Underascertained of Child Abuse Mortality in the United States

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The true incidence of fatal child abuse in the United States is unknown. Prevention of homicide by caregivers calls for very different strategies and allocation of resources than prevention of stranger homicide. Some research suggests that the incidence of child abuse homicide may be increasing and that the increase does not seem to be related to improved recognition.1,2 On the other hand, other research reports a decrease in maltreatment deaths.3 Confusion about the incidence and related prevention and intervention issues arises, in part, from underascertainment of fatal child abuse. Despite the growth of state fatality review teams over the last decade,4 absence of accurate data continues and is due to a number of factors including restrictions and inaccuracies in coding causes of death, incomplete or inaccurate information on death certificates and in police reporting, varying case definitions, lack of perpetrator information, and the absence of a national system for reviewing child homicides with categorization into abuse or nonabuse. Inaccuracies may further arise when neglect deaths are included in estimates of child maltreatment and/or abuse homicide.

See also Patient Page.

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Context Mortality figures in the United States are believed to underestimate the incidence of fatal child abuse.

Objectives To describe the true incidence of fatal child abuse, determine the proportion of child abuse deaths missed by the vital records system, and provide estimates of the extent of abuse homicides in young children.


Cases The Medical Examiner Information System was searched for all cases of children younger than 11 years classified with International Classification of Diseases, Ninth Revision codes E960 to E969 as the underlying cause of death and homicide as the manner of death. A total of 273 cases were identified in the search and 259 cases were reviewed after exclusion of fetal deaths and deaths of children who were not residents of North Carolina.

Main Outcome Measure Child abuse homicide.

Results Of the 259 homicides, 220 (84.9%) were due to child abuse, 22 (8.5%) were not related to abuse, and the status of 17 (6.6%) could not be determined. The rate of child abuse homicide increased from 1.5 per 100,000 person-years in 1985 to 2.8 in 1994. Of all 259 child homicides, the state vital records system underrecorded the coding of those due to battering or abuse by 58.7%. Black children were killed at 3 times the rate of white children (4.3 per 100,000 vs 1.3 per 100,000). Males made up 65.5% (133/203) of the known probable assailants. Biological parents accounted for 63% of the perpetrators of fatal child abuse. From 1985 through 1996, 9467 homicides among US children younger than 11 years were estimated to be due to abuse rather than the 2973 reported. The ICD-9 cause of death coding underascertained child abuse homicides by an estimated 61.6%.

Conclusions Using medical examiner data, we found that significant underascertainment of child abuse homicides in vital records systems persists despite greater societal attention to abuse fatalities. Improved recording of such incidences should be a priority so that prevention strategies can be appropriately targeted and outcomes monitored, especially in light of the increasing rates.
determine the proportion of child abuse deaths missed by the vital records system, and to provide estimates of the extent of abuse homicides of young children in the United States and their underascertainment by US vital records.

METHODS

The North Carolina ME System investigates and certifies all deaths in North Carolina that are of a sudden and unexpected nature including all apparent sudden infant death syndrome cases. By guidelines and practice, autopsies are performed for all such deaths. Our centralized ME system provides the most accurate method in North Carolina for capturing homicides because the Federal Bureau of Investigation’s Supplementary Homicide Report is based on voluntary reports. The ME information system was searched for all ME cases of children aged 10 years and younger with International Classification of Diseases, Ninth Revision (ICD-9) codes E960 through E969 as the underlying cause of death and homicide as the manner of death during the 10-year period from 1985 through 1994. The category E960 through E969 includes the ICD-9 classifications Homicide and Injury Purposely Inflicted by Other Persons. Category E967 is Child Battering and Other Maltreatment. For a homicide to be coded E967, the decedent must be younger than 18 years and the death certificate must list evidence consistent with prior abuse, or the certifier specify abuse, beating, or other maltreatment. A homicide due to an injury occurring from a single isolated episode such as a stabbing, shooting, or hanging is specifically excluded even if committed by a caregiver.

This study looked at all fatalities recorded in the ME system as homicides. Electronic data were downloaded for all 273 cases identified in the ME information system search. Fetal deaths (not involving a live birth) and deaths of children who were not residents of North Carolina were excluded. The ME record (including ME report, autopsy report, toxicology report, and notes to the file) of the remaining 259 cases were reviewed, and the case characteristics and narratives were entered into a database and merged with the electronic data for each case. The ICD-9 E codes assigned by nonspecialists from the state vital records system were obtained from the State Center for Health Statistics.

The definition of child abuse homicide for the study was that developed by the North Carolina State Child Fatality Prevention Team: the killing of a child by a person, usually older than 12 years, who was responsible for the child’s health or welfare. Baby-sitters and parents’ partners, in addition to parents, are considered caregivers. The term caregiver is used instead of caretaker because caretaker has a specific legal definition in North Carolina related to child protection services. Unintentional injuries, such as drownings of unsupervised toddlers, though usually considered neglect deaths, are not classified as homicides and were not included in this study because of the focus on abuse fatalities only. We used the definition above to characterize each case as abuse, nonabuse, or undetermined as a result of insufficient perpetrator information in the ME records and police records. The 17 undetermined cases were not included in the analysis.

Child abuse homicides were further researched to determine if the perpetrator could be identified. Local law enforcement officials were interviewed when possible (88 cases) and victim witness coordinators at local district attorneys’ offices were contacted in the majority of cases.

Homicide rates per 100 000 children aged 10 years and younger were calculated using North Carolina population estimates, obtained from the North Carolina Office of State Planning, for each of the 10 years of the study. The population of children aged 10 years and younger in 1985 was estimated to be 931 247 and increased to 1 084 494 by 1994. According to the US Census, in 1990, 69% of North Carolinians younger than 11 years were white, 28% black, and 3% other minorities. Age-, race-, and sex-specific rates were calculated using the associated population numbers. Race- and race-sex-specific population estimates were calculated by applying the 1990 census percentages of blacks and whites younger than 11 years to the 10-year total and sex-specific population estimates. Rates with a numerator of 20 or less were not calculated due to the potential for rate instability. Statistical analyses of the homicide rates were based on the Poisson distribution. The percentage underascertainment of coding of child abuse deaths was calculated by subtracting the number of fatalities coded as abuse from the actual number of abuse deaths then dividing by the total number of all homicides.

A minimum estimate of abuse deaths for the United States was calculated by applying the overall proportion of homicides of children younger than 10

![Table 1. Age, Sex, and Race of Child Abuse Homicide Victims Younger Than 11 Years Among North Carolina Resident Children, 1985-1994](http://example.com/1121700.png)
years found in our study to be due to battering or abuse to US homicide statistics for children younger than 10 years for 1985 through 1996. A maximum estimate was computed by adding the proportion of cases (6.6%) with insufficient information to determine whether or not abuse was a factor to the overall proportion.

Data were analyzed using SAS statistical analysis and Epi Info software.11.12 Statistical evaluation included simple regression analysis and χ² tests. P<.05 was considered statistically significant.

RESULTS

TABLE 1 shows the characteristics of child abuse homicides among children aged 10 years and younger in North Carolina from 1985 through 1994. Child abuse accounted for 84.9% (220/259) of all child homicides. Twenty-two child homicides (8.5%) were not related to abuse, and the status of 17 (6.6%) could not be determined. The rate for child abuse homicides increased during the period by a mean of 12.3% per year (95% confidence interval [CI], 3.0%-21.6%) (FIGURE). TABLE 2 presents information on the 203 identified perpetrators of child homicides from 1985 through 1994 by sex and relationship to the victim.

There were 12 cases that probably involved sexual abuse of the victim (8 girls, 4 boys). The age range for these cases was 2 months to 10 years. Six cases had sufficient evidence to show that sexual abuse had actually occurred. These findings included trauma to the genitalia or rectum, physical evidence of rape, and sexual mutilation. In the other 6 cases, the history suggested that the child had been sexually abused because of the circumstances in which the body was found (unclothed), suspicious autopsy findings, or a prior history of sexual abuse.

The number (220) of homicides due to child battering or abuse identified by the study was 3.2 times higher than the number (68) reported by the North Carolina vital records system (TABLE 3).

TABLE 4 shows the numbers of homicides of children younger than 10 years in the United States from 1985 through 1996 and the estimate for deaths resulting from child abuse based on North Carolina data. Sixty percent of deaths likely to be due to battering or abuse were not coded as such in the vital records system. TABLE 5, with numbers aggregated in 5-year periods for statistical stability, compares North Carolina child homicide rates to those of the United States.

COMMENT

Almost 60% of the homicides found to be due to abuse were not coded as such by the North Carolina vital records system. Because ICD coding requirements are the same for every state, it is reasonable to assume that similar proportions of underrecording occur nationally due to the nosologists' dependency on death certificate information and ICD coding requirements. In addition, North Carolina child homicide rates are close to US averages (Table 5). Our study focused on abuse homicides rather than the entire spectrum of child maltreatment. Because our methods involved review of the complete ME file of all identified child homicides, our data provide exact figures on coding underascertainment of child abuse homicides within the spectrum of recognized child homicides.

For the United States, we estimated that 6494 more children were killed by fatal child abuse from 1985 through 1996 than reflected by vital records coding. The new version of ICD (ICD-10), in use since January 1999, does not have any significant changes in the require-
mortality that includes examination of comprehensive review of every child rately capture abuse fatality data is a present, the only method to accu-

cides due to either small sample size, accounted for 63% of the perpetrators

The public, as well as law enforcement, need a heightened sensitivity to the reality that most victims of child homicide are killed by parents or caregivers. This knowledge could lead to increased reporting of suspected maltreatment and more intense intervention when abuse is evident.

Frequently cited estimates for annual child maltreatment deaths of approximately 2000 for children 17 years and younger and 1200 for those 4 years and younger include figures for neglect deaths, and are the mean from the upper estimate in studies by Ewigman et al and McClain et al from 1979 through 1988. Neglect deaths in these studies were implied to include those from causes listed as illnesses or unintentional injuries such as drownings or falls for which child protective services had determined that lack of proper care or supervision was a fac-

ment for applying the E967 (now Y07) child battering code. Until coding and death certification procedures and criteria are revised, the limitations of such data should be strongly emphasized and estimates for the proportions of underascertainment of abuse homicides in the group of all child homicides due to either small sample size, lack of actual record and perpetrator review, limitations of the data sources used, or focus on all maltreatment deaths and not just homicides. At present, the only method to accurately capture abuse fatality data is a comprehensive review of every child homicide that includes examination of perpetrator status and acknowledges that single instances of any kind of trauma can constitute abuse. Revisions in death certification and ICD coding criteria to require inclusion of perpetrator data and changes in the battering definition are needed to improve the recording of the true extent of child abuse fatalities. Such a change could result in increased resources directed toward investigation, prevention, and criminal justice outcomes.

Although the public may believe that biological parents are less likely to kill their own offspring, we found they accounted for 63% of the perpetrators of fatal child abuse. The findings from this study indicate that caregiving males, biological parents, and caregivers of children younger than 1 year are the most common perpetrators of fatal abuse and, therefore, need to be espe-

Table 5. Summary Homicide Rates per 100 000 for United States (US) and North Carolina (NC) Children*

<table>
<thead>
<tr>
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<tr>
<td>0-1</td>
<td>7.39</td>
<td>8.31</td>
<td>8.38</td>
<td>9.75</td>
</tr>
<tr>
<td>1-4</td>
<td>2.55</td>
<td>2.31</td>
<td>2.84</td>
<td>2.55</td>
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<tr>
<td>5-9</td>
<td>0.91</td>
<td>0.85</td>
<td>0.86</td>
<td>1.00</td>
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<tr>
<td>Overall</td>
<td>2.28</td>
<td>2.25</td>
<td>2.45</td>
<td>2.55</td>
</tr>
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</table>

*Data are from the Centers for Disease Control Wonder/PC Data Files, compressed mortality data, 1976-1996.13

Table 4. Number and Rate of Homicides, Incidents Coded for Abuse or Battering, and Estimates of Actual Number of Homicides Due to Abuse or Battering*

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Homicides</th>
<th>Rate per 100 000</th>
<th>No. Coded ICD-9 E967</th>
<th>Lower and Upper Estimate for Actual No. of Abuse Homicides (Mean)</th>
<th>Underascertainment of Child Abuse Deaths Out of All Homicides, %†</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>200</td>
<td>2.06</td>
<td>154</td>
<td>620-664 (642)</td>
<td>68.2</td>
</tr>
<tr>
<td>1986</td>
<td>278</td>
<td>2.26</td>
<td>211</td>
<td>688-737 (712)</td>
<td>63.2</td>
</tr>
<tr>
<td>1987</td>
<td>273</td>
<td>2.10</td>
<td>196</td>
<td>649-694 (672)</td>
<td>63.6</td>
</tr>
<tr>
<td>1988</td>
<td>315</td>
<td>2.42</td>
<td>231</td>
<td>759-812 (786)</td>
<td>63.4</td>
</tr>
<tr>
<td>1989</td>
<td>335</td>
<td>2.46</td>
<td>239</td>
<td>788-844 (816)</td>
<td>63.5</td>
</tr>
<tr>
<td>1990</td>
<td>332</td>
<td>2.33</td>
<td>273</td>
<td>750-803 (776)</td>
<td>58.2</td>
</tr>
<tr>
<td>1991</td>
<td>380</td>
<td>2.51</td>
<td>298</td>
<td>820-878 (849)</td>
<td>58.2</td>
</tr>
<tr>
<td>1992</td>
<td>326</td>
<td>2.37</td>
<td>285</td>
<td>781-836 (809)</td>
<td>58.1</td>
</tr>
<tr>
<td>1993</td>
<td>344</td>
<td>2.61</td>
<td>303</td>
<td>869-930 (899)</td>
<td>59.5</td>
</tr>
<tr>
<td>1994</td>
<td>313</td>
<td>2.43</td>
<td>305</td>
<td>817-874 (846)</td>
<td>57.4</td>
</tr>
<tr>
<td>1995</td>
<td>311</td>
<td>2.36</td>
<td>256</td>
<td>798-854 (826)</td>
<td>62.0</td>
</tr>
<tr>
<td>1996</td>
<td>332</td>
<td>2.39</td>
<td>222</td>
<td>807-864 (835)</td>
<td>65.8</td>
</tr>
<tr>
<td>Total</td>
<td>3739</td>
<td>2.28</td>
<td>2973</td>
<td>9145-9789 (9467)</td>
<td>61.6</td>
</tr>
</tbody>
</table>

*Data are from the Centers for Disease Control and Prevention Wonder/PC Data Files, compressed mortality data, 1976-1996.13 1996 is the most recent year available. Estimates based on North Carolina data.
†Calculated using the mean estimate.
‡Mean does not sum to 9468 due to rounding.
Although it has been known for years that homicide is the leading cause of injury deaths among infants in the United States, few public policy or prevention strategies reflect this fact. Furthermore, the true incidence of child abuse homicides is unknown. Our finding of a 12.3% per year increase in the rate of North Carolina child abuse fatalities from 1985 through 1994 denotes a serious problem in our culture and one that we found to disproportionately affect black children. Nationally, homicide rates for children younger than 10 years increased from 2.06 per 100 000 in 1985 to 2.43 in 1994 and the rates for infants aged 1 year or younger rose from 5.31 to 7.91. As pointed out by Overpeck et al, the increase is unlikely due to better detection of homicides because death review teams have not been in place long enough to affect detection. In addition, review of child deaths by fatality review teams is not yet universal. It is possible that an enhanced concern for child abuse fatalities and a more critical approach to death certification could account for some of the increase nationwide in the numbers of deaths classified as homicides, although there are no data to support this contention.

Further study to determine the reasons for the increasing fatal violence against children would aid in determining where to direct prevention efforts. Factors that appear to put black children at 3 times the risk of white children for dying at the hands of their caregivers should be distinguished from the effects of social class and socioeconomic status. The need to collect accurate data on child abuse homicides and to devise primary strategies for the prevention of child homicides is urgent.

REFERENCES