Risk of Death Among Children Reported for Nonfatal Maltreatment
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This article presents analyses of longitudinal data to explore whether low-income children who survived a first incident of reported maltreatment were at higher risk of later childhood death compared to a matched comparison group of low-income children without reports of maltreatment (n = 7,433). Compared to the comparison group, children in the maltreatment group had about twice the risk of death before age 18 (0.51% vs. 0.27%). Among children with maltreatment reports, median time from the first report to subsequent death was 9 months. The majority of deaths among children who were reported for maltreatment could be categorized as preventable (accidents or recurrent maltreatment) as compared to resulting from severe health conditions.

Keywords: preventable death; child abuse; child neglect; child maltreatment; fatality; services

BACKGROUND

Nearly 1,500 children were reported to have died as a result of maltreatment in 2004 (U.S. Department of Health and Human Services [USDHHS], 2006). Among children under the age of 5, child maltreatment was recently reported to be the second-leading cause of death (Peddle, Wang, Diaz, & Reid, 2002). Many of these children reported in such statistics are dead or dying at the time of the reported maltreatment. Less is known about the risk of death for children who remain alive following a first reported incident of child abuse or neglect. From scant studies available with samples of maltreated children or children placed in foster care, maltreated children who survive the initial report appear to remain at an elevated risk of death (Barth & Blackwell, 1998; Sabotta & Davis, 1992; White & Widom, 2003). The aim of this article is to better understand subsequent fatalities among children who survive a first report of abuse or neglect. A sample of poor children with first reports of maltreatment is compared to a matched group of poor children without record of reports, comparing rates of fatalities and risk factors for fatalities. We consider child age, type of initial maltreatment report, type of fatality, patterns of income maintenance use, race, and child health.

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reports. This study did not control for poverty. White and Widom (2003) followed children with substantiated maltreatment reports prior to age 12 compared to a control group matched on age, race, sex, and approximate socioeconomic status. That study did not find a statistically significant difference in death rates between maltreated and nonmaltreated children. Both studies had samples reported for maltreatment in the early 1970s and were limited to substantiated cases. The former limitation makes it difficult to generalize to the present-day child welfare system, and the latter may seriously hamper our understanding of the risk of death within the reported population. Substantial research indicates similarities between outcomes for substantiated and unsubstantiated cases (Hussey et al., 2005; Jonson-Reid, Drake, Kim, & Han, 2004; Leiter & Johnsen, 1997; Lucas et al., 2002).

More work needs to be done to understand the contributions of type of maltreatment history, poverty, and other risk factors to subsequent child fatality.

There are also two known longitudinal studies of death among children in (or exited from) foster care compared to the general population of children (Barth & Blackwell, 1998; Thompson & Newman, 1995). Both the Barth and Blackwell (1998) study done in California and the Thompson and Newman (1995) study in Canada found an elevated risk of death for children in (or exited from) foster care. However, not all children enter foster care for abuse or neglect, and general population comparison groups include children with maltreatment reports that are not placed into foster care.

Even among the more plentiful studies of maltreatment fatalities (children whose reports accompany death), there is a lack of information about history of service use and often a sole focus on death from physical abuse. This is problematic given the large numbers of neglect reports made each year and the numbers of fatal maltreatment reports involving neglect (USDHHS, 2006). Understanding the risk for future fatalities among a child welfare population is an essential step that can inform any future prevention efforts.

Risk Factors

Because the vast majority of studies in this area focus solely on children reported at the time of a death, much of our understanding of risk factors comes from this literature and is briefly reviewed here.

Age. Child maltreatment fatalities most often occur among children younger than age 5, with more than half of victims being infants (Browne & Lynch, 1995; Ewigman, Kivlahan, & Land, 1993; Gellert, Maxwell, Durfee, & Wagner, 1995; Kirschner, 1997; McClain, Sacks, Froehlke, & Ewigman, 1993). Comparing child deaths because of neglect and child deaths because of abuse, Margolin (1990) found that victims of neglect (mean age 1.8 years) were an average of 1 year younger than victims of abuse (mean age 2.8 years). However, age is not a risk factor unique to maltreated populations. Large studies of general population childhood injuries and death also indicate a higher risk among young children because of the heightened vulnerability at this age (National SAFE KIDS Campaign, 2004; UNICEF, 2001).

Gender and race. Sorenson, Peterson, and Richardson (1997) found a male to female ratio of 1.2 to 1.0 during a decade among victims of fatal maltreatment in Los Angeles. White and Widom (2003) found that maltreated females had a higher rate of all types of death combined than did nonmaltreated females, whereas males did not. According to Dobrin, Wiersema, Loftin, and McDowall (1996), the maltreatment fatality rate among Blacks may be higher than for other racial groups. White and Widom found no statistically significant differences by race. It remains unclear how gender and race may be associated with risk of childhood death within a maltreated and/or low-income population.

Poverty has been associated with risk of maltreatment (Drake & Zuravin, 1998), but the relationship between poverty and death is less clear. Some studies have found associations between lower incomes and child maltreatment fatalities (Casis, 2000; Castillo, 1998). It is not known, however, whether among lower income children, those who survive initial maltreatment reports are at higher risk of later fatalities.

Parental characteristics. Becoming a parent at a young age is associated with increased child maltreatment fatality rates (Anderson, Ambrosino, Valentine, & Lauderdale, 1983; Brewster et al., 1998; Casis, 2000; Castillo, 1998; deHaan, 1997; Jason & Andereck, 1983). Research also indicates that 10% to 43% of perpetrators of fatal maltreatment had mental health services prior to the fatal incident (Kasim, Cheah, & Shafie, 1995; Lucas et al., 2002; Sommander & Rammer, 1991). Chance and Scannapieco (2002) also found that parents of fatality victims frequently have unrealistic expectations of the child’s behavior. These parental factors are also associated with risk of maltreatment (National Center for Injury Prevention and Control, 2005). It is not clear if they make a unique contribution to risk of death separate from maltreatment.

Child factors. Studies have found that maltreated children have higher rates of developmental delay,
health problems, and mental health problems than do nonmaltreated children (Flaherty & Wiess, 1990; Jonson-Reid et al., 2004; Leiter & Johnsen, 1997; Trupin, Tarico, Low, Jemelka, & McClellan, 1993). Research indicates an increased risk of death for children who have chronic medical conditions, serious behavioral disorders, developmental delays, and behavior perceived by caregivers as provoking or rejecting (Chance & Scannapieco, 2000; Fein, 1979; Kasim et al., 1995). It is not known how risk of death varies between poor maltreated and nonmaltreated children while controlling for these issues.

Maltreatment type. The majority of studies of death related to maltreatment focus on abuse rather than neglect. This is problematic given the fact that neglect was reported in about 51% of maltreatment fatalities nationally (USDHHS, 2003). Stiffman, Schnitzer, Adam, Kruse, and Ewigman (2002) found that more than two thirds of maltreatment deaths in a statewide study were the result of a caregiver’s failing to protect the child from a hazard rather than inflicting an injury. It is not known how rates of other preventable deaths differ for abused compared to neglected children.

Child welfare services. Of children who would subsequently experience fatal maltreatment, 30% to 50% were reported to a child protection agency prior to the fatal incident (Besharov, 1991; Mitchel, 1989; Peddle et al., 2002; Peddle & Wang, 2001; Wang & Daro, 1998; Wiese & Daro, 1995). Among children with maltreatment reports prior to a fatal incident, Lucas et al. (2002) determined that the rates of both substantiated and unsubstantiated reports were high. Several studies have found that a large proportion of families in fatality cases had received protective services following a maltreatment report prior to the child’s death (Casis, 2000; Castillo, 1998; Chance & Scannapieco, 2002; USDHHS, 2003). In studies not limited to following children from the first report onward, it may be that service rates are higher because the families have had opportunities to have more than one report prior to the fatal incident. In a study of maltreatment report recurrence following a first report, none of the children with recurrent reports listed as fatalities had services following the first report (Drake, Jonson-Reid, Way, & Chung, 2001).

Type of Death

Sabotta and Davis (1992) found that maltreated children had a much higher rate of death by homicide than comparison children. Studies of neglect deaths have identified the most common causes of death among these children as house fires and drowning (Christianson-Wood, 1995; Lucas et al., 2002; Stiffman et al., 2002). As previously stated, the literature in this area is scant as most studies use only child maltreatment reports of fatalities rather than linking to death records to examine all forms of death.

Research Questions and Hypotheses

The present study attempts to build knowledge by answering the following research questions: (a) Do poor children who survive an initial report of maltreatment have an increased risk of childhood death compared to other poor children while controlling for other factors (infant health condition, pattern of income maintenance, mother’s age at birth, mother’s education, mother’s record of mental health treatment, child demographics)? It is hypothesized that children in the maltreatment group will have higher rates of death than children in the comparison group. (b) Among sample children who later die, do children surviving a first report of maltreatment die of different causes than the other children? (c) Among children in the maltreatment report group, what factors predict subsequent fatalities? These last two questions are exploratory in nature because of the lack of literature regarding nonmaltreatment fatalities.

METHOD

This article uses data from a longitudinal study of services and outcomes for poor children in a major midwestern metropolitan region. The designation of “poor” is based on family receipt of income maintenance (Aid to Families with Dependent Children [AFDC]) during the sampling period or within 24 months prior to the sampling period of 1993 to 1994. This means child participants resided almost entirely in single-parent households at the study start. Within this sample of poor children, there are two groups: (a) a group first reported for abuse or neglect in 1993 to 1994 (called “maltreatment group” in the remainder of the article) and (b) a comparison group of children with no record of child maltreatment reports or child welfare contact prior to or during the sample frame (called “comparison group” in the remainder of the article). The parent study restricted the maltreatment group to children with first reports so that services and outcomes could be followed after first contact and to avoid a substantial overrepresentation of frequent users of the child welfare system. Children who died during or shortly after birth and children in the maltreatment report group whose first report of maltreatment was for a fatality were excluded. This latter restriction was made to focus...
on preventable downstream outcomes for children living at the time the services systems encountered them.

It was not feasible to create a comparison group based on family rather than child characteristics. One child per family younger than 12 years at study start was selected from the maltreatment group as the index child. The nonmaltreated comparison group was created by stratifying available comparison group families with children of the same birth year and area of residence as the maltreatment group children (and no record of any child welfare contact prior to or during the sampling period) and then randomly selecting an equal number of children (one child per family) within each strata (total $N = 10,256$). Because of the residentially segregated nature of the study region, matching on area of residence is nearly equivalent to matching on race among lower income populations. A goal of the present analyses was to control for infant health conditions that might confound the association between the risk associated with the maltreatment report and fatality. It was necessary to limit the sample further to children who were born in 1987 or later because complete coverage of child Medicaid health records was not available prior to this year ($n = 7,438$ children, with 3,719 in each group). Thus, all children were 7 years or younger at study start. Finally, cases are cross-checked for accuracy across data sets. This resulted in a loss of five cases because of residence outside the study region ($n = 3,718$, maltreated group; $n = 3,715$, comparison group—none of the cases lost included child deaths). Cases were tracked through annual, dated administrative data records, providing a longitudinal database on participants for 7.5 years, until time of death, or age 18. Our study is therefore both longitudinal and retrospective.

Administrative data from multiple years include statewide vital statistics (birth and death), child abuse and neglect reporting, child welfare service records, income maintenance, and child and parent Medicaid hospital and mental health records. Following linkage, all identifying information was stripped from the data and results were aggregated to avoid accidental identification of individuals. The study received human participants approval from the Hilltop Human Subjects Committee at Washington University in St. Louis.

**Dependent Variables**

Child death is measured according to presence of a death record in the statewide vital statistics data. Death at the individual-child level is coded as a binary ($1 = \text{yes}$) variable. Type of death is taken from the death records and collapsed into larger categories for purposes of confidentiality: (a) intentional (assault and maltreatment), (b) accidental deaths (fires, drowning, etc.), (c) health issues (cancer, sudden infant death syndrome—SIDS, birth defects, other medical conditions), and (d) unknown. The original death codes were ICD-9 E-Codes or ICD-10 VVXY Codes. It was not possible to determine if the assault cases involved family members. We use the term preventable deaths to include both intentional and accidental deaths (similar to Barth & Blackwell, 1998). It was not possible to determine if deaths related to health issues (e.g., cancer or SIDS) could have been prevented by better care; therefore, these are coded as nonpreventable deaths. Although the study sample included one child per family, it was possible to track the presence or absence of death for nonindex siblings listed in the AFDC data. Death was therefore also examined as a family-level event ($yes = 1$). In other words, in some cases the selected child may not die during the study period, but another child in that home does die in the study period.

**Independent Variables**

Children in the maltreatment report group were from families with no known prior record of a maltreatment report or child welfare service prior to the sample period (1993-1994). Reports include both substantiated and unsubstantiated reports (coded as a binary variable; $yes = 1$). Children in the maltreatment report group were limited to those with first reports of neglect, physical abuse, sexual abuse, or mixed type abuse. Maltreatment type was taken from the 44 specific reported subtypes (up to 5 subtypes per report) and recoded into major categories. These subtypes are fairly specific (e.g., physical abuse included bruises, welts, red marks, internal injuries, etc.; sexual abuse included fondling, digital penetration, etc.; neglect included lack of supervision, insufficient food and shelter, untreated illness or injury, etc.). Specific subtypes were examined for maltreated children who died. Child characteristics included race (White $= 1$), gender (female $= 1$), birth year, and age at death in months. Because of the demographics of the region, virtually all study participants (98%) were identified as Black or White, so race was coded as White and non-White. A variable called infant medical risk ($0 = \text{none known}, 1 = \text{medical problem}$) was constructed from a record of abnormal birth condition likely to affect health (e.g., heart anomalies are included, but a malformed ear is not), very low birthweight (under 1,500 grams), or treatment record for a medical condition that manifested through medical records in the first 12 months of life that made a child more vulnerable.
to later death (e.g., cerebral palsy, sickle cell, heart condition). These data came from Medicaid hospital records and birth records and were reviewed with the assistance of a neonatologist prior to coding.

**Parental/Family Factors**

Because of the small numbers of children who died in the study sample, family and community characteristics were controlled for through the use of propensity scores rather than covariates in a multivariate model. A conditional logistic regression model of sample group membership (maltreatment or comparison) was created using characteristics already in existence at the time of sampling. Family characteristics at study onset included number of children in AFDC or Temporary Assistance for Needy Families records, parent age, high school completion (yes = 1), parental Medicaid mental health or drug treatment (yes = 1), maternal alcohol use at time of birth on birth record (yes = 1), parent history of foster care as a youth, number of moves, and a permanent (i.e., not because of move out of state, imprisonment, child death, or children placed into foster care) exit from AFDC. Community variables were obtained from census (1990) tract-level data and linked based on the address at study onset. Two tract-level variables had sufficient bivariate association or influence in the multivariate model to be used: mobility (percentage of population at same residence for 5 years) and proportion White in the tract. The latter was included as segregation by race and class is common in the study region.

**Analyses**

Analytic tasks were accomplished using SAS for Windows. Analyses included basic descriptive and bivariate statistics for all independent variables and death, including Wald chi-square and life tables. Power analysis using PROC POWER revealed a 99% power with simple bivariate analysis but only a 73% power when two variables were included. Because child death is a rare event and power analyses revealed an inability to control for more than two variables, a propensity score method was used to control for variables that were potentially related to group membership (maltreatment and comparison; Kurth et al., 2006; Newgard, Hedges, Arthur, & Mullins, 2004). A conditional logistic regression model was used to account for clustering at the census tract to obtain the predicted probability of sample group membership. Variables included in the propensity score model were chosen because they are theoretically linked to being within the maltreatment group (e.g., parent age at birth of child, large family size, indicators of drug or alcohol use, indicator of mental health issue, family mobility, low education, and tract-level mobility and segregation) and existed prior to the sampling period when cases were selected (see Table 1). In addition, two interaction terms were significant in the model (an interaction between race and permanent exit from AFDC and an interaction between race and proportion of White persons in a census tract). Variables were assessed for multicollinearity prior to inclusion in the logistic regression model (Wald $\chi^2 = 451.19$, df = 14, $p < .0001$). The predicted probabilities of being in the comparison group as opposed to the maltreatment group are then output as propensity scores. The mean propensity to be in the comparison group was 0.551 ($SD = 0.15$) compared with 0.449 ($SD = 0.15$) for the maltreatment group ($t = 29.1$, $df = 7,431$, $p < .0001$). The scores were then converted into weights using the inverse probability of treatment weighted estimator (Kurth et al., 2005).

In SAS, PROC SURVEYFREQ is capable of using sampling weights, adjusting for clustering and strata and produces a Rao-Scott chi-square that corrects for such complex designs. This procedure was used to conduct bivariate and nested table analyses. Given the rare nature of death across the study period, the strata capacity of SURVEYFREQ was used to attempt to control for time by two 4-year increments (study start to Year 4 and Year 4 to Year 7 and 10 months). Limitations because of sample size are discussed.

**RESULTS**

Simple analyses pertaining to Question 1: Study children. A total of 29 (0.39%) of the sample children ($n = 7,433$) died within 7.5 years. The average age of death in this sample was 3.5 years. The rate of death was nearly 50% higher for children in the maltreatment group (0.51%) as compared to the comparison group (0.27%; Rao-Scott $\chi^2 = 4.67$, $df = 1$, $p = .031$). One can also look at death at the family level by examining whether death occurred for the children in the sample or one of their siblings (as listed in the AFDC household data). The rate of death as a childhood death in the family was 0.78% for the maltreatment group and 0.38% for the comparison group (Rao-Scott $\chi^2 = 12.89$, $df = 1$, $p = .0003$).

Table 2 provides descriptive statistics for child characteristics by death according to sample group (significant associations are noted by superscript). Although about 26% of the comparison group children were eventually reported for child maltreatment after the sampling window, none of these children died during the study period (not shown).
youngest age group at the time of study onset had the highest rate of death in both sample groups. Although there are some evident differences in proportion of children who died by race and gender, particularly within the comparison group, these differences were not statistically significant. The family and community characteristics were used in the propensity score model of sample group membership and therefore are not used in analyses of death except as an overall weight.

**Question 1:** Is the association between presence of a maltreatment report and risk of death remained after controlling for Medical risk in infancy? Among children with a known medical risk for future death (*n* = 510), children in the maltreated group had a slightly higher proportion of deaths (1.7%) than children in the comparison group (1.4%). Among children without a known medical risk in infancy (*n* = 6,923), children in the maltreated group had twice the proportion of deaths (0.41%) than those in the comparison group (0.20%). PROC SURVEYREG was used to see if the association remained between the sample group and death children with medical risk for later death in infancy and those without. Within the group of children without a serious medical risk for later death in infancy there remained a borderline significant association between sample group and death (# of deaths = 21; Rao-Scott $\chi^2 = 3.83$, *df* = 1, *p* = .0505). This was not true for the group of children with a medical risk for death present in infancy (*n* = 510; # of deaths = 8). An attempt was made to control for time by using the strata option for the first 4 years of the study compared to the last 3.5 years of the study. When the added control was introduced, the significance level for the association between sample group and death among children without known infant medical risk was reduced to *p* = .0543 (Rao-Scott $\chi^2 = 3.63$, *df* = 1). Seven of the 8 deaths among children with infant health risks were because of health-related reasons, whereas only 6 of the 21 deaths in the group without known infant health risks were because of health-related reasons.

**Question 2:** Do causes of death differ for the maltreatment and comparison group children? There were 2 children (out of 29) whose cause of death was coded as “child abuse fatality” (meaning the children had at least two maltreatment reports and the later report was made because of death) among the maltreated group cases and 1 assault-related death in the comparison group. Of the 10 deaths in the comparison group, 70% were health related, compared to only 31% of the 19 deaths within the maltreated group. We explored cause of death by combining intentional and accidental deaths into a category called “preventable deaths” and excluding “unknown cause” cases (*n* = 3). About 65% of the deaths in the maltreatment group were preventable, compared to about 22% of the deaths in the comparison group (Rao-Scott $\chi^2 = 14.02$, *df* = 1, *p* = .0002).

### Table 1: Descriptive Statistics for Variables Used in Propensity Score Model of Sample Group Membership

<table>
<thead>
<tr>
<th>Variable</th>
<th>Maltreated Group (%)</th>
<th>Comparison Group (%)</th>
<th>p Value From $\chi^2$ Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caregiver high school grad yes</td>
<td>56.4</td>
<td>43.6</td>
<td>.0001</td>
</tr>
<tr>
<td>Caregiver race White</td>
<td>17.4</td>
<td>24.1</td>
<td>.0001</td>
</tr>
<tr>
<td>Birth record of maternal alcohol consumption</td>
<td>1.5</td>
<td>3.9</td>
<td>.0001</td>
</tr>
<tr>
<td>Caregiver Medicaid substance abuse Tx</td>
<td>1.4</td>
<td>2.6</td>
<td>.0001</td>
</tr>
<tr>
<td>Caregiver Medicaid MH Tx</td>
<td>0.9</td>
<td>2.2</td>
<td>.0001</td>
</tr>
<tr>
<td>Caregiver record of being in foster care as a youth</td>
<td>2.6</td>
<td>6.2</td>
<td>.0001</td>
</tr>
<tr>
<td>Permanent exit from AFDC prior to 1993</td>
<td>7.1</td>
<td>1.8</td>
<td>.0001</td>
</tr>
</tbody>
</table>

Means for Continuous Variables

<table>
<thead>
<tr>
<th>p Value From t Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of caregiver</td>
</tr>
<tr>
<td>Number children</td>
</tr>
<tr>
<td>Number known moves prior to 1993</td>
</tr>
<tr>
<td>% White in census tract</td>
</tr>
<tr>
<td>% Remained in tract for last 5 years</td>
</tr>
</tbody>
</table>

**NOTE:** Tx = treatment. AFDC = Aid to Families With Dependent Children.

a. Comparison group was matched on year of birth and city or county residence.
b. *p* value for unequal variance.
c. *p* value for equal variance.

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Question 3. Next, the sample was restricted to the maltreatment group \((n = 3,718)\) to examine maltreatment report and child welfare service characteristics that might be associated with the later deaths. Of the maltreatment child participants, 19 died within the study period. Seven of the 19 children died less than 2 months after the first maltreatment report, but the remainder died several months later. The median time between a first maltreatment report and death was 9 months \((\mu = 24.7\text{ months})\).

Of the causes of death, 17 were known, and about 65% of these deaths were classified as preventable. Examination of death by maltreatment type, substantiation, and services involvement is provided, but results should be viewed with caution given the small numbers. None of the maltreatment cases that later died were initially reported for sexual abuse. Nearly 58% of later fatalities were initially reported for neglect alone, compared to 66% of surviving children \((n = 3,699)\) who survived the entire study period \((\text{Rao-Scott } \chi^2 = 5.91, df = 1, p = .015)\). Children who died following first reports that were substantiated died sooner than children who died following unsubstantiated reports \((\text{Mdn} = 3\text{ months v. 34 months, respectively})\). Nine of the 12 children who survived 2 months or longer had a second maltreatment report that still preceded their later death by 4 months or more. There were too few children who died to examine foster care separately from in-home services. Only 2 of the 12 children who survived 2 months or more beyond their first report had child welfare services beyond an investigation following the first report of maltreatment.

### DISCUSSION

Our first aim was to examine whether or not low-income maltreated children who remained alive following their first report of maltreatment had a higher rate of death than nonreported low-income children. We found a significantly higher rate of death among the children in the maltreatment report group. A similar difference was found when deaths among any

<p>| Table 2: Descriptive Statistics for Childhood Deaths by Data Set and Sample Group |
|---------------------------------|----------------|
|                                  | Comparison Group (a) | Maltreated Group (b) |</p>
<table>
<thead>
<tr>
<th>n</th>
<th>% Died</th>
<th>n</th>
<th>% Died</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1987-1988</td>
<td>768</td>
<td>0.00</td>
<td>769</td>
</tr>
<tr>
<td>1989-1990</td>
<td>1,004</td>
<td>0.20</td>
<td>1,005</td>
</tr>
<tr>
<td>1991-1992</td>
<td>1,231</td>
<td>0.16</td>
<td>1,231</td>
</tr>
<tr>
<td>1993-1994</td>
<td>712</td>
<td>0.84(^*)</td>
<td>713</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1,804</td>
<td>0.39</td>
<td>1,806</td>
</tr>
<tr>
<td>Male</td>
<td>1,911</td>
<td>0.16</td>
<td>1,912</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-White</td>
<td>3,069</td>
<td>0.33</td>
<td>2,823</td>
</tr>
<tr>
<td>White</td>
<td>646</td>
<td>0.00</td>
<td>895</td>
</tr>
<tr>
<td>Infant health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Known risk</td>
<td>215</td>
<td>1.40</td>
<td>295</td>
</tr>
<tr>
<td>None</td>
<td>3,500</td>
<td>0.20(^*)</td>
<td>3,423</td>
</tr>
</tbody>
</table>

\(a\). \(n = 3,715\).
\(b\). \(n = 3,718\).
\(c\). Fisher’s Exact Test comparing youngest group with all others, \(p = .004\). In comparison group only.
\(d\). Fisher’s Exact Test, \(p = .01\).
children in the household were compared between groups. The finding that maltreatment was associated with an increased risk of death was consistent with Sabotta and Davis (1992). Although mortality rates were higher among non-White than White children, this difference did not attain statistical significance in our sample. This is consistent with findings reported by White and Widom (2003). Our study examined all deaths (not just maltreatment related), but the strong association between infant health risk and later death is consistent with studies of maltreatment deaths (Chance & Scannapieco, 2002; Fein, 1997; Kasim et al., 1995). In our low-income sample, however, this was equally true for comparison-group children.

Next, we explored how type of death was associated with the sample groups. The majority of deaths among children in the maltreatment group were categorized as preventable (i.e., because of accidents or maltreatment rather than serious health conditions). Similar to prior studies (Christianson-Wood, 1995; Lucas et al., 2002; Stiffman et al., 2002), children reported for maltreatment often had accidental deaths that might be related to aspects of a neglecting environment. The idea that official cause of death is likely to underplay the relationship with maltreatment is consistent with studies comparing death certificate findings with child fatality review team determinations (Crume, DiGuiseppi, Byers, Sirotnak, & Garrett, 2002).

Although rate of death was higher among cases with prior physical abuse reports, most of the maltreated children who later died had prior reports that included neglect. Although our study examined all forms of death, this is consistent with the national data on maltreatment fatalities (USDHHS, 2003). Our findings underscore the need to consider how neglect may pose a serious risk to a young child apart from whether or not a case is substantiated or resulted in injury at the time of the report. The fact that several of the surviving children in the maltreatment group had siblings that later died is also consistent with the finding that in studies of child maltreatment fatalities a sibling was often reported first (Fein, 1979; Hicks & Gaughan, 1995; Stanley, 1995).

Although the relatively low rate of death in our study may seem surprising, this is because of the focus of the article and the sample. The rate of child maltreatment fatalities and even child deaths in the population are highest for infants (USDHHS, 2006; UNICEF, 2001). Because the parent study was focused on understanding longer term service patterns and outcomes for children reported for maltreatment, we purposively excluded infants who died within a week of birth or children who were dead or dying at the time of their first maltreatment report.

Limitations

The limitations of this study are primarily related to the reliance on administrative data and the rarity of childhood death. Cause of death was limited to the reason noted by the coroner without data on specific circumstances surrounding the death. It was therefore not possible to determine if some of the “accidental” or “health-related” deaths might have been associated with maltreatment. Given the small numbers of deaths in our study sample, we were unable to do analyses of types or duration of child welfare services provided. The necessity of using the SURVEYFREQ procedure meant that there was no exact test option to adjust for very small samples. Future studies will need larger samples of children to examine whether these findings hold while controlling for additional confounders and across regions. It was also not possible to assess services that may have been provided through community counseling or pediatric clinics that were not included in the Medicaid data. Future studies should attempt to capture these additional service venues.

Practice Implications

For children first reported because of fatality, there is little that child welfare can do. But for children who survive an initial report, our study indicates that there is time to intervene once child welfare is contacted. Consistent with general studies of child death (UNICEF, 2001) and child maltreatment fatalities (Browne & Lynch, 1995; Ewigman et al., 1993; Gellert et al., 1995; Kirschner, 1997; McClain et al., 1993), we found that younger children face greater risk of death than older children. This suggests that interventions targeting the prevention of child death in this population should focus on families with young children. Consistent with prior studies (Chance & Scannapieco, 2002; Fein, 1979), those children with infant medical risks had higher later rates of death as well. A better collaboration between pediatricians and available early intervention resources (nurse home visiting, Parents as Teachers, etc.) may be useful for this population. Consistent with national statistics on child maltreatment fatalities (USDHHS, 2006), our study suggests that neglecting homes are a logical prevention target. Yet many of these families do not reach the threshold needed to receive formal child welfare services. For example, in some states substantiation is a prerequisite for services (Drake & Jonson-Reid, 2000). Only about half of the children in this study who died after at least one report of maltreatment had a first report that was substantiated.
**Policy Implications**

Given the likely difficulty in accurately predicting individual risk of future death, a public health approach to improve early childhood parenting or access to dependable child care for families who do not qualify for more intensive services may be beneficial. Possible venues for such services to high-risk families exist through nationwide programs such as Parents as Teachers (Wagner, Iida, & Spiker, 2001; Wagner & Spiker, 2001) or early childhood special education services (IDEA Improvement Act, 2004). These venues might be altered or expanded to better reach families reported to child welfare. Of course, many of the children who later died had medical conditions at birth or during infancy that made the child vulnerable to long-term developmental and/or health problems. Families of children with these types of medical conditions may require program models that can provide medical and social supports. Some nurse home visitation models have been found to be effective (and cost-effective) in preventing maltreatment and enhancing child outcomes, particularly in combination with other support services (Eckenrode, 2003; Karoly et al., 1998). Such programs may hold promise for linking families of high-risk infants with services that will decrease the likelihood of preventable childhood death. Cost-benefit analysis studies will be critical to supporting policy in this area as such programs are likely to be expensive.

**Research Implications**

Level of analysis is key to interpreting findings and considering program and policy options for prevention of childhood death among maltreated children. For example, only 19 of our maltreatment group study participants died, but about the same number of additional children in our sample group had another child family member who died during the study period. This supports the idea of looking at case- or family-level needs rather than focusing on individual children when attempting to implement programs aimed at reducing likelihood of childhood death. Furthermore, more work needs to be done to understand which risk factors, if any, are diminished by receipt of services. Such work will require a much larger sample than available for the present study.

**Conclusion**

Death in childhood was a rare phenomenon even in a sample at high risk because of poverty and/or maltreatment. Avoidance of preventable death, even if rare, is a high priority for child protection agencies, public health, and medicine. Our data suggest that low-income children known to child welfare agencies are at higher risk of death than other low-income children and that the children most at risk may be benefited by more general targeting of high-risk families through nurse visiting, programs such as Parents as Teachers, or early childhood special education services. Our data also suggest that physical abuse, although certainly a serious risk factor, is not the sole cause for concern regarding risk of fatality among maltreated children. It is hoped that this study helps to call attention to the need for ongoing research on the serious outcomes related to neglect and research considering all preventable deaths rather than only those categorized as maltreatment fatalities.

**REFERENCES**


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