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A comparison of child abuse and neglect encounters before and after school closings due to SARS-Cov-2

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\textbf{ABSTRACT}

\textbf{Background:} Risk factors for child abuse and neglect and commonly used reporting mechanisms were highly affected by SARS-Cov-2 pandemic; yet, little is known about the effects of SARS-Cov-2 on rates of child abuse and neglect.

\textbf{Objective:} To compare overall rates, demographics, types of abuse and acuity of child abuse and neglect encounters seen at one university health system for the 6 months before and after school closings due to the SARS-Cov-2 pandemic.

\textbf{Participants and setting:} Data was extracted from a database of billed ICD10 codes for child abuse and neglect including sexual abuse codes. There were 579 encounters for patients <18 years of age and 476 unique patients.

\textbf{Methods:} In addition to ICD10 code and pre/post school closing, each encounter was identified to be inpatient, outpatient and/or emergency department. Demographic data such as age, gender, ethnicity, and race were extracted. Incident rate ratios in addition to descriptive statistics, Mann-Whitney U test, two-sample t-test, or the chi-square test of association were used in the analysis.

\textbf{Results:} No significant differences were identified for total rates of child abuse and neglect encounters \((p = .08)\), physical abuse \((p = .91)\) nor child maltreatment \((p = .86)\) codes or in the age \((p = .46)\), gender \((p = .58)\), and race/ethnicity \((p = .15)\) of patient encounters pre- versus post-school closings. The sexual abuse incidence and inpatient encounters increased by 85\% (IRR = 1.85, \(p < .0001\); IRR = 1.85, \(p = .004\), respectively).

\textbf{Conclusions:} Our findings provide a unique contribution to the existing literature in that we identified a significant increase in the incidence of sexual abuse and higher patient acuity as evidenced by higher rates of inpatient encounters after school closing due to SARS-Cov-2.

1. Introduction

Child abuse and neglect is a significant problem in the United States (U.S.) with an estimated 656,000 children (persons aged 0–18 years) victimized in 2019 (United States Department of Health and Human Services, 2019). In this same year, 1840 children died as a result of child abuse and neglect (United States Department of Health and Human Services, 2019).

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result of abuse or neglect, a rate of 2.5 per 100,000 children (United States Department of Health and Human Services, 2019). Cases of child abuse and neglect are generally categorized into one of four groups: child neglect, which in 2019 accounted for 61% of cases; child physical abuse (10.3% of cases); child sexual abuse (7.2% of cases); and more than one type of abuse (15% of cases) (United States Department of Health and Human Services, 2019). Of concern, in many states rates are escalating with some states reporting as much as a 100% increase from 2015 to 2019 (United States Department of Health and Human Services, 2019). In Kentucky (KY) from 2015 to 2019, there was a 6.5% increase in the number of child victims. In 2019, KY had the highest rate of child abuse, a rate over double the national average at 20.1 per 1000 children versus the national average of 8.9 per 100,000 children (United States Department of Health and Human Services, 2019).

Reporting a suspected cases of child abuse and neglect is an important step to initiate a system to provide services that help to ensure the safety of children (United States Department of Health and Human Services, 2019). All states have laws that require reporting of child maltreatment and some states, including KY (KRS 620.030(1)), require any individual suspecting child maltreatment to report the case to the Cabinet of Health and Family Services (Kentucky Cabinet for Health and Family Services, 2020). Approximately 67% of child abuse reports are made by individuals interacting with children as a result of their profession such as teachers, police officers, health care workers, social workers and lawyers (United States Department of Health and Human Services, 2018). Only 16% of reports are made by friends, family or neighbors (United States Department of Health and Human Services, 2018).

Considering this inequity in reporting, the SARS-CoV-2 world pandemic posed a critical threat to the safety and well-being of children as it relates to child abuse and neglect. To review the pertinent timeline of events related to SARS-CoV-2 and child abuse reporting, it is noted that on January 21, 2020, the SARS-CoV-2 virus was identified in the United States (Center for Disease Control and Prevention, 2020). On March 6, 2020 the governor of KY declared a State of Emergency. On March 20, 2020, the recommendation was made to discontinue all in-person school instruction and telehealth was encouraged if not required (Commonwealth of Kentucky, 2020). As a result of these recommendations, a number of the mechanisms used to report child abuse were limited due to the use of telehealth and e-learning resulting in lack of in-person contact and assessment (Commonwealth of Kentucky, 2020). Not surprisingly, the reports of child maltreatment made to the Cabinet for Health and Family Services decreased (Welch, 2020). In KY, rates of reports to Cabinet for Health and Family Servicedropped by 43% from Spring 2019 to Spring 2020 (Cheves, 2020). Nationally rates of reports to Cabinet for Health and Family Services decreased by 20 to 70% (Welch, 2020).

Although reports of child maltreatment made to the Cabinet of Health and Family Services decreased, identified risk factors for maltreatment escalated due to SARS-CoV-2, specifically financial insecurity, social isolation, and family stress (World Health Organization, 2020). The effects of psychological stressors are magnified with the use of maladaptive coping mechanisms such as drugs and alcohol or challenges maintaining sobriety in isolation (University of Michigan Department of Psychiatry, 2020). With alcohol and drug use being known risk factors for child maltreatment, an ominous stage was set for the wellbeing of children at risk of maltreatment (United States Department of Health and Human Services, 2018).

Due to the novelty of the SARS-CoV-2 pandemic and its widespread effects on healthcare and education, the repercussions on child abuse and neglect have not been fully described. A recently-published article reported that there was an increase in the percent of emergency department visits related to suspected and confirmed child abuse and neglect in 2020 compared to 2019 (Swedo et al., 2020). Although this study provided insight into the effects of SARS-CoV-2 on healthcare visits related to child abuse and neglect, it did not detail the incidences of specific types (e.g., sexual abuse) of child maltreatment and reported emergency department encounters.

With this context, the study purpose is to utilize a healthcare claims database to evaluate the effects of SARS-CoV-2 on children related to child abuse and neglect seen at one university healthcare system and a children’s hospital serving the Central, Eastern, and Southern regions of KY in the U.S. The aims to:

Aim 1: Compare the demographics (i.e., age, gender, residence, race, and ethnicity) of those affected by child abuse and neglect before and after in-person school instruction was ceased due to SARS-CoV-2 on 3/20/2020.

Hypothesis: There will be a significant increase in the age of the children with codes for child abuse and neglect after March 20, 2020, resulting from increased time of older children in at-risk environments.

Aim 2: Compare rates of child maltreatment 6 months before and after in-person school instruction was ceased on 3/20/2020 due to SARS-CoV-2.

| Table 1 |
| International classification of diseases ICD-10-CM for the identification of physical abuse cases among hospitalized children (Children’s Hospital Association, 2020). |

| Abuse and assault codes | ICD-10-CM description | ICD-10-CM codes |
|-------------------------|------------------------|-----------------|
| Unspecified child maltreatment, confirmed | T7492XA |
| Unspecified child maltreatment, suspected | T7692XA |
| Child physical abuse, confirmed | T7412XA |
| Child physical abuse, suspected | T7612XA |
| Shaken infant syndrome | T744XXA |
| Unspecified child maltreatment, confirmed | T7492XA |
| Child sexual abuse, confirmed, initial encounter | T7422XA |
| Child sexual abuse, suspected, initial encounter | T7622XA |
| Encounter for examination and observation following alleged child rape | Z044Z |
| Encounter for examination and observation following alleged child physical abuse | Z0472 |
Hypothesis: There will be a lower rate of encounters for child abuse and neglect as a result of a decrease in healthcare system usage during the pandemic.

Aim 3: Compare the ICD10 codes (Table 1) for types of child abuse and neglect before and after March 20, 2020. This is an exploratory aim.

Aim 4: Compare the acuity of the child abuse and neglect cases based on inpatient versus outpatient status before and after in-person school instruction was ceased due to SARS-Cov-2 on 3/20/2020.

Hypothesis. There will be an increased prevalence in the cases of inpatient child abuse codes seen after March 20, 2020, resulting from lack of mechanisms in place to identify and remediate at-risk environments.

2. Methods

2.1. Sample

This project utilized the University of Kentucky’s Clinical and Translational Science bioinformatics services as honest brokers to obtain deidentified clinical/claims data associated with the inclusion/exclusion criteria (Table 1) provided in the study design following IRB approved protocol number 45668. The original data extraction included 579 encounters for patients <18 years of age. Patient encounters billed with codes for International Classification of Diseases ICD-10-CM for the Identification of Physical Child Abuse Cases Among Hospitalized Children (Table 1) were extracted and grouped based on whether the ICD-10 diagnosis code was submitted 6 months before or after March 20, 2020 or the date of school closings in KY (Children’s Hospital Association, 2020). Codes were also extracted for encounters billed with child sexual abuse codes and then grouped in the pre-and post-school closing groups (Table 1). Each encounter was identified to be inpatient, outpatient and/or emergency department. If the patient was both outpatient/seen in the emergency department and admitted on the same date their visit was coded as inpatient. Demographic data such as age, gender, ethnicity, and race were extracted. Age was initially extracted as a continuous variable and then collapsed into categories based on school ages (preschool, elementary, middle, and high) for analysis purposes. Although there were 576 unique visits retained in the analysis, there were only 469 unique patients. The discrepancy between the unique encounters vs. unique patients is accounted for by 3 patients with both a ‘suspected’ and ‘confirmed’ ICD-10 code for the same manner of abuse in the original extraction; these patients were coded as ‘confirmed’ for the particular manner of abuse. Similarly, there were 65 patients with one or more unique encounter for included codes (Table 1).

2.2. Data analysis

Descriptive statistics, including means and standard deviations or frequency distributions, as appropriate, were used to summarize study variables. Differences in demographic distributions were evaluated using the Mann-Whitney U test, two-sample t-test, or the chi-square test of association. Incidence rate ratios were used to estimate rates of abuse by individual ICD-10 codes and also by the broad categories of physical abuse (T7412XA, T7612XA, Z0472), maltreatment (T7492XA, T7692XA) or sexual abuse (T7422XA, T7622XA, Z0442). To adjust for differences in health care utilization over time, the total number of encounters within the healthcare system among patients <18 was used as the denominator for the incidence rate ratios. Differences in rates were calculated using OpenEpi (Sullivan et al., 2009) and all other data analysis was conducted sing SAS, version 9.4 (Cary, NC); an alpha of 0.05 was used for inferential testing and confidence intervals.

| Table 2 | Demographic characteristics of child physical abuse claims by study period. |
|---------|----------------------------------------------------------------------------------|
|         | Pre (9/19/2019–3/20/2020)                                                       | Post (3/21/2020–9/20/2020)                                                       | p       |
|         | (n² = 268)                                                                      | (n² = 201)                                                                       |         |
| Age category | n (%) or mean ± SD                                                              | n (%) or mean ± SD                                                              |         |
| Preschool (0–4) | 158 (59.30%)                                                                   | 124 (61.7%)                                                                    | .46a   |
| Elementary (5–10) | 55 (20.5%)                                                                     | 44 (21.9%)                                                                     |         |
| Middle (11–13) | 29 (10.8%)                                                                      | 14 (7.0%)                                                                      |         |
| High (14–17) | 26 (9.7%)                                                                       | 19 (9.4%)                                                                      |         |
| Gender     |                                                                                 |                                                                                | .58b   |
| Male       | 118 (44.0%)                                                                     | 83 (41.5%)                                                                     |         |
| Female     | 150 (56.0%)                                                                     | 117 (58.5%)                                                                    |         |
| Race       |                                                                                 |                                                                                | .15c   |
| White, NH | 189(71.6%)                                                                      | 156 (79.6%)                                                                    |         |
| Black/African American, NH | 44 (16.7%)                                                                     | 28 (14.3%)                                                                     |         |
| Other race, NH | 4 (1.5%)                                                                       | 1 (0.5%)                                                                       |         |
| Hispanic | 27 (10.2%)                                                                       | 11 (5.6%)                                                                       |         |

a p from Mann-Whitney U test.

b p from chi-square test of association.

c Although there were 317 and 259 visits in the pre- and post-periods, there were 258 and 201 unique patients respectively.
3. Results

Of the 469 unique children in our sample, the majority were female (57%) and White (75%; see Table 2). When the pre- and post-closing groups were compared on age, gender, and race/ethnicity, none of the differences were significant (Table 2). During both periods, over half of cases were among patients in the preschool age category (0–4; 59% and 62%, respectively). More specifically the age with the highest percentage of encounters was those less than one year of age (22% pre-school and 23% post-school closings) followed by those 1 to 2 years of age (Fig. 1). Among those with more than one visit (n = 42 patients in the pre and n = 23 in the post), the median number of encounters for an included code (Table 1) was 2. (See Fig. 2.)

While there was an observed increase in the incidence of billed encounters for any child abuse and neglect code between the six months prior to March 20, 2020 (58.0 per 10,000 encounters) and the six months that followed the closing of in-person school (67.3 per 10,000 encounters), this comparison was not significant (p = .077, see Table 3). The incidence of physical abuse and maltreatment was not significantly different before and after school closing related to SARS-Cov-2 using the broad categories for these outcomes; the p-values for the pre- and post-closure comparisons of these categories were 0.91 and 0.86, respectively (Table 3). However, the incidence of child sexual abuse was 85% higher after March 20, 2020 (10.8 per 10,000 encounters in the pre-closure and 20.0 per 10,000 post-closure on March 20, 2020; Table 3). When we compared pre/post incidence rates for the individual ICD-10 codes and secondary Z codes, there were some increases between pre-closure to post-closure. In particular, there was a 354% increase in Z0472: ‘Encounter for examination and observation followed alleged child physical abuse’ (IRR = 4.54, 95% CI = 2.28–9.69; p < .001) and a 143% increase in T7622XA: ‘Child sexual abuse, suspected, initial encounter’ (IRR = 2.43, 95% CI = 1.53–3.92; p < .001). Consistent with higher acuity cases, the inpatient encounters were 85% higher in the post-closure period relative to the six months before the schools closed to in-person learning, with rates of 7.32 and 13.51 per 10,000 encounters, respectively.

4. Discussion

Findings from this study suggest that child sexual abuse and the acuity of child maltreatment, as evidenced by the requirement for inpatient treatment, increased following March 20, 2020, the date of in-person school closings in KY due to SARCov-2. This study is the first to identify an increased rate of child sexual abuse following the SARS-Cov-2. The increased acuity of child maltreatment as a result of SARS-Cov-2 school closures is supported by the only other article identified in our review of the literature (Swedo et al., 2020). This article reported findings specific to the emergency department as opposed to our findings reporting findings from a health system.

By using health visit data, we have an estimation of maltreatment events that necessitated medical care. However, given that the majority of child maltreatment cases are associated with neglect (United States Department of Health and Human Services, 2019), and may not require medical treatment, the increase in the acuity of child maltreatment as evidenced by increased in-patient hospitalizations is alarming. In particular, this raises concern about the magnitude of the problem in light of the potential for multiple increased risk factors for abuse created by the financial and social stressors resulting from the SARS-Cov-2 pandemic (World Health Organization, 2020).

Despite state statutes mandating reporting, non-professional contacts are unlikely to report child maltreatment to the Cabinet for Health and Human Services (Kentucky Cabinet for Health and Family Services, 2020; United States Department of Health and Human Services, 2018). As such in times of social isolation, where in-person contact with professionals known to report child abuse and neglect is limited or non-existent, two options may help mitigate the increased risk to minor children. First, because of the grave need for children to have access to the professionals who do report, we must consider creative options using technologic resources to reach
children at risk for maltreatment. Second, effective community-based or virtual school-based approaches to improve the identification and reporting of child maltreatment must be effectively implemented. In 1999, Tomison and Wise wrote an article published by the Australian Institute of Family Studies describing the need to address structural forces and the importance of community approaches to develop healthy resilient families. A few of the many community approaches described by authors include: (1) developing familial social networks; (2) a structured approach involving not only families, governments, and child welfare but health and education agencies, business, unions, and religious organizations; and (3) mass media approaches to changing beliefs about social power in efforts to prevent child sexual abuse (Tomison, 1999). Similarly, the Center for Disease Control has implemented the Essentials for Childhood Framework in seven states (California, Colorado, Kansas, Massachusetts, North Carolina, Utah, and Washington). This program aims to build safe communities to prevent child abuse and neglect (Center for Disease Control and Prevention, 2021a). However, many interventions in the US aimed at addressing sexual abuse specifically are school based and intended to increase knowledge and reporting (Walsh et al., 2015). With this as the focus, prevention of further abuse is the goal as opposed to prevention of any or initial abuse. Truly preventing the initial and any subsequent abuse would require (1) reducing risk factors for perpetration (i.e., history of abusive relationships, hypermasculinity, alcohol and substance abuse) and (2) providing individuals and families the

![Fig. 2. Encounter code frequencies pre- and post-school closing.](image)

**Table 3**

Comparison of child physical abuse, maltreatment and sexual abuse along with inpatient, outpatient and emergency department visits before and after school closings due to SARS-Cov-2.

| Visit type | Pre (9/19/2019–3/20/2020) [54,636 encounters] | Post (3/21/2020–9/20/2020) [38,484 encounters] | IRR (95% CI); \(p\) | Post vs. Pre |
|------------|---------------------------------------------|---------------------------------------------|-----------------|----------------|
| Any child abuse/assault | 317 | 58.0 | 259 | 67.3 | 1.16 (0.98, 1.37); \(p = .077\) |
| Physical abuse | 210 | 38.4 | 146 | 37.9 | 0.99 (0.80, 1.22); \(p = .91\) |
| T7412XA | 48 | 8.8 | 19 | 4.9 | 0.62 (0.36, 1.04); \(p = .07\) |
| T7612XA | 102 | 18.7 | 95 | 24.7 | 1.32 (0.99, 1.75); \(p = .051\) |
| Z0472 | 10 | 1.8 | 32 | 8.3 | 4.54 (2.28, 9.69); \(p < .001\) |
| Maltreatment | 45 | 8.2 | 33 | 8.6 | 1.04 (0.66, 1.63); \(p = .86\) |
| T7492XA | 37 | 6.8 | 28 | 7.3 | 1.07 (0.65, 1.76); \(p = .77\) |
| T7692XA | 8 | 1.5 | 5 | 1.3 | 0.89 (0.0.26, 2.75); \(p = .85\) |
| Sexual abuse | 59 | 10.8 | 77 | 20.0 | 1.85 (1.32, 2.61); \(p < .001\) |
| T7422XA | 21 | 3.8 | 23 | 6.0 | 1.56 (0.86, 2.84); \(p = .15\) |
| T7622XA | 28 | 5.1 | 48 | 12.5 | 2.43 (1.53, 3.92); \(p < .001\) |
| Z0442 | 10 | 1.8 | 6 | 1.6 | 0.85 (0.29, 2.36); \(p = .77\) |
| Visit type | Pre (9/19/2019–3/20/2020) [54,636 encounters] | Post (3/21/2020–9/20/2020) [38,484 encounters] | IRR (95% CI); \(p\) | Post vs. Pre |
| Emergency | 153 | 28.00 | 120 | 31.18 | 1.11 (0.88–1.41); \(p = .38\) |
| Inpatient | 40 | 7.32 | 52 | 13.51 | 1.85 (1.22–2.80); \(p = .004\) |
| Outpatient | 124 | 2.27 | 87 | 2.26 | 1.00 (0.76–1.31); \(p = .89\) |

Note: Broad categories of physical abuse, maltreatment and sexual abuse include individual ICD-10 and encounter codes listed below.
resources to change beliefs and behaviors (Center for Disease Control and Prevention, 2021b).

An increase in child sexual abuse was projected by world organizations such as Interpol. It was recognized that confinement at home, increased online entertainment and virtual learning environments, which resulted from the SARS-Cov-2 pandemic, had the potential to exacerbate the already substantial problem of child sexual abuse (Interpol, 2020). Our findings suggest that these predictions are substantiated.

It is recognized that child sexual assault is often not reported at the time of the incident suggesting that emergency medical care was not required (Child Advocacy Center Foundation, n.d.). At the university medical center in which encounters are reported approximately 30% of all child abuse and neglect cases are coded as a suspected or confirmed sexual assault (i2b2 Query and Analysis Tool). This significant percent increase with increased rates identified in this study, suggest innovative approaches to preventing incidences, improving timely reporting and develop therapeutic approaches to address the long-terms effects of this type of abuse need to be a focus of the national and state health agencies and justice systems.

Limitations of the study include the retrospective nature of the data used in the analysis. We used the 6-month interval directly prior to the school closings in KY as the comparison time period. The decision to compare the six months prior versus the six month follow school closing due to SARS-Cov-2 was based on the similarity of risk factors known to affect rates of such as economic stressors and community violence and crime (Center for Disease Control and Prevention, n.d.) We acknowledge that a comparison of the same seasonal period in the prior year might have resulted in differing findings. An additional limitation relative to the use of an existing dataset of billed encounters is that health care providers might bill an encounter where child abuse or neglect was present using alternate codes, which would have resulted in a lower number of relevant cases than reported. For example, the ICD10 code for non-accidental trauma could have been used in place of the abuse/neglect codes extracted for our analysis (Table 1). Similarly, the ICD-10-CM Official Guidelines for Coding and Reporting has provided specifications for the use of Z04.71, Z04.72, Z04.41 and Z04.42; yet the applications of the codes may be variable (Centers for Medicare and Medicaid Services, n.d.).

In conclusion, we identified differences in incidence rates of specific types of child abuse and neglect and their acuity when comparing the six months before the SAR-Cov-2 school closures to the six months after in KY. Our findings provide a unique contribution to the existing literature in that we have compared types of child abuse and neglect before and after the SAR-Cov-2 pandemic and found that there were significant increases in the incidence of child sexual abuse. We also found an increase in incidence of inpatient admissions suggesting a higher acuity in patients who were seen after school closing as opposed to before school closings due to the pandemic. This study contributes to the understanding of the effects of SARS-Cov-2 on child abuse and neglect and suggests that the magnitude of the effect is immense. Future studies investigating innovative approaches to combat child maltreatment risks, identify maltreatment in an environment of isolation and then address the significant ramifications of child maltreatment in a world still highly affected by SARS-Cov-2 need to be conducted.

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Disclosures

There are no significant financial disclosures relevant to this project.

Ethics statement

This study complies with the Declaration of Helsinki, that the locally appointed ethics committee has approved the research protocol and that informed consent has been obtained from the subjects (or their legally authorized representative).

Data availability statement

Data is available upon request.

Declaration of competing interest

There are no conflicts of interest to report in regard to this project.

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