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## Counts and Child Protection Reports of Diagnosed Child Maltreatment Before and After the COVID-19 Pandemic Onset

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### Abstract

**Background:** Mechanisms for reporting child maltreatment (CM) were affected by changes in service provision immediately following the onset of the COVID-19 pandemic.

**Objective:** To examine changes in counts and CPS reporting of CM medical encounters before and after the onset of COVID-19.

**Participants and Setting:** All emergency department and inpatient medical encounters with at least one CM diagnosis during the study period at Rady Children's Hospital San Diego, the largest pediatric hospital in California between 2016 and November 2021.

**Methods:** Using linked medical record and CPS administrative data, interrupted time series models tested for changes in monthly counts and percentages of CM medical encounters reported to CPS with the onset of COVID-19. Logistic regression tested for the likelihood of a CPS report being associated with a CM encounter.

**Results:** CM medical encounters totaled 2,528, including 793 after the onset of COVID-19. Interrupted time series models indicated with the onset of the pandemic, the counts of CM encounters increased 18% (RR: 1.18, 95% CI (1.03–1.34) and the percentages reported to CPS increased 10% (RR: 1.10, 95% CI: 1.05–1.17). CM encounters that occurred after the onset of the

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COVID-19 pandemic had increased odds of a CPS report (fully adjusted model: OR: 1.08; 95% CI: 1.05–1.12).

**Conclusions:** This study found increases in monthly counts and a higher percentage of CM medical encounters with CPS reports after the pandemic onset.

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## Introduction

During the initial COVID-19 pandemic response period in 2020, reports to child protection systems (CPS) in the United States dropped precipitously (Bullinger et al., 2021; Shusterman et al., 2022). Concurrent evidence suggests that factors associated with risk of child maltreatment (CM) were experienced by more families during this period, including familial stress, substance use, economic hardship, and decreased service support (Dodge et al., 2021; Gassman-Pines, Ananat, & Fitz-Henley, 2020; Patrick et al., 2020). The majority of CM reports are made by professionals, including educators, law enforcement, medical providers, and social service personnel (U.S. H.H.S., 2021). During the acute pandemic response period, when schools and social services were closed or migrated to virtual spaces, there was an increased likelihood that CM went undetected (Katz et al., 2022; Nguyen, 2021).

Hospital and emergency medicine personnel continued to serve children and families throughout the COVID-19 pandemic period, elevating their role in the identification and response to physical child abuse (Sharma et al., 2021). Research demonstrates that medical encounters can serve as warning signs for worsening CM. More than one-quarter of infants with confirmed child abuse had experienced a sentinel injury in the year prior, compared to none of the definitely not-abused control group (Sheets et al., 2013), and more than 20% of a sample of children with abuse fracture diagnoses had at least one previous physician visit at which abuse went undetected (Ravichandiran et al., 2010). Out of a sample of homicide cases involving children under age 4, 30% had attended a healthcare visit for reasons other than well-child care in the year prior to their death (King et al., 2006). Separate from inflicted injuries (Putnam-Hornstein, 2011), CM can cause lasting developmental and physical harms (Strathearn et al., 2020) and histories of reported maltreatment have been associated with infant death from disease (Schneiderman et al., 2021). Medical providers' understanding and response to CM, particularly in stressful periods such as the pandemic response period when other mechanisms of CM identification have been disrupted, is of vital importance (Martinkevich et al., 2020).

Despite the critical role of medical providers in the identification of CM (Christian & Committee On Child Abuse & Neglect, 2015) there is empirical evidence reports to CPS are not always made. Surveys of medical providers have found that between 8% and 75% of possible abuse injuries went unreported (Flaherty et al., 2000; Flaherty et al., 2008). While research has shown medical providers to be more likely than educators to report suspected CM (Kenny, 2001), reporting by medical providers may still only occur in less than half of situations where CM is suspected (Zusman & Saporta-Sorozon, 2022). This is true even for cases where children are formally diagnosed with CM; a population-based study of hospitalized children under age 3 found that more than 15% of these children

were not reported to CPS (Rebbe et al., 2022). Providers have cited myriad reasons for nonreporting that include past negative experiences with CPS (Herendeen et al., 2014), including perceptions that it would harm the family, a lack of understanding of the laws or process, and a belief that CPS intervention does not help (Flaherty, 2015). This is despite published guidance from the American Academy of Pediatrics for pediatricians regarding role that they play in the evaluation and identification of CM that includes identification of injuries that raise the suspicion of CM, tests to conduct when CM is suspected, medical and social histories to collect, consultations with colleagues and/or child abuse experts, and their role as mandated reporters required to report suspected CM to CPS (Christian & Committee On Child Abuse & Neglect, 2015).

In the context of the pandemic response, when medical settings became proportionately more likely to be the sole identifiers of child abuse and neglect, it is unknown which medical encounters with diagnosed CM resulted in a CPS report, and whether the tendency to report changed in comparison to pre-pandemic years. In the current analysis, we describe medical encounters diagnosed with CM before and after the onset of the pandemic, examine if the percentage of medical encounters with a CM diagnosis reported to CPS changed with the onset of the pandemic, and estimate the likelihood that a medical encounter with a CM diagnosis was reported to CPS.

## Methods

### Data

The retrospective data for the current study included all emergency department and inpatient medical encounters at Rady Children's Hospital San Diego with a CM diagnosis between January 1, 2016 through November 30, 2021. Rady Children's Hospital San Diego is the largest pediatric hospital in California and the region's only pediatric level 1 trauma center. With a catchment area of 1 million children, the hospital serves over 280,000 children every year. Medical encounters with diagnosed CM were then linked with statewide CPS records from California using a probabilistic matching algorithm. Records were linked using a combination of child-specific personal identifiers, which were then stripped to create an anonymized dataset for analysis. The unit of analysis for this study was a CM medical encounter.

### Measures

We used the *International Classification of Diseases, Tenth Edition, Clinical Modification* (ICD-10-CM) to identify encounters with at least one CM diagnosis for the initial encounter of: (1) confirmed forms of CM (T74.XX), (2) suspected CM (T76.XX), and (3) codes identified as suggestive of high-risk physical abuse in the literature (Chaiyachati et al., 2022). Supplementary Table 1 provides the full list of CM diagnostic codes. The onset of COVID-19 was identified as March 16, 2020, the day that public schools closed in San Diego County and other pandemic restrictions were established (Underwood & Younis, 2020).

A CPS report associated with the CM encounter was defined as any CPS report (regardless of whether it was screened-in for investigation) that occurred three days prior to the admission date through three days after the discharge date to allow for modest variations in data documentation practices. Measures about the medical encounter came from the medical records and included variables regarding the most intensive setting (inpatient, emergency department), the hierarchically coded CM subtype (physical abuse, neglect, sexual abuse, psychological abuse, and unspecified maltreatment), and CM diagnostic code type (confirmed, suspected, suggestive). Child-specific measures from the medical encounter records included sex (male, female), age (less than 1 year, 1–4 years, 5–17 years), health insurance payment for encounter (public insurance, private/other insurance), and race/ethnicity (any race Hispanic, non-Hispanic Asian/Pacific Islander, non-Hispanic White, non-Hispanic Black, Other/Unknown). Any race Hispanic was the reference group because it was the largest.

## Analysis

CM encounters were aggregated and stratified as occurring before or after the onset of the COVID-19 pandemic. Chi-square analyses were used to examine if the observed frequencies before/after the COVID-19 onset matched the expected frequencies. We then counted the number of encounters with CM diagnoses by month and plotted them over time with a LOESS (Locally Estimated Scatterplot Smoothing) line corresponding to before/after COVID-19 onset. We calculated the percent of CM encounters with an associated CPS report for each month and plotted this over time with a LOESS line. We ran interrupted time series models (Xiao et al. 2021) using a quasi-Poisson model for count data and to address over-dispersion (Bernal et al., 2017) to test if the onset of the COVID-19 pandemic was associated with a change in both the count of CM medical encounters and the percentage reported to CPS. Results are presented as relative risks (RR) with 95% confidence intervals (95% CI). We ran logistic regression models with the binary outcome of a CPS report during the CM medical encounter. The models were run in an additive manner with just the COVID-19 variable first, then including the medical encounter characteristics, and then adding the child characteristics. Results are presented as odds ratios (OR) with 95% confidence intervals.

## Results

A total of 2,528 emergency department and inpatient medical encounters with CM diagnoses were identified from January 1, 2016 through November 30, 2021. There were 1,735 CM encounters prior to the onset of COVID-19 and 793 CM encounters after the onset. Table 1 presents the distributions of the encounter characteristics stratified by the onset of COVID-19. Supplementary Table 2 presents the distributions stratified by CPS report status. Compared to the pre-pandemic period, a higher percentage of CM encounters were reported to CPS (82.8% vs. 74.9%;  $p < 0.001$ ), were in the inpatient setting (30.5% vs. 22.9%;  $p < 0.001$ ), had a suspected (vs. a confirmed or suggestive) CM code type (58.0% vs. 52.0%;  $p = 0.014$ ), and involved a child under 1 year of age (25.5% vs. 19.1%;  $p < 0.001$ ) after the onset of COVID-19. Statistically significant differences were not observed for any other variables.

Figure 1 plots the total monthly count of CM encounters over time in the top panel and the monthly percent of CM encounters with a CPS report on the bottom panel. The trend line for the monthly count of CM encounters was relatively flat prior to the onset of the pandemic (January 2016-February 2020); there was an average of 34.3 encounters per month. After the onset of the pandemic (March 2020), an upward trend is observed with the maximum (64) encounters observed in August 2021 and an average monthly count of 39.0. The monthly average percentage of CM encounters reported to CPS prior to the onset of COVID-19 was 75.1%. For the first two months after the onset of COVID-19, the percentage rose to over 87%. The month with the highest reporting percentage was October 2020 (92.7%) and the trend gradually returned to the pre-pandemic levels by the end of the observation window; the monthly average percentage reported to CPS after the COVID-19 onset was 82.5%.

The interrupted time series models document that both the counts of CM encounters and the percentages reported to CPS increased with the onset of the pandemic. The counts increased 18% (RR: 1.18, 95% CI (1.03–1.34) and the percentages increased 10% (RR: 1.10, 95% CI: 1.05–1.17).

Table 2 presents the logistic regression results as odds ratios. CM encounters that occurred after the onset of the COVID-19 pandemic had increased odds of a CPS report across all three models (full model: OR: 1.08; 95% CI: 1.05–1.12). In the fully adjusted model, CM encounters with a physical abuse diagnosis had higher odds of being reported to CPS than those with a neglect, psychological, or unspecified CM diagnosis (OR: 1.08, 95% CI: 1.04–1.14). The only other statistically significant findings were non-Hispanic Asian/Pacific Islander children had 10% higher odds (OR: 1.10; 95% CI: 1.01–1.20) and non-Hispanic Black children had 6% higher odds of being reported to CPS than children identified as any race Hispanic and children aged 1–4 years were less likely to be reported to CPS than children under one year of age (OR: 0.93; 95% CI: 0.89–0.97).

## Discussion

The current population-based study identified that monthly counts of medical encounters with diagnosed CM in the inpatient and emergency department settings increased and were more likely to be reported to CPS in the 20 months after the onset of the COVID-19 pandemic than in the four years preceding it. The most pronounced differences of CPS reports were observed in the first months following the onset of the COVID-19 pandemic when the percentage of encounters reported to CPS was over 87%. Monthly counts of medical encounters with diagnosed CM were highest during the second year of the pandemic with a peak in August 2021.

These results contrast with the widespread decline of reports to CPS with the onset of the pandemic (CCWIP; Marmoret al., 2021). Those declines in overall CPS reports have been attributed to the reduced number of interactions between children and professionals, such as teachers and social service providers, not necessarily a decline in the occurrence of CM (Brown et al., 2021). It is possible, especially given the numerous concerns voiced about professionals' reduced opportunities to detect CM during the pandemic (Herrenkohl et al., 2020; Thomas et al., 2020), that this influenced the decisions to report to CPS. Thus,

concerns about gaps in service provision, such as home visiting, in-person school, and well-child medical visits, could have pushed medical providers to report to CPS after the onset of the COVID-19 pandemic. Further, given that children were interacting with fewer people during the pandemic, this may have also reduced the number of possible explanations for the injuries presented during the encounter. In other words, while a playground accident could have explained an injury before the pandemic, this would be a less likely explanation during periods of pandemic-induced remote learning and isolation. Similarly, the occurrence of extra-familial CM was also less likely to occur given restrictions and reduced interactions outside of the home.

It is also possible that the CM observed during this pandemic period was more severe than in the years prior, especially given the messaging that people should stay home unless significantly ill or injured. The observed increased percentage of CM encounters that led to inpatient treatment suggests that the injuries required more intensive levels of care than would have been provided in the emergency department. This is a similar finding to three studies that also found an increase in inpatient CM encounters after the onset of the pandemic (De Boer et al., 2022; Salt et al., 2021; Swedo et al., 2020).

This study adds to the small but growing literature related to CM and responses to CM with the onset of the COVID-19 pandemic. This study's use of linked administrative data enabled an analysis of how children interacted between medical providers and CPS. Nonetheless, there are several important limitations to consider. First, there is a large quantity of information that is considered when making the decision to report a child to CPS and our analysis did not have access to much of this information. Two, our study includes the data of one large trauma provider and it is unknown how generalizable these results are to other medical facilities and regions. Third, previous research has identified that CM is under-coded in medical records (Brink et al., 2023) and it is possible that we are underestimating the frequency of CM during the study time period.

## Conclusion

The results from this analysis indicate that the likelihood that a medical encounter with a CM diagnosis was reported to CPS increased with the onset of the COVID-19 pandemic. These results held even after controlling for a number of encounter and child characteristics. Given that CPS agencies are reliant on calls of concerns be made of them, these results provide important information and context regarding CPS reports of CM medical encounters before and after the onset of the COVID-19 pandemic.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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**What is known:**

Mechanisms for reporting child maltreatment were affected by changes in service provision immediately following the onset of the COVID-19 pandemic as schools closed to in-person learning and social services stopped.

**What this study adds:**

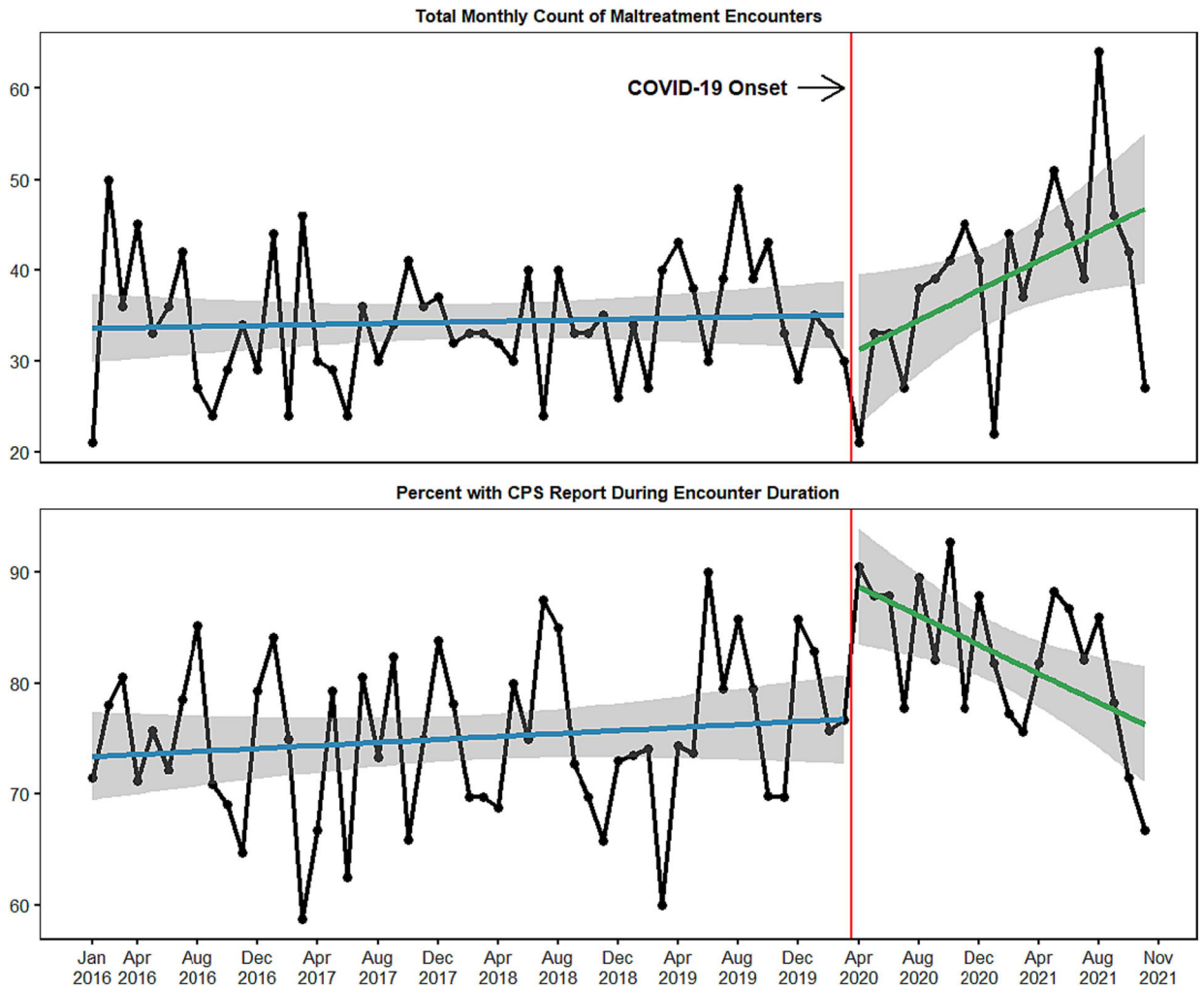
This study found statistically significant increases in the counts of medical encounters for maltreatment and the share of those encounters reported to child protection agencies following the onset of the COVID-19 pandemic.

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**Figure 1.** Monthly Counts of Child Maltreatment Encounters and Percentages with CPS Report Over Time

**Table 1.**

Distribution of Encounter & Child Characteristics by COVID-19 Onset

	All CM Medical Encounters n = 2,528	Before Onset of COVID-19 n = 1,735	After Onset of COVID-19 n = 793	p-value
	n (%)	n (%)	n (%)	
<b>CPS Report During Encounter</b>				
Yes	1957 (77.4)	1300 (74.9)	657 (82.8)	<0.001
No	571 (22.6)	435 (25.1)	136 (17.2)	
<b>Encounter Type</b>				
Inpatient	639 (25.3)	397 (22.9)	242 (30.5)	<0.001
Emergency Department	1889 (74.7)	1338 (77.1)	551 (69.5)	
<b>Child Maltreatment Category</b>				
Physical Abuse	1235 (48.9)	827 (47.7)	408 (51.5)	0.076
Sexual Abuse	825 (32.6)	587 (33.8)	238 (30.0)	
Neglect	224 (8.9)	145 (8.4)	79 (10.0)	
Unspecified	176 (7.0)	123 (7.1)	53 (6.7)	
Psychological Abuse	68 (2.7)	53 (3.1)	15 (1.9)	
<b>Maltreatment Code Type</b>				
Confirmed	1057 (41.8)	759 (43.6)	298 (37.6)	0.014
Suspected	1363 (53.9)	903 (52.0)	460 (58.0)	
Suggested	108 (4.3)	73 (4.2)	35 (4.4)	
<b>Sex</b>				
Male	1073 (42.4)	756 (43.6)	307 (39.5)	0.098
Female	1455 (57.6)	979 (56.4)	469 (60.5)	
<b>Age</b>				
Less than 1 Year	534 (21.1)	332 (19.1)	202 (25.5)	<0.001
1–4 Years	759 (30.0)	549 (31.6)	210 (26.5)	
5–17 Years	1235 (48.9)	854 (49.2)	381 (48.0)	
<b>Health Insurance</b>				
Public Health Insurance	1763 (69.7)	1205 (69.5)	558 (70.4)	0.677
Private/Non-Public Insurance	765 (30.3)	530 (30.5)	235 (29.6)	
<b>Race/Ethnicity</b>				
				0.650

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	All CMI Medical Encounters n = 2,528		Before Onset of COVID-19 n = 1,735		After Onset of COVID-19 n = 793		p-value
	n (%)	n (%)	n (%)	n (%)	n (%)		
Hispanic	1289 (51.0)	871 (50.2)	418 (52.7)				
Non-Hispanic White	653 (25.8)	457 (26.3)	196 (24.7)				
Non-Hispanic Black	271 (10.7)	184 (10.6)	87 (11.0)				
Other/Unknown	218 (8.6)	157 (9.0)	61 (7.7)				
Non-Hispanic Asian/Pacific Islander	97 (3.8)	66 (3.8)	31 (3.9)				

**Table 2.**

Logistic Regression Results of CPS Report as Odds Ratios

	CPS Report During Maltreatment Medical Encounter					
	OR	95% CI	OR	95% CI	OR	95% CI
<b>After Onset of COVID-19 Pandemic</b>						
No	Ref.	--	Ref.	--	Ref.	--
Yes	1.08	1.05–1.12	1.08	1.04–1.12	1.08	1.05–1.12
<b>Encounter Type</b>						
Emergency Department	Ref.	--	Ref.	--	Ref.	--
Inpatient	0.99	0.95–1.02	1.01	0.97–1.05		
<b>Child Maltreatment Category</b>						
Neglect/Psychological/Unspecified	Ref.	--	Ref.	--	Ref.	--
Physical Abuse	1.06	1.02–1.11	1.08	1.04–1.14		
Sexual Abuse	1.04	0.99–1.09	1.04	0.99–1.09		
<b>Maltreatment Code Type</b>						
Suspected/Suggested	Ref.	--	Ref.	--	Ref.	--
Confirmed	0.98	0.95–1.02	0.98	0.95–1.01		
<b>Sex</b>						
Female	Ref.	--	Ref.	--	Ref.	--
Male	0.99	0.96–1.04				
<b>Age</b>						
Less than 1 Year	Ref.	--	Ref.	--	Ref.	--
1–4 Years	0.93	0.89–0.97				
5–17 Years	1.00	0.96–1.04				
<b>Health Insurance</b>						
Private/Non-Public Insurance	Ref.	--	Ref.	--	Ref.	--
Public Health Insurance	1.02	0.99–1.06				
<b>Race/Ethnicity</b>						
Any Race Hispanic	Ref.	--	Ref.	--	Ref.	--
Non-Hispanic White	1.00	0.96–1.04				
Non-Hispanic Black	1.06	1.00–1.12				



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CPS Report During Maltreatment Medical Encounter						
	OR	95% CI	OR	95% CI	OR	95% CI
Other/Unknown			1.06	0.99–1.12		
Non-Hispanic Asian/Pacific Islander			1.10	1.00–1.13		