

# Emergency Visits and Hospitalizations for Child Abuse During the COVID-19 Pandemic

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Economic recession and natural disasters have been associated with increases in child physical abuse (CPA).<sup>1,2</sup> Our objectives were to compare the volume and severity of CPA encounters in children's hospitals during the coronavirus disease 2019 (COVID-19) pandemic to that of previous years.

## METHODS

We conducted a retrospective cohort study of emergency department (ED) and inpatient encounters for children ≤5 years old in the Pediatric Health Information System (PHIS) (administrative database from 52 US children's hospitals).<sup>3</sup> This study was deemed exempt by the Institutional Review Board of the University of California, San Francisco.

We compared the volume of CPA encounters from January 1 to August 31, 2020, to that of the same time frame in previous years (2017–2019) to understand overall trends. We compared the severity of CPA encounters during the COVID-19 pandemic period (defined as March 16 to August 31, 2020) to that of the same time frame in previous years (2017–2019).

## OUTCOMES

Our primary outcome was the change in volume of encounters in which CPA was diagnosed, defined by using

*International Classification of Diseases, 10th Revision, Clinical Modification*, diagnosis codes.<sup>4</sup> Secondary outcomes included markers of CPA severity: ICU use (yes is more severe), number of injuries (a higher total is more severe), injury type (abusive head trauma is more severe), hospitalization resource intensity scores for kids (H-RISK) (a higher score is more severe), and in-hospital mortality (yes is more severe). H-RISK is a measure of severity based on resource use.<sup>5</sup>

## ANALYSIS

We described the total volume of children's hospital ED and inpatient encounters in 2020 and previous years using frequencies. To compare the volume of CPA encounters in 2020 to that of previous years, we conducted a difference-in-differences analysis using linear regression models with an interrupted time series approach. The models evaluated were the following: (1) differences in the volume of CPA encounters at the onset of the pandemic, comparing March 2020 to previous years and (2) differences in the rate of change in CPA encounters, comparing 2020 to previous years.

To compare severity of CPA encounters during the COVID-19 pandemic to that of previous years, we analyzed categorical severity variables (eg, ICU use) using  $\chi^2$  tests and H-RISK scores using Student's *t* tests. Analyses were

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Drs Kaiser, Kornblith, Puls, and Pantell interpreted the data and drafted the initial manuscript; Dr Richardson conducted the analyses and interpreted the data; Ms Gruhler De Souza and Drs Fleeegler, Fritz, Parikh, Zagel, Sills, Goyal, Hogan, Heller, DeLaroche, and Cooper interpreted the data; and all authors conceptualized and designed the study, reviewed and revised the manuscript, approved the final manuscript as submitted, and agree to be accountable for all aspects of the work.

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**TABLE 1** CPA Severity During the COVID-19 Pandemic Versus That of Previous Years

	Children Aged <1 y			Children Aged 1–5 y		
	COVID-19 Pandemic ( <i>n</i> = 616)	Previous Years ( <i>n</i> = 2101)	<i>P</i> <sup>a</sup>	COVID-19 Pandemic ( <i>n</i> = 621)	Previous Years ( <i>n</i> = 2477)	<i>P</i> <sup>a</sup>
ICU use, <i>n</i> (%)	95 (15.4)	448 (21.3)	<.01	46 (7.4)	196 (7.9)	.68
H-RISK score, mean (SE)	1.267 (0.082)	1.368 (0.049)	.31	0.941 (0.076)	0.863 (0.035)	.33
Type of injury, <i>n</i> (%)						
Fracture	361 (58.6)	1183 (56.3)	.31	134 (21.6)	428 (17.3)	.01
Abusive head trauma	198 (32.1)	713 (33.9)	.41	67 (10.8)	219 (8.8)	.13
Abdominal	13 (2.1)	59 (2.8)	.34	39 (6.3)	124 (5.0)	.20
Burn	17 (2.8)	52 (2.5)	.69	48 (7.7)	172 (6.9)	.50
Skin	237 (38.5)	834 (39.7)	.59	460 (74.1)	1893 (76.4)	.22
Other	66 (10.7)	212 (10.1)	.65	86 (13.8)	324 (13.1)	.61
No. injuries, <i>n</i> (%)			.74			.08
1	394 (64.0)	1348 (64.2)	—	465 (74.9)	1955 (78.9)	—
2	173 (28.1)	568 (27.0)	—	111 (17.9)	382 (15.4)	—
≥3	49 (8.0)	185 (8.8)	—	45 (7.2)	140 (5.7)	—
In-hospital mortality, <i>n</i> (%)	12 (1.9)	71 (3.4)	.07	15 (2.4)	55 (2.2)	.77

The COVID-19 pandemic period was defined as March 16 to May 31, 2020. CPA encounters during this time frame were compared to those in the same time frame in previous years (2017–2019). —, not applicable.

<sup>a</sup> Calculated by using  $\chi^2$  tests for categorical variables and Student's *t* tests for H-RISK scores.

performed by using SAS 9.4 (SAS Institute, Inc, Cary, NC), and the significance was set at  $\alpha = .05$ .

## RESULTS

There was a sharp decline in the all-cause, overall volume of ED and inpatient encounters in children's hospitals in week 10 of 2020, corresponding to March 16 (Fig 1A).

When comparing trends in the volume of CPA encounters in 2020 to that of previous years, we also found

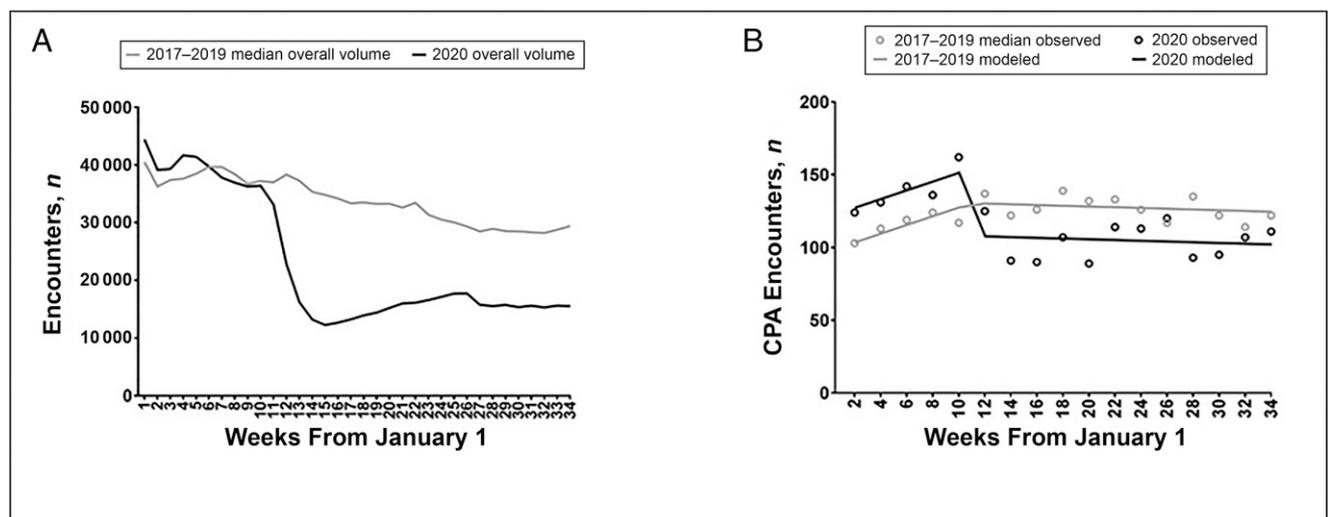
a significant decline at week 10 of 2020 (−63.4 cases [95% confidence interval: −91.8 to −35.9]). We found no significant differences in intercepts or slopes of CPA encounter trends by comparing 2020 to previous years (Fig 1B).

The severity of CPA encounters during the COVID-19 pandemic was similar to that of previous years, with no significant differences in the proportion of infants with abusive head trauma, proportion of children from the ages of 1 to 5 years with ICU

use, or proportion of children with in-hospital mortality (Table 1). ICU use in infants decreased during the COVID-19 pandemic, and injury patterns in children ages 1 to 5 changed (a greater proportion with fracture).

## DISCUSSION

In this multicenter study of US children's hospitals, we found declines in CPA encounters during the COVID-19 pandemic. These declines were during a time when the



**FIGURE 1**

All-cause, overall children's hospital encounters and CPA encounters in 2020 compared to that of previous years (2017–2019). A, Illustrates changes in the all-cause, overall volume of children's hospital encounters in 2020 compared to that of previous years (black versus gray lines, respectively). B, Illustrates changes in trends in volume of CPA encounters in 2020 compared to that of previous years (black versus gray lines, respectively).

total volumes of encounters were also lower. We found the severity of CPA encounters during the pandemic was similar to that of previous years. Our findings may reflect true decreases in CPA; or our findings may, instead, reflect compromised infrastructure for detecting CPA or delayed effects of the pandemic on CPA.

With our study, we cannot explain the mechanisms driving these findings. Protective factors contributing to decreases in CPA may have included financial stipends from the Coronavirus Aid, Relief, and Economic Security Act and/or eviction protections. Policies supporting such protections should continue to be prioritized, and the mechanisms by which such policies and/or other protective factors may have decreased CPA should be investigated.

If the proportion of children diagnosed with more severe abusive injuries (eg, abusive head trauma or ICU admission) had increased during the COVID-19 pandemic, this could indicate that declines in the number of CPA encounters were driven by children with less severe

abusive injuries not presenting for medical care or being missed by clinicians. However, we found the severity of CPA encounters was stable in pandemic versus prepandemic years. We interpret this to suggest that either (1) the true occurrence of CPA decreased similarly across the whole spectrum of severity or (2) the presentation of CPA to medical care and/or missed cases of CPA by clinicians decreased similarly across the whole spectrum of severity. The latter case is less likely because more severe injuries are associated with significant clinical signs and symptoms and clinicians more often miss CPA with less severe injuries. Nonetheless, to better ensure detection of CPA and promote overall child health, it will be important to ensure access to primary care and prevention services (eg, home visiting), promote continued awareness of CPA among clinicians,<sup>6</sup> and safely reopen schools and daycares.

Our study was limited to the first 6 months of the pandemic; analyzing

longer-term effects may reveal different patterns, and we intend to examine this in the future. The goal of this analysis was to provide timely, actionable guidance for clinicians and policymakers. Thus, the PHIS database was chosen because it is updated quarterly, whereas other national, all-payer databases are updated every 1 to 3 years (eg, Healthcare Cost and Utilization Project databases). Additionally, encounters in PHIS children's hospitals represent a small portion of CPA. Thus, our results do not represent the overall epidemiology of CPA during the COVID-19 pandemic, and larger national samples should be studied.

#### ABBREVIATIONS

COVID-19: coronavirus disease 2019

CPA: child physical abuse

ED: emergency department

H-RISK: hospitalization resource intensity scores for kids

PHIS: Pediatric Health Information System

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#### REFERENCES

1. Wood JN, French B, Fromkin J, et al. Association of pediatric abusive head trauma rates with macroeconomic indicators. *Acad Pediatr*. 2016;16(3):224–232
2. Seddighi H, Salmani I, Javadi MH, Seddighi S. Child abuse in natural disasters and conflicts: a systematic review. *Trauma Violence Abuse*. 2021; 22(1):176–185
3. Children's Hospital Association. PHIS. Available at: <https://www.childrenshospitals.org/phish>. Accessed September 20, 2020
4. tPuls HT, Anderst JD, Davidson A, Hall M. Trends in the use of administrative codes for physical abuse hospitalizations. *JAMA Pediatr*. 2019;174(1):91–93
5. Richardson T, Rodean J, Harris M, Berry J, Gay JC, Hall M. Development of Hospitalization Resource Intensity Scores for Kids (H-RISK) and comparison across pediatric populations. *J Hosp Med*. 2018;13(9):602–608
6. Rosenthal CM, Thompson LA. Child abuse awareness month during the coronavirus disease 2019 pandemic. *JAMA Pediatr*. 2020;174(8):812

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