A multi-institutional study evaluating pediatric burn injuries during the COVID-19 pandemic

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Conflicts of Interest and Sources of Funding

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Abstract

During the COVID-19 pandemic, children were out of school due to Stay-at-Home orders. The objective of this study was to investigate how the COVID-19 pandemic may have impacted the incidence of burn injuries in children. Eight Level I Pediatric Trauma Centers participated in a retrospective study evaluating children <18 years old with traumatic injuries defined by the National Trauma Data Bank. Patients with burn injuries were identified by ICD-10 codes. Historical controls from March-September 2019 ("Control" cohort) were compared to patients injured after the start of the COVID-19 pandemic from March-September 2020 ("COVID" cohort). A total of 12,549 pediatric trauma patients were included, of which 916 patients had burn injuries. Burn injuries increased after the start of the pandemic (COVID 522/6711 [7.8%] vs. Control 394/5838 [6.7%], p=0.03). There were no significant differences in age, race, insurance status, burn severity, injury severity score, intent or location of injury, and occurrence on a weekday or weekend between cohorts. There was an increase in flame burns (COVID 140/522 [26.8%] vs. Control 75/394 [19.0%], p=0.01) and a decrease in contact burns (COVID 118/522 [22.6%] vs. Control 112/394 [28.4%], p=0.05). More patients were transferred from an outside institution (COVID 315/522 patients [60.3%] vs. Control 208/394 patients [52.8%], p=0.02), and intensive care unit length of stay increased (COVID median 3.5 days [interquartile range 2.0-11.0] vs. Control median 3.0 days [interquartile range 1.0-4.0], p=0.05). Pediatric burn injuries increased after the start of the COVID-19 pandemic despite Stay-at-Home orders intended to optimize health and increase public safety.

Key words: Pediatric burns; COVID-19; burn injury; pediatric trauma

Introduction

The COVID-19 pandemic led to an unprecedented change in the daily lives of children. In the United States, implementation of mandatory Stay-at-Home Orders (SHOs) led to closures of non-essential businesses and schools. For younger children, access to daycare facilities was variable due to regional heterogeneity in the extent of SHO provisions, and older children were without access to many of their regular extracurricular activities.[1–3] Furthermore, the pandemic and subsequent local and regional societal responses led to an unprecedented combination of increased family stress, increased unemployment, and loss of family and social support, including support for childhood supervision.[4,5] These changes may have led to an increased risk of unintentional injury, particularly for children who would have otherwise been in a structured setting outside of the home. Burns are a common unintentional injury in children that often occur at home.

During the early months of the pandemic, a number of single institution studies described changes in pediatric burn injuries, with considerable variability in the findings.[4,6–9] Study periods were frequently restricted to a number of weeks after the pandemic began, and data were often from referral centers or combined adult/pediatric centers.[4,6,8–11] Multi-institutional, large-scale studies that investigate changes in pediatric burn injuries during the COVID-19 pandemic are lacking.

The objective of this study was to perform a multi-institutional evaluation of how the COVID-19 pandemic impacted the incidence of burn injuries in children. We investigated how burn injuries in children changed during this unprecedented time compared to a historic cohort, including changes in patient and burn characteristics and hospital outcomes. We hypothesized that pediatric unintentional burn injuries increased during the first six months of the COVID-19 pandemic.

Methods

Study Population

A retrospective study of children <18 years of age with burn injuries at eight Level I Pediatric Trauma Centers was performed. All patients met National Trauma Data Bank inclusion criteria. Of the eight centers, two were verified by the American Burn Association (ABA), four were non-ABA verified burn centers, and two did not define themselves as burn centers. Patients with burn injuries were defined as having at least one documented burn injury, as identified by International Classification of Diseases, 10th revision (ICD-10), Diagnosis and/or External Cause of Injury Codes (Appendix 1). The "COVID cohort" included patients injured after the start of the COVID-19 pandemic, defined by the implementation of the SHOs at each site (varying dates in March and early April), through September 2020. These patients were compared to historical controls treated during the same time period in 2019 ("Control" cohort). This study was approved by the Institutional Review Board at each site with a waiver of consent.

Patient, Burn, and Clinical Characteristics

Patient age, sex, race, ethnicity, and insurance status were collected. Burn characteristics, such as degree of burn, total body surface area (TBSA), type of burn, and anatomic burn location were determined from the ICD-10 coding structure. For degree of burn, 'Superficial' was defined as first degree burns while 'Deep' was defined as second degree (i.e. partial thickness) or third degree (i.e. full thickness). Injury information included intent of injury, location of injury, weekday or weekend injury occurrence, and injury severity score (ISS). Intentional injuries included suicide, assault, and unspecified intentional injuries. Many patients had more than one type of burn and/or more than one body location affected.

Outcomes of interest included number of patients admitted to the hospital, admitted to the intensive care unit (ICU), and that required intubation in addition to hospital length of stay (LOS), ICU LOS, ventilator days, mortality, and hospital discharge disposition. Median LOS, ICU LOS, and ventilator days were calculated among all patients admitted to the hospital, those admitted to the ICU, and those on mechanical ventilation, respectively. The number of burn injuries, ICU admissions, and transfers from a referring institution were calculated per site to investigate any regional variation that may have impacted the aforementioned outcomes.

Statistical Analysis

Comparisons between cohorts were performed using Chi-squared tests for categorical variables and Wilcoxon signed-rank tests for continuous, non-parametric variables. Statistical significance was set at $p \leq 0.05$. In the setting of this exploratory analysis, when a variable with more than two groups was statistically significant, comparisons of binomial proportions were completed to understand which group was statisicaly different.

Additionally, temporal trends over time were analyzed. The number of pediatric burn patients per week from January 1-September 30 for 2019 and 2020 was depicted on a time series plot to compare burn injuries during the COVID and Control time periods. January-February was included to capture the presence or absence of a temporal trend before the COVID-19 pandemic started. An overlying LOESS smoothing line was implemented to represent the moving average in addition to a line of best fit.[12] Differences in the density distribution were compared with Kolmogorov-Smirnov testing and linear trends were compared with slope analysis.[13] All statistical analysis was performed using RStudio©, version 1.4.1717.

Results

Demographics

A total of 12,549 pediatric trauma patients were identified among the two cohorts, of which 916 patients had burn injuries. There was an increase in burn injuries during the COVID-19 pandemic (COVID 522/6711 patients [7.8%] vs. Control 394/5838 patients [6.7%], p=0.03). The average number of burn patients treated per week also increased (Figure 1; p<0.001). In addition, more patients were transferred from a referring institution during the COVID-19 pandemic (COVID 315/522 patients [60.3%] vs. Control 208/394 patients [52.8%], p=0.02). For overall differences by institution, six centers had an increase in burn injuries between the Control and COVID cohorts, with increases ranging from 13.3%-78.6%. One institution had no meaningful change in burn injuries and one had a 4.9% decrease in burn injuries from the Control to COVID cohort.

Patient and Injury Characteristics

There were no statistically significant differences between the COVID and Control cohort in regards to age, sex, race, and insurance status (Table 1). With regard to ethnicity, the COVID cohort had fewer patients in the 'Unknown/Missing' category (p<0.001) but no significant difference in the Hispanic (p=0.46) and non-Hispanic (p=0.09) categories.

Degree of burn, TBSA, anatomic burn location, number of inhalational injuries, intent of injury, location of injury, weekend compared to weekday injury occurrence, and overall ISS did not differ between the COVID and Control cohorts (Table 2). The number of flame burns in the COVID cohort was significantly greater than in the Control cohort (140/522 patients [26.8%] vs. 75/394 patients [19.0%], p=0.01). There were also significantly less contact burns in the COVID cohort compared to the Control cohort (118/522 [22.6%] patients vs. 112/394 [28.4%] patients, p=0.05). There was no significant difference in scald burns between the two cohorts.

Hospital Outcomes and Characteristics

Within the COVID cohort, 73.9% (386/522) of patients were admitted to the hospital compared to 79.7% (314/394) in the Control cohort (p=0.05), though there was no significant difference in hospital LOS or discharge disposition (Table 3). There was no significant difference in the proportion of patients admitted to the ICU or intubated between the COVID and Control cohorts. However, for patients that were admitted to the ICU, there was a statistically significant increase in the median ICU LOS in the COVID cohort (3.5 days [interquartile range (IQR) 2.0-11.0] vs. 3.0 days [IQR 1.0-4.0], p=0.05). When ICU admissions were stratified by site, there was no site that had a disproportionate change in ICU admissions compared to others. There were no significant differences in number of ventilator days between the two cohorts.

Discussion

This multi-institutional study found that pediatric burn injuries increased during the COVID-19 pandemic. In addition, a higher percentage of children with burn injuries were transferred from a referring institution. Flame burns increased during the pandemic while contact burns decreased. Despite similar overall ISS and burn severity between cohorts, the ICU LOS was higher in the COVID cohort. However, the number of ICU admissions did not significantly increase.

The findings of our study are concordant with reports in adults and combined adult/pediatric studies, which also found an increase in burn injuries associated with the COVID-19 pandemic.[4,6,8,9] The findings may be in part due to an increase in the transfer of children with burn injuries to pediatric centers when adult and adult/pediatric hospitals were under strain due to the COVID-surge, and indeed a higher percentage of transfers was found in this study. However, the identified relative increase in transfers between the two cohorts does not fully account for the observed

increase in burn injuries. In addition, no simultaneous decrease in ISS or burn severity was identified, which might be expected if the increase in burns was simply due to many children with minor burns being transferred during the pandemic who would have otherwise been cared for at referring facilities. There were also no clear patterns that drove relative differences in burn injuries by institution. Regional variation that caused some centers to have a higher increase in burn injuries than others may be driven by burn center verification, proximity to other sites that treat pediatric burns, changing admission patterns due to the COVID-19 pandemic, and other unmeasurable factors.

Contrary to speculation that there would be more burn injuries due to increased time at home, possibly with less supervision, we identified no change in burn injury location (i.e. home or outside the home) and no differences between weekday and weekend incidence for burn injuries. These findings potentially indicate that being at home and out of school for an extended period of time was not an instigating factor for the increase in burn injuries. We surmise that if school and daycare cancellations were a factor contributing to the increase in burn injuries, then there would have been an increase in injuries occurring on a weekday and/or at home in the COVID cohort.

An increase in flame and a decrease in contact burns in particular was identified in the COVID cohort compared to the Control cohort. There were no changes in scald burns. Our multi-institutional study provides further insight on a large scale into delineating which types of burns had a higher risk of occurrence during the initial 6 months of the COVID-19 pandemic, including the initial SHOs. Other studies have evaluated the change in burn type during the COVID-19 pandemic with varying results. Sanford et al. and Williams et al. both reported a similar increase in flame burns in their single-instutional studies.[4,14] Williams et al. reported flame burns tripled, while contact and scald injuries increased by 70% and 15%, respectively, between 2019 and 2020.[14] In contrast, a single-institutional study by D'asta et al. in the United Kingdom noted an increase in scald burns rather than flame burns, which they attributed to the practice of steam inhalation as a method of

infection treatment in the United Kingdom.[8] The decrease in contact burns in our study could be due to the relative and notable increase in flame burns. Although our study identified that most flame burns occurred outside of a building and by flame exposure or by ignition of flammable material, we were unable to ascertain the specific etiology from the dataset utilized. However, perhaps relevant to the increase in flame burns during the pandemic in the United States is the cancellation of professional fireworks shows associated with the July 4th holiday. In the summer of 2020, consumer fireworks sales increased by as much as 200%-300% since other entertainment options were non-existent.[15] From June-July 2020, there were 3,000 more fireworks-related injuries that were treated in the emergency department compared to the same period in 2019.[16,17] Teenagers from the ages of 15-19 years old had the second highest number of fireworks-related injuries, occurring in 6.1 injuries per 100,000 people.[16] Outdoor firepits and propane/electronic heaters were bought and used in greater numbers, as some families may have attempted to safely gather outside rather than indoors, especially during colder months.[18,19] An associated rise in pediatric burns due to firepits and heaters has also been reported.[20]

Our study found no significant difference in the age of children with burn injuries between the COVID cohort and Control cohort. In contrast, Williams et al.'s evaluation of pediatric burns treated at a burn center in North Carolina identified a 28% increase in burns in school-aged children between March 10th and May 22nd, 2020 compared to a month-matched historical cohort.[6] Likewise, D'asta et al. retrospectively evaluated patients treated at a United Kingdom-based regional pediatric burn center between March 23d and April 30th, 2020 compared to the same time period in 2019, and reported an increase in mean age from 2.9 years to 4.8 years.[6,8] The findings of our study may differ due to use of multiple reporting sites rather than a single-institution and because our sites are all dedicated children's hospitals rather than primarily burn centers, which may have narrowed the age range treated. In addition, our study investigated the impact of COVID-19 on burn injuries for a longer period of time than previous studies.

Our study found no statistically significant increase in the degree of burn or TBSA between the two cohorts. This finding is similar to that reported by Tatar et al., who found no increase in burn severity at a pediatric burn center in Romania during a two month period after March 16th, 2020 compared to the same time period in 2019.[11] Our study's findings are in contrast, however, to a study from Sethuraman and colleagues, who reviewed data from a tertiary care pediatric hospital and burn referral center and reported an increase in the proportion of house fires, burns >5% TBSA, and ICU admissions when comparing the 2.5 weeks of SHOs in 2020 to the same dates in 2019.[7] D'asta et al. also found that children presenting with burns during the SHO period had greater TBSA involvement, with 50% experiencing >5% TBSA burns and 29% experiencing >10% TBSA burns.[8] Our study's findings may vary in part because not all of the included sites have dedicated burn centers and we investigated the impact of COVID-19 over a longer period of time. Triage patterns during the pandemic may have changed, guiding care to regional burn centers to keep beds open locally for other patients.

Our study identified a decrease in the proportion of patients admitted for their burn injuries after the start of the COVID-19 pandemic, without a change in hospital LOS. This finding may be due to a higher threshold to admit patients in order to save hospital beds for COVID patients, as well as a concerted effort to expeditiously discharge patients and minimize exposure to hospitalized COVID-positive patients. Similarly, D'Asta et al. reported the LOS/TBSA ratio went from 1.04 in their 2019 cohort to 0.42 during the United Kingdom's lockdown period; therefore, for the same TBSA, patients were in the hospital for fewer days during lockdown in 2020 as compared to 2019.[8] The authors of that study hypothesized that change may reflect management of larger burns in an outpatient setting.[8] This hypothesis is plausible given that parents and other caregivers may have been more readily available to learn care and transition to the home environment during the pandemic.

Of note, the ICU LOS in our study increased after the start of the COVID-19 pandemic, though there was no difference in number of ICU admissions. This increased LOS was not explained

by increased severe burn injury, as both TBSA and depth of burn were unchanged. In addition, ISS and the number of inhalational injuries were similar. Upon query of the participating sites, we found that some sites changed work flow patterns to include the provision of sedation services in the ICU instead of the emergency department and/or operating room due to resource limitations during the pandemic. This practice may in part explain the differences seen in ICU LOS.

There are several limitations to our study. The study was retrospective in nature, which introduces potential selection bias, misclassification bias, unknown/missing data, and recording errors depending on how the data were documented. Additionally, we were unable to distinguish exact etiologies of the contact, scald, and flame burns due to limitations imposed by ICD-10 codes. Our study was also limited only to patients meeting National Trauma Data Bank inclusion criteria, which means that children who presented from home for their injury and were discharged from the emergency department were not included. This exclusion potentially represents a sizable number of young children, in particular those with minor scald injuries. However, this number may not be different in the absence of COVID-19 considerations. And if this selection bias was in fact present, one would expect more burns, not fewer burns, may have been seen and discharged from the emergency department during the pandemic in order to avoid hospitalization. The estimated increase in burns may therefore be conservative, and the true difference in all burns sustained by children during the pandemic actually greater.

Our study demonstrated that the first six months of the COVID-19 pandemic coincided with an increase in burn injuries among children and a change in the relative types of burns sustained. More studies are needed to delineate the context in which these burn injuries occur so injury prevention strategies can be modified or developed accordingly. Disruptive situations, such as the COVID-19 pandemic, may change the risk of injury for children, such that tailored injury prevention programs warrant consideration.

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Table 1. Demographic characteristics of children with burn injuries at eight pediatric trauma centers during the COVID-19 pandemic compared to a corresponding time period in the year prior			
	COVID N = 522 (%)	**Control N = 394 (%)**	**P-value**
Age (years)			
< 1	114 (21.8)	105 (26.7)	0.41
1 – 4	188 (36.0)	139 (35.3)	
5 – 9	93 (17.8)	67 (17.0)	
10 – 14	85 (16.3)	51 (12.9)	
15 – 17	42 (8.1)	32 (8.1)	
Sex			
Male	328 (62.8)	247 (62.7)	0.96
Female	194 (37.2)	147 (37.3)	
Race			
White	334 (64.0)	250 (63.5)	0.79
African American	127 (24.3)	88 (22.3)	
Asian/Pacific Islander	16 (3.1)	13 (3.3)	
Other	29 (5.6)	27 (6.9)	
Unknown/Missing	16 (3.1)	16 (4.1)	
Ethnicity			
Hispanic	41 (7.9)	25 (6.4)	0.001
Non-Hispanic	466 (89.3)	336 (85.3)	
Unknown/Missing*	15 (2.9)	33 (8.4)	
Insurance			
Private	164 (31.4)	129 (32.7)	0.89
Public	307 (58.8)	231 (58.6)	
No Insurance	26 (5.0)	19 (4.8)	
Unknown/Missing	25 (4.8)	15 (3.8)	
Transferred from outside institution	315 (60.3)	208 (52.8)	0.02

*P-value < 0.001 for 'Unknown/Missing'; the other variables for ethnicity were not statistically significant

Table 2. Burn injury characteristics of children with burn injuries at eight pediatric trauma centers during the COVID-19 pandemic compared to a corresponding time period in the year prior			
Descriptive Characteristics	**COVID N (%)**	**Control N (%)**	**p-value**
Degree of Burn			
Superficial	28 (5.4)	15 (3.8)	0.37
Deep	321 (61.5)	240 (60.9)	
Unspecified	23 (4.4)	12 (3.1)	
Unknown/Missing	150 (28.7)	127 (32.2)	
Total Body Surface Area			
< 10%	329 (63.0)	254 (64.5)	0.27
≥ 10%	56 (10.7)	52 (13.2)	
Unknown/Missing	137 (26.3)	88 (22.3)	
Type of Burn*			
Contact	118 (22.6)	112 (28.4)	0.05
Scald	146 (28.0)	126 (32.0)	0.21
Flame	140 (26.8)	75 (19.0)	0.01
Unspecified**	519 (99.4)	390 (99.0)	0.71
Anatomic Burn Location*			
Head, Face, and Neck	133 (25.5)	87 (22.1)	0.27
Trunk***	152 (29.1)	117 (29.7)	0.91
Upper Extremity	210 (40.2)	158 (40.1)	1.00
Lower Extremity	144 (27.6)	124 (31.5)	0.23
Inhalation Injury	4 (0.8)	1 (0.3)	0.56
Unknown/Missing	162 (31.0)	143 (36.3)	0.11
Intent of Injury			
Intentional	42 (8.1)	33 (8.4)	0.96
Unintentional	479 (91.8)	360 (91.4)	
Unknown/Missing	1 (0.2)	1 (0.3)	
Location of Injury			
Home	267 (51.1)	188 (47.7)	0.18
Outside of Home	21 (4.0)	26 (6.6)	
Unknown/Missing	234 (44.8)	180 (45.7)	
Day of the Week			
Weekday	330 (63.2)	258 (65.5)	0.74
Weekend	192 (36.8)	136 (34.5)	
Injury Severity Score			
0 – 14	389 (74.5)	297 (75.4)	0.58
15 – 24	32 (6.1)	18 (4.6)	
> 25	101 (19.4)	79 (20.1)	

*Percent values represent proportion of type of burn/location of burn per patient; p-values represent differences between proportions

**'Unspecified' represents exposure to toxic effects of corrosive substances, nonspecific corrosive substances, or unidentified type of burn

***Trunk: thorax, abdomen, back, pelvis

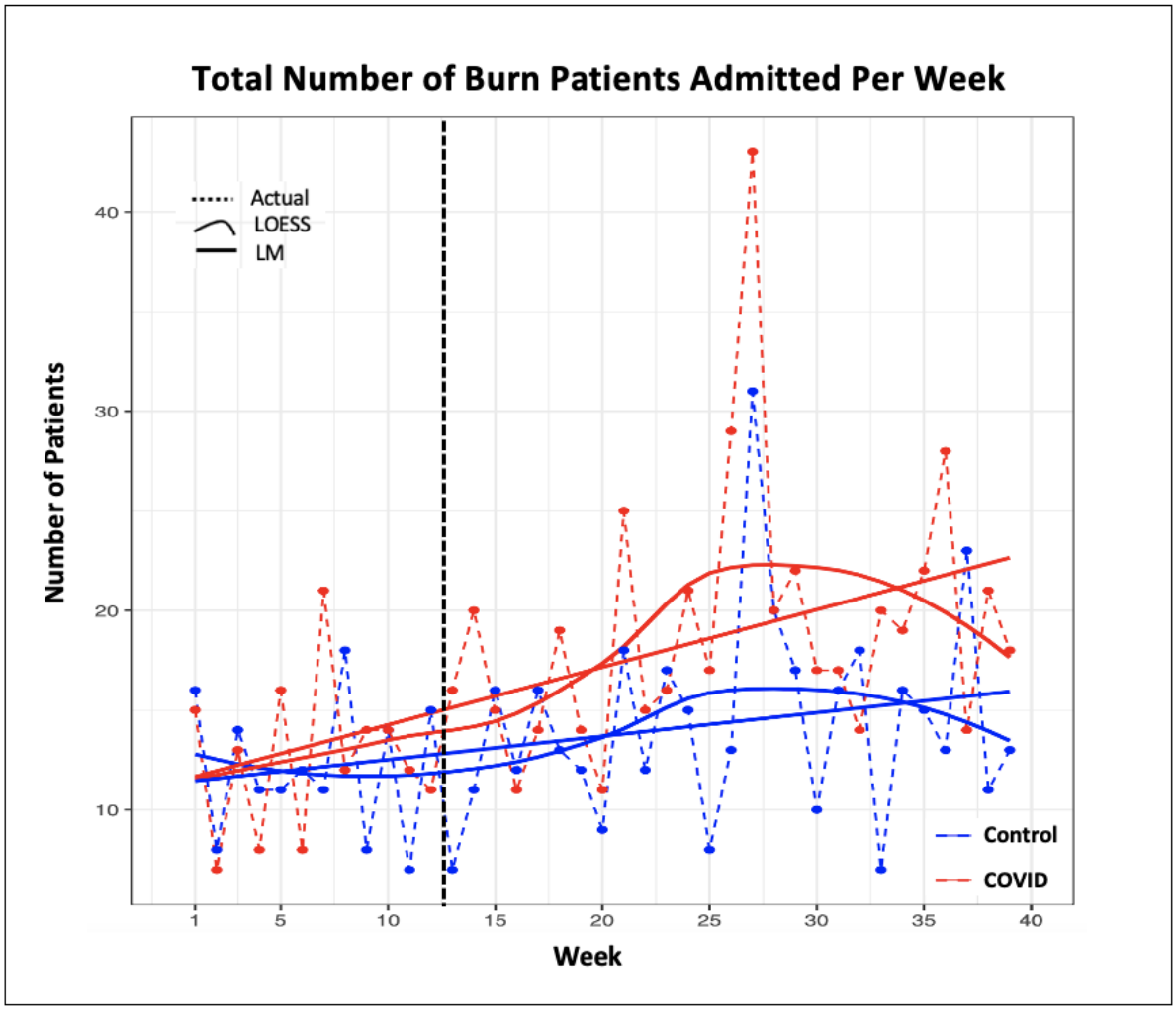
Table 3. Hospital outcomes of children with burn injuries at eight pediatric trauma centers during the COVID-19 pandemic compared to a corresponding time period in the year prior

Outcomes	COVID (N = 522)	Control (N = 394)	p-value
Admission and Hospital Length of Stay			
Number of Patients (%)	386/522 (73.9)	314/394 (79.7)	0.05
Median (IQR)	2.0 (1.0 – 5.0)	2.0 (1.0 – 5.0)	0.46
Intensive Care Unit-Days			
Number of Patients (%)	40/522 (7.7)	26/394 (6.6)	0.63
Median (IQR)	3.5 (2.0 – 11.0)	3.0 (1.0 – 4.0)	0.05
Ventilator-Days			
Number of Patients (%)	28/522 (5.4)	11/394 (2.8)	0.08
Median (IQR)	4.5 (2.0 – 10.0)	3.0 (3.0 – 5.5)	0.52
Discharge Disposition, N (%)			
Number of Patients	406	329	
Home	371 (91.4)	311 (94.5)	0.07
Long-term care*	23 (5.7)	10 (3.0)	
Jail	0 (0.0)	1 (0.3)	
Death	1 (0.3)	0 (0.0)	
Unknown/Missing	11 (2.7)	7 (2.1)	

*Acute care facility, rehabilitation, skilled nursing facility
IQR: interquartile range

Figure Legend

Figure 1. Overlapping comparison of the total number of burn patients admitted per week, stratified by cohort. The black dashed line represents an estimated start of the COVID-19 pandemic. The trend of the exact values (dashed line) is represented by a LOESS smoothing line (solid curved line) and a linear model (LM) of best fit (solid straight line). Both comparison of density distribution by Kolmogorov-Smirnov testing and comparison of linear trends with slope analysis demonstrate a significant increase in injuries during the COVID cohort compared to the Control cohort that occurred at the start of the COVID-19 pandemic ($p<0.001$).



Appendix 1. Burn Diagnosis ICD-10 Codes	
ICD-10 Codes	**Description**
T20	Burns and corrosions of external body surface, specified by site
T21	Burns and corrosions of external body surface, specified by site
T22	Burns and corrosions of external body surface, specified by site
T23	Burns and corrosions of external body surface, specified by site
T24	Burns and corrosions of external body surface, specified by site
T25	Burns and corrosions of external body surface, specified by site
T26	Burns and corrosions of external body surface, specified by site
T27	Burns and corrosions of external body surface, specified by site
T28	Burns and corrosions of external body surface, specified by site
T30	Burns and corrosions of multiple and unspecified body regions
T31	Burns and corrosions of multiple and unspecified body regions
T32	Burns and corrosions of multiple and unspecified body regions
T54.1X1	Toxic effect of other corrosive organic compounds, accidental (unintentional)
T54.1X2	Toxic effect of other corrosive organic compounds, intentional self-harm
T54.1X4	Toxic effect of other corrosive organic compounds, undetermined
T54.2X1	Toxic effect of corrosive acids and acid-like substances, accidental (unintentional)
T54.2X2	Toxic effect of corrosive acids and acid-like substances, intentional self-harm
T54.2X4	Toxic effect of corrosive acids and acid-like substances, undetermined
T54.3X1	Toxic effect of corrosive alkalis and alkali-like substances, accidental (unintentional)
T54.3X2	Toxic effect of corrosive alkalis and alkali-like substances, intentional self-harm
T54.3X4	Toxic effect of corrosive alkalis and alkali-like substances, undetermined
T54.91X	Toxic effect of unspecified corrosive substance, accidental (unintentional)
T54.92X	Toxic effect of unspecified corrosive substance, intentional self-harm
T54.94X	Toxic effect of unspecified corrosive substance, undetermined
V91.00X	Burn due to merchant ship on fire
V91.01X	Burn due to passenger ship on fire

V91.02X	Burn due to fishing boat on fire
V91.03X	Burn due to other powered watercraft on fire
V91.04X	Burn due to sailboat on fire
V91.05X	Burn due to canoe or kayak on fire
V91.06X	Burn due to (nonpowered) inflatable craft on fire
V91.07X	Burn due to water-skis on fire
V91.08X	Burn due to other unpowered watercraft on fire
V91.09X	Burn due to unspecified watercraft on fire
V93.00X	Burn due to localized fire on board merchant vessel
V93.01X	Burn due to localized fire on board passenger vessel
V93.02X	Burn due to localized fire on board fishing boat
V93.03X	Burn due to localized fire on board other powered watercraft
V93.04X	Burn due to localized fire on board sailboat
V93.09X	Burn due to localized fire on board unspecified watercraft
V93.10X	Other burn on board merchant vessel
V93.11X	Other burn on board passenger vessel
V93.12X	Other burn on board fishing boat
V93.13X	Other burn on board other powered watercraft
V93.14X	Other burn on board sailboat
V93.19X	Other burn on board unspecified watercraft
V95.04X	Helicopter fire injuring occupant
V95.14X	Ultralight, microlight or powered-glider fire injuring occupant
V95.24X	Other private fixed-wing aircraft fire injuring occupant
V95.34X	Commercial fixed-wing aircraft fire injuring occupant
V95.44X	Spacecraft fire injuring occupant
V96.04X	Balloon fire injuring occupant
V96.14X	Hang-glider fire injuring occupant
V96.24X	Glider (nonpowered) fire injuring occupant

X00.0XX	Exposure to flames in uncontrolled fire in building or structure
X00.1XX	Exposure to smoke in uncontrolled fire in building or structure
X00.2XX	Injury due to collapse of burning building or structure in uncontrolled fire
X00.3XX	Fall from burning building or structure in uncontrolled fire
X00.4XX	Hit by object from burning building or structure in uncontrolled fire
X00.5XX	Jump from burning building or structure in uncontrolled fire
X00.8XX	Other exposure to uncontrolled fire in building or structure
X01.0XX	Exposure to flames in uncontrolled fire, not in building or structure
X01.1XX	Exposure to smoke in uncontrolled fire, not in building or structure
X01.3XX	Fall due to uncontrolled fire, not in building or structure
X01.4XX	Hit by object due to uncontrolled fire, not in building or structure
X01.8XX	Other exposure to uncontrolled fire, not in building or structure
X02.0XX	Exposure to flames in controlled fire in building or structure
X02.1XX	Exposure to smoke in controlled fire in building or structure
X02.2XX	Injury due to collapse of burning building or structure in controlled fire
X02.3XX	Fall from burning building or structure in controlled fire
X02.4XX	Hit by object from burning building or structure in controlled fire
X02.5XX	Jump from burning building or structure in controlled fire
X02.8XX	Other exposure to controlled fire in building or structure
X03.0XX	Exposure to flames in controlled fire, not in building or structure
X03.1XX	Exposure to smoke in controlled fire, not in building or structure
X03.3XX	Fall due to controlled fire, not in building or structure
X03.4XX	Hit by object due to controlled fire, not in building or structure
X03.8XX	Other exposure to controlled fire, not in building or structure
X04.XXX	Exposure to ignition of highly flammable material
X05.XXX	Exposure to ignition or melting of nightwear
X06.0XX	Exposure to ignition of plastic jewelry
X06.1XX	Exposure to melting of plastic jewelry

X06.2XX	Exposure to ignition of other clothing and apparel
X06.3XX	Exposure to melting of other clothing and apparel
X08.00X	Exposure to bed fire due to unspecified burning material
X08.01X	Exposure to bed fire due to burning cigarette
X08.09X	Exposure to bed fire due to other burning material
X08.10X	Exposure to sofa fire due to unspecified burning material
X08.11X	Exposure to sofa fire due to burning cigarette
X08.19X	Exposure to sofa fire due to other burning material
X08.20X	Exposure to other furniture fire due to unspecified burning material
X08.21X	Exposure to other furniture fire due to burning cigarette
X08.29X	Exposure to other furniture fire due to other burning material
X08.8XX	Exposure to other specified smoke, fire and flames
X10.0XX	Contact with hot drinks
X10.1XX	Contact with hot food
X10.2XX	Contact with fats and cooking oils
X11.0XX	Contact with hot water in bath or tub
X11.1XX	Contact with running hot water
X11.8XX	Contact with other hot tap-water
X12.XXX	Contact with other hot fluids
X13.0XX	Inhalation of steam and other hot vapors
X13.1XX	Other contact with steam and other hot vapors
X14.0XX	Inhalation of hot air and gases
X14.1XX	Other contact with hot air and other hot gases
X15.0XX	Contact with hot stove (kitchen)
X15.1XX	Contact with hot toaster
X15.2XX	Contact with hotplate
X15.3XX	Contact with hot saucepan or skillet
X15.8XX	Contact with other hot household appliances

X16.XXX	Contact with hot heating appliances, radiators and pipes
X17.XXX	Contact with hot engines, machinery and tools
X18.XXX	Contact with other hot metals
X19.XXX	Contact with other heat and hot substances
X76.XXX	Intentional self-harm by smoke, fire and flames
X77.0XX	Intentional self-harm by steam or hot vapors
X77.1XX	Intentional self-harm by hot tap water
X77.2XX	Intentional self-harm by other hot fluids
X77.3XX	Intentional self-harm by hot household appliances
X77.8XX	Intentional self-harm by other hot objects
X77.9XX	Intentional self-harm by unspecified hot objects
X86	Assault by corrosive substance
X97	Assault with fire/smoke/etc
X98	Assault with fire/smoke/etc
Y26.XXX	Exposure to smoke, fire and flames, undetermined intent
Y27.0XX	Contact with steam and hot vapors, undetermined intent
Y27.1XX	Contact with hot tap water, undetermined intent
Y27.2XX	Contact with hot fluids, undetermined intent
Y27.3XX	Contact with hot household appliance, undetermined intent
Y27.8XX	Contact with other hot objects, undetermined intent
Y27.9XX	Contact with unspecified hot objects, undetermined intent
Y36.300	War operations involving unspecified fire, conflagration and hot substance, military personnel
Y36.301	War operations involving unspecified fire, conflagration and hot substance, civilian
Y36.330	War operations involving flamethrower, military personnel
Y36.331	War operations involving flamethrower, civilian
Y36.390	War operations involving other fires, conflagrations and hot substances, military personnel
Y36.391	War operations involving other fires, conflagrations and hot substances, civilian
Y37.300	Military operations involving unspecified fire, conflagration and hot substance, military

	personnel
Y37.301	Military operations involving unspecified fire, conflagration and hot substance, civilian
Y37.330	Military operations involving flamethrower, military personnel
Y37.331	Military operations involving flamethrower, civilian
Y37.390	Military operations involving other fires, conflagrations and hot substances, military personnel
Y37.391	Military operations involving other fires, conflagrations and hot substances, civilian
Y38.3	Terrorism with fire/smoke/etc.