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REVIEW PAPER

State-by-State Analysis of Child Fatality Reporting: a 21-Year Review

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Abstract

Online reports published by Child Fatality Review Boards (CFRBs) for all 50 of the USA across 21 years, from 1998 to 2018, were downloaded and analyzed to determine the nature of the information available to the public about the causes of child fatalities. A modified coding system based on the Life Events Checklist (LEC) system of the National Center for PTSD was used to identify contexts of children's fatal injuries. Child death due to inflicted injury by other persons is the most frequently reported context category in the 21 years surveyed. The LEC-based system captured 80% of the published fatality context data. A lack of consensus was found among the states in regard to the kinds of information reported online, how the information is organized and presented, and the frequency of reporting. These inconsistencies encumber the development of national data trends and analyses. Individual case reports with specific details about child injury context and causation, child protection history, and child protection interventions were infrequent, and when present often highly redacted.

Keywords Child maltreatment · Child fatalities · Cause of death · Manner of death · Child Fatality Review Boards · Child Fatality Reports · Child abuse and neglect · Physical assault

In 2017, it was reported that 674,000 cases of child abuse and neglect were substantiated nationwide, a 2.7% increase from the national statistics in 2013 (USDHHS 2017). Of these substantiated cases, 1720 child victims reportedly died as a result of their maltreatment (USDHHS 2017). These child fatality statistics are thought to be underestimates of true rates due to system-wide problems with underreporting and under-investigation of suspected cases (Barnett et al. 2005; Crume et al. 2002; Gilbert et al. 2009; Schnitzer et al. 2013). A number of factors can contribute to underestimation, including the lack of standardized reporting requirements (including definitions of

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abuse and neglect), differences in child fatality investigations systems, variation in state child fatality review and reporting processes, lack of coordination among the involved agencies, and factors related to the determination and recording of the manner and time of death, among others (Child Welfare Information Gateway 2019).

Failures to recognize and report symptoms of child abuse and neglect contribute to a significant number of young children experiencing multiple potentially fatal injuries even before these cases are officially identified by medical, child welfare, law enforcement, and mental health personnel (Brewster et al. 1998). This includes failures to recognize child maltreatment as the cause of some fatal injuries (Ewigman et al. 1993; Schnitzer and Ewigman 2005). After Child Protective Services (CPS) identifies at-risk families, some families experience continued child maltreatment. Multiple agency-based factors have been identified as contributing to child protection failures. These factors include weaknesses in the service contact by CPS workers, the intensity of the investigation, and non-compliance with preventive services before and after case closings. This enables child maltreatment to reoccur in active cases under the watch of CPS (Bae et al. 2009; Connell et al. 2007). Documented failures to intervene in cases of maltreatment clearly demonstrate that some at-risk children presented for the agency and professional care do not receive the necessary services until more serious—and sometimes fatal—inflicted and negligent injuries occur (Douglas and Mohn 2014).

Of course, the number of children who die from inflicted injuries is a small fraction of the total number who experience abuse or neglect. Reflecting, however, continuing societal problems in addressing physical child abuse (Daro and McCurdy 1991; Whittaker et al. 2017), challenges remain in achievement of timely identification and protection of children at risk for fatal and permanent injuries. Child survivors of inflicted and potentially lethal physical abuse may carry lifelong disabilities, which may not be tracked and followed over time (Biron and Shelton 2005; Duhaime et al. 1992; Finnie et al. 2012; Makaroff and Putnam 2003; Matshes et al. 2011; Trainor and Krug 2000). Quinton (2017) states that federal and state-based policy initiatives have made increasingly more coordinated efforts to enact comprehensive Child Fatality Review Boards across the USA and notes that the lack of standardization in reporting procedures is attributed to financial, legislative, and administrative differences across state agencies.

Current Study

In their qualitative review of medico-legal investigative records from one medical examiner's office and one coroner's office, Posey and Neuilly (2017) suggested that "child death reports are the leading source used to orchestrate child fatality prevention policy" (p. 1). Our project is intended to expand upon the more limited third-party (non-governmental) studies to provide a nationwide review of all child death reports, with the presentation of information regarding child fatalities as categorized by the states themselves (Klevens and Leeb 2010; Posey and Neuilly 2017) over a 21-year time period. This report contains the results of the group data presently available on the websites of Child Fatality Review Boards. It does not seek to establish the incidence or prevalence rates for fatal injury during this time period, as the accuracy of such data has already been called into question, but rather the frequency with which injury contexts

are identified and whether individual and detailed case reports are available along with the year-to-year CFRB reports.

Method

Data Collection

Four research assistants reviewed the publicly available information provided online by each US state's Child Fatality Review Board (CFRB). The presence or absence of Child Fatality Reports (CFRs) for each state published within a specified year or years during the period of 1998 to 2018 was recorded. For states that did not directly provide CFRs for a given year, the National Center for Fatality Review and Prevention (NCFRP) website (https://www.ncfrp.org) was searched to identify whether CFRs were made available through this resource. All available CFRs during the period by these two resources were downloaded and reviewed. If no CFRs were available for a given state and year, through either the state's CFRB website or the NCFRP page for that state, the data provided on the NCFRP-published mortality statistics sheets were reviewed and used instead.

Coding Development

Content of the collected CFRs or NCFRP mortality statistics sheets were coded based on categories from the Life Events Checklist (LEC). The LEC was developed by the National Center for Post-Traumatic Stress Disorder (PTSD) as an assessment tool for PTSD in survivors of extreme and potentially fatal life events (Gray et al. 2004). The categories of the LEC were modified to match the context of child fatalities by removing categories that were not potential causes of death. The following modified categories were used for the present coding scheme: natural disaster (flood, hurricane, tornado, earthquake); fire or explosion; transportation accident; recreation-related serious accident; exposure to toxic substance; physical assault—inflicted injury (battering, asphyxiation-suffocation); assault with a weapon (shot, stabbed, bomb, etc.); sexual assault; poisoning, starvation, kidnapping, abandonment.

The absence of individual case details in some of these reports led to the decision to put ambiguous postings into the "other" category. As the coding developed, additional categories were added, for example, "illness," "drowning," and "neglect." A more expansive list of these categories is discussed in the results section.

Data Coding

Four research assistants worked to review the content within every downloaded CFR and NCFRP mortality statistic sheet. Each coder was assigned to 12 or 13 states, and one coder reviewed each download available for their assigned states. Each report was reviewed once by one coder.

For each report, coders noted the presence or absence (present = "1"; absent = "0") of information within each publication falling within the LEC categories. For example, when the information was reported on fatalities caused by starvation, the LEC category

"Poisoning, Starvation, Kidnapping, and Abandonment" was coded as "1" for that year. If no information was provided in a CFR for a given category, that LEC category for the specific state and year was coded as "0."

When information on causes of death that did not fall into these LEC categories was present in a given report, it was entered into the coding system through an "other" category. A "1" was coded, and the specific cause of death was documented through qualitative notes.

Score Range

Codes of 0 or 1 for all LEC and the "other" categories were summed. The maximum score attainable for one state for one LEC category was 21; i.e., relevant information for that LEC category was found in the online sites for each of the surveyed 21 years. The maximum score for 1 LEC category for all 50 states is $21 \times 50 = 1050$, i.e., every state in the USA posted relevant data on that LEC every year for 21 years. Posting of category-specific data every year by every state did not occur for any LEC category. Therefore, no LEC category reached a maximum frequency of 1050. Some causal or context categories were posted by very few states. All LEC event categories were present in data published by at least one state. Some LEC categories were present in data reports much more frequently than others. The total published data for the LEC categories are shown in Fig. 2. Since the score range for a single LEC category for one state fell between 0 and 21, a score of 18 for "natural disaster," for example, would indicate that among all the reports or statistics sheets available to review for a given state for that year, 18 of those reports had provided information on that specific cause of death ("natural disaster").

The theoretical maximum score for a single category is 1050. This score would occur when report data for a category occurred every year for all 21 years for all 50 states. If none of the states published data for a category in any of the 21 years, the total score for that category would be 0. Scores of 0 and 1050 did not occur. The numbers inside of the vertical bars in Fig. 2 indicate the total number of times the presence of information on that LEC category received the coding of 1 for each of the 50 states for each of the 21 years.

Individual Case Reports

Individual case reports are singular reports of the life, injury, and death of a single child. Figure 1 shows the state-by-state frequency of published individual reports identified in this survey, again for each state for each of the 21 years.

Results

Every state created CFRs and made either single-year or multiple-year reports publicly available for at least some portion of the 21-year period (Fig. 1). The number of states publicly reporting a CFR, whether single-year or multiple-year reports, steadily increased from 1998 to 2009 (Fig. 1; Table 1). By 2010, all 50 states reported CFR information (Table 1). This trend remained consistent from 2010 to 2016, with between

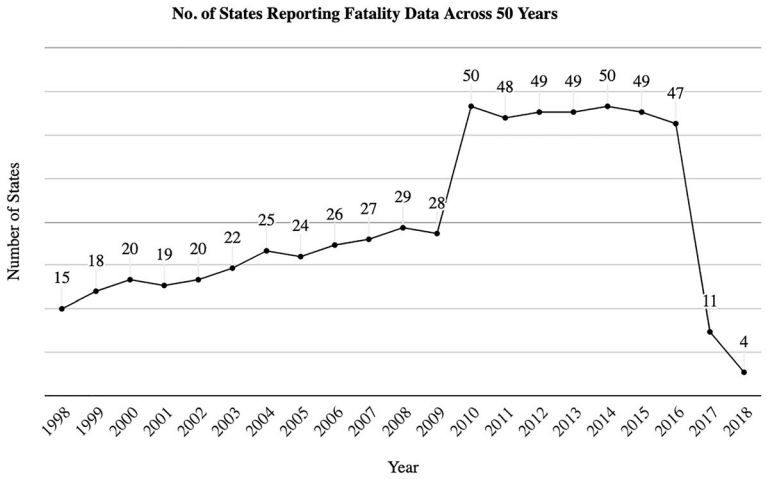

Fig. 1 Total number of states reporting any child fatality statistics for 21 consecutive years (either single-year or multiple-year Child Fatality Reports) on Child Fatality Review Board websites. This graph shows an increasing trend in nationwide reporting until the years 2010 to 2016 which had consistently available data publications, followed by a sharp drop in online reporting from 2017 to 2018

47 and 50 states reporting CFR information in each of these years (Table 1). In 2017, however, the number of publicly available CFR data fell from 47 states the previous year to only 11 states, further dropping to just four states by 2018 (Table 1).

States were generally more likely to provide single-year reports than multiple-year reports, particularly from 2010 to 2016 when at least 44 states were providing single-year data (Table 1). In contrast to the trend of single-year data increasing over the 21-year period, individual case reports remained infrequent across the 21-year period, never exceeding 6 states total in any given year (Table 1). Individual case reports with individual case detail remained infrequent in CFRs when compared with the frequency of single-year and multiple-year reports.

Analysis of the LEC categories yields important information about the types or contexts of child fatalities occurring across the nation for the last 21 years. The most common cause of death category was fatality due to inflicted abusive injury (combined LEC categories for physical assault ($N = 435$), assault with a deadly weapon ($N = 453$), and sexual assault ($N = 19$), total ($N = 907$)). This produces a combined rate of causation that is larger than other high-frequency child fatality categories, such as transportation-related accidents ($N = 562$), followed by fire or explosion ($N = 535$) and poisoning-starvation-kidnapping-abandonment ($N = 442$) (Fig. 2). We consider it likely that some of the cases coded under poisoning-starvation-kidnapping-abandonment represent intentional inflicted rather than accidental child fatalities which could not be added to the abusive inflicted injury category due to lack of clarity in the published data.

No evidence was found of a uniform national category system for reporting types of child fatalities in use by all states. The "other" category was used when the findings from CFRBs did not fit the LEC categories. This resulted in a frequently coded "other" category that has a wide range of death circumstances and causes ($N = 614$) (Fig. 2). The diverse content of the "other" category includes descriptors which sometimes

Table 1 Online availability of state-by-state child fatality data, 1998 to 2018

Year	Total number of states reporting any CFRs*	Single-year data provided**	Multiple-year data provided***	Individual case reports provided
1998	15	6	9	2
1999	18	10	10	1
2000	20	12	9	3
2001	19	13	8	2
2002	20	13	9	3
2003	22	16	8	3
2004	25	20	6	3
2005	24	15	11	6
2006	26	15	13	6
2007	27	15	14	3
2008	29	19	14	6
2009	28	18	14	6
2010	50	47	20	5
2011	48	44	20	5
2012	49	46	21	4
2013	49	47	20	3
2014	50	47	18	4
2015	49	46	19	3
2016	47	44	18	5
2017	11	9	3	3
2018	4	4	0	2

*Single-year and/or multiple-year data

**Full CFR from state or data-only from National Center of Fatality Review and Prevention

***Multi-year CFR from state

overlap one another (e.g., deaths related to sudden infant death syndrome (SIDS) and sleeping environment) and descriptors which overlap but do not wholly or specifically encompass LEC categories (e.g., "SIDS and sleeping environment" may overlap with "Suffocation/Inflicted Injury"). A full list of categories coded as "other" can be found in Table 2. Yet, the LEC categories remained robust and captured more than 80% of the CFRB postings. The least common causes of death reported were natural disaster ($n = 19$) and sexual assault ($n = 19$) (Fig. 2). Five categories of death used by medical examiners and coroners (suicide, homicide, accident, natural, undetermined) were also often seen in specific states' CFRB postings.

Discussion

The LEC-based analysis of 21 years of CFRB postings by 50 states provides important quantitative and qualitative insights into the availability and characteristics of publicly accessible child fatality information on a state-by-state basis for the USA. These results

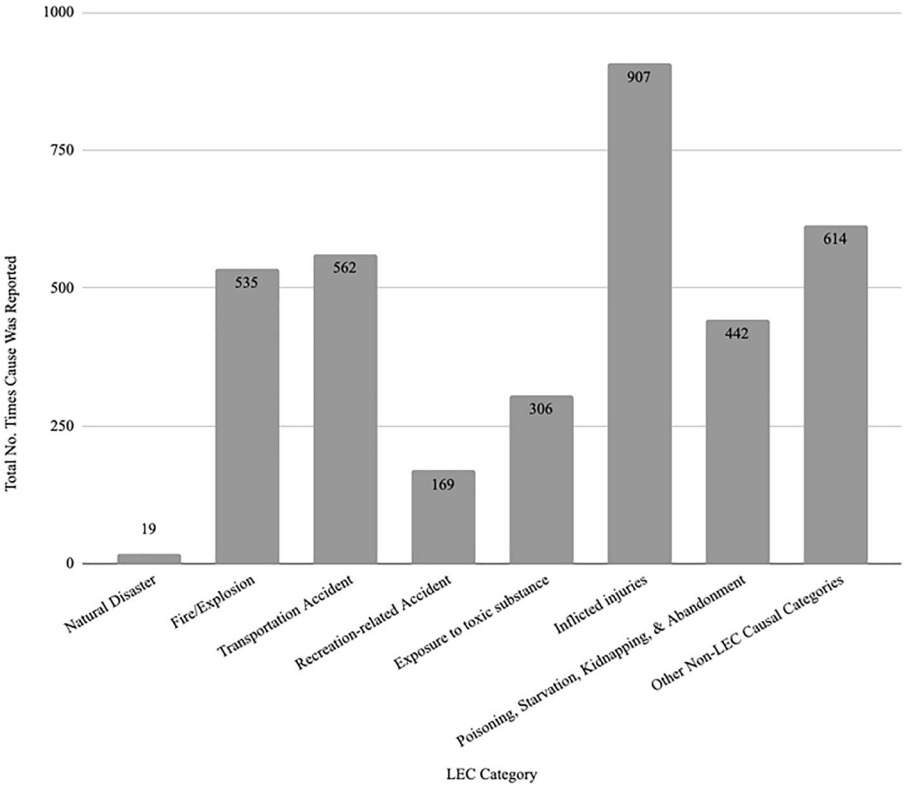

Fig. 2 Life Events Checklist (LEC) categorical data statistics for total reports of causes of death (within LEC and the other categories). Numbers indicate the number of times within the combined data pool (for all 50 states over the 21-year period) that each cause of death was cited in the publicly available CFRs. The maximum possible frequency for a category is 1050 (50 States with a score of 1 each year for 26 years). For example, "transportation-related accidents/incidents" were cited 562 times across the total number of CFRs examined. The most frequently occurring categories of LEC were "inflicted injuries," which were cited 907 times, and encompassed the combined total of physical assault ($N = 435$), assault with a weapon ($N = 453$), and sexual assault ($N = 19$), indicating a high documentation of these types of cases compared with that of other commonly documented causes of death

are from a survey of the single-year and multiple-year group data. There are many years in which states did not post new or comparative data. States did not use a uniform national coding system to report their data either on a single- or multiple-year basis. As such, individual states varied both in how and what data was presented on their Child Fatality Review Board websites. For some years, some states only had information regarding the child fatalities for that year within multiple-year reports while other states presented this information in single-year reports. Some states had substantial information regarding the specific child fatalities, which included detailed information as to how the child fatality occurred. Other states did not offer detailed single case information. The data trend is that case-specific information on CFRB web sites is underreported. Thus, information about timeliness and adequacy of agency and professional responses to indicators of children's risks for serious and potentially lethal injury and death in specific cases does not appear to be routinely posted on the websites of Child Fatality Review Boards in the USA.

Table 2 "Other" causal categories of death present in reports but not captured by the LEC Codes

General categories coded as other*	Examples**
Asphyxia	Unintentional suffocation, sleep-related suffocation
Medical causes	Congenital anomalies, infections, prematurity, perinatal events, birth defects, other/unnamed medical events
Drowning	Drowning in a pool, lake, bathtub, etc.
Electrocution	
Fall/crush	
Neglect-related causes	Malnutrition
Substance use–related	
Sleep-related	SIDS, SUID/sleep-related suffocations, poor sleeping conditions
Accidental injury	Animal bite or attack, unintentional firearm wound, other unintentional injury (unlisted)
Accident (general)	Specific causes not specified
Homicide (general)	Specific causes not specified
Suicide	Hanging, self-inflicted gunshot wound, intentional overdose
Natural	Diseases, medical conditions, SIDS
No cause of death given	Blank cause of death, cause pending investigation, undetermined cause, unknown cause

*These event references were listed or included in states' Child Fatality Reports, but were not captured using the Life Events Checklist coding scheme

**Some categories are listed twice. This reflects the intent of the authors to exactly capture how states chose to report child fatality causes and the variability in the data presentation from state to state and also within the reporting by individual states

The National Center for Post-Traumatic Stress Disorder LEC categories captured over 80% of the CFRB report content about child fatality (2940 of 3554 posted fatality causal contexts). While it is noted here that the National Center for PTSD LEC system was developed to assess survivors' involvement in specific categories of events which can cause PTSD reactions, this application shows that those events can also cause fatality. The boundary between death and survival in compromised children is unclear when there is exposure to potentially lethal events. Although the LEC categories did not always provide a good fit for the raw data, the system did confirm that inflicted injuries and hardships are the major causal contexts of child fatalities identified in the CFRB postings.

Limitations

When CFRB information made reference to circumstances not included in the LEC system, the "other" was coded for the context data points. Too often, coders found difficulty in determining the appropriate categories for some available data. Many states did not differentiate between the manner of death related to specific causes, circumstances, and intentions. For example, statistics for "weapon"- and "poisoning"-related deaths often combined data for homicides and suicides. Further, states often did not

provide specific enough sub-types of general causes of death, which made them difficult to match with LEC categories. For example, statistics for a "transportation"-related death did not always specify if the vehicle was traffic-related or recreational, or involved in a suicide or homicide, and statistics for "drowning"-related deaths did not always specify if the cause was neglect-related in the home, recreationally related, or a result of hazardous caretaker behavior or malevolent action. More broadly, it is thought that child neglect is an underlying causative circumstance in cases of abandonment, starvation, poisoning, drowning, and asphyxiation, and under other circumstances as well, and that this aspect of the data has not received adequate attention.

Future Directions

A need for additional surveys and analysis of CFRB data is indicated. Analyses using manner of death data may reveal helpful information about causality, contribute to a fuller understanding of LEC findings, and reduce coding in the "other" category. Analyses focusing on individual case report data may also yield specific causal and contextual information about the circumstances of children's deaths and the availability and helpfulness of specific prevention and rehabilitation services. Such data can inform child protection policy, training, and intervention procedures to more effectively monitor and rehabilitate at-risk families experiencing child protection referrals for assessments and monitoring. Closer examination of surviving children from inflicted injury with significant medical, neurological, and psychological injury can also provide insights into how to identify and protect at-risk children and better secure safe caretaking for them. The data from such research can aid the development of a risk assessment tool with improved descriptive and predictive validity to better identify children at risk for serious and potentially fatal injury. The use of standardized assessment, monitoring, and intervention tools on a national level can enable states to report and pool their information and benefit from their common experience.

Concluding Remarks

The development of national standards for the reporting of child injury and fatality data; increased information sharing among the states; and improved best practice case identification, intervention, and prevention methods are needed to overcome the weaknesses in child fatality reporting identified in this study. Table 3 contains a list of 9 conclusions supported by the research data. Particular attention is focused on conclusion 3 which addresses the outcome overlap of multiple forms of interpersonal violence as major life event contexts for the occurrence of PTSD among survivors and life-ending injury contexts for child victims. The standardization of group data collecting and reporting could greatly aid the science of child protection practice. Detailed individual case reports illustrating the developmental trajectories resulting in severe and lethal injuries to children are also needed to illustrate, explain, and test the accuracy and explanatory power of the underlying science.

Table 3 Main conclusions from the state-by-state study of Child Fatality Review Board's posted data

(1) 21 years of posted data from Child Fatality Review Boards (CFRB) from 1998 to 2018 for all 50 states indicate that inflicted physical injury by another person was the most frequently occurring causal category for child deaths in these reports for the USA as a whole.

(2) A modified checklist based on the Life Events Checklist (LEC) developed by the National Center for PTSD for adults was successful in identifying contexts for 80% of the reported child fatalities.

(3) This intersection of trauma-inducing events for surviving adults and life-ending events for children is not surprising as the multi-event checklist combines physical injury due to physical assault, assault with a deadly weapon, and sexual assault, all well-known causes of mental health disorders in children and adults.

(4) States were inconsistent in the format and content of their posted Child Fatality Reports. These inconsistencies included the organization, type, and amount of information in reports and variability in nomenclature, time frames, and formats for the presentation of data.

(5) Individual case reports providing case-specific information with detailed causal factors connected to child death were nearly absent in the CFRB postings.

(6) The absence of uniform report standards and individual case reports with explanatory detail prevents the accurate development, collection, and analysis of state and national child injury and fatality.

(7) The absence of state and national data pools based on uniform data collection and reporting standards are major barriers to the development of effective child protection programs and practices.

(8) The drop-off in CFRB postings in 2017 presents an additional problem of concern for the development of national child fatality information and the tracking of child deaths, their cause, and interventions which may be mitigating and preventing harm to children.

(9) One fifth of the posted data could not be coded with the modified LEC categories. Those data are collected in an aggregated "other" category. Examples of its content are presented in Table 2.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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