Public Health Surveillance of Fatal Child Maltreatment: Analysis of 3 State Programs

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Child maltreatment causes a significant number of fatalities in the United States, and accurately determining the number of maltreatment-related deaths each year remains a challenge. With data from child protective services agencies, the National Child Abuse and Neglect Data System estimated there were nearly 1500 child abuse–related or neglect-related deaths in 2004 (2.0 per 100 000 children).[1] However, child protective services data are known to underestimate maltreatment deaths for a variety of reasons including difficulties identifying, investigating, and reporting deaths to child protective services; lack of standard definitions of child maltreatment; and differing legal standards for substantiation of maltreatment.[2,3]

In the United States, a death certificate is the official record of death. Death certificates include a determination of the cause and manner of death and are often used to summarize the mortality burden of injuries and diseases. It is, however, well documented that these vital records underestimate the magnitude of fatal child maltreatment.[3–6] In fact, 50% to 60% of all child maltreatment deaths are not identified as such by death certificates,[3,5,6] with 1 report estimating that 85% of deaths related to child maltreatment are recorded on the death certificate as attributable to other causes.[7]

The combination of data from multiple sources to obtain more accurate identification of individuals with the condition under surveillance (i.e., case ascertainment) has enhanced public health surveillance of injuries and violence[8–11] and has shown promise as a method for obtaining more accurate estimates of mortality related to child maltreatment.[3,6] In September 2001, the Centers for Disease Control and Prevention (CDC) funded programs in 3 states—California, Michigan, and Rhode Island—to develop and evaluate public health surveillance of fatal child maltreatment through the use of multiple data sources for

Objectives. We sought to describe approaches to surveillance of fatal child maltreatment and to identify options for improving case ascertainment.

Methods. Three states—California, Michigan, and Rhode Island—used multiple data sources for surveillance. Potential cases were identified, operational definitions were applied, and the number of maltreatment deaths was determined.

Results. These programs identified 258 maltreatment deaths in California, 192 in Michigan, and 60 in Rhode Island. Corresponding maltreatment fatality rates ranged from 2.5 per 100 000 population in Michigan to 8.8 in Rhode Island. Most deaths were identified by child death review teams in Rhode Island (98%), Uniform Crime Reports in California (56%), and child welfare agency data in Michigan (44%). Compared with the total number of cases identified, child welfare agency (the official source for maltreatment reports) and death certificate data underascertain child maltreatment deaths by 55% to 76% and 80% to 90%, respectively. In all 3 states, more than 90% of cases ascertained could be identified by combining 2 data sources.

Conclusions. No single data source was adequate for thorough surveillance of fatal child maltreatment, but combining just 2 sources substantially increased case ascertainment. The child death review team process may be the most promising surveillance approach. (*Am J Public Health.* 2008;98:296–303. doi:10.2105/AJPH.2006.087783)

case ascertainment. We describe the approaches taken in these programs and summarize the epidemiology of fatal child maltreatment. Because underascertainment of fatal child maltreatment by both child protective services and death certificate data are well documented, we focused on the relative utility of additional data sources available for surveillance and explored various options for improving case ascertainment. Four of the authors took part in the state programs (T.M.C. and V.J.P. in Michigan, S.J.W. in California, and W.V-O. in Rhode Island). By summarizing options for surveillance based on their experiences, we hope to provide useful information to other states interested in establishing surveillance for fatal child maltreatment.

METHODS

Identification of child maltreatment deaths for inclusion in the surveillance program (i.e., surveillance case ascertainment) was conducted for 2 years (2000 and 2001) in California and Michigan and for 5 years in Rhode Island (1998–2002, to compensate for the small number of deaths). Each state developed an approach to child maltreatment case ascertainment by using multiple sources of applicable data available in their state. The 3 states used 4 data sources in common: records from the state's child welfare agency, state child death review team(s) data, law enforcement reports of homicides made to the Federal Bureau of Investigation Uniform Crime Report system (UCR), and death certificates. Although California and Rhode Island each used an additional data source (Child Abuse Central Index in California and medical examiner records in Rhode Island), we focused on the 4 sources of child maltreatment fatalities consistently available in most states.

The 3 states used the same conceptual case definition that included deaths of children aged younger than 10 years that resulted from actions or inactions by the child's parent or other adult caregiver (e.g., babysitter). In addition, each state program developed unique operational definitions to identify cases from the data sources in that state.

Once potential cases were identified and the operational definitions of child maltreatment were applied, the total number of maltreatment deaths for the surveillance period was determined. Duplicate cases (i.e., deaths ascertained by more than 1 source) were identified by name and other personal identifiers and counted in the total only once. The implementation of this process differed by state and is described below. All data sources, criteria for identifying potential cases, and operational definitions used are listed in Table 1.

California

The California Department of Health Services obtained information on all deaths that met the criteria for potential cases from each data source (Table 1). These cases were unduplicated (i.e., individual child deaths included in more than 1 data source were identified and counted only once), resulting in a list of potential child maltreatment deaths.

As a method of verification, the California Department of Health Services sent each county child death review team the list of potential child maltreatment deaths that occurred either in its jurisdiction or to a resident of the jurisdiction. The teams were asked if they had reviewed these deaths (approximately 75% had been reviewed) and, if so, whether the deaths were determined by the team to be maltreatment related. They were also asked to submit information on any other deaths not included on the list that they had reviewed and considered to be maltreatment related. This verification process is referred to as the Child Death Review Team Reconciliation Audit. The maltreatment deaths reported here are those identified from all sources, including deaths added by the Child Abuse Central Index and the Child Death Review Team Reconciliation Audit, but excluding deaths determined during the audit to not be maltreatment related.

Michigan

A key component of Michigan's surveillance efforts was the convening of a work group that was involved in every aspect of the surveillance process. The work group was multidisciplinary and included individuals from child protective services, public health, and state police, as well as a child abuse pediatrician, social worker, forensic pathologist, child law expert, and others.

Case ascertainment began after the work group determined specific criteria for the identification of potential cases from each data source. A case abstractor then compiled all records related to the deaths that met these criteria. The work group developed an operational case definition based on Michigan laws and policies and then met on a regular basis to review the abstracted records on each potential case. Deaths were classified as maltreatment related if they met any of the case definition criteria (Table 1).

A special emphasis for Michigan was to more completely ascertain neglect-related deaths. The work group chose to do this by examining the circumstances of unintentional injury deaths. Because of the enormous volume of these deaths among children aged younger than 10 years, only unintentional injury deaths of children with any substantiated child protective services report on the child or family member was reviewed (approximately 27% of child injury deaths met these criteria). These deaths were identified, abstracted, reviewed, and classified in the same manner as deaths identified from the other 4 sources.

Rhode Island

All deaths that met the case definition (Table 1) from state child welfare agencies, UCR, and death certificate data were included as cases in the surveillance system without additional review. For child death review team data, the types of deaths reviewed and the review process changed during the surveillance period. To ensure that maltreatment-related deaths were consistently identified from this source, the following procedure was implemented: data on all child deaths that occurred in Rhode Island from 1998 through 2002 in which the manner of death was listed as homicide, suicide, accident, or undetermined, and natural deaths in which the cause of death was sudden infant death syndrome were obtained and abstracted. In addition, abstracted data on the 3 natural deaths that occurred in 1998 and 1999 that had previously been identified by the child death review team as possibly maltreatment related were also compiled. Two child abuse pediatricians

independently reviewed the abstracted data, identified deaths attributable to child maltreatment, and then compared their findings. If the physicians' maltreatment determinations differed for a particular death, they discussed the death and reached agreement (differing initial determinations occurred for only 3 deaths; consensus was reached on each of these). The deaths determined to be maltreatment related by this process were included in the surveillance data as child death review team maltreatment-related deaths.

Data Analyses

Population data for each state were obtained from the United States Census Bureau and used to calculate standard age-specific maltreatment fatality rates per 100 000 population.[12] Rates were calculated by averaging the total maltreatment deaths over the 2-year period (5 years for Rhode Island), dividing this by the year-2000 population, and multiplying by 100 000; 95% confidence intervals (CIs) were calculated around these rates. Rates by age, gender, race, ethnicity, and type of maltreatment were calculated in the same way as the overall rates; a χ^2 statistic was calculated to assess differences within the states.

RESULTS

Ascertainment of Maltreatment Deaths

The total number of maltreatment deaths, the number identified by each data source, and the number identified by combining sources are presented by state in Table 2. During the surveillance period, there were a total of 258 cases identified in California, 192 cases in Michigan, and 60 cases in Rhode Island. In California, 13 (5.0%) cases uniquely identified by the Child Abuse Central Index (i.e. identified only by the Child Abuse Central Index data) were included in this total. The medical examiner data in Rhode Island did not identify any cases that were not also identified by another data source.

Of the deaths ascertained by each of the 4 data sources, the most deaths were ascertained by the child death review team in Rhode Island (98%), UCR in California (56%; followed closely by the child death

TABLE 1—Fatal Child Maltreatment Surveillance Data Sources, Criteria for Identifying Cases, and Operational Case Definitions: California and Michigan, 2000–2001, and Rhode Island, 1998–2002

Data Sources Used by Funded States	Criteria for Identifying Potential Cases	Case Definition to Meet Criteria for Case Ascertainment
California		
Department of Social Services Child Welfare System/ Case Management System	All deaths of children receiving any services from the state child welfare system	Any death that meets at least 1 of the criteria below and is not ruled out by the Child Death Review Team Reconciliation Audit as not related to maltreatment:
Fatal Child Abuse and Neglect Surveillance Program	Fatal Child Abuse and Neglect Surveillance Program forms submitted by county child death review teams with reported judgment that the death was caused by or related to child abuse or neglect, categorized as suspicious, or questionably related to child abuse and neglect	• Child deaths identified in the Child Welfare System/Case Management System as being caused by abuse or neglect (by birth parent or caretaker)
Department of Justice supplemental homicide reports reported to the FBI Uniform Crime Reports		• Child deaths reported by the Fatal Child Abuse and Neglect Surveillance Program to be definite child abuse or neglect
Department of Health Services Office of Health Statistics—Death Statistics Master File	Reported supplemental homicide reports homicides that either have victim–offender relationship of child–parent (or stepparent), or a precipitating event variable coded as "child abuse" or "babysitter"	• Child homicide deaths recorded as either having a victim–offender relationship of child–parent (or stepparent) or precipitating event variable coded as either "child abuse" or "babysitter"
Department of Justice Child Abuse Central Index	Homicides among children aged younger than 10 years identified by manner or *ICD-10* codes X85–Y09[a]	• *ICD-10* codes Y06, Y07, T74[a]
	Deaths submitted to the state Child Abuse Central Index registry at the completion of the local investigation as substantiated or inconclusive for child abuse or neglect	• Deaths identified as substantiated or inconclusive of child abuse or neglect in the Child Abuse Central Index registry
		• Additional deaths submitted by child death review teams as part of their Reconciliation Audit to be child abuse or neglect fatalities
Michigan		
Family Independence Agency records	All deaths of children receiving any services from the state child welfare system	Any death that meets at least 1 of the following criteria:
Keeping Kids Alive Child Death Review Team forms	All deaths reviewed by a child death review team in which abuse or neglect was reported to be the cause or a contribution to the death	• Family Independence Agency classified as Category I or Category II (i.e., a preponderance of evidence supports the allegation of intense [Category I] or high [Category II] risk of child maltreatment)
State Police supplemental homicide reports reported to the FBI Uniform Crime Reports	All homicide deaths reported by the state police in Uniform Crime Reports	• The Child Death Review Team determined the death to be maltreatment related
Michigan vital statistics death certificate files	Deaths deemed homicide or undetermined in the vital statistics system	• Charges filed under Michigan's penal code for 1st-, 2nd-, or 3rd-degree child abuse or a higher charge
	Deaths deemed accidental in vital statistics, if there was also a prior substantiated child protective services report on child or caregiver	• *ICD-10* code for child maltreatment (Y06, Y07, T74)[a] listed as the underlying cause of death, irrespective of manner of death
		• Event leading to death is the result of grossly negligent failure to provide physical care, health care, or supervision
Rhode Island		
Department of Children, Youth, and Families records	Deaths determined by child protective services to be attributed to abuse or neglect	Any death that meets at least 1 of the following criteria:
Rhode Island Child Death Review Team records	Child death review team potential cases: 1998–1999, all child deaths reported to the State Medical Examiner; 2000–2002, all deaths where manner of death is not natural or cause is sudden infant death syndrome	• Deaths determined by child protective services to be attributed to abuse or neglect
Office of the State Medical Examiner records		• Independent review of child death review team abstracted data by 2 child abuse pediatricians who classified deaths as related to abuse or neglect
Supplemental homicide reports	Deaths determined by the medical examiner to be homicide by parent, caregiver, or unknown perpetrator	• Deaths determined by the medical examiner to be homicide by parent, caregiver, or unknown perpetrator
Vital records	All supplemental homicide reports	• All supplemental homicide-reported deaths where the perpetrator was listed as parent, caregiver, or unknown perpetrator
	Deaths deemed homicide (*ICD-9* codes E960–E969; *ICD-10* codes X85–Y09)[a]	• Deaths with manner homicide (*ICD-9* codes E960–E969; *ICD-10* codes X85–Y09)[a]

Notes. FBI = Federal Bureau of Investigation; *ICD = International Classification of Diseases, Ninth Revision*. Surveillance in Rhode Island included 3 additional years of data to compensate for the small number of deaths.
[a] *ICD-9* codes E960–E969 = homicide and injury purposely inflicted by other persons.[16] *ICD-10* codes X85–Y05, Y08–Y09 = assault, Y06 = neglect and abandonment, Y07 = other maltreatment syndromes, and T74 = maltreatment syndromes.[17]

TABLE 2—Fatal Child Maltreatment Cases Ascertained From Each Data Source, Combinations of Sources, and Surveillance Approach: California and Michigan, 2000–2001, and Rhode Island, 1998–2002

Data Sources	No. (%) of Maltreatment Cases Identified		
	California	Michigan	Rhode Island
Total maltreatment deaths, cases[a]	258 (100)	192 (100)	60 (100)
Cases by data source			
Child welfare agency	63 (24)	85 (44)	16 (27)
Child death review team	141 (55)	62 (32)	59 (98)
UCR	145 (56)	35 (18)	9 (15)
Death certificates	51 (20)	19 (10)	10 (17)
Number of cases identified by combining 2, 3, or 4 data sources[b]			
Child welfare agency and child death review team	175 (68)	108 (56)	60 (100)
Child welfare agency and UCR	168 (65)	99 (52)	21 (35)
Child welfare agency and death certificates	92 (36)	92 (48)	21 (35)
Child death review team and UCR	214 (83)	64 (33)	59 (98)
Child death review team and death certificates	160 (62)	63 (33)	59 (98)
UCR and death certificates	152 (59)	44 (23)	10 (17)
Child welfare agency, child death review team, and UCR	228 (88)	109 (57)	60 (100)
Child welfare agency, child death review team, and death certificates	187 (72)	109 (57)	60 (100)
Child welfare agency, UCR, and death certificates	171 (66)	102 (53)	21 (35)
Child death review team, UCR, and death certificates	217 (84)	65 (34)	59 (98)
Child welfare agency, child death review team, UCR, and death certificates	230 (89)	110 (57)	60 (100)

Notes. UCR = state law enforcement homicide reports made to the Federal Bureau of Investigation Uniform Crime Report system; surveillance in Rhode Island included 3 additional years of data to compensate for the small number of deaths. Fatal child maltreatment cases were those that included deaths of children younger than 10 years that resulted from actions or inactions by the child's parent or adult caregiver.
[a]Includes all cases identified by the 4 common data sources plus those identified by the Child Abuse Central Index and the Child Death Review Team Reconciliation Audit in California, and the surveillance work group in Michigan.
[b]For this section, the total number in each column includes only cases identified by the existing data sources listed in each row; cases identified by the Child Abuse Central Index data source and Child Death Review Team Reconciliation Audit process in California and the surveillance work group in Michigan are excluded. Percentages are calculated with the number listed in the column as the numerator and the total number of maltreatment cases identified in the state as the denominator.

review team at 55%), and child welfare agencies in Michigan (44%). Sources that identified the fewest cases, 20% or less, were death certificates in all 3 states and UCR in Rhode Island and Michigan. State child welfare agencies, the official reporting source for child maltreatment, identified approximately one fourth of the deaths ascertained in California (24%) and Rhode Island (27%), and 44% in Michigan.

Table 2 illustrates the effect of combining data sources and presents the number of unique deaths ascertained by all combinations of the 4 data sources. In Rhode Island, the 4 sources captured 100% of the ascertained cases (60 of 60), but not in California (89%; 230 of 258) or Michigan (57%; 110 of 192). This was the result of the different

approaches to surveillance taken by the states. Rhode Island combined the maltreatment deaths identified by each data source into an unduplicated total number of deaths. By contrast, California identified 15 unique cases during the Child Death Review Team Reconciliation Audit, (plus 13 additional cases from the Child Abuse Central Index data), and Michigan added 81 cases after reviewing unintentional injury deaths among children who had a prior substantiated child protective services report. Consequently, California and Michigan each identified a number of additional cases during the surveillance process that were not identified as maltreatment in the 4 common data sources and therefore were not included in the data source totals in Table 2. However, because these deaths were

identified as maltreatment related by the Child Death Review Team Reconciliation Audit, (California) and the review of injury deaths (Michigan), they are included in the total number of cases ascertained by the surveillance process.

In all 3 states, more than 90% of the cases ascertained by combining the 4 data sources could be identified by linking just 2 of the sources, although the 2 key sources differed by state. In Rhode Island, all but 1 of the cases were ascertained with the child death review team data; combining child death review team and child welfare agency data resulted in ascertainment of all 60 cases. In Michigan, the combination of child death review team and child welfare agency data identified all but 2 of the cases ascertained by the 4 sources (108 of 110). And in California, child death review team and UCR data identified 93% (214 of 230) of cases identified by the 4 sources.

Descriptive Epidemiology of Fatal Child Maltreatment

Child maltreatment fatality rates and descriptive epidemiology are presented in Table 3. Overall fatality rates per 100 000 population ranged from a low of 2.5 (95% CI=2.1, 2.9) in California to 8.8 (95% CI=3.7, 13.9) in Rhode Island. Rates were calculated by age group, gender, race, ethnicity, and type of maltreatment. Although these rates varied substantially across states, the data consistently identified the highest rates among infants and African Americans (χ^2 $P<.05$). Boys had higher fatality rates than girls in Rhode Island and Michigan but not in California, where the fatality rates by gender were similar. Rates for neglect were 2 to 6-times higher than those for physical abuse in Michigan and Rhode Island, but not in California.

Child maltreatment fatality rates by data source for each state are shown in Table 4. Fatality rates calculated from state child welfare agency data (typically the official source of child maltreatment statistics) ranged from 0.6 per 100 000 in California to 3.0 per 100 000 in Michigan. The highest fatality rates were for child death review team and UCR data in California (1.4 per 100 000), child welfare agency data in Michigan, and

TABLE 3—Demographic Characteristics of Maltreated Children and Type of Fatal Maltreatment: California and Michigan, 2000–2001, and Rhode Island, 1998–2002

Child Characteristics	California		Michigan		Rhode Island	
	No. (%)	Rate[a] (95% CI)	No. (%)	Rate[a] (95% CI)	No. (%)	Rate[a] (95% CI)
Total maltreatment deaths[b]	258 (100)	2.5 (2.1, 2.9)	192 (100)	6.8 (5.4, 8.2)	60 (100)	8.8 (3.7, 13.9)
Age, y						
<1	116 (45)	12.0 (8.8, 15.2)	108 (56)	41.2 (30.0, 52.4)	41 (68)	67.2 (37.5, 96.9)
1–4	100 (39)	2.5 (1.8, 3.2)	57 (30)	5.3 (3.3, 7.3)	7 (12)	2.7 (0.2, 5.6)
5–9	42 (16)	0.8 (0.5, 1.1)	27 (14)	1.8 (0.8, 2.8)	12 (20)	3.3 (0.6, 6.0)
Gender						
Boy	121 (47)	2.3 (1.7, 2.9)	103 (54)	7.1 (5.1, 9.1)	39 (65)	11.2 (6.1, 16.3)
Girl	136 (53)	2.7 (2.0, 3.4)	89 (46)	6.4 (4.5, 8.3)	21 (35)	6.3 (2.4, 10.2)
Race/ethnicity[c]						
White	99 (38)	1.2 (0.9, 1.5)	102 (53)	4.7 (3.4, 6.0)	42 (68)	7.2 (4.1, 10.3)
Hispanic	89 (34)	1.8 (1.3, 2.3)	NA	NA	11 (18)	10.4 (1.5, 19.3)
African American	54 (21)	5.9 (3.6, 8.2)	87 (45)	15.6 (10.9, 0.3)	11 (19)	16.9 (2.5, 31.3)
Asian/Pacific Islander[d]	13 (5)	1.2 (0.3, 2.1)	0	0	3 (5)	. . .
American Indian/ Alaska Native[d]	0	0	1 (0)	. . .	3 (5)	. . .
Other or unknown[d]	92[e] (36)	. . .	2 (1)	. . .	1 (2)	. . .
Type of maltreatment						
Physical abuse	199 (77)	1.9 (1.5, 2.3)	65 (34)	2.3 (1.5, 3.1)	9 (15)	1.3 (0.1, 2.5)
Neglect	74 (29)	0.7 (0.5, 0.9)	127 (66)	4.5 (3.4, 5.6)	53 (88)	7.8 (4.8, 10.8)

Notes. CI = confidence interval; NA = not available. In California and Rhode Island, type of maltreatment totals more than 100% because the categories are not mutually exclusive. California has 1 case with unknown gender.
[a]Average maltreatment fatality rates per 100 000 population.
[b]Inclusive years: 2000–2001 for California and Michigan and 1998–2002 for Rhode Island. Surveillance in Rhode Island included 3 additional years of data to compensate for the small number of deaths.
[c]Race information obtained from each source in California and from death certificates in Michigan and Rhode Island.
[d]Fatality rates not calculated for categories with fewer than 5 deaths, because rates are very unstable for small numbers. Also, fatality rates were not calculated for the "other" category because of a lack of a denominator.
[e]Includes 79 children of Hispanic ethnicity in which race information is unknown.

child death review team data in Rhode Island (8.7 per 100 000). Fatality rates by child characteristics and type of maltreatment shown in Table 4 demonstrate that although the rates were lower for the single data sources, the overall patterns identified with the combined data remained the same. That is, fatality rates were higher for infants and African Americans, and fatality rates were generally higher for physical abuse than for neglect in Rhode Island and Michigan data, but not in California.

DISCUSSION

Our results confirm existing literature that documents the underascertainment of child maltreatment deaths by state child welfare agency and death certificate data. When compared with the total number of cases identified by multiple sources and alternative approaches to surveillance in these 3 states, state child welfare agency data underascertained child maltreatment deaths by 55% to 76%, and death certificates underascertained deaths by 80% to 90%, a range that is consistent with the literature.[3,5–7] Our findings further contribute to the understanding of child maltreatment by documenting case ascertainment by other sources of existing state data proposed for surveillance and by summarizing important differences across states regarding how well individual data sources perform. For example, in California, UCR data identified the most cases, but in Michigan and Rhode Island, UCR data were completely redundant—every case identified by UCR data was also identified by another

source. Although no single source was consistently the best or worst across all 3 states, child death review team data were the best or second-best single source in Rhode Island, California, and Michigan, identifying 98%, 55%, and 32% of cases, respectively.

Our results demonstrate that each data source, when used in isolation, substantially underascertains the total number of fatal child maltreatment cases identified. The exception is child death review team data in Rhode Island. The success of the child death review team in Rhode Island is likely related to the relatively small number of child deaths that occur in the state each year. Furthermore, the child death review team process in Rhode Island differs from the processes in California and Michigan in that 1 team reviews deaths for the entire state and this team included a child abuse pediatrician, factors that may have facilitated identification of fatal child maltreatment by the Rhode Island child death review team. By contrast, California and Michigan have child death review teams in each county that may (although many do not) include a child abuse pediatrician. These teams review the death and then transmit data to a state agency that aggregates and summarizes the data provided.

The results further demonstrate the value of using multiple existing data sources to improve child maltreatment surveillance. In each state, the use of 2 data sources resulted in ascertainment of more than 90% of unique cases identified from all 4 sources. Although the 2 data sources were not consistent across the states, child death review team data were a key source. Combining child death review team data with child welfare data in Michigan and Rhode Island resulted in 98% (108 of 110) and 100% (60 of 60) ascertainment, respectively, whereas combining child death review team and UCR data in California identified 93% (214 of 230) of cases ascertained by all sources.

In addition, the expanded surveillance processes in California and Michigan ascertained cases not identified from the 4 common sources. This suggests that even when multiple data sources are combined, maltreatment fatalities are still underascertained, and other methods to identify cases such as the effort in Michigan to identify neglect by

TABLE 4—Rates of Fatal Maltreatment by Data Source and Child Characteristics: California and Michigan, 2000–2001, and Rhode Island, 1998–2002

Child Characteristics	California				Michigan				Rhode Island			
	Child Welfare Agency (n = 63), Rate	Child Death Review Team (n = 141), Rate	UCR (n = 145), Rate	Death Certificates (n = 51), Rate	Child Welfare Agency (n = 85), Rate	Child Death Review Team (n = 62), Rate	UCR (n = 35), Rate	Death Certificates (n = 19), Rate	Child Welfare Agency (n = 16), Rate	Child Death Review Team (n = 59), Rate	UCR (n = 9), Rate	Death Certificates (n = 10), Rate
Total	0.6	1.4	1.4	0.5	3.0	2.2	1.2	0.7	2.4	8.7	1.3	1.5
Age, y												
<1[a]	2.8	7.0	6.8	2.7	18.7	11.4	5.0	4.2	14.7	67.2	…	…
1–4[a]	0.7	1.2	1.6	0.6	2.6	1.9	1.5	0.7	1.9	2.3	…	…
5–9[a]	0.1	0.4	0.3	0	0.5	0.7	0.4	0	…	3.3	…	…
Gender												
Boy[a]	0.5	1.2	1.3	0.4	3.1	2.5	1.1	0.7	3.2	10.9	…	…
Girl	0.6	1.5	1.5	0.5	2.9	1.8	1.4	0.7	1.5	6.3	1.5	1.8
Race/ethnicity[b]												
White[a]	0.2	0.7	0.5	0.2	1.9	1.6	1.0	0.4	2.1	7.2	…	1.0
Hispanic[a]	0.5	1.1	1.2	0.4	NA	NA	NA	NA	…	10.4	0	…
African American[a]	1.8	3.6	4.1	1.6	7.5	4.7	2.1	1.8	…	16.9	7.7	…
Asian/Pacific Islander[a]	0.4	0.4	0.3	…	0	0	0	0	…	…	…	…
American Indian/Alaska Native[a]	0	0	0	0	0	0	0	0	0	…	0	0
Type of Maltreatment												
Physical abuse	0.5	0.9	1.3	0.4	1.4	2.2	1.2	0.7	0.7	1.3	1.3	1.3
Neglect[a]	0.1	0.5	0.1	0.1	1.6	…	0	0	1.6	7.7	0	…

Notes. UCR = state law enforcement homicide reports made to the Federal Bureau of Investigation Uniform Crime Report system; NA = not available. Rates were the average maltreatment fatality rates per 100 000 population. Surveillance in Rhode Island included 3 additional years of data to compensate for the small number of deaths.
[a]Rates not calculated for categories with fewer than 5 deaths, because rates are very unstable for small numbers. Also, rates were not calculated for the "other" category because of a lack of a denominator.
[b]Race information obtained from each source in California and from death certificates in Michigan and Rhode Island.

linking death certificates to child welfare agency records may be necessary to further improve surveillance.

Maltreatment-related fatality rates per 100 000 children ranged from 2.5 in California to 8.8 in Rhode Island. National fatality rate estimates from the National Child Abuse and Neglect Data System for 2000 and 2001 are 3.3 and 3.8 per 100 000 children aged younger than 10 years, respectively (L. Zikratova, personal communication, October 31, 2005). These national estimates are similar to the rates calculated with only child welfare agency data in Michigan (3.0 per 100 000) and Rhode Island (2.4 per 100 000) but substantially lower than the rates identified by the combined surveillance approaches in these 2 states (6.8 per 100 000 and 8.8 per 100 000, respectively). The higher rates obtained with the combined surveillance data not only further substantiate the undercount in available national data but also highlight the value of conducting public health surveillance for fatal child maltreatment.

After comparing fatal child maltreatment surveillance data in 3 states using multiple data sources for case ascertainment, we found consistent underascertainment by all individual sources; the amount of underascertainment varied across states and across data sources. These data indicate that no single source is sufficient for thorough surveillance with the methods employed by these states, except possibly the child death review team process in Rhode Island. However, combining as few as 2 data sources can markedly improve surveillance.

Limitations

Development of public health surveillance for child maltreatment is important because of its potential to contribute significantly to the identification of specific opportunities for prevention.[13–15] There are, however, several limitations to surveillance of child maltreatment. First, there are currently no standard definitions for child maltreatment, making it difficult to aggregate cases across sources and states.[14] However, the Division of Violence Prevention at CDC is developing standard case definitions specifically for the surveillance of child maltreatment, which will allow comparisons across states. Second, there is no gold standard for case ascertainment, so the surveillance approach chosen cannot be fully evaluated. Finally, neglect-related deaths are particularly difficult to identify, even with multiple data sources. These deaths are generally not reported to law enforcement or state child welfare agencies (unless gross negligence is involved), and it is usually impossible to identify the role of neglect from a death certificate unless additional information is sought.

Although child death review teams provide a mechanism for identifying neglect-related deaths, without a specific operational definition that is consistently applied, documentation of these deaths remains inconsistent.

Recommended Strategies

After evaluating the approaches taken in these 3 states, we propose 4 strategies for developing surveillance for fatal child maltreatment in other states. Additional approaches such as statistical estimation procedures (e.g., capture–recapture) might also be considered but are not discussed here.

Determination of the unduplicated total from multiple data sources was the strategy used in Rhode Island and the starting point for surveillance in California and Michigan. This option is more comprehensive than use of a single source and substantially increased the number of cases ascertained. Because it requires centralized processing of data and skilled staff to integrate and link the data, it is somewhat time and labor intensive. However, once surveillance is conducted in this manner for a few years, it would be possible to revise the surveillance strategy to use fewer sources.

Selecting a "relative standard" source and using this to reconcile other sources was the option used by California (Child Death Review Team Reconciliation Audit), and its use resulted in the inclusion of cases not identified from other sources. Importantly, this option would require no more resources than simply linking multiple data sources, because the personnel and data linkage capabilities would already be in place.

The surveillance approach used in Michigan was analogous to creating a "gold standard" review process. Advantages of this method include the development and consistent application of an operational case definition and the ability to adapt the process to an active surveillance approach (case finding for fatal neglect). In addition to being time and labor intensive, the major challenges of this approach are getting state-level and multiagency commitment to the process and access to sufficient case material to determine if a death was maltreatment related. Although this approach may be viewed as impractical given its resource intensity, Michigan found such value in the

process that it was institutionalized and continues today.

Selecting a single best source may be the least expensive and labor intensive of all options described, but it will clearly undercount the number of maltreatment-related deaths. Although identification of a single best source in other states might be difficult, our findings indicate that child death review team data are a good single-source option. It should be noted, however, that child death review team data will work for state and local surveillance only if there is a standardized data collection and reporting system in place. Furthermore, many child death review teams lack definitions for maltreatment, so standard definitions would need to be adopted and consistently applied. Finally, the resources needed to build capacity and maintain a well-functioning child death review team program could be substantial.

It is noteworthy to mention the Child Death Review Case Reporting System developed by the National Resource Center for Child Death Review Policy and Practice (http://www.childdeathreview.org). This is an ongoing project that addresses many of the limitations of using child death review team data for child-maltreatment surveillance. The goal of the reporting system is to compile standardized data from state and local child death review team programs and summarize the circumstances and causes of child deaths. Importantly, key variables for identifying child maltreatment are included in this system, facilitating the consistent identification of these deaths across participating states (http://www.childdeathreview.org/toolsforteams.htm).

In conclusion, the surveillance projects described here provide critical information for understanding the nature of current data sources available for surveillance, and insights into how states might better ascertain maltreatment deaths. Availability and implementation of standard surveillance case definitions will enable comparison of data across sources and states and are essential for moving these efforts forward. ■

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