changes to the presentations of LE injuries to U.S. EDs when comparing pre- and postpandemic times. Our results demonstrated a large decrease in the incidence of LE orthopedic injuries presenting to the ED after the start of the COVID-19 pandemic as predicted. However, contrary to our hypothesis, we observed a >25% increase in the number of hospital admissions from the ED in 2020 compared with prepandemic years. This increase in orthopedic, LE-related hospital admissions may have further impacted the limited hospital resources available during the COVID-19 pandemic and placed an even greater burden on already stressed emergency medicine services.

Using the NEISS database, we found that the total incidence of injuries presenting to the ED decreased 31% over the 5-year study period, with the largest percent decrease occurring between 2019 and 2020 at >25% (Figure 1). This decrease may be explained by several reasons, most notably given the strict lockdown procedures and social distancing that took effect in the early months of 2020. During this period, people became averse to the ED, with sources citing a complex interaction between both lockdown effects and fear of increased COVID-19 transmission risk as likely causes for this trend (22). Another explanation is that this decrease in seeking emergency care for LE injuries could be a result of the fact that most U.S. citizens were living more sedentary lifestyles during this time, resulting in a protective effect by discouraging risky behaviors that may lead to traumatic injuries (23). We further speculate that patients with chronic or less acute LE injuries may have delayed their presentation or avoided the ED completely during pandemic times, compared with previous years where the threshold to obtain

emergency care may have been lower. Our findings are in accordance with previous studies that noted a similar decrease in ED presentation volumes for hand and upper extremity injuries during the pandemic (20,24).

Despite the reduced number of ED visits for LE injuries in 2020, there were significantly greater odds of being admitted to the hospital when presenting with such injuries, with an estimated 181,671 admissions in 2020 compared with <130,000 admissions in 2016 (Figure 2). The proportion of those injuries resulting in hospital admission increased by nearly 50% from 2019 to 2020 (Figure 2). This trend was readily apparent in all age cohorts, and among essentially all LE areas (Table 1). Other studies have noted similar trends in orthopedic injury volume related to an increased prevalence of high-risk activities as the pandemic progressed and patients spent more time social distancing (24,25). Internationally, Wongtanarasarin et al. reported an increase in admission rates for traumatic ED presentations despite fewer overall visits to the ED in Thailand during their country's lockdown (26). Given the pandemic's mandated lockdown and the apprehension of patients to present to the ED, increased acuity of presentations may be a likely explanation for the increased rate of admissions for LE injuries. In addition, the cancellation of ambulatory surgical services during the early months of the pandemic likely contributed to the increase in hospital admissions. As a potential, speculative explanation, we postulate that elective, semielective, or urgent surgeries that otherwise would have been performed in outpatient surgery centers or had hospital admission scheduled in advance were directed to the ED for admission. Importantly, increased rates of admissions for LE complaints contributed to the increased hospital utilization in 2020, further stressing a hospital system already suffering from bed shortages in many areas of the country.

It has been widely documented that an overly stressed ED dramatically impacts patient care (27,28). ED crowding has been associated with decreased quality of service and experience, increased mortality, delays in time-sensitive treatments, adverse events and preventable errors, increased hospital stays, increased costs, provider burnout, and more (29). The influx of COVID-19 patients into U.S. EDs placed unprecedented stress on the hospital system that predisposed hospital systems to many of the aforementioned negative effects of ED crowding. Burnout among emergency medicine providers rose during the first year of the pandemic from already high prepandemic levels (30,31). While we cannot comment on the exact percent change in the overall patient traffic through EDs caused by the increased LE orthopedic complaints that resulted in hospital admission, it should be noted that the increase did place additional burden on already stressed EDs.

When evaluating admission rates following specific injury patterns, the results of the current study demonstrate significantly increased odds of hospital admission rates in several important injury patterns. Ankle contusion injuries, foot contusion injuries and dislocations, knee dislocations, lower leg contusions, upper and lower leg contusions, toe contusions and fractures, and upper leg crush injuries all demonstrated greater than two times odds of hospital admission in the COVID era compared to recent pre-COVID years (Table 2). These injury patterns may represent injuries imparted with a high level of energy, again supporting the notion that injury acuity presenting to U.S. EDs was likely far greater once the COVID pandemic began. Moreover, for these injuries to require hospital admission they may also require surgical management; this may have continued to strain the already markedly limited operating room resources observed throughout the country during the peak of the pandemic. In an analysis of the effects of COVID-19 on ED presentations, Harnett et al. found increased rates of high-severity medical issues such as cardiac arrest and ventricular fibrillation presenting during pandemic times, supporting the idea that patients who presented to the ED did so with higher acuity issues (32).

Limitations

There are inherent limitations with this retrospective database study. The NEISS is generated via a probability model creating a national estimate of injuries. This may fail to capture the true number of LE injuries that presented to the ED between the years of 2016 and 2020. As this study focused on the changing trends caused by the COVID-19 pandemic, only the 4 years before the pandemic (2016–2019) and the first year of the pandemic (2020) were analyzed. This did not allow for analysis of trends in ED utilization and subsequent hospitalization for LE MSK injuries before the onset of the pandemic. While the presented figures may potentially demonstrate both a decrease in ED utilization and a concomitant increase in subsequent hospital admission before the start of the pandemic, this is likely because of the limited number of observational years included in the study. The U.S. Department of Health and Human Services published a report demonstrating the normal ED utilization fluctuation patterns that showed the most recent peak in 2016, followed by small decreases in the following years (33). Rates of hospital admission from the ED also decreased until 2016 after the Medicaid expansion in 2014. After 2016, there was a subsequent rise in hospital admission rates leading up to 2020 and the COVID-19 pandemic (33). As the present study only includes data from 2016 to 2020, normal fluctuation in ED utilization and Medicaid expansion likely explain the changes in ED utilization and

hospital admission seen before the start of the pandemic. Next, the classification of LE injuries was primarily determined via emergency medicine providers; thus, the true inpatient diagnosis may be inaccurate in this setting. Moreover, the listed categories may underestimate or overestimate the true incidence of LE injuries over this 5-year period. Lastly, the NEISS database also does not include information regarding COVID-19 infection status or level of care of hospital. Further elucidation of surgically vs. nonsurgically managed patients, specific injury patterns, influence of COVID-19 infection status, level of care of hospital, and other comorbid factors would provide detail and more context to the current database study.

Conclusion

There was a 24.96% decrease in the incidence of LE orthopedic injuries presenting to the ED after the start of the COVID-19 pandemic with a concomitant 25.74% increase in the number of LE MSK injuries admitted to the hospital from the ED in 2020 compared with prepandemic years. These results suggest both increased acuity of cases presenting to the ED during the first year of the pandemic or inappropriate utilization of emergency medicine services because of the cancellation of ambulatory surgery centers as potential explanations of the increased rates of hospitalization for these injuries. This is an important finding in the context of current limitations in healthcare resources as the COVID-19 pandemic persists.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.jemermed.2022.04.032](https://doi.org/10.1016/j.jemermed.2022.04.032).

References

1. Wong JSH, Cheung KMC. Impact of COVID-19 on orthopaedic and trauma service: an epidemiological study. *J Bone Joint Surg Am* 2020;102:e80.
2. Kamacı S, Göker B, Çağlar Ö, Atilla B, Tokgözoğlu AM. The effect of the COVID-19 pandemic on orthopedic surgeries in a tertiary referral center. *Jt Dis Relat Surg* 2021;32:333–9. doi:[10.52312/jdrs.2021.78446](https://doi.org/10.52312/jdrs.2021.78446).
3. Luceri F, Morelli I, Accetta R, Mangiavini L, Maffulli N, Peretti GM. Italy and COVID-19: the changing patient flow in an orthopedic trauma center emergency department. *J Orthop Surg* 2020;15:323. doi:[10.1186/s13018-020-01816-1](https://doi.org/10.1186/s13018-020-01816-1).
4. Kalem M, Kocaoglu H, Merter A, Karaca MO, Ozbek EA, Kinik HH. Effects of COVID-19 pandemic curfew on orthopedic trauma in a tertiary care hospital in Turkey. *Acta Orthop Traumatol Turc* 2021;55:191–5.
5. Stullitel PA, Lucero CM, Soruco ML, et al. Prolonged social lockdown during COVID-19 pandemic and hip fracture epidemiology. *Int Orthop* 2020;44:1887–95. doi:[10.1007/s00264-020-04769-6](https://doi.org/10.1007/s00264-020-04769-6).

6. DiFazio LT, Curran T, Bilaniuk JW, et al. The impact of the COVID-19 pandemic on hospital admissions for trauma and acute care surgery. *Am Surg* 2020;86:901–3. doi:[10.1177/0003134820939904](https://doi.org/10.1177/0003134820939904).
7. Bram JT, Johnson MA, Magee LC, et al. Where have all the fractures gone? The epidemiology of pediatric fractures during the COVID-19 pandemic. *J Pediatr Orthop* 2020;40:373–9. doi:[10.1097/BPO.0000000000001600](https://doi.org/10.1097/BPO.0000000000001600).
8. Kruizinga MD, Peeters D, van Veen M, et al. The impact of lockdown on pediatric ED visits and hospital admissions during the COVID19 pandemic: a multicenter analysis and review of the literature. *Eur J Pediatr* 2021;180:2271–9. doi:[10.1007/s00431-021-04015-0](https://doi.org/10.1007/s00431-021-04015-0).
9. van Aert GJJ, van der Laan L, Boonman-de Winter LJM, et al. Effect of the COVID-19 pandemic during the first lockdown in the Netherlands on the number of trauma-related admissions, trauma severity and treatment: the results of a retrospective cohort study in a level 2 trauma centre. *BMJ Open* 2021;11. doi:[10.1136/bmjopen-2020-045015](https://doi.org/10.1136/bmjopen-2020-045015).
10. National Electronic Injury Surveillance System (NEISS). United States Consumer Product Safety Commission. Available at: <https://www.cpsc.gov/Research-Statistics/NEISS-Injury-Data>. Accessed August 21, 2021.
11. Hojjat H, Svider PF, Lin HS, et al. Adding injury to insult: a national analysis of combat sport-related facial injury. *Ann Otol Rhinol Laryngol* 2016;125:652–9. doi:[10.1177/0003489416644617](https://doi.org/10.1177/0003489416644617).
12. Gil JA, DeFroda SF, Kriz P, Owens BD. Epidemiology of snow skiing– versus snowboarding-related concussions presenting to the emergency department in the United States from 2010 to 2014. *Clin J Sport Med* 2017;27:499–502. doi:[10.1097/JSM.0000000000000395](https://doi.org/10.1097/JSM.0000000000000395).
13. Myers RJ, Linakis SW, Mello MJ, Linakis JG. Competitive wrestling-related injuries in school aged athletes in U.S. emergency departments. *West J Emerg Med* 2010;11:442–9.
14. Van Tassel D, Owens B, Pointer L, Moriatis Wolf J. Incidence of clavicle fractures in sports: analysis of the NEISS database. *Int J Sports Med* 2013;35:83–6. doi:[10.1055/s-0033-1345127](https://doi.org/10.1055/s-0033-1345127).
15. Lemme NJ, Ready L, Faria M, DeFroda SF, Gil JA, Owens BD. Epidemiology of boxing-related upper extremity injuries in the United States. *Phys Sportsmed* 2018;46:503–8. doi:[10.1080/00913847.2018.1516478](https://doi.org/10.1080/00913847.2018.1516478).
16. Diamond PT, Gale SD. Head injuries in men’s and women’s lacrosse: a 10 year analysis of the NEISS database. *Brain Inj* 2001;15:537–44. doi:[10.1080/02699050010007362](https://doi.org/10.1080/02699050010007362).
17. Forrester MB. Changes in product-related lower extremity injuries treated in emergency departments during the COVID-19 pandemic. *Low Extrem Rev* 2021;13 23–5,27,29–31.
18. Hogue K, Forrester MB. Changes in cleaning product-related injuries treated as emergency departments during the COVID-19 pandemic. *Clin Toxicol Phila* 2021;59:1046–7.
19. Maassel N, Saccary A, Solomon D, et al. Firework-related injuries treated at emergency departments in the United States during the COVID-19 pandemic in 2020 compared to 2018–2019. *Inj Epidemiol* 2021;8:65. doi:[10.1186/s40621-021-00358-2](https://doi.org/10.1186/s40621-021-00358-2).
20. Testa G, Sapienza M, Rabuazzo F, et al. Comparative study between admission, orthopaedic surgery, and economic trends during Covid-19 and non-Covid-19 pandemic in an Italian tertiary hospital: a retrospective review. *J Orthop Surg* 2021;16:601. doi:[10.1186/s13018-021-02754-2](https://doi.org/10.1186/s13018-021-02754-2).
21. Al-kulabi A, Mansour MA, Tahir A. The orthopaedic experience of COVID-19: a literature review. *J Perioper Pract* 2021;31:102–7.
22. Barten DG, Latten GHP, van Osch FHM. Reduced emergency department utilization during the early phase of the COVID-19 pandemic: viral fear or lockdown effect? *Disaster Med Public Health Prep* 2020;1–4. doi:[10.1017/dmp.2020.303](https://doi.org/10.1017/dmp.2020.303).
23. Giannouchos TV, Biskupiak J, Moss MJ, Brixner D, Andreyeva E, Ukert B. Trends in outpatient emergency department visits during the COVID-19 pandemic at a large, urban, academic hospital system. *Am J Emerg Med* 2021;40:20–6. doi:[10.1016/j.ajem.2020.12.009](https://doi.org/10.1016/j.ajem.2020.12.009).
24. Chen M, Chan KL. Characteristics of intimate partner violence in China: gender symmetry, mutuality, and associated factors. *J Interpers Violence* 2021;36:13–14. doi:[10.1177/0886260518822340](https://doi.org/10.1177/0886260518822340).
25. Jain A, Jain P, Aggarwal S. SARS-CoV-2 impact on elective orthopaedic surgery. *J Bone Joint Surg Am* 2020;102:e68. doi:[10.2106/JBJS.20.00602](https://doi.org/10.2106/JBJS.20.00602).
26. Wongtanarasarin W, Srisawang T, Yothiya W, Phinyo P. Impact of national lockdown towards emergency department visits and admission rates during the COVID -19 pandemic in Thailand: a hospital-based study. *Emerg Med Australas* 2021;33:316–23. doi:[10.1111/1742-6723.13666](https://doi.org/10.1111/1742-6723.13666).
27. Morley C, Unwin M, Peterson GM, Stankovich J, Kinsman L. Emergency department crowding: a systematic review of causes, consequences and solutions. *PLoS One* 2018;13. doi:[10.1371/journal.pone.0203316](https://doi.org/10.1371/journal.pone.0203316).
28. Kelen GD, Wolfe R, D’Onofrio G, et al. Emergency department crowding: the canary in the health care system. *NEJM Catalyt* 2021;5(2).
29. Kelen G, Peterson S, Pronovost P. In the name of patient safety, let’s burden the emergency department more. *Ann Emerg Med* 2016;67:737–40. doi:[10.1016/j.annemergmed.2015.11.031](https://doi.org/10.1016/j.annemergmed.2015.11.031).
30. Melnikow J, Padovani A, Miller M. Frontline physician burnout during the COVID-19 pandemic: national survey findings. *BMC Health Serv Res* 2022;22:365. doi:[10.1186/s12913-022-07728-6](https://doi.org/10.1186/s12913-022-07728-6).
31. Kelker H, Yoder K, Musey P, et al. Prospective study of emergency medicine provider wellness across ten academic and community hospitals during the initial surge of the COVID-19 pandemic. *BMC Emerg Med* 2021;21:36. doi:[10.1186/s12873-021-00425-3](https://doi.org/10.1186/s12873-021-00425-3).
32. Hartnett KP, Kite-Powell A, DeVies J, et al. Impact of the COVID-19 pandemic on emergency department visits — United States, January 1, 2019–May 30, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:699–704. doi:[10.15585/mmwr.mm6923e1](https://doi.org/10.15585/mmwr.mm6923e1).
33. Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services. Trends in the utilization of emergency department services, 2009–2018. Available at: <https://aspe.hhs.gov/reports/trends-utilization-emergency-department-services-2009-2018>. Accessed January 11, 2022.

ARTICLE SUMMARY

1. Why is this topic important?

While there were decreased rates of emergency department utilization for lower extremity (LE) orthopedic complaints during the first year of the pandemic, there was a concomitant increase in both the number and proportion of these injuries admitted to the hospital from the emergency department. This places an additional burden on already stressed emergency medicine services and overall hospital systems that could slow down the management of medical emergencies.

2. What does this attempt to show?

This study attempts to demonstrate that even with a decrease in the number of LE musculoskeletal (MSK) injuries presenting to emergency departments during the COVID-19 pandemic there was an increase in the number of hospital admissions from emergency departments for these injuries.

3. What are the key findings?

There was a 24.96% decrease in the number of LE MSK injuries presenting to emergency departments during the first year of the pandemic compared with the average of the previous 4 years. There was a 47.99% increase in the proportion of LE MSK injuries and a 25.74% increase in the total number of LE MSK injuries admitted to the hospital from the emergency department during the first year of the pandemic compared with the average of the previous 4 years. There was an increased likelihood of being admitted for a LE MSK injury for all age groups and the majority of injuries.

4. How is patient care impacted?

Increased burden on an already stressed emergency medicine system can limit emergency medicine providers' ability to treat true medical emergencies. Increased rates of hospital admissions for LE MSK patients likely led to increased demand for hospital beds, further contributing to the shortage of resources experienced throughout the pandemic.