



Public Health Data Standards Consortium

Using External Cause of Injury Codes

States' Compelling Stories

WHITE PAPER

PHDSC External Cause of Injury Codes Ad Hoc Committee

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TABLE OF CONTENTS

INTRODUCTION..... 4

OVERVIEW OF FOUR STATES’ STORIES 4

SOUTH CAROLINA.....5

UTAH.....6

CALIFORNIA.....8

NEBRASKA AND MISSOURI.....10

SUMMARY 11

**HISTORICAL PERSPECTIVE ON USING EXTERNAL-CAUSE-OF-
INJURY CODES..... 11**

Introduction

Many people think injuries are unavoidable chance happenings. In reality, injuries, like diseases, occur in highly predictable patterns. An important part of the public health mission is to emphasize that injuries are preventable and to dispel the widespread misconception that injuries are unavoidable.¹ While the circumstances leading to an injury, such as a motor vehicle crash, may not be avoidable, the injuries sustained in that crash can often be prevented or lessened by using seat belts or car seat.

Injuries are a significant health care issue in the United States. Collecting and reporting complete and accurate data regarding the causes of injuries can help public health practitioners and public health researchers to design and implement effective injury prevention and control programs.

The purpose of this paper is to share insights gained from compelling stories on several states currently collecting, reporting and using external-cause-of-injury data, with the goal of stimulating the interest of health care providers, public health practitioners and researchers, to continue reporting and using information concerning the external cause of injury. An historical perspective on using external cause of injury codes will also be shared.

This paper explores efforts to use external cause of injury codes to enhance our public health and health care systems. Improved data collection and continued research can increase awareness about the important role of external cause of injury codes in injury education, prevention and control programs, and compel policy makers to provide resources commensurate with the magnitude of the problem.

The experiences of several states exemplify the application and usefulness of external cause of injury codes. These four compelling stories may further stimulate policy makers to action in terms of funding and implementing programs to reduce the emotional and financial burden caused by injuries. This section first provides an overview of the states' experiences using external-cause-of-injury coding and data, then describes each state's unique story.

Overview of Four States' Stories

South Carolina's experiences demonstrate how use of injury data linked with other data sets can result in better use of public funds in (1) targeting fire prevention interventions and (2) providing communities with the necessary information to more effectively manage at-risk injury populations. In short, South Carolina is using injury data to get "more bang for their buck" while reducing the human and financial costs associated with injuries. The linkage has created

powerful combinations of data sets that have enabled researchers and policy makers to analyze injury data by looking at a wider range of potential injury risk factors not possible without collaborations with other service and social data systems. Identifying at-risk populations, environmental hazards, and resource utilization was enhanced with the broad view made available by use of linked data sets. The South Carolina story demonstrate that efforts to reduce the consequences of an accident start with identification of the injury with an external-cause-of injury code. These efforts are enhanced when a wide variety of contributing factors are also identified and analyzed.

In Utah, like many states, medical misadventures add emotional and financial costs to our health care system, not to mention the adverse effect on the American public's trust in our health care system. The Utah story describes the use of the external cause of injury code data to reduce health care costs and restore public trust in our health care system and highlights the importance of proper and accurate external cause of injury coding to identify the problem, thus enabling proper solutions to be crafted.

Meanwhile, California's experience reminds us of the importance of our discharge data systems in providing us with the injury data necessary to develop effective prevention and education programs, especially when many of these programs are directed to our most at-risk populations. California's story reminds us to protect the data sources that will help us better protect our at-risk populations from preventable injuries associated with inevitable accidents.

Nebraska - Missouri's study abstract underscores the importance of being "eternally vigilant" to remind policy makers of the value and importance of collecting external-cause-of-injury codes in as many care settings as possible. Studies, such as the one done in Nebraska, provide policy makers with evidence about where appropriate funding can make a difference.

Each of these states' stories is described in further detail below.

South Carolina

Compelling story #1: Community Assessment of Injuries

Fostering Collaboration. South Carolina's Department of Public Safety's Safe Communities program and the South Carolina's Department of Health and Environmental Control's Injury Education and Prevention Bureau's Safe Kids program require local communities to assess the impact of injuries and identify injuries that are significant problems for the local community.

The Purpose. The public health consequences of injuries are significant in terms of both physical injuries and fiscal costs. Community assessment of both intentional and unintentional injuries provides the starting point to develop intervention programs to reduce these injuries and the associated costs. Counties were chosen as the basis for these analyses as they are the geo-political unit used in South Carolina. This assessment can and has been used on areas smaller than a county for special purposes. Assessment of the current status of injuries in a community provides the starting point for identifying injury patterns and the subsequent development of intervention strategies to reduce injuries in a community.

Locating the Population. The definition for injuries includes all injury diagnostic codes using the ICD-9-CM coding convention for a primary diagnosis and all emergency room encounters and inpatient hospitalizations where there is an E-code, injury mechanism indicator. The strength of these assessments is further enhanced when incident reports such as crash reports, fire reports, criminal investigation reports and the like are linked to further explain the circumstances surrounding these injuries. Evaluating the overall injury rates by type of injury assists policy makers in determining the type of incident reports that would have the largest impact on reducing injuries for a community.

Policy Implications. Injuries, like politics, are a local issue. While some types of injuries (e.g., car crashes) are frequent in all communities, the outcomes of these injuries vary widely. With the linkage of medical outcomes to crash data, counties that have a high injury rate but low death rate have been identified and appropriate action taken. These community assessments provided one community with the information that there was a substance abuse problem with 10- to 14-year-old males inhaling various substances. Another community identified what they thought was a problem with suspected child abuse when their community rate was compared with the state and other similar counties. Local community officials investigated and found that the differences in rates were due to a reporting anomaly that was soon addressed. Community assessment for injuries provides a universal starting point to assist communities in developing interventions. Community assessments also provide a universal ending point to evaluate the successfulness of these programs. State agencies use these assessments to target grant funds such as money for fire prevention to maximize the impact of these funds. State policy makers use these data in the development of laws and allocations of funds to decrease the impact of injuries to again maximize the impact of funding projects.²

Utah

Compelling story #2: Detection and Prevention of Adverse Events

“Until we find [medical errors], we can’t fix them. [Our] success will be

indicated initially by seeing an increased number of [adverse] events detected and reported across the state” (Scott Williams, MD, Executive Director, Utah Department of Health).

Dr. Williams’ vision has guided collaboration between the Utah Department of Health (UDOH), the Utah Hospital Association and other partners to help hospitals improve detection, reporting, understanding and prevention of adverse events (medical errors and injuries due to medical care). The UDOH has used ICD-9-CM external cause of injury codes, in conjunction with their associated diagnosis codes, to identify potential sentinel events, medical misadventures,³ poisoning by drugs⁴ and adverse effects of drugs⁵ and communicate this information to all 41 acute care hospitals in the state. Because all Utah acute-care hospitals already use these codes, they provide a cost-effective approach for state surveillance and hospital quality improvement that require few or no new resources.

The UDOH analyzed and reported the annual number and percentage of inpatient discharges from all acute hospitals with at least one of these adverse event codes for all 41 hospitals combined (state level) and for each hospital (hospital level) for the years 1999 through 2002. From 1999 through 2002 at the state level, misadventures increased from 982 (0.43%) to 1,198 (0.49%) discharges, adverse effects of drugs increased from 4626 (2.01%) to 5,584 (2.26%) and poisoning by drugs increased from 1,109 (0.48%) to 1,570 (0.64%). The UDOH also determined positive predictive values (PPVs) for adverse drug event (ADE) codes based on medical chart reviews. PPVs suggest that external cause of injury codes for adverse effects of drugs detect almost twice as many in-hospital adverse events as external cause of injury codes for poisoning by drugs (32% vs. 17% respectively) in contrast to arrived-with ADEs (49% vs. 60% respectively) and false positives (19% vs. 23% respectively.) The UDOH then communicated these findings to the hospitals in four quarterly reports from August 2002 through September 2003. The UDOH also has developed electronic tools, with input from the Utah Hospital Association and beta testing by volunteer hospitals, based on these codes to make reporting of adverse events easier for hospital personnel.

Several hospitals have used information in the UDOH’s quarterly reports to make changes in their medication procedures. For example, one small rural hospital implemented an anti-coagulation clinic to shorten the time needed to get a patient’s level of medication within therapeutic range, lessening the risk of blood clots or bleeding. An urban hospital found that its poisoning rate was similar to the state average, but its rate for patients with adverse effects of psychotropic medication was eight to ten times the state average over a four-year period. As these cases could represent patients arriving at the hospital after suffering adverse reactions as outpatients, UDOH met twice with different groups involved in the clinic redesign and provided quality improvement personnel with identifiers for these cases to see what could be learned from reviewing their charts. Several

other hospitals have requested discharge-level information from the PS Team to assist with in-depth examination of other specific problem areas.

Use of external cause of injury codes has been a valuable part of the UDOH's contribution to improved, cost-effective detection and reporting which, in turn, can lead to prevention of adverse events.⁶

California

Compelling story #3 External Cause of Injury Coded Hospitalization Data Are Crucial to PH Policies in CA

Public health experts, including recent Surgeons General and Secretaries of the U.S. Department of Health and Human Services, agree that injuries are a major health problem. There can be no serious question of our ability to develop policies to reduce the burden of injury. In the 35 years since the founding of the National Highway Traffic Safety Administration, motor vehicle injury rates have fallen to a fraction of their levels in the 1950s and 1960s. Occupational injuries and injuries from poisoning, clothing fires and house fires, sports and other causes have dropped in response to smart safety policies. Still, injury policy has a long way to go. In California, 2002 data indicated that injuries killed 15,878 residents and caused 240,083 non-fatal hospitalizations. Only diseases associated with aging—such as cancer and heart disease—approach this level of morbidity.

External cause of injury coded hospitalization data have become the eyes and ears of the injury control community in the U.S. This is especially true in California, where the Epidemiology and Prevention for Injury Control (EPIC) Branch of the Department of Health Services has made daily use of these data since they became available 14 years ago. Before widespread external cause of injury coding of patient data, injury control professionals could discuss only fatal injuries, as described in the external cause of injury codes death certificates. Reliance on death data has two very big drawbacks:

- Death data is a small fraction of all serious injuries. For example, for every person over age 85 who dies immediately from a fall in California, almost 50 are hospitalized. With patient data, the public health problem is now 50 times bigger than it appeared before.
- Patterns of deaths and hospitalizations are often dramatically different. For example, there are 350 male suicides per 100 female suicides. For hospitalized self-injury, the ratio is only 63 males per 100 females.

Because California has excellent hospital discharge data, with virtually 100 percent external cause of injury coding, public health experts in the Department of Health Services and in counties and cities statewide have been able to contribute hard data to many policy debates. Here are a few examples of how we have used

external cause of injury coded patient data to replace speculation with facts and promote the public health.

Toddler Pool Drowning. We have used E910.8 to focus attention on the problem of small children near-drowning in pools and spas. A significant proportion of these children suffer lifetime brain damage (anoxic encephalopathy). The California Swimming Pool Safety Act and other legislation were stimulated by this information.

Youth Accidents and Suicides from Unauthorized Access to Guns. Each year, guns in the hands of youth through age 18 contribute to gunshot wounds causing about 50 deaths and 175 hospitalizations. California's Firearm Safety Act and related legislation, the state's policy response, are among the nation's strongest laws for requiring that guns be kept locked and inaccessible to youth.

Traumatic Brain Injury (TBI). California is part of CDC's multi-state surveillance of TBI. This system, based primarily on external cause of injury coded hospital discharge data, has been invaluable in understanding preventable injuries associated with bikes, motorcycles, senior falls, and child abuse (e.g., shaken baby syndrome), among others. External cause of injury coded data play role in California's requirements for bike and motorcycle safety helmets. In particular, it is very doubtful that California could have maintained its universal motorcycle safety helmet requirement against annual efforts to repeal or weaken it if we were not able to show that our law has resulted in a sharp and sustained decline in nonfatal brain injuries (skull fractures, lesions and concussions, and intracranial bleeds). Large numbers of permanent fatal and disabling brain injuries have thereby been prevented.

Senior Falls. CDC and other agencies are now working hard to prevent senior fall injuries. California's EPIC Branch is part of a multi-state effort to address this problem, whose entire existence is known because of external cause of injury coded hospitalization data. Senior falls (age 65 plus) in California cause about 63,000 initial hospitalizations each year. Recent research demonstrates that this toll can be reduced by a combination of medication monitoring, physical conditioning, home modifications, and osteoporosis prophylaxis.

Many other examples of the value of external cause of injury coded hospitalization data could be cited. In recent years, these data have contributed to many policy debates. Here are some examples.

- Child safety seats and booster seats
- Violence against women, including domestic violence
- Child pedestrian injuries not recorded by police, for example, driveway "back-overs"
- Poisonings, such as those involving ingestion of iron supplement pills,

which cause kidney failure when taken by small children in very low dosages

- Attempted suicide and other self-harm injuries - for every suicide, there are 5 of these injuries, constituting an almost completely hidden public health and mental health problem—17,141 hospitalizations in 2002.

To fill its role as the Department of Health Services injury control lead, the EPIC Branch must have external cause of injury coded hospitalization data. These data are crucial for illuminating injury policies (like motorcycle helmet requirements) as well as new policies with implications for public safety (such as the introduction of Segways into pedestrian walkways). To develop injury policies without this source of injury data would be equivalent to driving at night—with the headlights turned off.⁷

Nebraska and Missouri

Compelling story #4: The pyramid of injury - Using external cause of injury codes to accurately describe the burden of injury

Although much is known about injury-related deaths from the use of external-cause-of-injury codes reported on deaths certificates, most of the information regarding nonfatal injury is based on estimates from national surveys. The standardized collection and reporting of external-cause-of-injury codes by health care providers (e.g., hospitals) will help to better describe the burden of injury on our society and economy.

A recent study⁸ conducted by health care and public health care professionals from the University of Nebraska Medical Center, the Nebraska Health and Human Services and the Department of Emergency Medicine at Emory University concluded that collecting and reporting of external-cause-of-injury codes by acute care hospitals provides a comprehensive data retrieval system that allows for accurately identifying the burden of injury derived from “real patient encounters” within geographic regions. The authors reviewed external-cause-of-injury code frequencies for all injuries reported by acute care hospitals (both inpatient and emergency departments) in Missouri and Nebraska from 1996 through 1998. Reporting of external-cause-of-injury is mandatory in these two states.

The authors suggest that viewing injury from the limited perspective of fatal outcomes may lead to disproportionate attention to high case-fatality rate – low morbidity rate causes of injury, such as firearm suicides and homicides, whereas injury causes with relatively low case-fatality rates but high morbidity rates (e.g., motor vehicle crashes and falls) could be underemphasized. The latter (low case-fatality rate – high morbidity rate causes of injury) have a far greater cumulative effect on health care system use and costs than the former (high case-fatality rate – low morbidity rate causes of injury).

The study demonstrates the feasibility and value of reporting external cause of injury of all injured patients requiring emergency department evaluation and/or hospitalization.⁹

Summary

Injuries are a significant health care issue in the United States. Our compelling stories demonstrate the difference that having complete and accurate external cause of injury data can make in percolating injury prevention and treatment programs up to the consciousness of our public health policy makers.

The impact injuries have on our health care system remains high. Policy makers have to be reminded that funding injury prevention and educational programs must also remain high on their priority list. Connecting the need for these data with the resources necessary to collect complete and accurate external-cause-of-injury data in a standard way continues to be a challenge. With shrinking national and state budgets, the demands on and competition for the remaining pools of funding have intensified over the past few years. It is important that injury programs continue to get “their fair share” of funding. It is hoped that this paper will motivate others to share their compelling stories to increase attention on and stimulate funding for the development of injury prevention and treatment programs. Such efforts can marginalize the social and financial impacts that injuries have on our society today. We have to keep the goal in sight.

Documenting the circumstances leading to injuries such as vehicle crashes or falls is a critical and necessary step toward the prevention of injuries. Individuals and communities can prevent injuries through knowledge of risks, sensible behaviors, and the use of safe, well-designed products and environments. An important way of gaining this knowledge is through information obtained from external cause of injury codes.

Historical Perspective on Using External-Cause-of-Injury Codes

The importance of collecting external cause of injury codes was documented in the following 1994 excerpt from a Morbidity and Mortality Weekly Report. Note that the potential benefit from collection of external cause of injury codes has been realized over the past ten years.

Although analysis of hospital discharge data (HDD) can provide important information about severe nonfatal injuries, HDD often do not include information about the causes of these injuries (e.g., motor-vehicle crashes and assaults). Inconsistent reporting of causes of injury has limited the usefulness of HDD for injury surveillance. The International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) includes codes for classifying external causes of injury. This report describes progress in implementing external cause of injury codes reporting in

states.

In June 1991, the National Committee on Vital and Health Statistics (NCVHS), a legislatively mandated advisory committee of the U.S. Department of Health and Human Services, recommended that external cause of injury codes be included in hospital discharge data sets. In addition, because the uniform billing form for hospitals is used frequently as the source for HDD, the NCVHS recommended that the revised uniform billing form (UB-92) designate a space for an E-code. In

February 1992, a UB-92 that included a labeled space for external cause of injury codes was approved by the National Uniform Billing Committee (a committee comprising representatives from payor and provider organizations and recognized by the Health Care Financing Administration) for use by all U.S. hospitals. During October 1993-April 1994, all U.S. hospitals implemented use of the UB-92.¹⁰

Editorial Note: Because of the importance of collecting information about causes of injury, the 1993 national plan for injury prevention and control includes a recommendation for mandatory reporting of external cause of injury codes in HDD whenever injury is the principal diagnosis.¹¹ The Council of State and Territorial Epidemiologists, the American Public Health Association, the American Health Information Management Association, the National Association of Health Data Organizations (NAHDO), and other organizations also support the mandatory reporting of external cause of injury codes in HDD.

In a 2004 survey, an external cause of injury code survey was sent to all 50 states to compare HDD data results to a previous survey in 1997. The 2004 survey showed an overall improvement in the collection of external cause of injury data for hospitalization and emergency department data from 1997 to 2004. In states that are evaluating their hospital discharge data systems (HDDS) and hospital emergency department data systems (HEDDS) only 43.8% of HDDS and 54.5% of HEDDS have more than 90% of injury records E-coded in 2004. It is now mandated in 26 states and the District of Columbia to collect the external cause of injury data in their statewide HDDS. The use of external cause of injury codes has increased since 1997. This data suggest that there is more interest among policy-makers and public health practitioners in improving the availability of injury morbidity statistics based upon the external cause of injury coded data in HDDS and HEDS.¹²

Based on the collaborative work of CDC's NCHS, NCIPC and the Injury Control section of APHA as well as the ICE on Injury Statistics, a recommended framework was disseminated via the MMWR for the uniform tabulation and analysis of injury mortality data classified by the Ninth Revision of the International Classification of Diseases (ICD-9).¹³ Follow-up (modified with additional codes) frameworks were prepared based on ICD-9-CM codes¹⁴ and

ICD-10 codes for mortality (in use since 1999).¹⁵

Many injury epidemiology and injury control programs depend on data aggregated by external cause of injury code groupings for planning and evaluation. Such data are relevant for persons engaged in injury control activities and for those who collect, code analyze and report data concerning injury.¹⁶ Reporting of external cause of injury codes is useful for establishing priorities for state injury-control programs and for evaluating the etiology of severe injuries – including brain and spinal cord injuries. HDD that include external cause of injury codes are useful in conducting surveillance activities such as childhood injuries¹⁷ and assessing the cost of injuries by external cause (e.g., motorcycle-related injuries).¹⁸ To plan, implement, and evaluate injury-prevention programs, states should require the reporting of external cause of injury codes in HDD to obtain information about the causes of severe nonfatal injuries.¹⁹

Additionally, an Injury Surveillance Workgroup within the State and Territorial Injury Prevention Directors Association (STIPDA) convened in 2001 to assess the strengths and limitations of hospital discharge data for injury surveillance and to recommend standard methods for analyzing and reporting such data (both external cause and diagnosis data).²⁰ The Workgroup recommended standard processes for analyzing and reporting hospital discharge data by state injury prevention programs and others to facilitate comparisons of state hospital discharge rates for injury surveillance purposes.²¹ In 2003, the Workgroup presented a minimum set of recommendations for the analysis and reporting of state level hospital discharge data. The goal of these recommendations was to improve state injury surveillance to support injury prevention programs and policies using both ICD-9-CM diagnosis as well as external cause of injury codes.²²

In closing, training hospital health information management personnel on external cause of injury coding can help hospitals to improve completeness and accuracy of external cause of injury codes reporting and, consequently, provide better data for injury prevention and control efforts.²³

¹ State Injury Indicators Report.
www.cste.org/pdffiles/SCREENinjuryindicatorsreport.pdf.

² Tyrell, M. Office of Research and Statistics, State of South Carolina.

³“Medical misadventures” are cases in which harm to patients is clearly due to medical intervention. Examples of medical misadventures include (but are not limited to) accidental puncture or laceration (E870.0-E870.9, 998.2), foreign object accidentally left in the patient’s body (E871.0-871.9, 998.4, 998.7), failure of sterile precautions (E872.0-E872.9) and mechanical failure of medical instruments or apparatus (E874.0-E874.9).

⁴“Poisoning by drugs” includes situations in which the patient receives the wrong drug, wrong dosage or the wrong patient receives the drug (i.e. E850-E852, E856-

E858).

⁵“Adverse effects of drugs” include no errors in administration of the drug but the patient has an adverse reaction, such as rash or swelling of lymph nodes in the throat (i.e. E930-E949).

⁶ Utah Department of Health Office of Health Care Statistics.

⁷ Trent, R.; Chief, Injury Surveillance & Epidemiology Section, California Department of Health Services

⁸Wadman MC; Muelleman RL; Coto JA; Kellermann AL. The pyramid of injury: using e-codes to accurately describe the burden of injury. *Annals of emergency medicine*, Oct.2003; Vol.42, No. 4, pp 468-78.

⁹ Ibid.

¹⁰ The National Committee on Vital and Health Statistics, 1991, DHHS Publication No. (PHS) 92-1205, May 1992, pp. 84-114.

¹¹ Morbidity and Mortality Weekly Report (MMWR), July 1, 1994 /43(25) pp 465-467 also available at the following URL:

<http://www.cdc.gov/mmwr/preview/mmwrhtml/00031797.htm>

¹² <http://www.cste.org/pdffiles/newpdffiles/ECodeFinal3705.pdf>.

¹³ Morbidity and Mortality Weekly Report (MMWR), August 29, 1997/46(14) pp 1-30 also available at the following URL:

<http://www.cdc.gov/mmwr/preview/mmwrhtml/00049162.htm>

¹⁴ NCIPC website <http://www.cdc.gov/ncipc/whatsnew/matrix2.htm>

¹⁵ <http://www.cdc.gov/nchs/about/otheract/ice/matrix10.htm>

¹⁶ Morbidity and Mortality Weekly Report (MMWR), August 29, 1997/46(14) pp 1-30 also available at the following URL:

<http://www.cdc.gov/mmwr/preview/mmwrhtml/00049162.htm>

¹⁷ Morbidity and Mortality Weekly Report (MMWR), July 1, 1994 /43(25) pp 465-467 also available at following URL:

<http://www.cdc.gov/mmwr/preview/mmwrhtml/00031797.htm>

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Injury Surveillance Workgroup. *Consensus Recommendations for Using Hospital Discharge Data for Injury Surveillance*. Marietta (GA): State and Territorial Injury Prevention Directors Association; 2003.

<http://www.stipda.org/documents/hdd.pdf>

²¹ Ibid.

²² Ibid

²³ The Centers for Medicare and Medical Services and the National Center for Health Statistics’ “ICD-9-CM Official Guidelines for Coding and Reporting: <http://www.cdc.gov/nchs/data/icdguide.pdf>).