

Injury and Child Abuse

Suzanne M. Smith, M.D., M.P.H.,¹ Joseph E. Sniezek, M.D., M.P.H.,²
Jennifer J. Luallen, M.D.,^{1,3} Philip W. McClain, M.S.,²
Robert G. Froehlke, M.D.,⁴ Philip L. Graitcer, D.M.D., M.P.H.,⁵
and Juan G. Rodriguez, M.D., M.P.H.⁶

PUBLIC HEALTH IMPORTANCE

Injuries to children require special consideration. Because of their vulnerability, children are particularly dependent on society for protection from injuries. Over the last century in the United States, injury has surpassed disease as the leading cause of childhood mortality.

Among children aged 1–19 years, injuries cause more deaths than all diseases combined and are a leading cause of disability (1). In the last 60 years, rates of death caused by infectious diseases have declined 90%, but rates of death caused by injuries have declined only 40% (2). Thus, the relative importance of injuries has increased substantially. To reduce childhood injuries, we need to launch a coordinated, committed effort similar to that given to lower the rate of death from infectious diseases.

In the past two decades, injuries have begun to gain widespread recognition as a problem amenable through public health measures (3). However, intervention programs have been hampered because injuries have been perceived as **accidents** that are unpredictable and uncontrollable. Parents may believe **accidents** won't happen to their own children because they are confident in the level of supervision they provide for their children. Injuries, like diseases, actually occur in predictable patterns and are therefore preventable and controllable. **Accidents** are more accurately described as **unintentional events that produce injuries**. Children and adolescents sustain injuries from both unintentional events and events in which harm is purposeful (e.g., interpersonal and self-directed violence).

Injury Mortality

Injury causes almost 40% of deaths among children aged 1–4 years and more than half of

all deaths among children aged 5–14 years (1,4,5). In 1990, injuries caused >6,000 deaths among U.S. children under the age of 10 years (Table 1). Among children in their first year, injuries rank third after perinatal complications and congenital anomalies as a cause of death. After the first year of life, unintentional injuries are the most frequent cause of death for children of all ages (and persons up to 35 years of age). Violent injuries among children increase with age; for example, homicide

¹ Division of Unintentional Injury Prevention
National Center for Injury Prevention and Control
Centers for Disease Control and Prevention
Atlanta, Georgia

² Division of Acute Care, Rehabilitation Research,
and Disability Prevention
National Center for Injury Prevention and Control
Centers for Disease Control and Prevention
Atlanta, Georgia

³ Epidemic Intelligence Service
Epidemiology Program Office
Centers for Disease Control and Prevention
Atlanta, Georgia

⁴ Department of Pediatrics
Michigan State University
East Lansing, Michigan

⁵ Office of the Director
National Center for Injury Prevention and Control
Centers for Disease Control and Prevention
Atlanta, Georgia

⁶ Deceased

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TABLE 1. Ten leading causes of death* among children, by age-group — United States, 1990

Rank	Age-groups (years)		
	<1	1–4	5–9
1	Perinatal complications 17,482	Unintentional injuries 2,566	Unintentional injuries 1,771
2	Congenital anomalies 8,239	Congenital anomalies 896	Malignant neoplasms 569
3	Unintentional injuries 930	Malignant neoplasms 513	Congenital anomalies 286
4	Heart disease 794	Homicide 378	Homicide 156
5	Pneumonia and influenza 634	Heart disease 282	Heart disease 124
6	Homicide 332	Pneumonia 171	Pneumonia 76
7	Septicemia 267	Perinatal complications 134	HIV infection 64
8	Meningitis 197	HIV infection 123	Benign neoplasms 53
9	Nephritis 151	Septicemia 100	Bronchitis, emphysema, and asthma 34
10	Cerebrovascular disease 148	Meningitis 81	Cerebrovascular disease 33

* Causes and numbers of deaths are represented in each cell. To promote comparability between infant and child causes of death, leading causes of infant death shown in this table are ranked on the basis of 72 cause-of-death tabulation list, rather than on the 61 infant cause-of-death list as is more commonly used for ranking infant deaths. Because of this difference, rankings for leading causes of infant death are not identical to those shown in Table 1 of the Infant Mortality chapter.

Source: National Center for Health Statistics, CDC, mortality tapes.

as a cause of death increases in rank from sixth for children <1 year of age to fourth among those 1–9 years old.

Injury Morbidity

Injuries lead to 20% of all hospitalizations among children, closely following respiratory illnesses (23%), the leading cause of hospital-

izations among children (1). Each year an estimated 600,000 children are hospitalized because of injuries, and almost 16 million more are seen in emergency departments. Injuries result in more hospital days of care than any disease, cause the highest proportion of discharges to long-term care facilities, and result in the highest proportion of children requiring home health care after discharge. Although estimates of injury costs are difficult to develop,

one 1986 study found that for the 22,000 injury fatalities among persons ≤ 19 years old, the cost of future lost productivity amounted to nearly \$8.3 billion (in 1985 dollars) (6).

Children are exposed to injury hazards both within and outside the home. A recent study estimated that 60% of children < 5 years of age regularly received child care outside the home (7). Although an increased risk from infectious diseases in child-care settings is apparent (see the Bacterial and Other Infectious Diseases chapter), increasing evidence suggests that injury rates in child care centers are relatively low and that the injuries are predominantly minor. Most severe injuries in child care centers occur on playgrounds where lowering the height of equipment and providing more resilient surfaces could reduce children's risk of injury.

Cross-National Comparisons

The United States leads the industrialized world in childhood death rates (1). Virtually all of the excess mortality among children in the United States is attributed to unintentional injuries and violence. Factors that contribute to cross-national variations in injury rates include socioeconomic and cultural patterns as well as differences in agents of unintentional injury and violence (such as motor-vehicle use patterns, the level of safety-belt use, the prevalence of swimming hazards, and access to firearms). For additional information about related topics and surveillance activities, see the Pregnancy-Related Morbidity, Infant Mortality, and Unintentional Injuries and Violence chapters.

HISTORY OF DATA COLLECTION

Because injury has only recently been recognized as a problem requiring the attention of the public health community, adequate public health surveillance systems for injury have only begun to be developed. The limited injury-related data now available are often found among disparate data systems, many of which are maintained outside of the public health community—for example, police and fire reports. Coordinated and standardized data systems are critical for injury surveillance. Linking existing

data systems may prove to be an effective way to address these limitations.

Injury prevention and control programs depend on having access to information that describes the injury-producing event (i.e., the external cause of injury). Fortunately, because of the uniform death certificate coding standards in the United States, these data are available for fatalities. Unfortunately, standardized cause-of-injury data are not widely available in most nonfatal injury data systems such as hospital discharge data systems. Often only data on the injury outcomes (e.g., cerebral concussion or fractured femur) are available without reference to the causative event. Therefore, the available nonfatal injury data are useful only for estimating the burden of injuries. The injury burden may be useful for setting priorities, but if the data lack details about the underlying cause, they are not useful in designing effective injury-control measures.

Mortality Data

A number of existing data systems are used for the surveillance of fatal injuries (Table 2) (8). Currently, vital records provide the only virtually complete reporting source for fatalities. The other systems provide more detailed information but are limited in other ways. With few exceptions, these data systems are not readily linked to other data sources that might help to reduce some data limitations. Eleven states* currently have computerized, statewide medical examiner data, although these systems are not standardized; in North Carolina the data are regularly linked to vital records (*Parrish RG, unpublished data, 1993*).

In a study of deaths related to three-wheeled all-terrain vehicles (ATVs), Alaska used identifying information from existing mortality databases to link records such as vital statistics; medical examiner, coroner, and magistrate records; state department of transportation police reports; deaths recorded by the Consumer Product Safety

* Connecticut, Delaware, Iowa, North Carolina, New Jersey, New Mexico, Oklahoma, Rhode Island, Tennessee, Utah, and Vermont.

TABLE 2. Major sources of data on fatal injuries among children — United States, 1993

Data Source	Usefulness	Injury types	Comments
Vital records	High	All injuries	Underlying cause of death is cause of injury.
Medical examiner— coroner systems	Moderate	Various types— usually most traumatic deaths	Contain detailed information about circumstances surrounding death; not uniform across jurisdictions; rarely computerized.
Child fatality reviews	Undetermined*	Childhood deaths	Not uniform across jurisdictions; few states have mature activities.
Fatal Accident Reporting System	High	Fatal injuries from motor vehicle crashes on public roads	Limited to deaths occurring on public roadways and within 30 days of crash; contain little medical information.
Drug Abuse Warning Network	Moderate	Fatal injuries in which drug abuse was causal or contributory	More timely than vital statistics with more detailed drug data; may not be uniform across jurisdictions; limited to persons aged >6 years.
Uniform crime report— supplementary homicide report	High	Homicides	Complete for 90%–95% of murder and nonnegligent manslaughter cases.

* Child fatality reviews are newly established. The text summarizes an evaluation of the Georgia system.

Commission; emergency medical services records; and information from the Indian Health Service and the U.S. Armed Forces. Although no single data system identified all deaths related to ATVs, vital statistics and medical examiner data each captured 85% of all deaths; together they provided an adequate mechanism for monitoring ATV-related fatalities (9).

A specialized data set is available to monitor fatal motor vehicle crashes. The National Highway Traffic Safety Administration (NHTSA) maintains the Fatal Accident Reporting System (FARS), which contains data on all motor vehicle crashes occurring on public roadways that resulted in a fatality within 30 days of the incident (excluding crashes resulting from natural disasters). FARS analysts in all 50 states, the District of Columbia, and Puerto Rico use available data sources to collect information on crash, vehicle, and occupant characteristics (10). The FARS is particularly valuable for monitoring risk factors associated with fatal crashes. A major limitation of FARS is the absence of medical information.

Morbidity Data

Data systems to adequately measure the impact of nonfatal U.S. injuries are currently not well developed, and the data are much less available than injury fatality data. Because these data sources usually do not include external-cause-of-injury information, they have limited use in designing injury control programs. However, some existing data, such as hospital discharge data, have the benefit of being widely available, and some data sources, such as the National Electronic Injury Surveillance System and trauma registries, provide detailed information, albeit for a specialized subset of injuries (Table 3) (8).

The Behavioral Risk Factor Surveillance System (BRFSS), sponsored by CDC's National Center for Chronic Disease Prevention and Health Promotion, collects limited injury risk factor information in participating states. The BRFSS permits analyses of risk factors. For example, researchers with CDC's National Center for Injury

TABLE 3. Major sources of data on nonfatal injuries among children — United States, 1993

Data Source	Usefulness	Injury types	Comments
Hospital discharge data	Moderate	Injuries requiring hospitalization	Rarely contain external-cause-of-injury information; capture of less severe injuries is sensitive to treatment patterns; often not timely.
National Electronic Injury Surveillance System	High	Injuries associated with consumer products	Have been used for special projects (e.g., firearm-related injuries); utility limited to national estimates.
Trauma registry data	Moderate	Injuries treated at trauma registry hospitals	Inclusion criteria may vary; often difficult to define population at risk; mix of injuries referred for tertiary care and for those in hospital catchment area.
NCHS* surveys such as the National Health Interview Survey	Moderate	Injuries in past 14 days resulting in restricted activity or requiring medical attention	Contain little cause of injury information; provide national and regional estimates only; have little utility for injury control programs.
National Hospital Discharge Survey	Low	Injuries requiring hospitalization	No external-cause-of-injury information; capture of less severe injuries is sensitive to treatment patterns; provide national and regional estimates only; have little utility for injury control programs.

* National Center for Health Statistics, CDC.

Prevention and Control (NCIPC) used BRFSS data to characterize the association between reduced adult safety-belt use and reduced adult-reported use of occupant restraints for children <11 years old (11).

CDC SURVEILLANCE ACTIVITIES

To monitor the magnitude of fatal and nonfatal injuries in the United States, NCIPC primarily uses existing data systems such as vital statistics databases, the National Hospital Discharge Survey, and the National Health Interview Survey, which are maintained by CDC's National Center for Health Statistics. In addition, NCIPC provides national coordination for injury surveillance activities, standard definitions and methodologies in certain areas, and support to help states build their injury surveillance capacity. Several prototype surveillance systems are also under development (see the Future Issues section of this chapter).

GENERAL FINDINGS

Unintentional Injuries

Injury risks vary considerably with the child's age and developmental level. Across age-groups, marked differences in injury rates, by cause, reflect changes in cognitive, perceptual, motor/language abilities, and associated behaviors as well as changes in the environment and exposure to hazards. For example, toddlers exploring their homes are at risk for different injuries than older children who are frequently outside the home.

Injuries related to motor vehicle crashes are the leading cause of childhood injury death, accounting for 33.5% of all injury deaths among children <10 years old (Table 4). CDC and NHTSA researchers used FARS data to assess trends in fatalities among motor vehicle occupants <5 years old. They found that despite overall increases in the use of restraint devices, fatalities among children <5 years old increased overall between 1982

and 1989 (10). Of motor vehicle occupants <5 years old killed in crashes in 1990, an estimated 70% were not restrained.

Among children aged 5–9 years, pedestrian injuries cause more deaths than do any other injury cause (Table 4). Pedestrian fatality rates are nearly twice as high for males as for females (12). The risk of pedestrian injury is inversely related to socioeconomic status, with poor children having two to three times the risk of other children.

Dart-out incidents, in which the child darts out into the street in front of a moving vehicle, account for 50%–70% of pedestrian injuries among children <10 years of age. Incidents in which a vehicle backs up over a child account for about 5%–7% of pedestrian deaths; these fatal events occur primarily among children <5 years of age.

Among all children, falls are the leading cause of hospitalizations, whereas sports injuries are the leading cause of emergency department visits (13). According to national estimates based on data from a Massachusetts surveillance system (13), falls and sports injuries were by far the most frequent cause for emergency department visits among all persons <20 years of age. Emergency department visits for the next most frequent cause—motor vehicle occupant injuries—were outnumbered by more than fivefold

by visits for falls and by almost fourfold by visits for sports injuries.

More than half of burn deaths occurring before the age of 20 are among children <5 years of age, and almost 75% are among those <10 years of age (1). Residential fire deaths are most common among children <5 years of age. Although black children make up only about 15% of the pediatric population, they accounted for 40% of all pediatric fire and burn deaths in 1990. Historically, race categories have been collected in surveillance data for convenience. Race itself is certainly not a risk factor for burn death, but future research may help discern whether race is a proxy measure for a variety of socioeconomic factors that put children at greater risk: poor housing, improper heating, and greater exposure to homes with smokers (1). Children living in the South, especially the Southeast, have the greatest risk of dying in a house fire.

Although they make up only 26% of the pediatric population, children <5 years of age account for 37% of all pediatric drowning deaths (1). In California, Arizona, and Florida, drowning is the leading cause of injury death among children under the age of 5 years (14). Children aged 1–3 years are at greatest risk of drowning death. Up to 90% of drownings in this age-group occur in residential swimming pools.

TABLE 4. Leading causes of injury-related deaths among children aged 9 years or less, by age and sex — United States, 1990

Age and sex	All injuries*		Motor vehicle crash		Homicide		Drowning		Pedestrian incident	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
<5 years										
Boys	2,519	26.24	623	6.49	386	4.02	420	4.38	287	2.99
Girls	1,771	19.34	500	5.46	324	3.54	220	2.40	169	1.85
Total	4,290	22.87	1,123	5.99	710	3.79	640	3.41	456	2.43
5–9 years										
Boys	1,216	13.17	595	6.49	70	0.76	176	1.91	278	3.01
Girls	735	8.35	375	4.26	86	0.98	72	0.82	128	1.45
Total	1,951	10.82	970	5.38	156	0.86	248	1.38	406	2.25

* Rates per 100,000 population; categories may not be mutually exclusive.

Source: National Center for Health Statistics mortality tapes.

Injuries Caused by Violence

Over the past 25 years, homicide rates among children have at least doubled for each age-group (15). Homicide is now the third leading cause of injury death among children <10 years of age (Table 4). Most child homicides are among boys (68%), and 46% are among blacks (1). Race is not a causal factor but may be a marker for other yet-to-be-understood risk factors. Homicide rates are quite high during the first 3 years of life but are relatively low among children aged 5–10 years. For homicides among children <5 years of age, about half are the result of blows, and about 10% are the result of shootings. The proportion of homicides that are inflicted with firearms increases with age, regardless of the child's sex or race. In 1990, firearms accounted for 1.3% of deaths among children aged 1–4 years and 3% of deaths among those aged 5–9 years (16).

Surveillance of child abuse, both fatal and nonfatal, is severely hampered by inconsistent definitions and legal requirements and by varying record-keeping practices. No valid national estimates for the magnitude of child abuse cases are available. In two surveys, investigators found that reported cases of child maltreatment increased 66% from 1980 to 1986 (17), primarily because of an increase in reported child abuse. Reported cases of physical abuse increased 68%, and reported cases of sexual abuse rose >300% during the same period. Whether these trends represent a true increase in incidence or reflect increased reporting (or both) is not known.

INTERPRETATION ISSUES

Establishing effective public health systems for the surveillance of childhood injuries is especially challenging because of the enormous effect of injuries and the wide variety of injury-producing events and outcomes. Data needs are diverse and include the characteristics of injured children and causative events, etiologies, injury diagnoses, contributing factors, and long-term outcomes. Current data collection systems are fragmented and have critical gaps in information.

Injury surveillance systems may use data from many sources. Because these systems have been developed for other purposes, they fre-

quently lack essential information needed to plan, carry out, and evaluate injury control programs (8). Therefore, existing data sources frequently need to be modified or linked to other data sources to be useful for public health and prevention activities.

Medical sources such as hospital discharge databases often provide rich information about the magnitude and types of injuries that occur. Without cause-of-injury information, these sources' usefulness is limited to measuring the injury burden. Changing patterns of medical care, access, and reimbursement may influence the nature of injury data captured by these sources, complicating the capability to monitor the injury burden over time.

Trauma registries—specialized medical data systems developed primarily to assess quality of care—are another potential source of childhood injury data. Although trauma registries typically include critical external-cause-of-injury information, they are not population-based. Defining the population at risk is difficult because the catchment areas are often poorly defined. The main impediment to calculating population-based rates is that generally not all acute care hospitals in a population-defined geographic area participate in multihospital registries. As trauma registries mature and all acute care hospitals become participants (as has happened throughout Alaska and in San Diego, California), trauma registries will become population-based. Trauma registries generally include information on trauma patients who are admitted to the hospital, who die in the emergency department, or who are transferred to other facilities—patients whose records generally do not become part of hospital discharge databases.

Many states maintain specialized registries of persons sustaining selected injuries such as severe burns, traumatic brain injuries, and spinal cord injuries. Although these registries may be valuable sources of surveillance data on childhood injury, their primary purpose is to monitor service delivery to the injured persons. See the Unintentional Injuries and Violence chapter for more detailed information on state-based registries.

Nontraditional (from a public health perspective) sources of data used in injury surveillance

systems include police, fire, and motor vehicle crash reports. We can greatly increase the usefulness of these data sources by linking them to other data systems containing information on injury outcomes and cost.

We also must consider limitations related to data on child abuse and neglect. Our most notable concern is that no consensus definitions exist for either child abuse or neglect. Definitions, legal reporting requirements, and record-keeping practices often vary by jurisdiction. Increasing evidence suggests that child neglect, physical abuse, and sexual abuse are epidemiologically distinct entities requiring different prevention strategies (17). Available data are often based on a combination of voluntary and mandated reporting. Although the surveillance of many adverse health events is based on such reporting systems, data on child abuse and neglect are particularly vulnerable to reporting bias. Differences in clinical judgments, variability in recognition of cases, reluctance to report, and campaigns to increase awareness all may influence the reporting of child abuse and neglect. To address these limitations, CDC is involved in various activities to assess and improve mechanisms for the surveillance of child abuse and neglect.

Graitcer has suggested that we apply the following principles when addressing injury surveillance (18):

1. The design of any surveillance system needs to take into consideration the purposes of surveillance. The means of data collection will vary by the purposes of surveillance.
2. Various data sources are available for injury surveillance. Existing data systems may be most useful—obviating the need to develop new data systems. The accessibility of computerized data, the availability of cause-of-injury information, and the representativeness of the data must be considered.
3. A minimal amount of data should be collected in a surveillance system. Existing data systems may provide basic information—allowing investigators to study risk factors in more focused studies.
4. Injury surveillance is not the same as case investigation. Although surveillance may identify cases, more focused epidemiologic studies are the most effective way to define risk factors.
5. Local data should be used for local programs. This may limit available data to vital records and hospital discharge data.

EXAMPLES OF USING DATA

Oklahoma Residential Fire Injury Prevention Project

Burn injuries that require hospitalization or that result in death have been reportable conditions in Oklahoma since November 1986. The state established an active surveillance system using data from the three burn centers in the state and the state medical examiner. Data from the first 32 months of surveillance revealed that residential fires caused 313 (18%) of the 1,720 burn injuries reported and 201 (63%) of the 320 burn fatalities reported.

Using surveillance and fire department data, the Oklahoma injury prevention staff calculated injury rates per 100 residential fires to identify a high-risk area in need of a smoke detector giveaway program. The targeted area had the highest rate of residential fire-related burn injuries in Oklahoma City. It also had low median household incomes and a high prevalence of Hispanic, Asian, and Native American minorities. The annual burn injury rate was nearly three times higher in the targeted area (4.8 per 100 residential fires) than in the rest of the city (1.7 per 100 residential fires). Thirty-six months after the intervention, the injury rate in the targeted area had declined 83% ($p < 0.001$, Fisher's exact test) while the injury rate for the rest of the city increased by 33%, although the citywide increase was not statistically significant ($p = 0.2$, Fisher's exact test). Surveillance data played a critical role in targeting and ameliorating the high rate of residential fire injuries in this high-risk population.

Georgia Child Fatality Review System

Georgia is one of only 22 states currently conducting statewide multidisciplinary child fatality reviews (CFRs) aimed primarily at preventing fatal child abuse and neglect (19,20). Georgia conducted one third of all CFRs reported to the National Center for Child Abuse Prevention and Research in 1991. Reviews are mandated in Georgia for childhood deaths that are sudden, unexpected, or unexplained. Cases are referred to county CFR teams at the discretion of the county coroner or medical examiner. The results of county CFR reports are reviewed by a state-level panel.

In an analysis of this review system, the Georgia Department of Human Resources and CDC found that the CFR system reviewed 13.5% of all childhood deaths during 1991, the first full year of operation. Deaths among older children, boys, children from minority populations, and those whose deaths were attributed to injury were more likely to be reviewed than other childhood deaths in the state. Injury was the underlying cause in 24.4% of all deaths and in 49.4% of the deaths investigated by CFRs. The highest proportion of deaths reviewed were those caused by violence (40.5%). CFR reviews judged 71% of firearm-related deaths to be preventable. CFR reviews also identified a cause of death different from the cause listed on the death certificate in 21 cases; in five of these cases, this difference was found to be related to evidence of fatal abuse or neglect.

The Georgia CFR system has had an immediate public health impact. As a result of cases reviewed, the following actions have taken place:

- In a case originally attributed to sudden infant death syndrome, an autopsy required by the CFR led to a different determination for the external cause of death and a subsequent homicide prosecution.
- A traffic light was installed at an intersection where several adolescents had been killed in motor vehicle crashes.
- A court order was issued to prevent deliveries by a lay midwife.

- State rules regarding the certification of midwives have been revised to require all midwives to be licensed nurses.
- CFR data on failure to use child restraints convinced legislators to pass tougher motor vehicle child restraint laws in 1993.

FUTURE ISSUES

External-Cause-of-Injury and Poisoning Codes

Although 99% of all injuries in the United States are nonfatal, mechanisms to collect national nonfatal injury surveillance are severely limited. The current standard for coding external causes of nonfatal injury is the *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM), Supplementary Classification of External Causes of Injury and Poisoning*, also known as E codes[†] (21). Modifying existing hospital discharge data systems by requiring the use of E codes would be a practical and cost-effective way to collect information about severe nonfatal injuries (22). The Indian Health Service, U.S. Public Health Service, which for more than a decade has required the use of E codes in hospital records, has successfully used its computerized medical records system to target and monitor injury prevention efforts (23). Fourteen states[§] currently or will soon require the use of E codes in their hospital discharge data systems. The revised national uniform billing format, also known as UB92, used for third-party reimbursement now provides a separate, labeled space for E codes where none was previously available. The usefulness of E codes can be improved. E code users and potential users would benefit from standardized coding guidelines and definitions and from increased availability of training.

[†] Two types of codes are used to describe injuries under the ICD-9-CM systems. The injury and poisoning codes (N codes) specify the anatomical nature of the injury (i.e., the injury diagnosis). The external-cause-of-injury and poisoning codes (E codes) are a supplementary system that classifies the environmental events, circumstances, intentionality, and conditions that cause injury, poisoning, and other adverse effects.

[§] California, Delaware, Maryland, Massachusetts, Missouri, Nebraska, New Jersey, New York, Pennsylvania, Rhode Island, South Carolina, Vermont, Washington, and Wisconsin.

Physicians and coroners who complete death certificates should also be trained in the nature and limitations of the system so that their diagnoses and comments about external causes of childhood injuries and contributing conditions can be accurately translated into *ICD-9-CM* codes. Although a more rigorous evaluation of the E code scheme is currently under way, certain limitations still exist. Because the number of E codes for certain injury agents or events is restricted or absent (e.g., all-terrain vehicles, drowning in swimming pools vs. open bodies of water), the detail needed to conduct surveillance on certain injury problems is not available through E-coded data, regardless of coding accuracy. Also, important data on contributing factors, such as the role of alcohol and other drugs, are not captured in the current coding scheme. Some of these limitations are expected to be addressed in the 10th revision of the *International Classification of Diseases*, expected to be released in 1999.

Injury Control and Risk Factor Surveillance System

NCIPC is currently developing the Injury Control and Risk Factor Surveillance System (ICARIS), a prototype national computer-assisted telephone interview survey. The ICARIS is intended to be a flexible and rapid mechanism to collect injury risk factor information. The ICARIS follows the paradigm of other CDC computerized, telephone survey models such as the BRFSS and the Youth Risk Behavior Surveillance System. A national pilot survey is being conducted to determine the feasibility of this mechanism as a tool for evaluating injury control programs. The ICARIS also is intended to be useful for conducting state and local surveys.

National Electronic Injury Surveillance System

The National Electronic Injury Surveillance System (NEISS) is an ongoing surveillance system maintained by the U.S. Consumer Product Safety Commission. The NEISS tracks product-related injuries treated in hospital emergency departments across the United States. The NEISS is the only national system that collects data on injuries that are severe enough to require medical atten-

tion but not necessarily hospitalization. CDC has conducted special analyses to determine the system's usefulness in identifying certain injuries (e.g., product-related head injuries) (*Greenspan AI, personal communication, 1993*). In addition, CDC has supported expansion of the NEISS for special studies, such as a recent national survey of boating- and boat propeller-related injuries (24). One important special effort involving the NEISS and CDC has been the Firearm Injury Surveillance Study, which is intended to evaluate the feasibility and cost of using the NEISS to provide national data on nonfatal firearm injuries. This study will provide useful information on the feasibility of using the NEISS to obtain data on other injuries. For more details, see the Unintentional Injuries and Violence chapter.

Head and Spinal Cord Injury Surveillance

Working with government agencies, professional organizations, and consumer groups, NCIPC has developed standard guidelines (case definitions and a minimal data set) for the surveillance of head and spinal cord injuries. These guidelines, which use the CDC National Electronic Telecommunications Surveillance System format, are currently being field-tested. NCIPC currently receives spinal cord injury data from five states (see the Unintentional Injuries and Violence chapter for more details).

Data Linkage

CDC is collaborating with the National Highway Traffic Safety Administration on a project to improve data on nonfatal motor vehicle-related injuries by linking police crash reports with hospital discharge records. The project will include 1) an inventory of linkages that have already been made in some states; 2) descriptions of the methodologies employed to make these linkages; 3) descriptions of the data elements in existing linked data sets, including the elements used for linkage; 4) descriptions of data sets that other states use to form linkages; and 5) an inventory of agencies in other states with interests in achieving data linkages.

When completed, the data linkage project will provide us with improved epidemiologic data,

especially on the injuries sustained, the vehicles involved, and the circumstances of each crash. Linked data can be used to 1) measure the impact and cost of failure to use safety belts, child restraints, and motorcycle helmets; 2) measure the impact and cost of alcohol use in motor vehicle crashes; and 3) provide data of value to legislators drafting prevention legislation.

Child Abuse and Neglect

The NCIPC is involved in a number of activities intended to foster a better understanding of child abuse and neglect. In recent years, reports of child abuse and neglect have increased, but we have reason to believe that this increase may be related largely to increased awareness and reporting rather than to increased incidence. The NCIPC has developed a methodology to estimate confirmed, probable, and possible child abuse and neglect fatalities using vital records supplemented with Federal Bureau of Investigation crime data (25). In addition, NCIPC is assessing the adequacy of existing state records systems for identifying child abuse and neglect and is supporting the development of a model system for child fatality review.

Long-term goals

As more resources become available for NCIPC, CDC's newest center, our long-term surveillance goals will include the development of a comprehensive surveillance system that can provide data useful for state and local programs and for national estimates. Through the data linkage project, NCIPC and NHTSA also hope to refine data linkage methodology. Dissemination of this methodology will allow more states and local health agencies to improve the quality of injury surveillance data. In addition, NCIPC staff will use their findings from the national pilot test to make the ICARIS useful at the state and local levels.

Finally, we recognize the critical need for external-cause information on nonfatal injuries, and we will encourage all states to include external-cause-of-injury information in their hospital discharge data systems. We anticipate that the National Hospital Discharge Survey will be more

useful for injury surveillance when E codes are routinely available. In the meantime, additional methods to capture information about injuries not requiring hospitalization need to be developed.

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