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Pediatric head and neck burns increased during early COVID-19 pandemic

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Objective. The purpose of this study was to describe patterns of burns to the head and neck in children during the early COVID-19 pandemic.

Study design. This cross-sectional study reviewed pediatric patients in the Burn Care Quality Platform Registry. Patients were included if they were ≤17.9 years old and had sustained burns to the head and neck. Patients were separated into the following groups: March 13 to September 13, 2019 (before COVID-19 pandemic, BC) or March 13 to September 13, 2020 (during the initial 6 months of the COVID-19 pandemic, C19). The study team collected patient-related variables, details regarding burn injury, burn severity, and hospital course. Univariate and bivariate analyses were calculated. The chi-squared test was used for categorical variables. Statistical significance was $P < .05$.

Results. Fifty-five children with head and neck burn injuries were included. There was a 200% increase in burns to the head and neck region in children in April 2021 compared with previous year. Burns to head and neck in White children occurred more often during C19 ($P = .03$). The study revealed differences in timing of presentation (time of burn injury to emergency department admission) in different racial groups during (White children [$P = .05$]), and after the pandemic (African American children [$P = .02$]).

Conclusions. There was a transient increase in burns to the head and neck region in children during the early pandemic compared with the historic cohort. (Oral Surg Oral Med Oral Pathol Oral Radiol 2022;000:1−5)

Burns in children have a significant impact on metabolic markers,[1] heart,[2] and various organs.[3-5] A burn that involves the head and neck can result in cosmetic and functional deformities (i.e., speech/swallow impairment, airway compromise, disfigurement, and/or scars).[6] Reconstruction often requires multiple surgical revisions to accommodate craniofacial growth.[2]

The COVID-19 pandemic was caused by SARS-CoV-2.[7,8] COVID-19 affects children and adults differently.[9,10] Hospitalizations, morbidity, and mortality related to COVID-19 increase with an increase in age.[9-11] Children were less affected than adults by COVID-19 and presented with different symptoms.[8,12] However, some children develop multisystem inflammatory syndrome in children.[13] The long-term sequelae (e.g., years postinfection) of COVID-19 in children is unknown.[13,14]

There is little information regarding the impact of the COVID-19 pandemic on frequency and severity of burns to the head and neck region in children the US. The purpose of this study was to describe patterns of burns to the head and neck in children during the early COVID-19 pandemic. The authors' hypothesis was that frequency of burns to the head and neck increased during the early months of the pandemic.

MATERIAL AND METHODS

Study design

This cross-sectional study (Institutional Review Board #00001248) reviewed patients in the Burn Care Quality Platform Registry at Grady Memorial Hospital in Atlanta, GA. A patient was included when (1) their age was ≤17.9 years old, (2) they had burn/s to head/neck, and (3) they required inpatient admission.[15] Exclusion criteria were patients with burns not related to the head and neck and patients who received treatment/procedures only at the outpatient burn clinic.

The study team used a method previously described by the authors' group.[16] Briefly, patients were separated according to date of burn into one distinct period: (1) March 13 to September 13, 2019 (i.e., before COVID-19 pandemic [BC]) or (2) March 13 to September 13, 2020 (i.e., during the initial 6 months of COVID-19 pandemic [C19]). March 13 was chosen because COVID-19 was announced as a national emergency on that date,[17] and it was the last day for in-person school and preschool in the state of Georgia.[18]

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Variables and data analysis

The primary predictor variable was time: BC/C19. The primary outcome variable was frequency of burns to the head and neck in children. The study team collected the following patient-related variables: (1) demographic data (age, sex, race), (2) etiology (unintentional/intentional, other), and (3) mechanism of burn (chemical, contact, flame, scald). Details related to injury were as follows: (1) burn location (head and neck, isolated head, isolated neck, other [i.e., trunk, buttock, upper limb, and lower limb]); (2) presence of concomitant inhalation injury; and (3) carboxyhemoglobin level (range, 0%-100%).

To determine severity of burns, the study team collected information regarding (1) total body surface area percentage (%TBSA, ±10% burn) and (2) number of surgical interventions. A severe burn in pediatrics is defined as burn with >10% TBSA.[19,20]

Variables regarding hospital admission and inpatient course were as follows: (1) time from burn injury to presentation to the emergency department (ED); (2) admission (within 24 hours or after 24 hours, i.e., delayed); (3) length of stay (LOS) in (intensive care unit [ICU] or hospital); and (4) discharge disposition (home, rehabilitation facility).

Data was compiled using a standardized form and systematically analyzed. Descriptive statistics as well as univariate and bivariate analyses were performed. The chi-squared test was used for categorical variables. Statistical significance was $P < .05$.

RESULTS

During the study period, 196 patients sustained burns to the head and neck. Of them, 55 were children (BC: $n = 26$, C19: $n = 29$) and met the inclusion criteria. There were 26 patients (16 males) with a mean age of 4.7 months (range, 4.6−190 months) during BC. There were 29 patients (16 males) with a mean age of 6.2 months (range, 1−215 months) during C19.

During the second month of BC (April 2019), there were 2 patients (both males, mean age of 42 months old). During the second month of C19 (April 2020), there were 6 patients (3 females and 3 males, mean age 48 months old). This finding represents a 200% increase in April, a 75% increase in July, and a 50% increase in June compared with the BC period (Fig. 1).

Table I summarizes details regarding demographics and mechanism of burn. The authors' study found that burns to head and neck in White children occurred more often during C19 than BC (BC: $n = 2$, 7.7%; C19: $n = 9$, 31%, $P = .03$). There were no significant differences in age, gender, etiology, and mechanism of burn between BC and C19.

Table II summarizes details regarding burn injuries. During C19, 20 children (69%) sustained isolated burns to the head. However, there were no significant differences in locations of burn, concomitant inhalation injuries, and carboxyhemoglobin levels between BC and C19.

Table III summarizes the severity of burns. During BC, more than half of the children ($n = 16$, 61.5%) had less than 10% TBSA. During BC, more patients (mean: 3, range: 3-4) underwent surgical procedures ($P = .007$).

Table IV summarizes information regarding admission details and hospital course. The authors' data showed that during C19, patients presented later to the ED. When the authors stratified their data by time (less

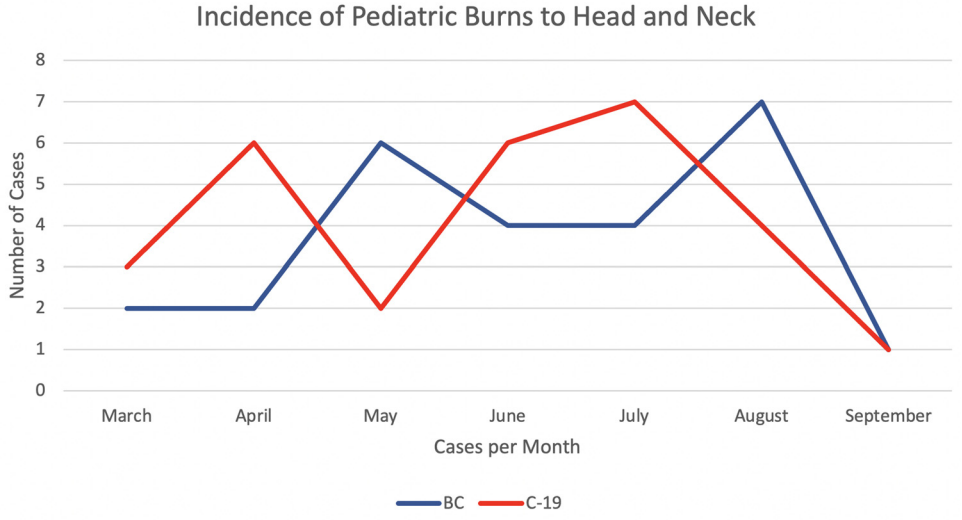

Fig. 1. Incidence of pediatric burns to head and neck per month before COVID-19 and during COVID-19. *BC*, before COVID-19; *C-19*, during COVID-19.

Table I. Patient demographics.

	BCn (%)	*C19n (%)*	P *value*
n = 55	26	29	
Age (mo)			
Mean (range)	4.7 (4.6-190)	6.2 (1-215)	.31
Sex			.63
Male	16 (61.5)	16 (55.2)	
Female	10 (38.5)	13 (44.8)	
Racial distribution			.15
African American	17 (65.4)	15 (51.7)	.31
White	2 (7.7)	9 (31)	.03*
Asian	1 (3.8)	1 (3.4)	> .99
Other	6 (23.1)	4 (13.8)	.49
Etiology			.16
Unintentional	3 (11.5)	7 (24.1)	.3
Intentional	0	2 (6.9)	.49
Other	23 (88.5)	20 (69)	.14
Mechanism of burn			.92
Scald	14 (53.8)	17 (58.6)	.72
Flame	8 (30.8)	7 (24.1)	.58
Chemical	2 (7.7)	3 (10.3)	> .99
Contact	2 (7.7)	1 (3.4)	.6

*Statistical significance ($P \leq .05$).*BC*, before COVID-19; *C19*, during COVID-19.

or more than 24 hours) and race, there were racial differences in the time interval from burn to presentation to the ED. The authors' data showed that during BC, more African American (AA) children had a delayed presentation to the ED ($P = .02$). In contrast, during C19, White children had a delayed presentation to the ED. Their data showed a significant racial disparity in time from injury to ED admission. There were no significant differences in LOS (intensive care unit, hospital) or discharge disposition between the periods.

DISCUSSION

The purpose of this study was to describe patterns of burns to the head and neck in children during the early COVID-19 pandemic. This analysis is the first that addresses burns to the head and neck in children during the COVID-19 pandemic in the US.

The authors' data showed that the overall number of pediatric burns to the head and neck remained the same during the pandemic. However, there was a 200% increase in burns to the head and neck region in children in April 2021 compared with the previous year, which corresponds to the second month of children being out of preschool/school. Depending on the age, some kids already started virtual learning at that time in the state of Georgia.[18] This information is similar to previous studies that showed an increase in pediatric burns at home during COVID-19 pandemic,[21-23] such as unintentional/inhalation burns.[21,22] A possible explanation for this finding relates to the exploratory nature of young children[2,24] and the assumption that during the pandemic, children spent majority of the day at home. Parents were also concomitantly working from home and thus may have not been able to directly

Table II. Details regarding burn injury.

	BCn (%)	*C19n (%)*	P *value*
Burn location			
Head and neck	9 (34.6)	5 (17.2)	.14
Isolated head	14 (43.8)	20 (69)	.25
Isolated neck	3 (11.5)	4 (13.8)	> .99
Other body parts			
Trunk	13 (50)	21 (72.4)	.09
Buttock	2 (7.7)	1 (3.4)	.6
Upper limb	19 (73.1)	21 (72.4)	.96
Lower limb	3 (11.5)	9 (31)	.08
Concomitant inhalation injuries	2 (7.7)	3 (10.3)	> .99
COHb level mean (range)	0.25 (0.2−0.3)	3 (0.3−7.7)	.19

BC, before COVID-19; *C19*, during COVID-19; *COHb*; carboxyhemoglobin.

Table III. Severity of burns.

	BC n (%)	*C19* n (%)	P *value*
TBSA burn mean (range)	10.4 (1−65)	9.7 (0.8−41)	.83
TSBA severity (%)			
<10	16 (61.5)	19 (65.5)	.76
>10	10 (38.5)	10 (34.5)	.76
No. of surgical interventions mean (range)	3 (3-4)	2 (1-3)	.007*

*Statistical significance ($P \leq .05$).*TBSA*, total body surface area; *BC*, before COVID-19; *C19*, during COVID-19.

Table IV. Admission details and hospital course.

	BCn (%)	*C19n (%)*	P *value*
Time from burn injury to presentation to ED (h) Mean (range)	8.4 (0.5-48)	12 (0.5-96)	.54
ED Presentation			
Within 24 h of burn	18 (69.2)	21(72.4)	.8
AA	10 (38.5)	14 (48.3)	.46
White	2 (7.7)	4 (13.8)	.67
Asian	1 (3.8)	0	.47
Other	5 (19.2)	3 (10.3)	.46
More than 24 h after burn	8 (30.8)	8 (27.6)	.8
AA	7 (26.9)	1 (3.4)	.02*
White	0	5 (17.2)	.05*
Asian	0	1 (3.4)	> .99
Other	1 (3.8)	1 (3.4)	> .99
LOS (d) mean (range)			
ICU	5.3 (1-14)	5 (1-9)	.94
Hospital	3.9 (1-14)	2.4 (1-13)	.16
Discharge disposition			> .99
Home	23 (88.5)	25 (86.2)	> .99
Rehabilitation facility	1 (3.8)	1 (3.4)	> .99
Not documented	2 (7.7)	3 (10.3)	> .99

*Statistical significance ($P \leq .05$)*BC*, before COVID-19; *C19*, during COVID-19; *ED*, emergency department; *AA*, African American; *LOS*, length of stay; *ICU*, intensive care unit.

supervise all of their children's activities. In addition, some home-based activities such as cooking and baking[25-27] have the potential to lead to accidental burns. Children may have been involved in these activities without direct supervision, thus placing themselves at risk for burns.

In the authors' study, scald burns were the most common mechanism of burn before and during the pandemic. This data is consistent with current literature.[2,28] Unattended bathtub submersion, pulling hot liquid containers, and steam inhalation are common causes of scald burns.[29,30] There is a correlation between scald burns due to steam inhalation and countries with higher prevalence of COVID-19.[30] Specific cultures (e.g., Asian) use certain homeopathic and home remedies that rely on steam inhalation[30] and have a higher likelihood to cause scald burns. It is possible that the misconception regarding the beneficial effects of steam inhalation in treating respiratory tract symptoms lead to an increase in this method, which caused a surge in pediatric scald burn.[30]

In the authors' study, there was racial disparity in time from injury to ED admission. However, there were no differences in burn injury severity. Their data is different from the literature.

There are well documented disparities regarding access to health care for children of various ethnic and racial groups.[31-33] The COVID-19 pandemic exposed additional longstanding racial and ethnic health inequities in the US[32,34] regarding pediatric burns. Previous studies have found that pediatric burn injuries were more common among AA.[35-38] AA and Hispanic children experience a delay in presentation to the ED and treatment of burns.[35-38] These delays have a significant impact on the outcomes,[35-38] such as slower fluid resuscitation,[37,39] poor wound healing,[35-38] an increase in morbidity and mortality.[37,39]

There were some limitations to the present study. This retrospective review did not allow for further statistical analysis. In addition, this data represents only the first 6 months of pandemic, so overall numbers will likely evolve as the pandemic progresses. This study team is continuing to collect data regarding burns to the head and neck as the subject of additional investigation. Lastly, because the authors' study is the first analysis of burns to the head and neck in children during the COVID-19 pandemic in US, the authors were not able to compare their findings with previous studies.

CONCLUSIONS

There was a transient increase in head and neck burns in children during the early COVID-19 pandemic. The increase is parallel with closures of preschools/schools, initiation of the virtual school environment, and remote working. Changes in lifestyle due to restrictions from COVID-19 influenced this increase.

DISCLOSURE

None.

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