Consensus Recommendations for Surveillance of Falls and Fall-Related Injuries





Report from the Injury Surveillance Workgroup on Falls (ISW4)

ISW4

STIPDA

Consensus Recommendations

For Surveillance of

Falls and Fall-Related Injuries

August 2006

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Injury Surveillance Workgroup on Falls
State and Territorial Injury Prevention Directors Association

The Injury Surveillance Workgroup on Falls (ISW4) and the development of this report are made possible through cooperative agreement U50/CCU423402 from the National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Recommended Citation

Injury Surveillance Workgroup on Falls, *Consensus Recommendations for Surveillance of Falls and Fall-Related Injuries*. Atlanta (GA): State and Territorial Injury Prevention Directors Association, 2006.

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Executive Summary

The *Consensus Recommendations for Surveillance of Falls and Fall-Related Injuries* is the latest in a series of guidelines issued by a national, collaborative workgroup to improve standardization in the collection of injury data. This report was prepared by the Injury Surveillance Workgroup on Falls (known as ISW4), which examined over twenty healthcare and related data sources that can be used to monitor falls and associated injuries in national, state and local jurisdictional levels. During regular meetings that began in April 2004, the Workgroup crafted standard definitions, examined existing databases in various stages of development, and considered the needs of a variety of users of fall injury data.

The standard definitions proposed for "fall" and "fall-related injury" are:

> *Fall:* An event which results in a person coming to rest on the ground or other lower level precipitated by a misstep such as a slip, trip, or stumble; from loss of grip or balance; from jumping; or from being pushed, bumped, or moved by another person, animal or inanimate object or force.
>
> *Fall-related injury:* An injury precipitated by a fall (as defined above) and caused by striking an injury-producing surface.

The five recommendations, summarized below and described in full in Section V, address two broad issue areas:

> *Fall Injury Surveillance* [Recommendations 1-3]—basic surveillance to be conducted at all jurisdictional levels using death and hospital discharge data; additional surveillance of falls and fall-related injuries in ambulatory, long-term care and community settings using widely, but not universally available datasets; and use of additional data sources available only at the national level.
>
> *Surveillance Capacity* [Recommendations 4-5]—standardization in data collection and policy; and further research support to improve future surveillance of falls and fall-related injuries.

Recommendation 1: Core Surveillance
At a minimum, all states, territories and other jurisdictions should conduct basic surveillance of fall-related deaths and injuries by:

a. Analyzing death certificates to monitor trends in all deaths from falls
b. Analyzing hospital discharge data to monitor trends in all fall-related hospitalizations
c. Using three indicators of fall injury to monitor the impact of this condition in populations
   - Unintentional fall-related deaths
   - Unintentional fall-related hospitalizations
   - Hip fracture hospitalizations in persons ages 65 years and older

Recommendation 2: Expanded Surveillance
Whenever possible, states, territories and other jurisdictions should expand surveillance to deepen their understanding of fall-related injuries in:

a. Hospital emergency department using Hospital Emergency Department Data Systems
b. Long-term care facilities using the Centers for Medicare and Medicaid Minimum Data Set for Nursing Homes (MDS-Nursing Home)
c. Workplaces using Census of Fatal Occupation Injuries (CFOI), and the Survey of Occupational Injuries and Illness (SOII),
d. Pre-hospital (emergency medical or ambulance) services using the National Emergency Medical Service Information System (NEMSIS)
e. Communities using the Behavioral Risk Factor Surveillance System (BRFSS).

Recommendation 3: Monitoring with National Databases
States should use selected national data sources (when state data are not available) to establish baselines and benchmarks and to compare trends. Five suggested sources for this purpose are:

Hospital Inpatient Records: National Hospital Discharge Survey (NHDS) and Healthcare Cost and Utilization Project-Nationwide Inpatient Sample (HCUP-NIS)

Emergency Department Records: National Electronic Injury Surveillance System-All Injury Program (NEISS-AIP), National Hospital Ambulatory Medical Care Survey-Emergency Department Component (NHAMCS-ED), and the National Electronic Injury Surveillance System–Work Injury and Illness Study (NEISS-WIIS)

Household Surveys: National Health Interview Survey (NHIS).

Recommendation 4: Standardization
Leadership is needed at national and state levels to establish appropriate standards and policies for consistent collection of data on injuries, including fall-related injuries. Such leadership should facilitate standardization and policy setting to:

- Ensure that external cause of injury (ECI) codes from the International Classification of Diseases (ICD) are collected on all medically treated injury cases.
- Ensure that a standard set of data elements is established in medical records and promoted for collection of more complete and detailed information about injury circumstances of falls.
- Solidify the capacity of the BRFSS to collect community data on the incidence and prevalence of personal risk factors for falls and fall-related injuries.

Recommendation 5: Fall Surveillance Research
Research should be pursued to determine and improve the usefulness of various methodologies for identifying and tracking falls and fall-related injuries and associated co-morbidities across a spectrum of healthcare delivery systems.

The ISW Initiative

In September 1999, the State and Territorial Injury Prevention Directors Association (STIPDA) published a report, Consensus Recommendations for Injury Surveillance in State Health Departments.[1] This document was the first product of a workgroup formed to address a major injury surveillance issue area, and the group became known as the Injury Surveillance Workgroup (ISW). In its consensus report, the ISW recommended a set of state surveillance capacities for injury prevention programs in different phases of development. They further identified 14 specific injuries and injury risk factors to be placed under surveillance by all states and 11 specific data sets to be used to monitor them. This report did not make recommendations regarding surveillance of falls and fall injuries because of the complexities and challenges of this condition.

Since publication of this landmark document, additional Injury Surveillance Workgroups (often with additional state and federal representatives) have been convened to address specific aspects of the *initial* injury surveillance recommendations. ISW2 assessed the methods of two survey data sets used by state surveillance systems: the Behavioral Risk Factor Surveillance System (BRFSS) and the Youth Risk and Behavior Surveillance Survey (YRBS). ISW3 examined the use and limitations of hospital discharge data systems for injury surveillance, and recommended a minimum standard for monitoring injury hospitalizations.

The Injury Surveillance Workgroup on Falls (known as ISW4) now joins this tradition as the third initiative spawned since the first document. The Workgroup's 14 members represented expertise and experience in both surveillance and prevention of falls and fall-related injuries at the state and national levels. Its members included individuals representing the four sponsoring organizations: STIPDA, the Council of State and Territorial Epidemiologists (CSTE), the National Center for Injury Prevention and Control at the Centers for Disease Control and Prevention (NCIPC/CDC), and the Society for the Advancement of Violence and Injury Research (SAVIR), formerly the National Association of Injury Control Research Centers (NAICRC). Through monthly conference calls starting in April 2004, and one face-to-face meeting in August 2005, ISW4 explored the issues and challenges posed to the injury prevention community regarding the collection and analysis of statistics on falls and fall-related injuries.

This report reflects the findings and recommendations that emerged from the ISW4's deliberations. It is the Workgroup's sincere hope that these recommendations will improve the understanding of falls and fall-related injuries in the United States and lead to more effective preventive strategies and policies.

I. Introduction

Risks for a falls occur in every setting—home, workplace, schools, recreation and transportation locales, and other healthcare facilities—and all persons are exposed to them. These diverse locations cover the full spectrum of an individual's life. An uncountable but vast number of falls do not lead to an injury, but even some of these falls require a person to seek assistance to return to an upright position. Furthermore, in some situations one fall incident is a mark of elevated risk for future falls.

The populations at high risk for falls need to be clearly identified and targeted by prevention programs. In this regard, the role of intrinsic personal health factors, as well as environmental hazards that increase the likelihood of a fall and a resulting injury, must be well described. Often noted is the high incidence of older adults (65 years and over) who sustain fall-related hip and wrist fractures. This is an increasing concern as the nation's population ages, in part because a serious injury from a fall may be the first step on a path of continued decline in health and loss of independence.

Because falls are so common, and because they lead to many different outcomes, the surveillance of fall-related injuries is an exceedingly complex endeavor. The wide variety of situations that can lead to falls and fall-related injuries requires that information from many sources be drawn together to fully monitor the impact of these injuries on the population at national, state and local levels. Furthermore, population groups with increased fall risk—such as older adults, children under 5 years, persons exposed through activities with high risk for a fall, and those with chronic conditions—also need to be characterized and monitored for prevention purposes.

The public health importance of falls and fall-related injury has been recognized by the U.S. Department of Health and Human Services, and highlighted for surveillance and prevention through two national *Healthy People 2010* objectives[2]:

15-27	Reduce deaths from falls
15-28	Reduce hip fractures among older adults (greater than 64 years old).

In addition, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), which is responsible for evaluating the quality and safety of care in more than 15,000 healthcare organizations, adopted as one of its 2006 Patient Safety Goals:[3]

Goal #9	Reduce the risk of patient harm resulting from falls.

(See Appendix A for the full set of *Healthy People 2010* objectives and JCAHO Patient Safety Goals and requirements that relate to fall and fall-related injuries.)

In its deliberations, the ISW4 used for its work the standard CDC definition of public health surveillance that is "…the ongoing, systematic collection, analysis, interpretation, and

dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve the health…" of the population.[4-6]
The ISW4 defined a broad domain to accommodate "real world" situations where only very limited information about a fall or fall-related injury may be available. Capturing all likely fall cases is given high importance, even if some will be excluded when tighter criteria are applied in the data analysis process.

Particular attention is paid to the differences in the data needs and perspectives between public health surveillance of injuries from falls and those in clinical and other specialized settings. For surveillance purposes, centrally collected health data—primarily from death records and clinical settings such as hospitals, emergency departments (ED) and other healthcare providers of ambulatory treatment for falls—are promoted to "paint" an overall picture of the falls in the population as a whole within a state or the nation. Data from these sources can help shape community-based interventions.

In addition, those who serve defined sub-populations need data to monitor the occurrence of fall-related injuries for client management, quality control and specialized prevention activities appropriate to their environments. These sub-populations include persons

- transported by Emergency Medical Services or ambulances to clinical care, or in some cases provided services on site without subsequent transportation;
- eligible for inclusion in a trauma registry after receiving ED services for a very severe injury;
- treated and managed by long-term care providers via nursing homes, rehabilitation facilities, and home health agencies;
- injured in the workplace (occupational injuries); and
- injured in sports and recreational settings.

The goal of surveillance in each of these settings is the most precise characterization of the circumstances leading to the incident and the establishment of the most effective policies and interventions to prevent falls from occurring.

A review of definitions for *fall* and *fall-related injury* in the literature and commonly used surveillance data sources revealed similar conceptualizations for these two terms. The ISW4 thus adopted the following definitions, which it recommends for public health surveillance purposes:

> ***Fall:*** An event which results in a person coming to rest on the ground or other lower level precipitated by a misstep such as a slip, trip, or stumble; from loss of grip or balance; from jumping; or from being pushed, bumped, or moved by another person, animal or inanimate object or force.
>
> ***Fall-related injury:*** An injury precipitated by a fall (as defined above) and caused by striking an injury-producing surface.

With these definitions as its foundation, the ISW4 offers this report for state and national health organizations to apply in monitoring falls and fall-related injuries. The recommendations in this report aim to guide *collectors* of fall and fall-related injury data, especially in the states; *care givers* in medical and long-term care settings who document the occurrence of falls and associated injuries; *users* of these data for prevention and more effective clinical interventions; *evaluators* of fall prevention interventions; and *policy makers* concerned with a variety of issues ranging from providing medical treatment after a fall has occurred to improving the control of situations with elevated risk for a fall in order to prevent their occurrence in residential and commercial places, work and recreational environments, and any other community settings. The focus is on establishing a consistent approach to tracking both fall events and their outcomes. A firm statistical base is imperative if effective prevention strategies and policies are to be supported, tested and promulgated.

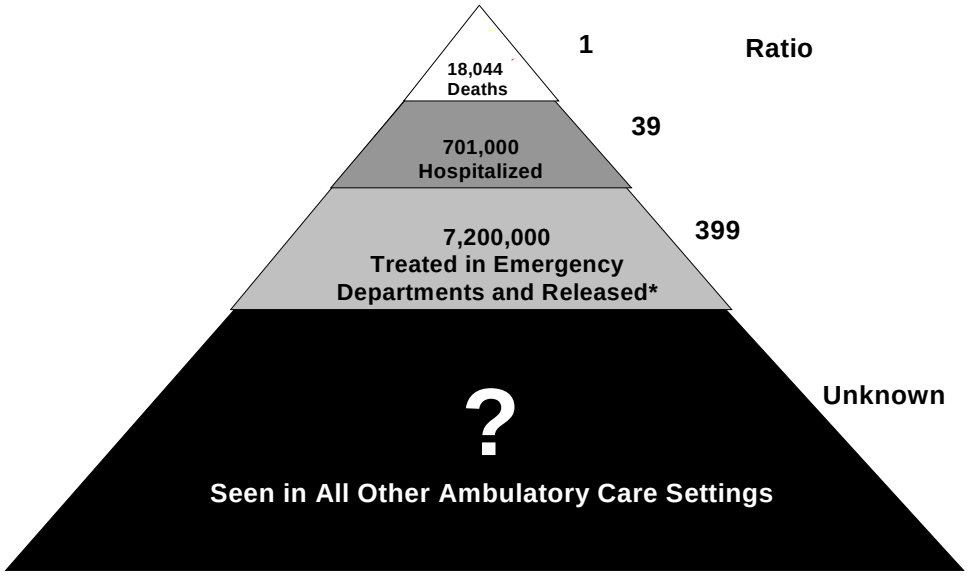
II. Public Health Burden of Falls

Fall injuries represent an enormous burden to individuals, society and the healthcare system. Information on falls in different populations, the underlying causes and circumstances, and the impact of differences by age and gender begins to characterize this burden. Understanding these differences and obtaining information about the location and events preceding a fall-related injury are vital to treatment as well, as identifying high-risk behaviors and situations, and developing effective interventions to prevent falls.

A. Numbers, Rates and Costs

In 2003, 18,044 U.S. residents lost their lives from falls. These fall-related deaths, however, represent only a fraction of the public health burden because many more people experience nonfatal injuries from a fall. (Figure 1) That same year, fall-related injuries were responsible for an estimated 701,000 hospitalizations or transfers for specialized medical care. (This estimate only represents those who were initially treated in a U.S. hospital emergency department.) In addition, falls led to nearly 7.2 million emergency department visits for which patients were treated and released. An even larger but unknown number of persons were treated for fall-related injuries in other ambulatory settings or sought no medical treatment. Overall incidence of fatal and non-fatal fall-related injuries numbered 11,567,000 in 2000. Medical costs alone for these injuries run over 26.9 billion dollars (all costs are in 2003 dollars).[7]

Figure 1. Injury Pyramid for Falls, United States, 2003

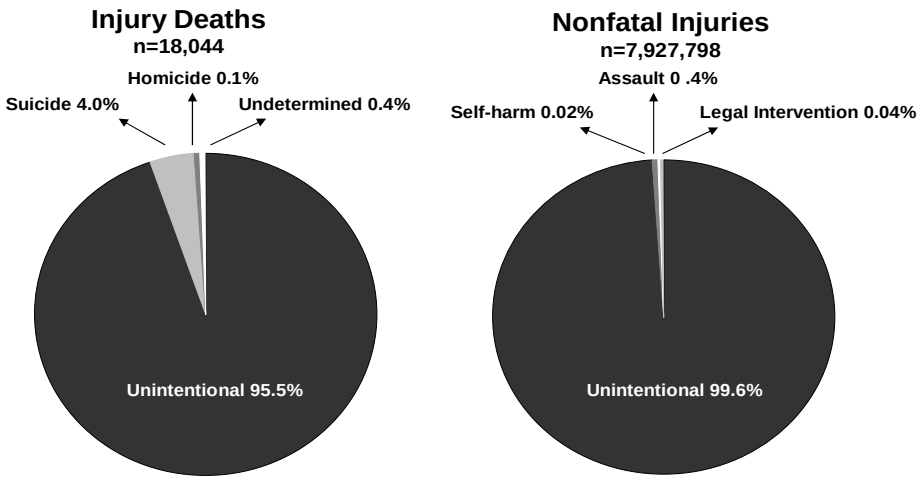


***Excludes 64,716 Observed/Left Without Being Seen/Unknown**

Sources: For deaths, 2003 National Vital Statistics Systems, NCHS; for non-fatal injuries, 2003 National Electronic Injury Surveillance System – All Injury Program, CPSC

Almost all fatal (95.5%) and nonfatal (99.6%) fall-related injuries are associated with unintentional circumstances.[8] (Figure 2) This distribution differs from all injury causes for which unintentional injuries account for about 65 percent of injury-related deaths and 93 percent of nonfatal injuries treated in U.S. hospital EDs.[9]

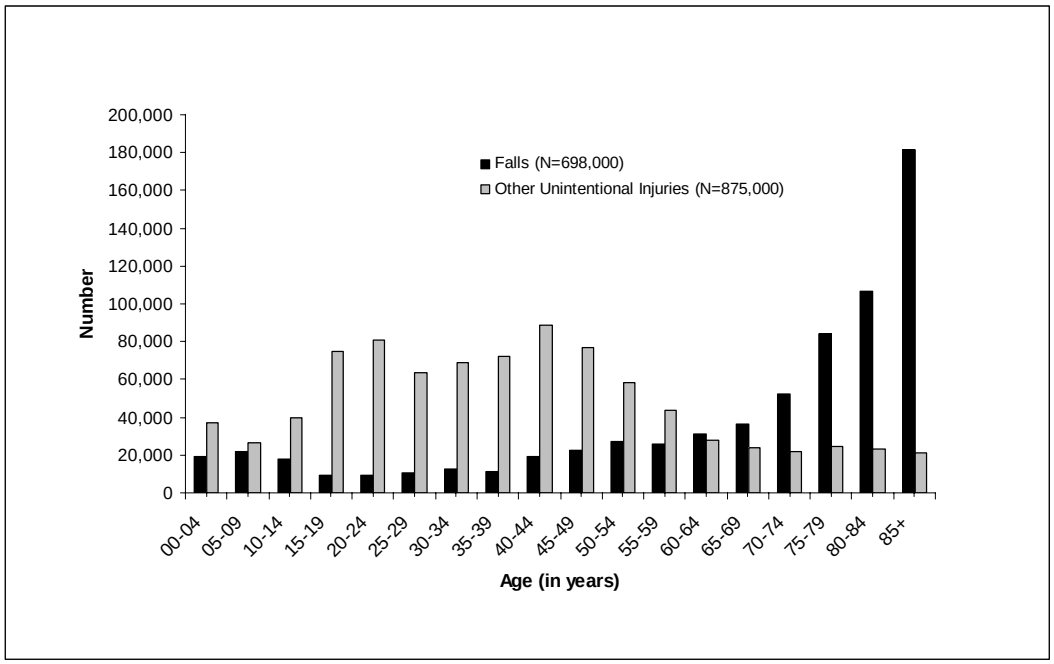
Figure 2. Fatal and Nonfatal Fall-Related Injuries by Intent of Injury, United States, 2003



Sources: For deaths, National Vital Statistics System, 2003, National Center for Health Statistics; for nonfatal injuries, National Electronic Injury Surveillance System – All Injury Program, 2003, US Consumer Product Safety Commission (CPSC), using WISQARS™, National Center for Injury Prevention and Control (NCIPC), CDC

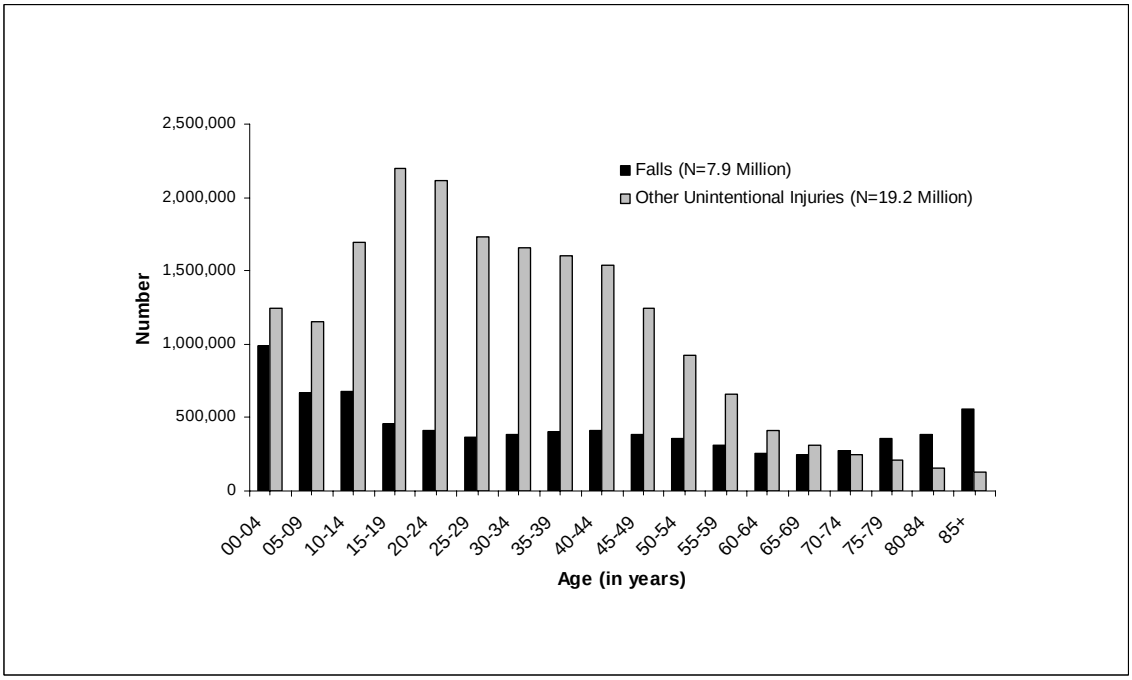
Among all causes of injury in 2003, falls were the fourth leading cause of injury-related death overall and the leading cause for persons aged 75 years and older. Falls also are the leading cause of nonfatal injuries leading to hospitalization or treatment in hospital EDs. Figures 3 and 4 examine non-fatal, unintentional injuries treated as hospital inpatients and as hospital emergency departments (ED) visits, respectively. In each figure, falls are compared to all other injuries, demonstrating the very different patterns in the numbers of these injuries. Falls are consistently highest among the youngest and oldest age groups while other injuries peak in the early to mid-adult age groups.

Figure 3. Nonfatal Fall-Related Injuries Compared to All Other Nonfatal Unintentional Injuries for Persons Hospitalized or Transferred for Specialized Care, United States, 2003



Source: National Electronic Injury Surveillance System – All Injury Program, US Consumer Product Safety Commission (CPSC), using WISQARS™, National Center for Injury Prevention and Control (NCIPC), CDC

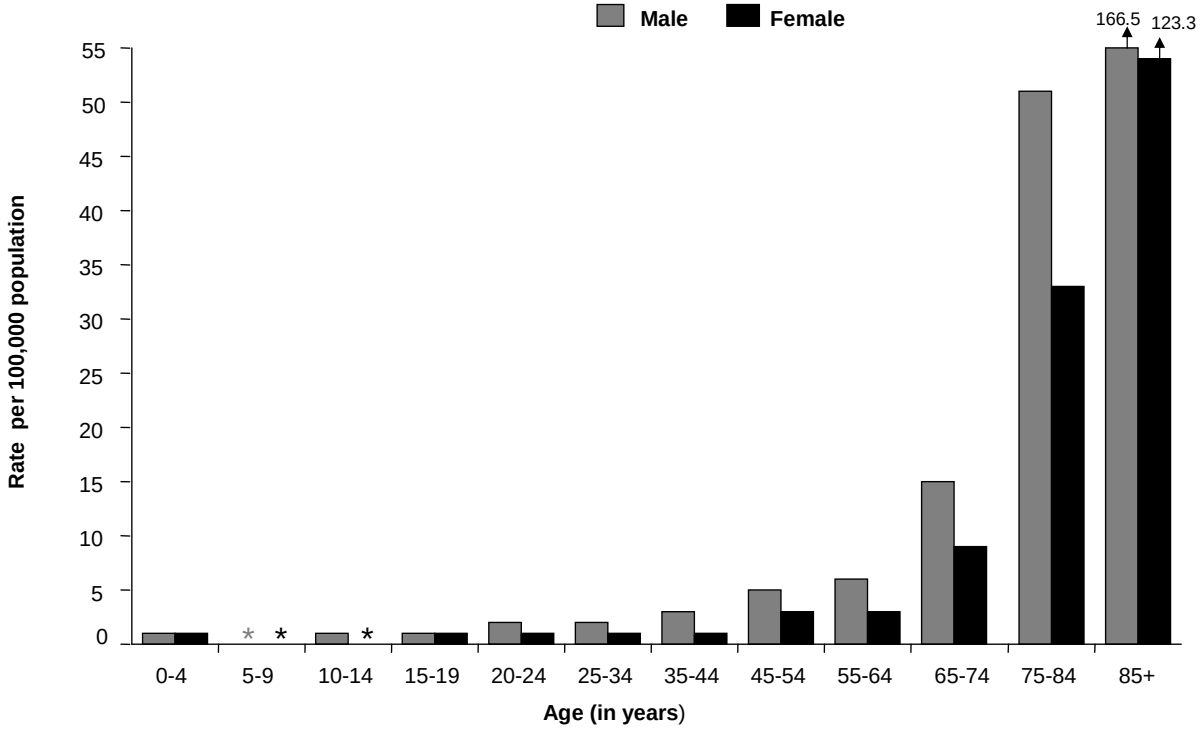
Figure 4. Nonfatal Fall-Related Injuries Compared to All Other Nonfatal Unintentional Injuries for Persons Treated in Hospital Emergency Departments Visits, United States, 2003



Source: National Electronic Injury Surveillance System – All Injury Program, US Consumer Product Safety Commission (CPSC), using WISQARS™, National Center for Injury Prevention and Control (NCIPC), CDC

Age-specific fall-related death rates increase with age, and the increase is consistently greater for males than females. Of these, the highest rates are observed in persons 85 years and older at 166.5/100,000 population for males and 123.3/100,000 for females. (Figure 5) In contrast, nonfatal fall-related injuries by age and sex form a J-shaped distribution. The highest rates were found at the ends of the age spectrum in two age groups: males aged four years and younger and females aged 85+ years.[10] (Figure 6) Notably, the female hospitalization rate exceeds that of males from age 20 upward. Two population groups stand out as being at particularly high risk: 1) children, especially boys aged 14 and younger; and 2) adults over 75 years of age.

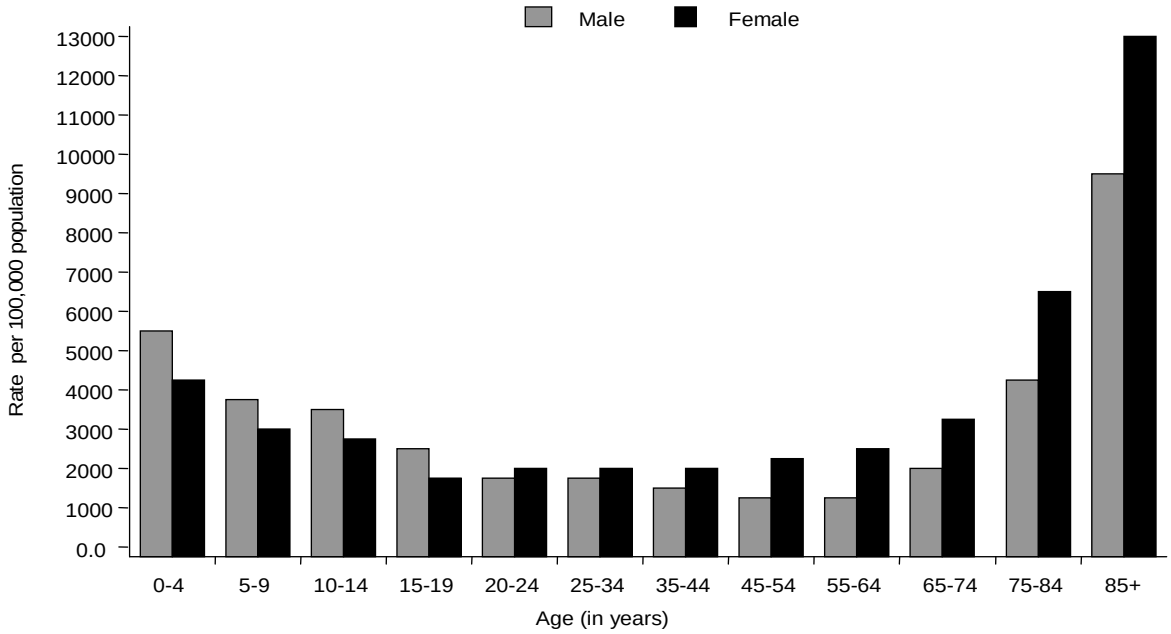
Figure 5. Fall-Related Age-Specific Death Rates by Sex and Age, United States, 2003



•Rate not reliable; based on fewer than 20 deaths
•Data Source: National Vital Statistics System, 2003, National Center for Health Statistics.

*For persons 85 years and over, the fall-related hospitalization rate is about three times higher than that for any other corresponding age/gender group.

Figure 6. Nonfatal Fall-Related Age-Specific Injury Rates by Sex and Age, United States, 2003



*National estimates of nonfatal injuries treated in U.S. hospital emergency departments.
Data Source: NEISS All Injury Program, 2003, operated by CPSC in collaboration with NCIPC, CDC

B. Patterns of Fall Causation

Understanding detailed differences in fall mechanisms by age and environmental setting can be useful to differentiate risk factors for population subgroups targeted by injury prevention programs.

By Age:

Children and Youth Ages 0-19 Years

In children, fatal falls are not common; however, nonfatal falls account for over half of all nonfatal injuries. The types of falls resulting in injuries generally mirror the developmental stage and activities of growing children. For babies and toddlers, falls are most frequently associated with nursery products such as furniture and walkers.[11] Infants fall from beds and other furniture, on floors and on stairs. Toddlers (ages 1-4 years) fall from beds and furniture, from buildings, and from playground equipment. Older children experience more slipping, tripping or stumbling; these injuries often occur in sports or recreational activities as well as on playgrounds. Each year more than 200,000 children under age 15 are treated in emergency departments for playground falls. Most of these injuries occur at public or school playgrounds and are associated with

climbing equipment, slides and swings. The most serious injuries among young children who fall involve the head/neck, arm/hand and leg/foot.[10, 12, 13]

Adults Ages 20-64 Years

Characterizing fall injuries for the middle years is more difficult, since information on locations and mechanism of injury is often not specified on death certificates, or on the records for non-fatal, medically treated injuries. Because this age group constitutes the vast majority of the workforce, many of the fall injuries are occupationally related. More than half of all unintentional fall deaths occur in the home, primarily on steps or stairs followed by falls from slipping, tripping or stumbling, and the death rates increase with age. Males experience more falls on steps and stairs, falling from ladders, or from or out of a building. Females experience a larger percentage of fatal falls from slipping, tripping or stumbling.[14]

Adults Ages 65 and Older

Among adults ages 65 and older, falls are the leading cause of injury deaths and the most common cause of nonfatal emergency department visits and hospitalizations. In 2003 more than 13,800 people over age 65 died of fall-related injuries, over 1.8 million older adults were treated in emergency department and more than 461,000 were hospitalized. An estimated one in three older adults living in the community fall each year. Those living in institutions fall at three times that rate. As many as 25 percent of institutional falls result in fracture, laceration or need for hospital care. Some studies have found that around 10 percent of falls end up with a serious injury. Since the 1970s, studies have documented that patient falls in hospitals and long-term care settings are high-risk, high volume, high cost adverse events contributing to morbidity, mortality, decreased quality of life and premature nursing home placement.[15]

The fear of falling is an additional risk factor. Research is conclusive that persons, as they age, become afraid of falling, irrespective of a history of previous falls. This fear occurs in 40 to 70 percent of recent fallers in long-term care situations and 20 to 46 percent of those without recent falls. This concern about falling can lead to alteration in self-esteem, daily activities, mental health, and change in functional independence and quality of life, and subsequently to an increase in fall frequency and even the need for more medical care and services. Some national studies have shown that half of the older adults with hip fractures cannot return home or live independently after their injury. Older adults who fall are also more likely to be admitted to a nursing home.[17-19] These events often place unanticipated financial, social, and psychological burdens on family members.

Hip fractures and traumatic brain are the most serious fall-related injuries in older adults. In addition to hip fractures, fractures to the vertebrae, leg, ankle, pelvis, upper arm and hand are common.[16, 19, 20]

The increase in fall-related injury with age in both males and females have been associated with a number of identified risk factors. These include natural changes that are part of aging (e.g. decreases in vision, strength, cognition, balance and flexibility); chronic health problems;

specific physical and functional impairments; alcohol and multiple medication use; and environmental hazards in the home.[15]

By Setting:

Home and Institutional Settings

Fall injuries and their consequences in homes, hospitals and long-term care settings, as discussed earlier in this report, contribute to significant morbidity, mortality, and decreased quality of life. For instance, based on 2001-2004 data from the National Electronic Injury Surveillance System – All Injury Program (NEISS-AIP), at least 46 percent of an estimated 7,750,000 unintentional fall injuries treated in U.S. hospital emergency departments occurred in the home annually.[20]

Occupational Settings

Falls are a significant problem in the workplace, and are the second leading cause of work-related deaths. In 2004 the Bureau of Labor Statistics system reported 815 fatal falls at work, the highest annual number since 1992. Thirty-eight percent of these deaths were due to falls from roofs or ladders. Falls also contribute significantly to non-fatal workplace injuries and lost-work time, accounting for almost 20 percent of the 1.3 million nonfatal occupational injuries and illnesses reported in 2003. Falls to a lower level result in a median absence from work of 15 days.[21-24]

Sport and Recreational Settings

From 2001 to 2004, 108,500,000 unintentional injuries were treated in U.S. emergency departments; about 16,300,000 (15%) of these injuries were caused during sports or other recreational activities. The proportion of sports and recreational injuries caused by falls was between 16 percent and 45 percent, depending on age group (25% for all ages combined).[21]

III. Challenges of Fall Surveillance

Numerous challenges arise in the effort to measure and track injuries from falls in a consistent manner. These are summarized in this section. An understanding of these challenges helps to appreciate the complexities of identifying, classifying and analyzing information from existing data sources.

Falls and Their Relationship to Fall-Related Injuries

Only some falls cause an injury serious enough to require medical treatment; many result in "near-misses" or in non-injury falls. Injuries from some falls manifest themselves much later or may be confounded with other conditions. For example, a fall may contribute to the eventual death of an older person with heart disease, but that association may be hard to assess or may not be recorded in medical or death records. Similarly, if a fall results in an intracranial bleed but no visible hematoma, that fall may never be recorded in the medical records. In addition, a pattern of repeated falls may predict the likelihood of an eventual fall-related injury, or serve as a signal to bring in preventive action. Furthermore, some falls do not cause injury but require the person who fell to receive outside assistance in returning to an upright position; in some of these cases, safety personnel such as Emergency Medical Services are called on to provide this assistance.

Intent and Circumstances of Injuries Associated with the Fall Mechanism

Among all injuries, falls are one category of "mechanism" or "cause." They can be described further with respect to: 1) intent, i.e. unintentional (often called "accidental") or intentional as in an assault or attempted self-harm and 2) the circumstance(s) that leads to a fall, e.g. slip or trip on same level, fall from ladders. Unintentional falls comprise the overwhelming majority of fatal and non-fatal episodes. Intentional falls are either self-inflicted, such as a suicide attempt by jumping, or related to an assault in which action by another person purposely initiated the fall.

The circumstances leading to a fall-related injury are well-described in both the literature and some are incorporated in the major medical care coding systems. Additional information on factors not usually captured in these coding systems can be helpful to more fully describe the injury event. Such factors include height or distance of the fall, and the characteristics of the surface on which the person landed (ground; floor covering such as wood, tile, carpet; piece of furniture; etc.). Use of protective equipment (hip, elbow or knee pads, helmets, bed rails) also would be a valuable expansion in describing fall circumstances. Furthermore, a combination of factors may be involved in a fall-related injury. Some data collection systems recognize this complexity by recording more than one mechanism or by recording precipitating causes (i.e. the cause that started the chain of events) that then lead to the immediate cause of the fall-related injury. For example, if a person fell and hit his or her head on the wall, the fall would be the precipitating cause and the immediate cause would be a struck by/against the wall.

Although determining circumstances and intent of a given fall may be difficult, this information is crucial to characterizing the conditions that lead to falls and provide guidance for prevention. Falls occur in all settings—the home (including institutional residences), workplace, school, recreational/sports and transportation locales.

Contributing and Associated Factors
In addition to the immediate circumstances that lead to a fall-related injury, a number of conditions can, if present, contribute to or increase the risk of such an injury. These are particularly important for prevention and case management purposes because they indicate when a person has elevated risk factors and should consider making changes in life style or living situation, or when to increase the monitoring of that person's activities. A major challenge is to document the contribution of these conditions to a fall or related injury. In some situations determining the role or sequence of predisposing factors may be difficult. An often-noted example is a hip fracture in a person with osteoporosis in which the order of precipitating events may be that bone fractured under some change in tension or position leading to the fall rather than the reverse.

Below are listed several types of contributing factors:

- *Predisposing medical conditions:* A variety of medical conditions and the use of certain medications can produce effects such as impaired balance, reduced visual cues, gait instability, etc. Other important factors are whether alcohol or non-prescription drugs may have contributed to the fall. This situation is often associated with medical conditions such as myocardial infarctions, strokes and fainting, which can themselves lead to a fall and subsequent injury; in some data systems these other conditions are given priority over the fall or even preclude documentation of the occurrence of a fall.

- *Predisposing environmental conditions:* Environmental factors that are frequently associated with falls include uneven walking surfaces, gravel or icy walkways, loose rugs on floors, lack of handrails, poor lighting, a mix of lighting and floor surface patterns that obscure the presence of steps, slippery sport or recreational areas, etc. Use of an assistive device such as a cane or walker can also increase fall risk.

- *Falls associated with transportation injuries:* In some data systems fall injuries related to transportation or traffic are coded as transportation injuries rather than falls *per se*. For example, when a pedestrian falls or a passenger falls in a bus or while trying to board a train, the event may be coded as a transportation-related fall or simply as an unspecified transportation injury. Data users interested in these fall situations will need to examine the recording and coding procedures carefully..

Technical Issues of Data Quality, Completeness and Quality Control
In its review of fall and fall-related injury data needs and the examination of available data sets, the ISW4 identified a variety of technical problems affecting data quality. Several examples are listed below:

- *Inadequate documentation of falls and their circumstances in source documents:* Medical records and other source documents often lack detailed descriptions of the circumstances associated with falls. Information is rarely recorded about the detailed circumstances of the fall, location where the fall occurred, other medical conditions, previous falls and other relevant details. The absence of this information precludes either identifying the fall

in general or selecting a more detailed External Cause of Injury (ECI) code to describe the injury. This results in the mechanism of injury being coded as "unspecified" in many medical records and contributes to under-reporting, inaccurate case ascertainment and inconsistency or lack of standardization in the surveillance data.

- *Undercounting of poorly documented fall injury:* Some data systems fail to record enough information to identify and characterize falls. For example, in some states, International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) ECI are not applied to all hospital discharge or emergency department patient records.

- *Over-reporting of fall injury identified in a medical provider source without clinical evidence:* For example, some persons found on the floor or on the ground are classified as "fall injuries" However, often in this situation the neither the medical record or the data set provides corroborating information or any indication of a related injury.

- *Under-reporting of fall-injury related deaths:* In the past acute health problems sometimes appeared to receive precedence over injuries on death certificates. In fact, the sequence of causes as reported by the certifier of a death will usually determine whether an acute medical condition or an injury is listed as the underlying-cause. This issue was addressed by the National Center for Health Statistics (NCHS) effective January 2006 with a change in technical instructions to coders in health departments. The expected result is that that fewer cases with an identified injury will be have a non-injury condition listed as the underlying cause, thereby reducing the under-reporting.

Medical record coders are trained to code only what appears in the records, without making inferences. Data analysts can help users of their analyses by prominently noting the limitations in their reports. Additional gaps lie in establishing consistent, standardized collection of information to improve identification of the causal factors.

Surveillance vs. Research Data Collection and Analysis

Since the task of ISW4 is to provide guidance on surveillance of falls and fall-related injuries, this report focuses on the use of data systems and data elements that are readily available and in a reasonably standard format. Often the surveillance data come from systems designed for purposes other than recording details on the injuries themselves. For example, hospital billing systems are primarily designed for fiscal purposes, and death certificates for legal documentation. Consequently, data from such systems are often incomplete with respect to valuable details describing the fall.

Because so much valuable surveillance information is obtained from secondary sources, ISW4 recognizes the importance of in-depth research studies. In some contexts, cases derived from secondary sources can be identified for follow-up to get additional details. Therefore, surveillance systems need to include sufficient case identifiers to permit research studies to follow-up on cases.

Variety of Data Users

Another challenge is meeting the needs of the data users. A wide variety of individuals and groups at national, state and local levels collect or use fall and fall-related injury data for purposes ranging from statistical reports to grant applications, justifications for funding, evaluation of interventions, and designing prevention programs and fact sheets. Some frequent data users and typical applications of data are highlighted in Table 1. All of them face challenges in their efforts to measure and track injuries from falls in a consistent manner. An understanding of these challenges helps to appreciate the complexities of using existing data sources and suggests future directions for surveillance, evaluation, research, and policymaking. Ultimately, the value of surveillance lies in its ability to drive and shape programs that truly reduce falls and fall-related injuries.

Table 1. Range of Data Consumers and Uses

DATA CONSUMERS	SOME COMMON USES
Injury surveillance programs at CDC, other federal agencies, state, local and tribal health departments, universities and other institutions	• Create standardized data reports • Monitor trends in falls, fall-related injury and death • Characterize persons at risk of a fall or fall-related injury • Identify and test the efficacy of intervention and prevention strategies • Identify appropriate target populations for interventions • Evaluate the effectiveness of the interventions
General injury prevention programs in state and local health departments, and non-governmental, community-based organizations	• Raise awareness of the problem of falls and its human and economic impact • Design, implement and evaluate fall prevention programs • Identify high-risk groups for whom intervention programs may be most effective
Specific prevention programs in state, local and community-based agencies, e.g.: *Recreation/Physical activity* *Disability prevention* *Seniors* *Youth (e.g. Safe Kids coalitions)* *Brain Injury*	• Include falls prevention guidance in program materials • Help persons with disabilities manage adverse outcomes of their condition (e.g. traumatic brain injury, severe burn) • Design disability prevention plans • Educate about how to avoid future falls and other injuries • Establish home fall prevention design and retrofits (grab-bars, ramps, increased lighting, etc.) • Design safe child care facilities • Develop fall prevention curricula for implementing best practices and train trainers to teach these in communities
Clinicians and institutional administrators	• Justify specialized service units such as hospital-based fall clinics • Provide physical and occupational therapy to modify fall risk factors • Advocate or arrange for modifications in the home/residence to reduce the risk of a fall • Design falls prevention education for health care professionals • Increase medication review and management for older adults
Occupational health programs	• Reduce falls in workplace and save costs • Reduce workers compensation and insurance premiums
Advocacy groups and policy makers	• Develop legislative initiatives for fall prevention • Garner financial allocations for fall and fall-related injury prevention programs, e.g. home retrofits, sports helmets • Promote the importance of fall prevention to audiences not traditionally engaged with injury prevention, e.g. architects, home builders and remodelers; businesses that produce products that prevent or reduce falls
Researchers	• Develop and implement research projects to establish best practices • Study technical and data quality problems in data sets to improve accuracy of standard statistics on falls

IV. Methods and Sources for Identifying Fall-Related Injuries

Several well-established methods are used to identify fall and fall-related injuries for surveillance and other statistical analyses. These include:

A. International Classification of Diseases (ICD)
B. Coding Schemes in Specialized Contexts
C. Community Survey Questions

Each is described below. (See Appendix B for additional methods that are under development.)

A. International Classification of Diseases

The *International Classification of Diseases (ICD)* is a classification system, with over 100 years of use, designed to promote international comparability in the collection, processing, categorization, and presentation of mortality and morbidity statistics. The World Health Organization (WHO) maintains the system and publishes the ICD. In the United States, it is used to classify the underlying and contributing causes of death from information found on the death certificate; since 1999, the tenth revision (ICD-10) is used for this purpose.[24]

An adjunct system based on the ICD, the ICD-Clinical Modification (ICD-CM), is the official system of assigning codes to diagnoses, external causes of injury, and procedures for billing medical treatment associated with hospital and other healthcare utilization in the United States. Currently the clinical modification of the ninth revision of the ICD (called for short ICD-9-CM) is used for this purpose. The clinical modification for the tenth revision of the ICD is currently under review and development and may become the standard within a few years. The National Center for Health Statistics (NCHS) and the Centers for Medicare and Medicaid Services (CMS) are the U.S. governmental agencies responsible for overseeing all changes and modifications to the ICD-CM. These are almost entirely consistent with the ICD system maintained by the WHO.

Regardless of ICD revision, two sets of ICD codes are used for identifying injury cases:

1. The **Nature of Injury codes** to document the damage done to the body (e.g. fracture) as well as the site of the injury (e.g. hip); and
2. The **External Cause of Injury** (ECI) **codes** to identify the injury mechanism (e.g. fall, motor vehicle, drowning).

Table 2 shows the codes for selecting falls and their respective labels for both ICD-9 and ICD-10. Codes listed for ICD-10-CM are still in draft form, and thus will need to be revisited once the tenth revision is formally approved and adopted. Also deserving note is a new supplementary code in ICD-9-CM that became effective October 1, 2005: V15.88 History of fall. The addition and use of this code may improve documentation of persons who are identified as having repeated falls and permit monitoring of this factor on health status over time. As no data from this code is available yet, the ISW4 is not listing it as a case identification code; however, in the future a role for the V15.88 code in fall surveillance may be justified. (See Appendix C for a more complete table, listing the codes for ICD-9, ICD-10, ICD-9-CM and proposed ICD-10-CM.)

Table 2. ICD Fall Codes and Labels for ICD-9 and ICD-10

Data Source and ID System		Fall Mechanism Codes
International Classification of Diseases (ICD)	ICD-9 & ICD-9-CM	E880-E886 E888 E957 E968.1 E987
	ICD-10 & ICD-10-CM	W00-W19 X80 Y01 Y30

Note: E887 is excluded since this code is not used in the definition of falls as an external cause of death in the external cause of injury mortality or morbidity matrices, and other accepted aggregations of ICD-9 and ICD-9-CM codes for falls. See Appendix C for further explanation.

For more information on ICD, visit the Web site www.who.int/classifications/icd/en/

B. Coding Schemes in Specialized Contexts

Occupational Injury and Illness Classification System

The U.S. Bureau of Labor Statistics developed the *Occupational Injury and Illness Classification System (OIICS)* for recording information about work-related injury and illness, both fatal and nonfatal. The American National Standards Institute adopted the OIICS as a national standard in 1995 (ANSI Z16.2-1995).

The OIICS system consists of four variables for recording data on four dimensions of a work-related injury or illness:

1. *Nature of Injury or Illness* refers to the physical characteristics of the injury or illness (e.g. laceration, fracture, tuberculosis, cancer).

2. *Source* refers to the object or substance that inflicted the injury or illness (e.g. scaffold, hand tool, truck, benzene). A separate data variable can be used to document a secondary source contributing to the injury or illness.

3. *Part of Body* refers to the body structure affected by the source (e.g. back, foot, kidneys, lungs).

4. *Event or Exposure* refers to the manner in which the source caused the injury (e.g. fall, vehicle collision, explosion, repetitive motion).

In this four-dimensional system, a fall is classified as a kind of Event or Exposure. Thus, falls can be cross-classified and described in terms of Nature of Injury or Illness, Part of Body and Source. The fall codes include some that are more common in work place than non-work

settings, such as falls from scaffolds or loading docks. Jumps have their own set of Event or Exposure codes separate from the fall codes. Falls from vehicles are coded under vehicle injuries.

Table 3. OIICS Fall Codes

Data Source and ID System		Fall Mechanism Codes
Occupational Injury and Illness Classification System (OIICS)	ANSI-Z16	10 11* 12* 13* 19

* Requires one or two additional digits to further specify type of fall.

Each code is hierarchical with four levels to permit users to code generally or specifically depending on the level of detail possible. The system has coding rules and "unlikely combination" edits to ensure consistency and quality.

OIICS was designed to be as compatible as possible with the ICD-9 CM Because the ICD system uses two main types of variables (mechanism and intent), compared to four in the OIICS comparability is necessarily partial. Furthermore the comparability that currently exists will not necessarily hold when comparing the OIICS with other revisions of the ICD. There is no straightforward way to cross-reference these rather different systems, despite their similarities.

As a work-related injury classification system, OIICS includes specific codes for some typical work-related injuries and lacks codes for some injuries that typically do not occur at work. For example, in OIICS a fall from a loading dock is coded, but not from playground equipment. OIICS Nature of Injury or Illness codes and Body Part Affected codes can be compared to ICD-9-CM diagnosis codes, although OIICS codes are much less detailed. OIICS codes for Source and for Event or Exposure can be compared to ICD of injury ECI codes. Unintentional falls are coded under Event or Exposure, with codes in the other three variables providing additional information for each injury event.

For more information, visit the Web site www.bls.gov/iif/oshoiics.htm.

Minimum Data Set for Nursing Home Resident Assessment and Care (MDS- Nursing Home)
The *Minimum Data Set for Nursing Home Resident Assessment and Care* (MDS – Nursing Home) is part of the federally mandated process of the Centers for Medicare and Medicaid (CMS) for clinical assessment of all residents in Medicare or Medicaid certified nursing homes. This process provides a comprehensive assessment of each resident's functional capabilities and helps nursing home staff identify health problems. Over 17,000 federally certified nursing homes report data to the MDS but, because of the cyclical nature of the survey, not all facilities are represented in the annual report (e.g. 15,989 facilities in the December 2005 report).

Resident Assessment Protocols (RAPs) are part of this process, and provide the foundation upon which a resident's individual care plan is formulated. The MDS-Nursing Home assessment forms are completed for all residents in certified nursing homes, regardless of source of payment. These assessments are required on admission to the nursing facility and then periodically within specific guidelines and time frames. Licensed healthcare professionals e.g. nurses, physicians, rehabilitation therapists) employed by the nursing home usually conduct these assessments. Information from the assessments is then transmitted electronically to the MDS-Nursing Home database in their respective states. Data from the state databases is forwarded to and incorporated into the national MDS-Nursing Home database at the CMS, and selected information is reported on the CMS Web site by calendar year quarters.

Two Quality Indicator questions on the MDS-Nursing Home assessment are used to identify fall cases:

QI 01. Has the resident had a hip fracture or other fracture in the past 180 days (or since the last assessment)?
QI 02. Has the resident fallen in the past 30 days?

National Emergency Medical Services Information System (NEMSIS)

The *National Emergency Medical Services Information System* (NEMSIS) is coordinated by state offices of emergency medical services. Standard EMS data are collected from ambulance run reports for injuries and other medical emergencies. The data can help assess EMS or ambulance transport times and the medical condition of the injured person upon EMS arrival at the scene and during subsequent transport to definitive care. Regarding fall-related injury, data are most useful when information about the scene or circumstances is captured, which may be identifiable through a code or recorded in a narrative field. The NEMSIS database is supported and overseen by the U. S. Department of Transportation, National Highway Traffic Safety Administration (NHTSA). In 2006 version 2.2.1 of the NEMSIS dataset was issued containing over 450 variables, of which over 80 are mandatory and are identified as “National Elements”.

Among the mandatory variables 07is “Cause of Injury” (Data Element E10_01), one of whose codes is “9550 Falls (E88X.0). This code is presented as self-explanatory, with no coding instructions. No other detail on the type of fall can be coded. However, one optional field is available to record the height of the fall.

C. Community Survey Questions

National Health Interview Survey (NHIS)

The *National Health Interview Survey (NHIS)* is a face-to-face household interview conducted on the health status of the civilian non-institutionalized population in the 50 States and the District of Columbia. In 2003, household interviews were completed for 92,148 persons living in 35,921 households. Medically attended falls are identified through verbatim text in response to:

“How did the injury happen?” and followed by these specific questions if a fall is mentioned:

- How did you fall?

- What caused you to fall?
- What activity were you involved in at the time of the injury?

This text is subsequently coded to ICD-9-CM as E880-E886, E888, E957, E968.1 and E987.

Behavioral Risk Factor Surveillance System (BRFSS)
The *Behavioral Risk Factor Surveillance System* (BRFSS) of telephone health surveys was established in 1984 by CDC and state health departments to gather information regarding health risk behaviors, clinical preventive health practices and healthcare access. The annual survey—implemented in all 50 states, District of Columbia, Puerto Rico, Virgin Islands and Guam —is obtained from a representative sample of adults (non-institutionalized persons 18 years or older). The BRFSS is the largest continuously conducted telephone health surveillance system in the world.

The 2003 survey had two fall-related questions that were asked of people 45 years or older:
- In the past 3 months, have you had a fall?
- Were you injured? (By injured, we mean the fall caused you to limit your regular activities for at least a day or to go see a doctor.)

The 2006 survey has the following very similar questions for persons 45 years or older:
- In the past 3 months, how many times have you fallen?
- How many of these falls caused an injury? (By an injury, we mean the fall caused you to limit your regular activities for at least a day or to go see a doctor.)

Similar question sets have been used nationally in other years or by individual states.

D. Data Sources

Multiple national and state-level sources have data for tracking falls and fall-related injuries. The primary sources for *mortality* data on injuries of all types, including those related to falls, are national and state death certificate files. Sources for data on *nonfatal* injuries, in general, can be categorized by the settings in which the data are collected:

Healthcare settings
- Hospital inpatient facilities
- Ambulatory care facilities (including hospital emergency departments, urgent care facilities, trauma centers, and medical offices and clinics)
- Emergency medical or ambulance services
- Long-term care facilities and home health agencies

Community settings

Occupational settings

The data elements found in each of these settings, and the quantity and quality of the information, vary considerably, depending on the purposes for which the source documents are collected, the intended use of the data, and the characteristics of the setting itself. The ISW4

reviewed more than 20 data sources for their utility in conducting public health surveillance of falls and fall-related injuries. Included in that review were both state level data systems, largely those with data residing in centralized repositories, and national data sets based on samples in order to provide: a) national level estimates that states can use for comparison purposes; and b) statistics that states can use to derive estimates when no state-level data are available. Table 4 displays the 20 data sources that the ISW 4 selected by type of setting.

Table 4. Potential Settings and Data Systems For Fall-Related Injury Surveillance

Settings for Data Collection	Data Systems	Fall Identification Method
National and State Death Records	**Death Certificates**	ICD-9 ICD-10
	Medical Examiner and Coroner Systems	(See Section VI)
	National Violent Death Reporting System (NVDRS)	(See Section VI)
Hospital Inpatient Facilities	**Inpatient Hospital Discharge Data (HDD) Sets**	ICD-9 CM
	National Hospital Discharge Survey	ICD-9 CM
	Healthcare Costs and Utilization Project–Nationwide Inpatient Sample (HCUP-NIS)	ICD-9 CM
Ambulatory Care Facilities	**Hospital Emergency Department Data Systems**	ICD-9-CM
	National Electronic Injury Surveillance System–All Injury Program (NEISS-AIP)	ICD-9-CM
	National Hospital Ambulatory Medical Care Survey–Emergency Department Component (NHAMCS-ED)	ICD-9-CM
	National Trauma Data Bank (NTDB)	(See Section VI)
Emergency Medical or Ambulance Services	**National Emergency Medical Services Information System (NEMSIS)**	NEMSIS Cause of injury code
Home Health Agencies and Long-Term Care Facilities	**Minimum Data Set (MDS-Nursing Homes)**	Quality Indicator questions
	Outcome and Assessment Information Set (OASIS)	(See Section VI)
	Uniform Data System for Medical Rehabilitation (UDSMR)	(See Section VI)
Community Settings	**National Health Interview Survey (NHIS)**	Survey questions translated into ICD-9-CM codes
	Behavioral Risk Factor Surveillance System (BRFSS)	Survey questions
	Longitudinal Study on Aging (LSOA)	(See Section VI)
Occupational Settings	**Census of Fatal Occupation Injuries (CFOI)**	OIICS
	Survey of Occupational Injuries and Illness (SOII)	OIICS
	National Electronic Injury Surveillance System–Work Injury and Illness Study (NEISS-WIIS)	OIICS

Sources noted in **bold** are included in the ISW4 recommendations in Section V. Those sources not bolded are considered to be limited in their current utility for public health surveillance of falls. Detailed descriptions of all data sources are in Section VI.

V. Recommendations for Improving Fall and Fall-Related Injury Surveillance

The ISW4, after reviewing over twenty data sources and the needs of many different groups of fall data users, recommends the use of 14 sources. The five recommendations address two broad issue areas:

A. Fall Injury Surveillance [Recommendations 1-3]
1. Core Surveillance
2. Expanded Surveillance
3. Monitoring with National Databases

B. Surveillance Capacity [Recommendations 4-5]
4. Standardization
5. Fall Surveillance Research

A. Fall Injury Surveillance

Recommendation 1: Core Surveillance
At a minimum, all states, territories and other jurisdictions should conduct basic surveillance of fall-related deaths and injuries by:

- ***a.*** *Analyzing death certificates to monitor trends in all deaths from falls*
- ***b.*** *Analyzing hospital discharge data to monitor trends in all fall-related hospitalizations*
- ***c.*** *Using three indicators of fall injury to monitor the impact of this condition in populations*
  - *Unintentional fall-related deaths*
  - *Unintentional fall-related hospitalizations*
  - *Hip fracture hospitalizations in persons aged 65 years and older*

This recommendation recognizes and builds on the current availability and characteristics of death certificates and hospital discharge data systems. Further it encourages establishment of injury indicators, defined as standard measures to monitor the societal impact of a health condition, for falls and fall-related injuries. The three indicators recommended use these data sources to track unintentional fall-related deaths and injuries.

Guidance on Implementing Recommendation 1

Recommendation 1.a. Core surveillance of fall-related deaths

Deaths are the most severe outcome from falls of all intents. All States have access to death certificate data and can therefore characterize and monitor trends in fatal falls. Fall-related deaths are identified from the underlying cause field on the death certificate, as shown in Table 5.

Table 5. Process for Identifying and Analyzing Fall-Related Deaths

Step	Action		
1. Access death certificate data	Arrange for and receive death record level file from state's vital records agency		
2. Identify fall-related deaths	Use underlying cause of death field on mortality file		
3. Include deaths with relevant underlying cause of death codes* • ICD-9 codes for 1979-1998 • ICD-10 codes for 1999 to present	**Intent** Unintentional Suicide Homicide Undetermined intent	**ICD-9** E880-E886, E888 E957 E968.1 E987	**ICD-10** W00-W19 X80 Y01 Y30
4. Select deaths for analysis	• For all deaths: include all of fall code range above based on analysis year • For other analyses of interest: include relevant part of fall code range		
5. Produce statistics	Numbers, age-specific rates for looking at subpopulations at high risk, and age-adjusted rates for trends and comparisons across populations (see Appendix D for definitions and guidance)		

*Codes used in this definition may need to be updated as new codes are introduced.

Recommendation 1.b. Core surveillance of fall-related injuries

Fall-related hospitalizations are a measure of injuries from falls that require inpatient treatment. The majority of states have centralized hospital discharge databases, and most of these databases include some level of ECI coding that will permit states to monitor trends and patterns.

Fall-related hospital discharges are a subset of all injury hospital discharges, with the principal diagnosis (that is, the diagnosis established after study to be chiefly responsible for the admission of the patient) being for an injury and having an associated ECI code for fall. The discharges are identified by the process shown in Table 6, as recommended in the ISW3 *Consensus Recommendations for Using Hospital Discharge Data for Injury Surveillance* (www.stipda.org/documents/hdd.pdf).[25] If the principal diagnosis is not specified, the one listed first on the discharge summary should be used.

Table 6. Process for Identifying and Analyzing Fall-Related Hospitalizations

Step	Action
1. Access hospital discharge data	Receive or arrange access to record level hospital discharge data file from the central repository agency in the state
2. Assess data completeness and validity	Evaluate data for completeness and accuracy per the procedures in the ISW3 report (p. 6)
3. Create a dataset of injury-related hospitalizations by including all hospitalizations with relevant ICD-9-CM codes* as the principal diagnosis (ISW3 report, p. 8)	Include Nature of Injury codes: 800-909.2, 909.4, 909.9 (Fracture, dislocation, sprains, strains, open wound, late effects of injury, poisoning, etc.) 910-994.9 (Superficial injury, contusion, foreign body, burns, injury to nervous system, etc.) 995.5-995.59 Child maltreatment 995.80-995.85 Adult maltreatment
4. Identify the subset of hospital discharges associated with a valid fall ECI code for analysis	Select the first valid code in either a separate ECI field, or another diagnosis field if appropriate Include: Unintentional falls: E880-E886, E888 Suicide: E957 Homicide: E968.1 Undetermined intent: E987
5. Select discharges for analysis	• For all falls: include all of fall code range above • For other analyses of interest: include relevant part of fall code range
6. Produce statistics	Numbers, age-specific rates for looking at subpopulations at high risk, and age-adjusted rates for trends and comparisons across populations (see Appendix D for definitions and guidance)

*Codes used in this definition may need to be updated as new codes are introduced, and following the adoption of ICD-10-CM.

Recommendation 1.c. Core surveillance of fall-related injuries using indicators

For the past few years, the NCIPC, with support from CSTE, STIPDA and other partners, has been developing standardized statistical markers on specific injuries to monitor national and state level trends. The ISW4 indicator recommendations for falls extend the work begun with the *Consensus Recommendations for Injury Surveillance in State Health Departments* prepared in 1999.[1]

Regarding deaths, the selected indicator is *unintentional fall-related deaths*. To monitor trends in fall-related injuries, two indicators are recommended: *unintentional fall-related hospitalizations* and *hip fracture hospitalizations in persons aged 65 years and older*. The choice of these indicators is based on the consideration that 99 percent of fall deaths and 95 percent of fall injury hospital discharges are unintentional (accidental), and that fall injury rates soar in the older adult population. The methodology recommended below for these indicators is congruent with the State Injury Indicators Reports[26] and the *Consensus Recommendations for Using Hospital Discharge Data for Injury Surveillance*.[25]

Table 7. Process for Identifying and Analyzing Fall Injury Indicators

Step	Action	
Unintentional fall-related deaths		
1. Access death certificate data	Arrange for and receive death record level file from state's vital records agency	
2. Identify fall-related deaths	Use underlying cause of death field on mortality file	
3. Select <u>unintentional fall</u> deaths for analysis with underlying cause of death codes* • ICD-9 codes for 1979-1998 • ICD-10 codes for 1999 to present	<u>ICD-9</u> E880-E886, E888	<u>ICD-10</u> W00-W19
4. Select deaths for analysis	For the <u>unintentional fall death indicator</u> include all deaths with an underlying cause in the above code range, based on analysis year	
5. Produce statistics	Numbers, age-specific rates for looking at subpopulations at high risk, and age-adjusted rates for trends and comparisons across populations (see Appendix D for definitions and guidance)	
Unintentional fall-related hospitalizations		
1. Access hospital discharge data	Receive or arrange access to record level hospital discharge data file from the central repository agency in the state	
2. Assess data completeness and validity	Evaluate data for completeness and accuracy per the procedures in the ISW3 report (p. 6)	
3. Create a dataset of injury-related hospitalizations by including all hospitalizations with relevant ICD-9-CM codes* as the principal diagnosis (ISW3 report, p. 8)	Include Nature of Injury codes: 800-909.2, 909.4, 909.9 Fracture, dislocation, sprains, strains, open wound, late effects of injury, poisoning, etc. 910-994.9 Superficial injury, contusion, foreign body, burns, injury to nervous system, etc.	
4. Select the hospital discharges with an <u>unintentional fall</u> ECI code for analysis	For the <u>unintentional fall indicator</u>, select all discharges with a valid code in either a separate ECI code field, or another diagnosis field: Include all discharges with codes E880-E886, E888	
5. Produce statistics	Numbers, age-specific rates for looking at subpopulations at high risk, and age-adjusted rates for trends and comparisons across populations (see Appendix D for definitions and guidance)	
Hip fracture hospitalizations in persons age 65 years and older		
1. Access hospital discharge data	Receive or arrange access to hospital discharge data file from the central repository agency in the state	
2. Assess data completeness and validity	Evaluate data for completeness and accuracy per the procedures in the ISW3 report (p. 6)	
3. Create a dataset of injury-related hospitalizations with the ICD-9-CM code for hip fracture as the principal diagnosis (ISW3 report, p. 8)	Include only the Nature of Injury Code: 820	
4. Produce statistics	Numbers, age-specific rates for trends and comparisons across populations	

*Codes used in this definition may need to be updated annually as new codes are introduced, and following the adoption of ICD-10-CM.

Recommendation 2: Expanded Surveillance
Whenever possible, states, territories, and other jurisdictions should expand surveillance to deepen their understanding of fall-related injuries in: hospital emergency departments, long-term care facilities, workplaces, pre-hospital (emergency medical or ambulance) services, and community settings.

As states develop capacity to conduct basic fall surveillance, they are urged to expand their efforts to collect and analyze data from additional sources and settings: emergency departments, long-term care facilities, workplaces, pre-hospital (emergency medical or ambulance) services, and community settings. Broader surveillance with additional data will lead to a more complete picture and a deeper understanding of the magnitude and characteristics of fall-related injuries, particularly those that do not result in inpatient care. These additional injury morbidity data sets will contribute to establishing targeted prevention efforts.

Guidance on Implementing Recommendation 2

Recommendation 2.a. Expanded surveillance into hospital emergency departments

Over 20 states have begun to establish central data repositories for emergency department visits. These offer a new opportunity for surveillance of injuries that do not lead to inpatient hospitalization, and is a first step in examining cases treated in ambulatory settings. The ISW4 recognizes ED visits as an important data source for fall-related surveillance activities and encourages states to develop and use these statewide data sets. Table 7 presents a general set of action steps for states that have ED surveillance databases.

Table 8. Process for Identifying Fall-Related Emergency Department Visits

Step	Action
1. Access ED visit records	Receive access to ED visit record level data file from central repository agency in the state
2. Assess data completeness	Evaluate data for completeness and accuracy per the procedures such as those used for inpatient discharges in the ISW3 report (p. 6)
3. Include all ED visits with a chief complaint of fall or principal diagnosis of injury with an accompanying ICD-9-CM ECI code (E-code)*	Select the first valid E-code in either a separate ECI code field, or another diagnosis field if appropriate **Include:** Unintentional falls: E880-E886, E888 Suicide: E957 Homicide: E968.1 Undetermined intent: E987 **Exclude: E887**
4. Select ED visits for analysis	Based on all or part of fall code range above
5. Produce statistics	Numbers, age-specific rates for looking at subpopulations at high risk, and age-adjusted rates for trends and comparisons across populations (see Appendix D for definitions and guidance)

*Codes used in this definition may need to be updated annually as new codes are introduced, and following the adoption of ICD-10-CM.

Recommendation 2.b. Expanded surveillance into long-term care facilities

Falls and fall-related injury in long-term care settings are recognized as an important sector for surveillance, in large part due to the significant and increasing burden to the healthcare system of falls in older, frail adults and their devastating consequences. As a starting point, all states should

attempt to track falls and fall-related fractures in nursing homes using the national Quality Improvement indicators from the CMS Minimum Data Set for Nursing Home Resident Assessment and Care (MDS-Nursing Home) dataset. These data enable states to examine repeat falls, hip and other fall-related fractures, along with contributing variables (such as balance problems, incontinence, and use of multiple medications) in this special population. In expanding surveillance in these settings, it should be recognized that all assisted living facilities are licensed to provide medical care.

Table 9. Process for Identifying Patients with Falls in Nursing Homes

Step	Action
1. Access MDS-Nursing Home data	Receive or arrange access to MDS-Nursing Home data through CMS or the jurisdiction's long-term care agency
2. Assess data completeness	Evaluate data for completeness and usability
3. Select cases for analysis	Use record level data, if available, and select cases that answer "yes" to these two questions: • Has the resident had a hip fracture or other fracture in the past 180 days (or since the last assessment)? • Has the resident fallen in the past 30 days? Otherwise, use aggregated data produced by CMS to monitor falls and associated injuries in nursing homes
4. Produce statistics	Numbers, percents, age-specific rates for looking at subpopulations at high risk, and age-adjusted rates for trends and comparisons across populations (see Appendix D for definitions and guidance). Analysis may be limited by available data to comparisons between falls and fall-related injuries within a state or comparison across states or for the nation

Recommendation 2.c. Expanded surveillance into occupational settings

In the workplace, falls tend to differ from those in other settings. Workplace fall injuries are concentrated in the working age population. These falls are often associated with specific industries (e.g. construction), occupations (e.g. roofer), and hazards (e.g. scaffolds) that have been subject to research by the National Institute for Occupational Safety and Health (NIOSH) and other workplace safety agencies. Many workplaces are highly regulated in that there are explicit programs to prevent injuries and to document their occurrence. In other workplaces, such as small family farms, regulation and documentation of falls and other injury-producing events may be slight or absent. The major national workplace injury sources that use the OIICS provide additional information for describing and tracking work-related falls. These are the Census of Fatal Occupation Injuries (CFOI), and the Survey of Occupational Injuries and Illness (SOII).

Table 10. Process for Identifying Falls in Occupational Settings

Step	Action
1. Access CFOI or SFOI or NEISS-WIIS databases	Contact state or federal agencies to establish access and to determine which sources of fall data are the most suitable for a given purpose
2. Select cases for analysis	For all falls: include all cases with one of the following OIICS codes: 10,11,12,13,19*
3. Produce statistics	Numbers, percents, age-specific rates for looking at trends and differentials for high-risk industries, occupations, and places . Consider analysis by nature, body part, and source of injury

* Codes 11,12,and 13 require 1 or 2 additional digits to specify type of fall

Recommendation 2.d. Expanded surveillance into pre-hospital (emergency medical or ambulance) services

Data systems used by emergency medical service and ambulance agencies vary greatly. Falls, and other injuries, are sometimes documented in these agency's pre-hospital care forms. The National Emergency Medical Services Information System (NEMSIS) is an effort to make pre-hospital data more standardized and more useful. Most states are working to implement NEMSIS in their states and local jurisdictions In NEMSIS, any type of fall must be recorded under a single fall code; an optional code records the height of the fall. EMS calls can include persons with repeat fall incidents and those that require services at the scene, such as being lifted, but are not transported for medical care.

Table 11. Process for Identifying Falls in Pre-Hospital Settings

Step	Action
1. Access NEMSIS-compliant or similar data set	Receive or arrange access to NEMSIS or similar EMS record level data through appropriate state or local agency
2. Assess data completeness and usability	Evaluate data for completeness and usability
3. Select EMS run reports for analysis	Choose all cases with the NEMSIS Cause of Injury code: 9550 Falls (E88X.0)
4. Produce statistics	Numbers, percents, age-specific rates for looking at subpopulations at high risk, and age-adjusted rates for trends and comparisons across populations (see Appendix D for definitions and guidance)

Recommendation 2.e. Expanded surveillance into community settings using BRFSS

The BRFSS provides a state-level prevalence estimate of falls and associated injuries as self-reported by community dwelling adults age 18 and over. In the years when a set of fall questions is asked, the cases for analysis will always have to be identified using the items in the question set for that survey year.

Table 12. Process for Identifying Fall-Related Injuries in Community Settings

Step	Action
1. Determine year(s) in which fall questions are asked	Receive or arrange access to the state's BRFSS analysis file
2. Assess dataset usability	• To get representative findings, use the weighted cases, not the raw numbers from the sample • Assess suitability of data in terms of numbers of cases or other limitations
3. Select all cases that had a fall identified	Select the cases whose answers to the screening question in the survey year indicate a fall occurred, e.g.: a. 2003: In the past 3 months, have you had a fall? b. 2006: In the past 3 months, how many times have you fallen?
4. Produce statistics	Numbers, percents, and population-based rates when the data permit

Recommendation 3: Monitoring with National Databases

States should use selected national data sources to establish baselines and benchmarks and to compare trends.

National data sets based on samples offer another avenue for states and other jurisdictions to use in fall injury surveillance that can provide: a) national level estimates that states can use for comparison purposes; and b) statistics that states can use to derive estimates when no state-level data are available. These data sources expand data options and deepen understanding of fall-related injuries. Six suggested sources are:

Hospital Inpatient Records

- National Hospital Discharge Survey (NHDS)
- Healthcare Costs and Utilization Project-Nationwide Inpatient Sample (HCUP-NIS)

Emergency Department Records

- National Electronic Injury Surveillance System-All Injury Program (NEISS-AIP)
- National Hospital Ambulatory Medical Care Survey-Emergency Department Component (NHAMCS-ED)
- National Electronic Injury Surveillance System–Work Injury and Illness Study (NEISS-WIIS)

Household Surveys

- National Health Interview Survey (NHIS)

B. Surveillance Capacity

Investment in fall and injury surveillance would improve the capacity of state public health agencies to describe falls and monitor prevention efforts.

Recommendation 4: Standardization and Policy

Leadership is needed at national and state levels to establish appropriate standards and policies for consistent collection of data on injuries, including fall-related injuries.

National and state leadership should facilitate standardization and policy setting to:

- Ensure that ECI codes from the International Classification of Diseases (ICD) are collected on all medically treated injury cases via standards and guidelines set by the

ICD-9-CM Coordination and Maintenance Committee, the National Uniform Billing Committee, billing requirements of the Centers for Medicare and Medicaid Services, DHHS and other policy-setting bodies.

Several of the key surveillance datasets recommended in this report are limited in their usefulness for injury surveillance due to a lack of complete ECI coding. These include state hospital discharge and emergency department databases, HCUP-NIS, NHDS, and potentially others.

- Ensure that a standard set of data elements is established in medical records and promoted in order to to collect more complete, detailed information about the circumstances of the fall, associated symptoms linked to the fall event, and the physical injury.

  These data elements should be based on the International Classification of External Cause of Injury (ICECI) for surveillance and their use should be encouraged through incentives and training. (See Appendix B for details re ICECI) Since fall surveillance relies heavily on information in the medical record, the value and utility of surveillance can only be as good as the quality of the content of that record.
- Solidify the capacity of the BRFSS to collect community data on the prevalence of personal risk factors for falls and fall-related injuries by: a) developing a standard, validated set of fall-related risk factor questions; b) negotiating a fixed cycle for including those questions in the core survey; and c) securing funding for their inclusion on that cycle.

Recommendation 5: Fall Surveillance Research
Research should be pursued to determine and improve the usefulness of various methodologies for identifying and tracking falls and fall-related injuries and associated co-morbidities across a spectrum of healthcare delivery systems.

Data systems identified in this report could be improved for falls and fall-related injury surveillance. ISW4 identified a number of research and systems development questions that deserve further attention. These include but are not limited to the following:

- How can ICECI be incorporated more widely in data collections systems to improve the identification of circumstance information on falls and other injuries?
- Can components of clinically-based fall risk assessment scales (such as Morse Fall Scale, Hendrich Fall Risk Assessment, Hendrich II, etc.) be adapted for inclusion in the BRFSS and other surveys to capture community prevalence of personal risk factors?
- What best practices and policies related to prevention of fall injuries in long-term healthcare settings might be placed under surveillance (e.g. low beds, floor mats, hip protectors, restraint avoidance, padded underwear, and raised toilet seats) in order to evaluate their use and effectiveness?
- Can co-morbid conditions (e.g. Parkinson's Disease, osteoporosis) or environmental factors (e.g. special flooring designed to prevent fall-related injuries) be monitored to determine their contribution to falls and fall-related injuries?

- Can criteria be established for identifying additional fall injury cases with a non-fall underlying cause of death or principal diagnosis, using multiple-cause-of-death data and secondary hospital discharge diagnosis fields?
- How can medications and medical procedures that increase risks for falling (e.g. in frail elderly) be profiled?
- Which ICD codes can serve as proxies for fall occurrence and surveillance in long-term care settings?
- How can Current Procedural Terminology (CPT) codes be best used to monitor fracture care in older adults?
- What methods of surveillance are suitable for falls in settings in which individuals are restricted for short periods of time, e.g. prisons, migrant camps?
- Should special consideration be given to surveillance of falls among children in hospitals or other healthcare settings?

Summary

The ISW4 strongly encourages all states, territories and other jurisdictions to conduct routine surveillance of falls and fall-related injuries as outlined in Recommendation 1 of this report. To the extent feasible, augmentation of core surveillance should be pursued as suggested in Recommendations 2 and 3. These efforts should be bolstered at the national level with initiatives on standardization and research (as in Recommendations 4 and 5), and getting inputs from all jurisdictional levels and stakeholders will improve the processes that can lead to the recommended changes . Opportunities to standardize the data elements, their location in medical records, and provide training to clinicians on recording the needed information is an important challenge that applies to falls, fall-related injuries and most other injuries as well. Whenever possible, federal and state public health agencies should collaborate with outside programs and agencies that share an interest in fall-related injury prevention.

VI. Detailed Descriptions of Data Sources

A. National and State Death Records

Death Certificates

Usual Source Contacts
State office of vital statistics or National Center for Health Statistics

Technique for Identifying Fall Cases
1979-1998: Use ICD-9 codes E880 to E886, E888, E957, E968.1, E987
1999 to present: Use ICD-10 codes W00-W19, X80 Y01, Y30

Description
Death certificates are collected by the vital statistics offices in each state. The certificates document underlying, immediate and contributing causes of death that are then coded to the ICD. The ECI code (e.g. a fall) is listed as the underlying cause for an injury death. However, some deaths with an injury component, such as a stroke following a fall that leads to death after a longer time period may not contain documentation of the injury on the death certificate. The contributing cause(s) of death is coded using the Nature of Injury ICD codes. All states have vital records data with almost 100 percent ECI coding for injury deaths.

Method
Attending physicians and/or medical examiners or coroners document cause of death on each death certificate, and funeral directors document the demographics of the decedent. State vital statistics offices compile these death certificate data, and then share them electronically with the National Center for Health Statistics (NCHS). The NCHS aggregates the data at the national level and produces an annual injury mortality report. In the last two years, annual injury mortality reports have supplemented the final mortality reports.

Uses
Because residence of the deceased is recorded on the death certificate, population-based injury cause-of-death rates from this source can be generated and compared for large or small geographic units (e.g. the nation, states, counties and cities).

Strengths
Death certificate data capture the most severe injuries, and were, prior to the availability of nonfatal injury data, the basis for creating and evaluating injury prevention programs and policies.

Limitations
Risk factor information is not recorded on death certificates.

Falls associated with an overriding medical event, such as a heart attack or stroke, may not be identified as an underlying cause of injury for surveillance purposes. As a result, a fall-related injury death may be missed, and this may lead to some undercounting.

Relevant Web sites for Mortality Coding and Data Access
www.cdc.gov/nchs/deaths.htm
www.who.int/classifications/icd/en/
wonder.cdc.gov/wonder/
www.cdc.gov/ncipc/wisqars/default.htm
www.cdc.gov/nchs/about/otheract/injury/injury_mortality.htm
www.cdc.gov/nchs/about/otheract/injury/tools.htm

Medical Examiner/Coroner Data

Usual Source Contacts
State or local Medical Examiner or Coroner Offices, depending on the state

Technique for Identifying Fall Cases
1979-1998: ICD-9 codes E880-E886, E888, E957, E968.1, E987
1999 to present: ICD-10 codes W00-W19, X80, Y01, Y30

Description
All states have medical examiner or coroner systems for investigating deaths that were unattended or occurred in otherwise questionable circumstances. Medical examiner systems exist in 22 states and coroner system in 11 states. The remaining states have a mixed medical examiner/coroner system. A medical examiner is usually a licensed physician, but a coroner does not have to be physician and may have little or no formal medical training, depending on the state. The ideal medical examiner system is statewide, population-based, with standardized systems of death certification and data management. From 1987-2004, the CDC's National Medical Examiner and Coroner Information Sharing Program worked to improve the quality of data on death certificates and to increase the availability of these data for injury prevention. In many states, new electronic reporting systems are now being used to collect death information and are being shared more frequently with state and local agencies.

Method
State medical examiners/coroners investigate questionable deaths and document the causes of death on state death certificates. Medical examiner and coroner reports are medical-legal documents, and therefore the circumstances of injuries are often well described and detailed. They typically contain more detailed information than the death certificate on manner of death, circumstances of the injury incident, types of injuries incurred, and personal issues related to mental health, job or finances, relationships, alcohol or substance abuse, etc.

Uses
Medical examiner/coroner information can be most useful for injury surveillance by state and local agencies and communities. Medical examiner/coroner data often provide more detailed information on circumstances of the injury incident. Concerning falls, these reports can be useful for identifying specific causes of fall events in the home and nursing homes (e.g. fell in bath tub, fell down stairs, fell after taking medication) important for designing prevention programs.

Strengths
State medical examiners and coroners can provide current, detailed information related to falls, and may be used to create and evaluate injury prevention policies and programs.

Limitations
State medical examiner and coroner systems do not capture all deaths, although a few capture all injury-related deaths.

Deaths occurring on federal lands (e.g. military bases, tribal lands) may not fall in the jurisdiction of a medical examiner or coroner.

Medical examiner and coroners systems are not standardized across and within states.

Relevant Web sites
www.thename.org

National Violent Death Reporting System (NVDRS)

Usual Source Contacts
National Center for Injury Prevention and Control (NCIPC) and state health departments of the 17 participating states: Alaska, California, Colorado, Georgia, Kentucky, Massachusetts, Maryland, North Carolina, New Jersey, New Mexico, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Virginia, and Wisconsin

Technique for Identifying Fall Cases
ICD-10 codes X80, Y01, Y30

Description
NVDRS provides a census of violent deaths that occur within the participating states to both residents and nonresidents. The system uses the WHO definition of violence: "a death resulting from the intentional use of physical force or power against oneself, another person, or against a group or community." The case definition includes suicides, homicides, deaths from legal intervention (a subtype of homicide), deaths from undetermined intent, and unintentional firearm fatalities. Legal executions, which are considered part of deaths from legal intervention, are excluded from NVDRS as beyond the scope of public health.

Method
The system is coordinated and funded by the NCIPC but depends on separate data collection efforts in each participating state. In accordance with the system's design principles, the data are incident-based rather than victim-based. The record for an incident includes information about all the victims and known suspects, their relationships, and any weapon(s) involved. The NVDRS states collect information about each incident from four primary data sources: Death Certificates (DC), Coroner/Medical Examiner (CME) records, Police Records (PR), and Crime Lab Records. The CDC has prepared customized data collection and transmission software used by all participating states, and plans to add new states as funds become available.

Uses
This state-based violent death reporting system provides accurate and timely information, which can be used to inform decision makers about the magnitude, trends, and characteristics of violent deaths; and evaluate and continue to improve state-based violence prevention policies and programs. It is well-suited for capturing incidents that involve multiple victims and/or suspects as well as multiple manners of death, which may include suicide by jumping or homicide by being pushed. It also provides information on precipitating circumstances, weapon type, victims' and suspects' demographics, decedents' toxicologic results, and an incident summary, which may include falls.

Strengths
NVDRS compiles data from the four data sources into a single incident record.

Limitations
Data depend on the depth, quality, and completeness of the original source documents in each participating state. Coroners and medical examiners vary across jurisdictions in the extent to which they ask about and record precipitating circumstances and characteristics of the incident.

Homicide circumstances and victim-suspect relationships—to the extent that they are known—are routinely documented by law enforcement. However, the reporting sites vary in how frequently they are able to obtain police reports and whether they obtain the initial incident reports as well as the findings from the completed investigation.

At present, NVDRS contains violent death reports from a convenience sample of states and urban areas; its findings may not be generalizable to violent deaths nationally.

Relevant Web sites
www.cdc.gov/ncipc/profiles/nvdrs

B. Hospital Inpatient Facilities

The primary recommended source of data from hospital inpatient settings is hospital discharge data sets. As of March 2004, 45 states and the District of Columbia were collecting and managing statewide hospital discharge data sets.[27] Supplemental national sources for estimates are the National Hospital Discharge Survey (NHDS) and the Healthcare Costs and Utilization Project–Nationwide Inpatient Sample (HCUP-NIS).

Inpatient Hospital Discharge Data (HDD)

Usual Source Contacts

The location of these data sets within individual states varies. The three main types of organizations managing these central repositories are: (1) statewide hospital associations, (2) state health departments and (3) private data management corporations.

Technique for Identifying Fall Cases

First identify the principal diagnosis as an injury and then identify the first valid ECI code for a fall with the following ICD-9-CM codes: E880-E886, E888, E957, E968.1, E987

Description

The state Inpatient Hospital Discharge Data (HDD) is gathered from individual hospitals, most often based on their billing data system. All hospitals produce these data for reimbursement purposes and periodically submit their facility-specific data to a central repository. Forty-five states use either the Uniform Bill-92, or a modification of it, as their data source document.

Since 1994, this form has had a dedicated field for recording an ECI code. Of the 45 states with HDD, 42 were routinely collecting ECI codes, and 26 had a mandate requiring that these be submitted for all injury hospitalizations.[28] An updated version of the Uniform Billing form, called the UB-04, has fields for recording the principal diagnosis code as well as 17 other ICD-9-CM diagnosis codes and three dedicated fields to capture ECI codes. The UB-04 is scheduled to replace the UB-92 form beginning with bills created on March 1, 2007 in according with the following transition schedule:

- March 1, 2007: Health plans, clearinghouses, and other information support vendors should be ready to handle and accept the new UB-04 form and data set.
- March 1 – May 22, 2007: Providers can use either the UB-92 or UB-04 forms and dataset specifications.
- May 23, 2007: The UB-92 is discontinued; only the UB0-04 form and dataset specifications should be used. All rebilling of claims must use the UB-04 from this date forward, even though earlier submissions may have been on the UB-92.

Method

The usual procedure is for the hospital to assemble the data fields required by its state's repository agency and then prepare and submit (on a regular schedule) an electronic file for all discharges that meet the case definitions. The repository agency reviews each hospital's files and requests corrections for data errors before preparing a file for analysis.

Uses
Statewide hospital discharge data sets, like vital records, provide population-based injury data. These data can be stratified by county and city. With the application of unduplicating procedures, hospital discharge data can provide information on persons who had multiple hospitalizations.

Strengths
Data from this system are very important in planning injury prevention activities and may be especially useful for surveillance in less-populated geographic areas where injury deaths occur infrequently.

Limitations
The usefulness of cause of injury information depends on the completeness ECI coding in the system.

Incidence rates based on HDD may sometimes be inaccurate due to the difficulty in identifying multiple hospitalizations for the same injury event. For example, a patient might be stabilized at one facility and transferred to another, or might be readmitted to the same or to a different hospital as part of standard care for the injury or for a complication. To determine accurate incidence rates, unduplication of these multiple records is essential.

Hospital discharge data are affected by changes in the healthcare system that influence hospital admissions and coding practices. These changes may compromise the ability to monitor trends in injury morbidity. For example, if hospitals become less likely to admit a given injury, hospitalization rates will decline even as the number of injuries stays the same.

Federal hospitals do not usually report to state hospital discharge data systems thereby creating an undercount of hospital discharges for the geographic area.

States have no system of reciprocity for exchanging HDD data on residents treated in other states. This is especially important in areas where the catchment area of a medical facility crosses state boundaries, and can lead to a major undercount of resident hospitalizations in those states sending clients to these across-the-border facilities.

Relevant Web sites
Following are a few states with Web sites that can provide guidance for collecting HDD inpatient data:

California: www.oshpd.cahwnet.gov/MIRCal
Colorado: www.chha.com
Minnesota: www.health.state.mn.us/divs/chs/top_2.htm
New York: www.health.state.ny.us/statistics/sparcs
Utah: www.health.state.ut.us/hda
Wisconsin: www.dhfs.wisconsin.gov/wish

National Hospital Discharge Survey (NHDS)

Usual Source Contacts
Chief, Hospital Care Statistics Branch, NCHS

Technique for Identifying Fall Cases
First identify the principal diagnosis as an injury and then identify the first valid ECI code for a fall with the following ICD-9-CM codes: E880-E886, E888, E957, E968.1, E987

Description
The NHDS, which has been conducted annually since 1965, is a national probability survey designed to gather needed information on characteristics of inpatients discharged from non-Federal short-stay hospitals in the United States.

Method
The NHDS collects data from a sample of approximately 270,000 inpatient records acquired from a national sample of about 500 hospitals. Only hospitals with an average length of stay of fewer than 30 days for all patients, general hospitals, or children's general hospitals are included in the survey. Federal, military and Department of Veterans Affairs hospitals, as well as hospital units of institutions (such as prison hospitals), and hospitals with fewer than six beds staffed for patient use, are excluded.

Variables that relate to the personal characteristics of the patient include: age, sex, race, ethnicity, marital status and expected sources of payment. Administrative items are also included such as admission and discharge dates (which allow calculation of length of stay), as well as discharge status. Medical information about patients includes diagnoses and procedures coded to the ICD-9-CM. A detailed description of the NHDS was published in "Design and Operation of the National Hospital Discharge Survey: 1988 Redesign," Vital and Health Statistics, Series 1, Number 39. National Hospital Discharge Survey data are available in publications, on public-use data tapes, data diskettes, CD-ROMs and downloadable files from the NCHS Web site.

Uses
NHDS data are used to examine important topics of interest in public health and for a variety of activities by governmental, scientific, academic and commercial institutions.

Strengths
The data are representative of the civilian population of the United States. Up to 7 diagnoses and 4 procedures are available for each discharge. Data can be examined by principal diagnosis or by any diagnosis.

Limitations
Incomplete information exists on ECIs. In 2003, 64 percent of injury discharges had at least one valid ECI. Falls did have ECIs, most often among those injuries that had this information listed at all.

Relevant Web sites
www.cdc.gov/nchs/about/major/hdasd/nhds.htm
www.cdc.gov/nchs/about/otheract/injury/injury_hospital.htm

Healthcare Costs and Utilization Project–Nationwide Inpatient Sample (HCUP-NIS)

Usual Source Contacts
Agency for Healthcare Research and Quality (AHRQ)

Technique for Identifying Fall Cases
First identify the principal diagnosis as an injury and then identify the first valid ECI code for a fall with the following ICD-9-CM codes: E880-E886, E888, E957, E968.1, E987

Description
The HCUP-NIS is the largest all-payer inpatient database in the United States, containing data from five to eight million hospital stays in about 1,000 U.S. community hospitals. Overall, the 2003 HCUP-NIS sampling frame includes hospitals from 37 states, comprises 77.8 percent of all U.S. hospitals and covers 90.8 percent of the U.S. population. The hospital universe is defined as all hospitals located in the U.S. open during any part of the calendar year and designated as community hospitals in the American Hospital Association (AHA) Annual Survey. The AHA defines community hospitals as follows: "All nonfederal short-term general and other specialty hospitals, excluding hospital units of institutions." Consequently, Veterans Hospitals and other Federal facilities (e.g. Department of Defense and Indian Health Service) are excluded. Beginning in1998, HCUP-NIS excluded short-term rehabilitation hospitals from the universe because the type of care provided and the characteristics of the discharges from these facilities were markedly different from other short-term hospitals.

Method
The HCUP-NIS is designed to approximate a 20 percent stratified sample of U.S. community hospitals. HCUP-NIS includes more than 100 clinical and non-clinical variables for each hospital stay. These include primary and secondary diagnoses, primary and secondary procedures, admission and discharge status, patient characteristics (e.g. gender, age, race, median income for ZIP Code), expected payment source, total hospital charges, length of stay and hospital characteristics (e.g. ownership, size, teaching status). National estimates are produced from weighting the HCPU-NIS data.

Uses
Researchers and policymakers use the HCUP-NIS to identify, track and analyze patterns s in healthcare utilization, access, charges, quality and outcomes.

Strengths
The HCUP-NIS contains charge information on all patients, regardless of payer, including persons covered by Medicare, Medicaid, and private insurance, and the uninsured. The number

of discharges included in the sample is sufficiently large to make annual estimates for most diagnoses.

A 2002 evaluation study suggests that estimates (overall, by demographic variables, and by injury diagnosis) calculated using weighted HCUP-NIS data are similar to those computed using weighted data from the National Hospital Discharge Survey.

Limitations
The frame is limited by the availability of inpatient data from state-based data sources, and not all states have hospital discharge databases. In 2003, HCUP-NIS included available data from 37 States. Care must be exercised for the analysis of trends because the sample contains varying number of states across the years.

External cause coding is incomplete; in 2001, 85.7 percent of injury discharges had at least one valid ECI code. However, the HCUP-NIS is much stronger than NHDS for which only about two-thirds of injury discharges had at least one valid external cause code.

Data are provided on a hospital's total charges rather than the amount actually paid to the hospital, an obstacle to understanding the costs of fall-related treatment.

Relevant Web sites
www.ahrq.gov/data/hcup
www.hcup-us.ahrq.gov/db/nation/nis/nisrelatedreports.jsp
www.hcup-us.ahrq.gov/nisoverview.jsp for NIS data and publications from 1988–2003
www.hcup-us.ahrq.gov/reports/TrendReport2005_1.pdf.
www.hcup-us.ahrq.gov/reports/2004_6.pdf
www.hcup-us.ahrq.gov/reports/2005_03_del_379.pdf

C. Ambulatory Care Facilities

Most injury cases enter the medical treatment system through an ambulatory care facility: hospital emergency departments (ED), urgent care facilities, trauma centers, and medical offices and clinics. Those cases that require hospitalization usually are attended first in an ED, though under some circumstances the patient may bypass the ED and go directly to a location of definitive care within the hospital (e.g. operating room or intensive care unit). At present, most ambulatory injury data is collected from EDs because almost no central repositories have been developed to collect such data from the other ambulatory sources. The primary recommended source is state ED data repositories; however, recognizing the gaps among states, the recommended federal data sources from ambulatory settings, the National Electronic Injury Surveillance System – All Injury Program and the National Hospital Ambulatory Medical Care Survey, are also extremely useful. Individual hospital emergency department systems serve as a potential alternative. A supplemental source currently under development is the National Trauma Data Bank.

Hospital Emergency Department Data Systems

Usual Source Contacts
State Health Departments
State Hospital Associations

Technique for Identifying Fall Cases
First identify the principal diagnosis as an injury and then identify the first valid ECI code for a fall with the following ICD-9-CM codes: E880-E886, E888, E957, E968.1, E987 or a fall-related injury listing in the ED's patient log.

Description
Emergency department visit data are available in statewide hospital emergency department data systems in 25 states and Washington D.C. as of March 2004. [30] Of these, 23 states are routinely collecting ECI codes, and 15 mandate them. A number of the states have published reports incorporating their ED data.

Method
In general, attending physicians document the principal diagnosis and other diagnoses associated with each ED visit on the ED record. These are coded by the medical records department using ICD-9-CM by trained hospital medical information specialists. Records with injury diagnoses are also coded for ECI (i.e. assigned ICD-9-CM External Cause codes). The first-listed ICD-9-CM ECI code is usually associated with the principal diagnosis. As with hospital discharge records, other ECI codes may be applied to more fully describe the injuries and the place of occurrence (E849). These coded data along with information on the patient, treatments, disposition, charges, etc. are then submitted electronically to a centralized office in the state to become part of a statewide emergency department database.

Strengths
The large number of ED-treated falls means that more cases are available to analyze patterns in subgroups, such as counties with small populations and single year age groupings. Furthermore, falls treated in EDs include cases at all severity levels and are the best broadly available source for identifying patterns of less severe injuries that do not lead to hospitalization.

Limitations
State-based emergency department patient records often lack information on the activity at the time of injury, place of occurrence, detailed circumstances of the injury incident (e.g. fall from ladder, fall from building), risk factors (e.g. medication interactions, environmental hazards), or protective factors (e.g. use of helmet or other sports equipment). Therefore, data often are coded as unspecified falls.

Data on fall-related ED visits may be limited in some state-based emergency department data systems because of the lack of completeness of ECI coding of all injury-related visits.

Relevant Web sites
Following are a few states with Web sites that can provide guidance for collecting ED visit data:

Massachusetts: www.mass.gov/dph/oems/oems.htm
Missouri: www.dhss.mo.gov/PatientAbstractSystem/Reports.html
South Carolina: www.ors2.state.sc.us/er.asp
Utah: www.health.state.ut.us/hda/
Wisconsin: www.dhfs.wisconsin.gov/wish

National Electronic Injury Surveillance System–All Injury Program (NEISS-AIP)

Usual Source Contacts
National Center for Injury Prevention and Control (NCIPC), Centers for Disease Control and Prevention (CDC), Atlanta, Georgia

Technique for Identifying Fall Cases
ICD-9-CM codes are not available. Two ICD-9 ECI variables are defined by major cause categories (e.g. fall, struck by/against, cut/pierce): Precipitating (or underlying) cause and immediate cause of injury. (The usual scenarios are "fall" followed by "struck by/against" or "struck by/against" followed by "fall".) These ECI variables are coded using ICD-9 coding guidelines into major groupings.

Description
NEISS-AIP provides national estimates of nonfatal injuries treated in U.S. hospital emergency departments. This expansion of the NEISS was initiated in July 2000 by the NCIPC as a collaboration with the US Consumer Product Safety Commission (CSPC), Bethesda, Maryland and is operated by CPSC through an interagency agreement.[30] Data are obtained from a stratified probability sample of 66 out of 100 NEISS hospitals, including four strata based on hospital size as measured by the annual number of ED visits (i.e. very large, inner city hospitals with trauma centers, as well as large urban, suburban, rural hospitals) and a stratum for children's hospitals.

NEISS-AIP receives data on approximately 500,000 injury cases annually. Data are obtained on age, sex, and race/ethnicity of the injured person, principal diagnosis, primary body part affected, CPSC-defined groupings of consumer products involved, disposition at ED discharge (i.e. treated and released, hospitalized, transferred, held for observation, left without being seen, left against medical advice, died), locale where the injury occurred, work-relatedness, and a narrative description of the injury circumstances. Also, major categories of external cause of injury (e.g. fall, motor vehicle, cut/pierce, poisoning, and fire/burn) and of intent of injury (e.g. unintentional, assault, self-harm, legal intervention) are being coded for each case in a manner consistent with the ICD-9-CM coding rules and guidelines.[31] NEISS-AIP also has the capacity for special studies to collect more detailed data on unintentional and violence-related injuries. One special study of traumatic brain injury is underway by NCIPC and will provide data relevant to falls.

Method
Emergency department records are reviewed daily by trained on-site NEISS hospital coders. Coders abstract data on first-time visits only for all injury-related cases and then transmit these data within 72 hours to CPSC headquarters in Bethesda. ECI variables are coded from the brief narratives by trained quality assurance coders at CPSC headquarters. Data go through extensive quality assurance and edit checks and are then sent to CDC for preparation of analysis files and data release annually.

Uses
NEISS-AIP data characterize and monitor nonfatal injuries in the US population. These data are readily available to the public through a web-based query system called Web-based Injury Statistics Query and Reporting System (WISQARS). Public use analysis files are also available to injury researchers and the public free of charge at the Inter-University Consortium for Political and Social Research (ICPSR) at the University of Michigan, Ann Arbor.

Strengths
NEISS-AIP is a cost-effective system for capturing data on a national sample of all injuries treated in U.S. hospital emergency departments.

NEISS-AIP obtains data on both the precipitating (or underlying) cause and immediate cause of injury. Thus cases involving two injury mechanisms in sequence (e.g. a fall and struck by/against or a fall and cut/pierce) can be analyzed jointly.

Limitations
NEISS-AIP only provides national estimates of nonfatal injuries and thus cannot be used directly for obtaining regional, state or local estimates.

Hip fractures are not coded separately; some are coded as lower trunk and others as upper leg. Some may be mentioned in the narrative, but likely not all.

Relevant Web sites
www.cdc.gov/ncipc/wisqars
www.icpsr.org

National Hospital Ambulatory Medical Care Survey–Emergency Department Component (NHAMCS-ED)

Usual Source Contacts
Chief, Ambulatory Care Statistics, NCHS

Technique for Identifying Fall Cases
Use ICD-9-CM codes E880-E886, E888, E957, E968.1, and E987. These codes can be in any of the three fields designated for ECI.

Description
The NHAMCS-ED is an annual survey designed to collect data on the utilization and provision of ambulatory care services in hospital emergency departments. Findings are based on a national sample of visits to the emergency departments of general, short-stay hospitals, exclusive of federal (e.g. military, Veterans Administration, Indian Health Service, National Institutes of Health) hospitals and clinics, located in the 50 States and the District of Columbia.

Two additional surveys, similar to the NHAMCS-ED are conducted in ambulatory care settings: the National Ambulatory Medical Care Survey (NAMCS) of physician's private offices and the National Hospital Ambulatory Medical Care Survey-Outpatient Department Component (NHAMCS-OPD). Beginning with data year 2005, neither of these two surveys will be collecting mechanism of injury. Thus, fall injuries will not be able to be identified from these surveys. If similar definitions of nonfatal injury are applied to the NHAMCS-ED data as they are to the NEISS-AIP data, the estimated numbers of injuries seen in emergency departments are comparable (average annual 29.7 vs. 28.8 million visits for 2002-03, respectively).

Method
The NHAMCS-ED survey uses a four-stage probability design with samples from geographically defined areas, hospitals within these areas, emergency service areas within emergency departments, and patient visits within emergency departments. Annual data collection began in 1992. Specially trained interviewers visit the hospitals prior to their participation in the survey to explain survey procedures, verify eligibility, develop a sampling plan, and train hospital staff in data collection procedures. For the survey, the Patient Record form instrument is provided to emergency department staff who complete it for a systematic random sample of patient visits during a randomly assigned 4-week reporting period. Data are obtained on demographic characteristics of patients, expected source(s) of payment, up to three patient complaints or reason for visit, up to three physicians' diagnoses, diagnostic/screening services and procedures ordered or provided, up to six medications ordered or provided, disposition, types of healthcare professionals seen, causes of injury where applicable, and certain characteristics of the hospital, such as type of ownership.

Public-use microdata files may be downloaded in ASCII format. Statistical software such as SAS, SPSS, or STATA are generally required to read the data files. Downloadable data files and documentation are available for survey years 1992-2003. Public-use data (including documentation for SAS, SPSS and STATA) are also available on CD-ROM in Statistical Export

and Tabulation Software (SETS) format. Public-use data tapes are also available for all survey years through 1997.

Uses
Injury data from the NHAMCS-ED provide national estimates of utilization. Because persons can make multiple visits for the same incident, estimation of injury incidents is more difficult. A variable identifying whether or not the visit was an initial or follow-up was introduced in 2001.

Strengths
Injury diagnoses and ECI are coded using the ICD-9-CM. Verbatim text is available for the external cause of the injury, which means that the field can be searched for items that are not part of the ICD code set. For example, to estimate the number of falls due to a specific activity (i.e. basketball) the verbatim text could be searched. However, multiple years of data would need to be combined to get reliable estimates.

Reasons for the visit and medications are coded using classification systems developed by NCHS. All of the documentation as well as the data files are available on the NCHS Web site.

Limitations
Data elements can vary by year. In general, forms remain the same for two years but can change after that depending on the quality of the data received and competing interests related to new topics. For example, a new item was added for 2001-02, but dropped in 2003, on whether the visit was related to an adverse drug event, and, if so, the names of up to two drugs involved.

The four geographic regions are the only geographic detail available from the NHAMCS-ED.

Due to sample size constraints, multiple years of data may need to be combined for sub-group analyses.

Because persons can make multiple visits for the same incident, estimation of injury incidents is difficult is to determine prior to 2001.

Relevant Web sites
www.cdc.gov/nchs/about/major/ahcd/ahcd1.htm
www.cdc.gov/nchs/about/major/ahcd/nhamcsds.htm
www.cdc.gov/nchs/about/otheract/injury/injury_emergency.htm

National Trauma Data Bank

Usual Source Contacts
American College of Surgeons (ACS), Chicago, Illinois

Technique for Identifying Fall Cases
Use ICD-9-CM codes E880-E886, E888, E957, E968.1, and E987

Description
The National Trauma Data Bank (NTDB), started in 1994, is the largest aggregation of trauma registry data ever assembled. The system currently contains over 1.1 million records from 405 trauma centers out of about 1150 hospital trauma centers in the U.S., its territories and the District of Columbia. The goal of the NTDB is to inform the medical community, the public, and decision makers about a wide variety of trauma care-related issues. Through research and statistical reporting, the NTDB is proving to be a valuable source of information for improving care for the surgical patient.

ACS, with technical support from the National Center for Injury Prevention and Control, is developing a national probability sample of 100 hospitals in the United States that treat patients with traumatic injuries in order to develop national estimates of patients treated in U.S. trauma centers. Data from this nationally representative sample will be helpful for assessing quality of trauma care and for monitoring and characterizing severe injuries treated in U.S. trauma centers.[32]

Method
Data are submitted voluntarily from hospitals with trauma registries that choose to participate. Each year, the NTDB office sends out a request for data from the previous calendar year. Participating NTDB hospitals then prepare their trauma registry data (originally collected using a variety of trauma registry software) into a required format for transmission to NTDB headquarters in Chicago. Data from all NTDB hospitals are then assembled into a database with 13 related and linkable files that contain the patient record information (i.e. facility, demographics, scene, safety, prehospital, emergency department, diagnosis, (Abbreviated Injury Scale (AIS) code, intubation, procedures, complications, comorbidities, and outcomes). The ECI are available in the scene file.

Uses
NTDB data are currently available to researchers on CD-ROM for use in assessing a variety of trauma care issues. The ACS Committee on Trauma produces an annual summary of the injury data, including ECI. In the future, the NTDB could provide national data on fall-related injuries treated in US trauma centers useful for planning and implementing injury prevention programs.

Strengths
ECI codes are available on over 96 percent of cases.

Quality assurance efforts are underway to improve data quality.

Limitations
NTDB hospitals vary in the quality and completeness of other patient data.

NTDB hospitals have different inclusion criteria for their trauma registry databases. As a result, fall-related data in the NTDB may be subject to selection bias, such as the exclusion of cases with a pre-existing co-morbid condition. For instance, NTDB hospitals vary substantially on whether data on patients with hip fractures are included in their registry, often excluding those with osteoporosis or arthritis. This is a concern given that hip fractures represent 45 percent of injuries requiring hospitalizations in the US population over age 65 years.

Relevant Web sites
www.ntdb.org

D. Emergency Medical or Ambulance Services

An important service for persons who fall is transportation provided by Emergency Medical Services and ambulances. Supplemental information on the services rendered by these providers, when data are available, can improve the understanding of the circumstances related to falls and associated injuries.

National Emergency Medical Services Information System (NEMSIS)

Usual Source Contacts
The state office of emergency medical services

Technique for Identifying Fall Cases
Use NEMSIS cause of injury code: Cause of Injury (Data Element E10_01), code 9550 Falls (E88X.0)

Description
Since the early 1970s, various publications and legislation have contributed to the development of emergency medical services (EMS) information systems and databases. EMS systems vary in their ability to collect patient and systems data and to put these data to use. No means currently exists to easily link EMS databases to allow analysis beyond any given system's jurisdiction. For this reason, the National Association of State EMS Directors is working with its federal partners at the National Highway Traffic Safety Administration (NHTSA) and the Trauma/EMS Systems program of the Health Resources and Services Administration's (HRSA) Maternal Child Health Bureau to develop NEMSIS. The newest version of the NEMSIS dataset is called 2006 NHTSA Uniform Prehospital Dataset V 2.2.1.

All states except New York and Vermont have agreed to implement NEMSIS, but only 15 states have done so statewide as of this writing. In states without a centralized EMS database, implementation is especially difficult. As a system still under development, NEMSIS is not yet a

tool for national injury surveillance. Five states (Delaware, Mississippi, Missouri, North Carolina, and Oklahoma) are combining their data in a test of concept for an eventual national database. A paper showing combined data for these states is expected to be completed in 2006.

Method
EMS data are collected from ambulance run reports for injuries and other medical emergencies. The data can help assess EMS transport times and the medical condition of the injured person upon EMS arrival and during subsequent transport to definitive care.

Regarding fall-related injury, data are most useful when information about the scene or circumstances is captured, which may be recorded in a narrative field and the one optional field for recording the height of the fall.

Uses
NEMSIS provides some data on fall injuries by identifying patients with this condition in the mandatory field Further information on the fall would be developed through analysis in conjunction with other NEMSIS variables, e.g. demographics, pre-hospital interventions, and details of transport.

Strengths
Although nationwide data will not be available for some time, some states and many local jurisdictions have implemented NEMSIS and could provide information to local data users on the number and pre-hospital aspects of falls receiving an emergency medical response.

Limitations
Not all states have computerized, standardized EMS data systems with the NEMSIS variables.

In Version 2.2.1, it appears that the cause code for falls is also associated with the ICD-9 E880 code range for unintentional falls.

Relevant Web sites
www.nemsis.org/

E. Home Health Agencies and Long-Term Care Facilities

Long-term care—whether delivered by nursing homes, home health agencies, or rehabilitation hospitals—has only recently become recognized as a source of data for injury surveillance, and most particularly falls. The patterns of fall injury, which either lead a person into these levels of care or continue when care is given through these agencies, can improve understanding of risk factors and suggest options for developing both primary and secondary prevention strategies to better safeguard these individuals. At this time, available data for surveillance come only from nursing homes.

Minimum Data Set For Nursing Home Resident Assessment and Care Screening (MDS-Nursing Homes)

Usual Source Contacts

The national Centers for Medicare and Medicaid Systems (CMS)

Technique for Identifying Fall Cases

The MDS Quality Indicator (QI) set contains two questions on falls that are used to identify fall cases:

> QI 01. Has the resident had a hip fracture or other fracture in the past 180 days (or since the last assessment)?
> QI 02. Has the resident fallen in the past 30 days?

Description

The Minimum Data Set (MDS) is part of the federally mandated process, established by the CMS, for clinical assessment of all residents in Medicare or Medicaid certified nursing homes. This process provides a comprehensive assessment of each resident's functional capabilities and helps nursing home staff identify health problems. Over 17,000 federally certified nursing homes report data to the MDS but, because of the cyclical nature of the survey, not all facilities are represented in the annual report (e.g. 15,989 facilities in the December 2005 report).

Resident Assessment Protocols (RAPs), are part of this process, and provide the foundation upon which a resident's individual care plan is formulated. Regardless of source of payment, MDS assessment forms are completed for all residents in certified nursing homes. They are required for residents on admission to the nursing facility and then periodically, within specific guidelines and time frames. In most cases, the assessment process is conducted by licensed healthcare professionals (such as nurses, physicians, rehabilitation therapists) employed by the nursing home. MDS information is transmitted electronically by nursing homes to the MDS database in their respective states. MDS information from the state databases is captured by the national MDS database at CMS. The national database is updated quarterly and reported on the CMS Web site by calendar year quarters.

The MDS uses Quality Indicators (QI) to collect data in the Report for Accidents that is filled out for all patients admitted into a nursing home in order to guide clinical decisions. QIs are aggregated across residents to generate facility level reports which show proportion of residents in the facility with the condition. In a like manner, QIs are aggregated across facilities to

generate the state level reports. QIs are not definitive measures of quality of care, but are "pointers" that indicate potential problem areas that need further review and investigation. Some responses may carry forward if they have not changed from one assessment to the next because the intention is to maintain a current profile with the most recent standard information for an active resident, regardless of source of information.

Method

The MDS Active Resident Report summarizes information for residents currently in nursing homes. The source of these counts is the resident's MDS assessment record. The MDS assessment information for each active nursing home resident is consolidated to create a profile of the most recent standard information for the resident.

Active Resident. An active resident is one whose most recent assessment transaction is not a discharge and whose most recent transaction has a target date less than 180 days old. If a resident has not had a transaction for 180 days, then that resident is assumed to have been discharged.

*Inactive Resident***.** An inactive resident is one whose most recent transaction is a discharge or whose most recent transaction is more than 180 days old.

Uses

MDS assessment data are used to generate state and national level the reports available through the CMS Web site:

1. Quality Indicator Reports present data on 24 "indicators" of quality of care (32 with subcategories).
2. Active Resident Reports contain data for residents currently in nursing homes.

The reports summarize, by state, the average percentage of nursing home residents who activate (trigger) one of 24 quality indicators during a quarter. QIs are triggered by specific responses to a set of MDS elements and identify residents who either have or are at risk for specific functional problems needing further evaluation. At a nursing home level each facility receives a report of its own and the state aggregate data. This report can be used by the facility as a tool to compare to the state and to target areas of care for improvement. Trend reports are also available.

Strengths

In the MDS Quality Indicator (QI) Report, the quality indicator data are collected on all residents of certified nursing homes in a given state.

The active resident information represents a composite of items taken from the most recent comprehensive, and admission assessments.

Limitations

State and national level data currently available on falls via the CMS Web site only show the percentages of nursing home residents who did or did not experience a fall or hip fracture within specified time periods. The resulting information permits very minimal surveillance.

Nursing homes vary in the number of patients who are very frail. In order to take this fact into account, the residents in a facility are grouped into "high risk" and "low risk" for a certain

problem, and the QI is assessed separately in each of these groups. The high risk group includes only residents who have other medical conditions that may make them more susceptible to developing the problem. For example, residents with balance problems are at high risk for falling. The low risk group includes all other residents. High or low percentages may be the result of a number of factors, so caution is advised in interpreting state comparisons. The variation may indicate differences in quality of care, but other reasons for variation may include geographic differences. For example, residents of nursing homes in northern areas may fall more often because of slipping on ice and snow than residents of homes in southern areas.

Reports only on current active residents are maintained by the states, those with activity other than discharge in the last 180 days. However, the dataset will allow for an audit trail to determine the actual disposition of the resident.

Relevant Web sites
CMS: www.cms.hhs.gov/states/mdsreports

Outcome and Assessment Information Set (OASIS) for Home Healthcare

Usual Source Contacts
The national Centers for Medicare and Medicaid Systems (CMS)

Technique for Identifying Fall Cases
ICD-9-CM nature of injury codes are identified in the OASIS data set for encoding the primary and secondary diagnosis fields. With the software revision in version 1.40, the OASIS data field "M0280" was modified to accept an ICD-9-CM ECI code effective 10/1/2003; this would permit the identification of fall injuries. Also fall information may sometimes appear in text fields associated with an injury that was treated either in an emergency department or by inpatient hospitalization.

Description
All Home Health Agencies are required to submit standard, electronic reports on their clients to their state oversight agency, which in turn submits the mandated data fields to the Centers for Medicare and Medicaid (CMS) for incorporation into the national OASIS standard base. Injuries that lead to emergency room treatment, or transfers to an inpatient facility because of injuries, are currently tracked in the OASIS data. Patients who are discharged and transferred to other care settings are also tracked. However, the OASIS dataset is not currently available to organizations or agencies outside of the regulatory or quality improvement system for Home Health Agencies. Major initiatives are underway to link these datasets with electronic healthcare records at the national level in the coming years.

Method
OASIS data are electronically transmitted to state agencies. The Home Assessment Validation and Entry (HAVEN) software system is available to all home health agencies to transmit the data.

Uses
The OASIS dataset may become available to researchers in the near future as a public use file similar to the availability of the MDS-Nursing Home data in the long-term care setting.

Strengths
The major strength of this database is that is has the potential to become the most important standardized source of information on patients served by home health agencies.

Limitations
Currently ICD-9-CM codes in OASIS are only used to identify the nature of injury and do not capture an ECI code.

Currently this dataset is not available for fall injury surveillance.

Relevant Web sites
www.cms.hhs.gov/OASIS/01_Overview.asp

Uniform Data System for Medical Rehabilitation (UDSMR)

Usual Source Contacts
UDSMR, Amherst New York, 716-817-7856

Technique for Identifying Fall Cases
To identify cases use items 53 and 54 related to falls in the Inpatient Rehabilitation Facility (IRF) Patient Assessment Instrument (PAI). These encompass three measures: 1) assessment for balance problems at admission; 2) assessment for balance problems at discharge; and 3) total number of falls during the rehabilitation stay.

Description
In 1988, UDSMR began data collection and reporting services for facilities that provide comprehensive medical rehabilitation services for adults. Currently, this database includes over 13 million patient assessments. Research using the FIM™ instrument and changes in the delivery of rehabilitation services have led to the development of other adult rehabilitation databases for subacute care programs, Veterans Affairs rehabilitation units, and acute medical/surgical care units. In addition, a pediatric data set has been developed for inpatient and outpatient pediatric settings. This data set uses the WeeFIM® instrument as the measure of disability. The Guide for the Uniform Data Set for Medical Rehabilitation (including the FIM™ instrument) has been translated into several languages for use as an international rehabilitation database.

The large number of patient records in the databases has permitted the tracking of attributes such as case mix, patient age, length of stay, functional status on admission and at discharge, and the percentage of patients discharged to the community. These data provide information that can be used to evaluate the efficiency and effectiveness of rehabilitation services. The aggregate data serve as a reference point for outcomes against which facilities can compare their own performance with others across the United States and internationally.

Method
Beginning with the implementation of CMS's Prospective Payment System and IRF-PAI in 2002, facilities have been able to submit data on patient falls. Although the type of review that can be performed with the existing data is limited, the UDSMR offers an important opportunity to "profile" patient falls. Unfortunately, there is no universally accepted definition of a "patient fall." Their review is further limited by other factors, including a lack of information regarding the following:

- The circumstances of the patient's fall
- Whether the fall was intentional or assisted (as is the case with some situations in rehab) [Note that in rehabilitation parlance the term "intentional fall" has a clinical meaning that differs from the understanding by persons working in primary prevention.]
- The patient's state of mind at the time of the incident
- The time of day at which the fall occurred
- The activity the patient was performing at the time of the fall
- Which medication (if any) the patient was taking at the time of the fall

Uses
Because falls are reported for each acute rehabilitation admission, population-based fall rate data can be analyzed to distinguish between a single fall occurrence and repeat falls per patient stay. These data can be studied for rehabilitation impairment, such as traumatic brain injury, stroke and amputation. The data can be compared internally and externally with like-size bed units.

Strengths
UDSMR data can be compiled to "profile" patient falls among those living with chronic diseases, are newly disabled, or living with disability, across diagnostic cohorts.

Additionally, these data can be analyzed in relation to functional performance improvements made during acute inpatient rehabilitation programs. Outcomes can also be compared between fallers and non-fallers matched on age, diagnosis, and length of stay.

Limitations
A limited number of facilities actively collect USDMR data.

The program does not collect data on fall-related injury.

Relevant Web sites
www.udsmr.org

F. Community Settings

National Health Interview Survey (NHIS)

Usual Source Contacts
NCHS, Division of Health Interview Statistics for general information on the survey or
NCHS, Office of Analysis and Epidemiology for injury specific questions on the NHIS

Technique for Identifying Fall Cases
Identify medically attended falls through the verbatim text question: "How did the injury happen?"

Description
Data are collected via face-to-face household interviews on the health status of the civilian non-institutionalized population in the 50 States and the District of Columbia. The 1997 NHIS redesign included more detailed injury questions. Screening questions capture injury and poisoning events that occurred in the 3 months prior to interview and required medical attention. The recall period was lengthened from 2 weeks (old NHIS) to 3 months in order to obtain larger numbers of events. From 1997 forward, injuries reported must have been medically attended. Verbatim responses on how the injury happened, the kind of injury, and the body part(s) affected are recorded by the interviewers and are then coded to ICD 9-CM during data processing. Additional information related to activity and place of occurrence of the injury is being collected. In 2003, interviews were completed for 92,148 persons living in 35,921 households. The survey is representative of the civilian non-institutionalized population.

Method
If the interviewer identifies the injury from the verbatim text as a fall, then follow-up questions related specifically to falls ask about: 1) how the fall happened, and 2) what caused the fall. Each of these has standard answer choices presented in pick-lists. The text for falls is coded to ICD-9-CM as E880-E886, E888, E957, E968.1, and E987.

The 1997–2004 NHIS sample design uses cost-effective complex sampling techniques including stratification, clustering, and differential sampling rates to achieve several objectives, including improved reliability of racial, ethnic and geographical domains. Beginning in 2004, a recall period of five weeks may be used to estimate injuries.[31]

Uses
Data from the NHIS are used to provide national estimates of medically attended injuries reported by the civilian non-institutionalized population.

Strengths
ECI and diagnoses are coded using the ICD-9-CM.

Information is obtained for all members of the family.

Follow-up questions specific to falls are included. Data on circumstances and causes are reported directly from a knowledgeable adult and are not based on medical records.

Narrative (or verbatim) information is available for each episode reported.

Other-health related behaviors and conditions are available to supplement the injury information.

Limitations
No attempt is made to corroborate or authenticate information provided. Incidence numbers are known to be underestimates, much like other reports based on household level data as opposed to medical record data.

Relevant Web sites
www.cdc.gov/nchs/nhis.htm
www.cdc.gov/nchs/about/otheract/injury/injury_interview.htm
ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2004/english/QFAMILY.pdf (beginning on page 70 for all injury questions. The questions specific to falls are labeled FIJ.130 and FIJ.131.)

Behavioral Risk Factor Surveillance System (BRFSS)

Usual Source Contacts
National Center for Chronic Disease Prevention and Health Promotion, state health department, or state office of vital statistics

Technique for Identifying Fall Cases
When fall-related questions are asked nationally or by an individual state, they will be similar to the two example sets from the 2003 and 2006 BRFSS surveys.

The 2003 survey had two fall-related questions that were asked of people 45 years or older:

- In the past 3 months, have you had a fall?
- Were you injured? (By injured, we mean the fall caused you to limit your regular activities for at least a day or to go see a doctor.)

The 2006 survey has the following very similar questions for persons 45 years or older:

- In the past 3 months, how many times have you fallen?
- How many of these falls caused an injury? (By an injury, we mean the fall caused you to limit your regular activities for at least a day or to go see a doctor.)

Description
The BRFSS system of telephone health surveys was established in 1984 by CDC and state health departments to gather information regarding health risk behaviors, clinical preventive health practices, and healthcare access. The annual survey – implemented by all 50 states, the District of Columbia, Puerto Rico, the Virgin Islands, and Guam – is obtained from a representative sample of adults (persons 18 years or older) in each state or other jurisdiction. The BRFSS is the largest continuously conducted telephone health surveillance system in the world and now usually uses computer-assisted telephone interview (CATI) technology.

Method
The data are weighted to produce national and state level estimates. The BRFSS has some flexibility since states are allowed to add questions of their own choosing to their surveys. Through over sampling and modifications of the survey sampling strategy, data may be collected at regional, county or metropolitan area levels.

Uses
CDC and the states may use BRFSS data to establish and track health objectives.

Strengths
The 2003 and 2006 falls questions provide basic information on the incidence of falls in the community-dwelling older adult population. The data can be analyzed to correlate falls with other information collected in BRFSS, e.g. chronic illness, activity levels, and demographic information.

Limitations
Survey respondents are limited to adults in households with home-based telephones; cell phones are excluded.

Fall injury questions are not on a fixed cycle in the BRFSS. Most recently they have been asked in 2003 and 2006. Individual states have included fall questions in other years.

The CDC web query system of BRFSS results does not include information from the falls questions. As of November 2005, no national analysis of the 2003 falls questions has been published, though some states have published on it for their state.

At the national level, it is difficult and costly to find the resources to add the falls questions to the core set of questions asked by each state. Likewise, while states may include fall questions on their own, costs and the need to limit the length of telephone interview are serious constraints.

Few validated falls questions are available for states or others to use to in their own BRFSS or other telephone-based health surveys.

Relevant Web sites
www.cdc.gov/brfss

Second Longitudinal Study of Aging (LSOA II)

Usual Source Contacts
Office of Analysis and Epidemiology, NCHS (lsoa@cdc.gov)

Technique for Identifying Fall Cases
The Second Longitudinal Study of Aging (LSOA II) collects data on falls, but the questions are limited. They were asked at each interview – the baseline interview in 1994 and at each follow-up (in 1997 and 1999). The questions are:

1. Have you fallen in the past 12 months? [Yes/No]

[If yes to 1:]

2. Have you fallen more than once? [Yes/No]
3. Were you injured as a result of the fall(s)? [Yes/No]

[If yes to 3:]

4. What kind of injuries did you have - a fracture, bruise, scrape or cut; did you lose consciousness, or did you have some other injury? [Mark all that apply: fracture, bruise/scrape/cut, lost consciousness, other]
5. [Did you fall/Were any of these falls] because you felt dizzy? [Yes/No]

Description
The Second Longitudinal Study of Aging (LSOA II) is a prospective cohort study of older Americans. It is a collaborative effort of the National Center for Health Statistics and the National Institute of Aging and was designed primarily to: 1) provide information on the sequence and consequences of health events among the elderly, including utilization of medical care and services, 2) provide information on the causes and correlates of changes in functioning, and 3) provide a replication of the first LSOA in order to determine whether there have been changes in the disability and impairment process between the 1980's and 1990's.

Method
The LSOA II sample is comprised of 9,447 persons and is nationally representative of the civilian, noninstitutionalized population 70 years of age and over in 1995. The baseline interview (the Second Supplement on Aging or SOA II) was conducted between 1994 and 1996 as part of the National Health Interview Survey on Disability, Phase II. These interviews were administered in person. Two follow-up interviews have been conducted. The first LSOA II follow-up, also known as Wave 2, was fielded between 1997 and 1998. Wave 3 was fielded between 1999 and 2000. Both were administered via Computer Assisted Telephone Interview (CATI) and both surviving sample persons and proxies for those deceased were eligible for the follow-up interviews.

Uses
The LSOA II surveys provide benchmark information on health issues in older adults at the national level. These results could be extrapolated by states to estimate the distribution of falls and fall-related injuries.

Strengths
Combined with the initial LSOA surveys, LOSA II provides baseline data for monitoring falls as a health issue for older adults.

Limitations
No state-level data available from LSOA surveys.

Relevant Web sites
www.cdc.gov/nchs/about/otheract/aging/lsoa2.htm

G. Occupational Settings

Federal responsibility for surveillance and research on work-related injuries lies with the U.S. Bureau of Labor Statistics (BLS) and the National Institute for Occupational Safety and Health (NIOSH). BLS is in the federal Department of Labor (DOL), and NIOSH is part of the Centers for Disease Control and Prevention (CDC). BLS and NIOSH work closely together on surveillance systems that document work-related falls.

The three systems described below are the most comprehensive sources used by NIOSH. All of the systems are considered supplemental sources of data. NIOSH's Fatal Accident Circumstances and Epidemiology (FACE) program, which investigates many work-related fall deaths, is not included. For information on more specific NIOSH efforts such as FACE and other surveillance projects, contact the NIOSH Division of Safety Research.

Census of Fatal Occupation Injuries (CFOI)

Usual Source Contacts
Division of Safety Research, National Institute for Occupational Safety and Health, Centers for Disease Control, Morgantown, West Virginia.

Technique for Identifying Fall Cases
Falls in the COFI are identified via OIICS ANSI-Z16 codes 10, 11, 12, 13, 19

Description
Since 1992, the Bureau of Labor Statistics has contracted with an office in each state and the District of Columbia to assemble reports of work related deaths from several sources. The resulting data set is designed to be the most complete set of work-related deaths in the U.S. By searching for cases among various sources—including newspaper clippings—deaths not captured in one system may be captured in another.

Various sources of information on possible work-related injury deaths are cross-referenced to determine true cases. Injuries must come from a work-related event or from a single instantaneous exposure in the work environment. An eligible decedent must have been involved

in some kind of legal, compensated work activity or be at the scene of the incident as a work requirement.

Method
Staff in state offices gather information from sources such as death certificate files, workers' compensation agencies, newspaper clippings, and various state regulatory agencies. In general, only cases located in at least two of these sources are included. Some one-source cases are included if the information on them is convincing enough. Questionnaire follow-backs are sometimes used for confirmation. Information is coded to the OIICS, described earlier. Falls are thus classified according to OIICS criteria.

Uses
The CFOI is operated by BLS and used by NIOSH to track and describe all fatal work injuries. Other sources from which work-related deaths can be derived are generally incomplete in that they do not cover all types of cases. For example, a worker on a family farm who dies of a fall from a barn roof may not be captured by a state's workers compensation system or the Survey of Occupational Injuries and Illnesses. This death might be captured by CFOI in some state agencies records or in a newspaper report.

Strengths
CFOI permits the most comprehensive description of work injuries, including those involving self-employed and government workers.

Limitations
Some true cases identified in only one source may be excluded, depending on the accuracy of the sources.

Relevant Web sites
www.bls.gov/news.release/cfoi.toc.htm

Survey of Occupational Injuries and Illness (SOII)

Usual Source Contacts
BLS and NIOSH

Technique for Identifying Fall Cases
Falls in the SOII are identified from OSHA reportable cases in employer-maintained logs. These are subsequently coded to the OIICS ANSI-Z16 codes 10, 11, 12, 13, 19.

Description
BLS contracts with agencies in states to conduct an annual sample survey of employers who provide information based on their personnel records. Employers give total counts of injuries and illness and detail on more serious cases, such as those involving days off from work. Eligible cases are all those reportable to OSHA. Larger employers are allowed to provide data on a sample of their injured workers. Besides information about the injury or illness, employers

provide occupation, age, sex, race/ethnicity, and length of service for the more serious cases. BLS and NIOSH use the Survey's results to develop estimates of work injuries (with sampling errors) in a large proportion of the private sector labor force. BLS provides aggregated summary data as well as the ability to do record-level analysis.

Method
Employers selected for a given year's survey receive a BLS questionnaire in which they record the number of illnesses and injuries for the one-year reporting period. SOII cases are identified from the log of injuries kept by employers, using guidelines set by the Occupational Safety and Health Administration in the DOL. Included are injuries that result in lost work time, medical treatment beyond first aid, restriction of work or motion, loss of consciousness, or transfer to another job. To permit calculation of injury rates, employers also provide information on employee hours worked. To permit comparisons among establishments of the same size, employers provide information on the number of employees. Since 1992, information on the demographics of affected workers and conditions associated with illnesses and injuries is also available.

Uses
Data from the survey are intended to characterize industries with an excess of occupational illness or injury problems for the overall U.S. and for participating states. Information can be used to assess needs for interventions, evaluate existing work safety and hygiene programs, and evaluate strategies for worker's compensation and development of safety and hygiene devices and systems.

Strengths
No other occupational injury dataset permits as detailed and standardized comparisons among industries for illnesses and injuries over a range of severity. Although data come from a sample of enterprises, the design of the survey permits the calculation of confidence intervals around point estimates.

Limitations
Not included are work-related deaths. The survey does not cover workers who are self-employed, on farms with fewer than 11 employees, in private-households, or who are employees of government agencies. The Survey is based on a sample of employers and thus is subject to sampling error.

Relevant Web sites
www.bls.gov/iif/oshsum1.htm
www.bls.gov/iif/home.htm#records

NEISS–Work Injury and Illness Study (NEISS-WIIS)

Usual Source Contacts
NIOSH, Surveillance and Field Investigations Branch, Division of Safety Research

Technique for Identifying Fall Cases
Falls in the NEISS-WIIS are identified via OIICS ANSI-Z16 codes 10, 11, 12, 13, 19

Description
Through an interagency agreement with the U.S. Consumer Product Safety Commission, NIOSH supports collection and coding of work-related injury data in a national sample of 67 of 100 NEISS hospitals that are already gathering data on consumer product injuries as part of the general NEISS system. In addition to the data normally gathered in the NEISS system, the NIOSH codes work-related injuries and illnesses according to the Occupational Injury and Illness Classification System. The case definition includes all work-related injuries and illnesses treated in an emergency department and involving a civilian worker, including the self-employed, workers on small farms, government employees, and volunteers.. The system does not include the estimated two-thirds of work injuries that are treated in places other than emergency departments, for example, doctors' offices and work-place clinics. Data on fatal injuries or data at the sub-national level (e.g. states or regions) are not available.

Method
All injuries and illnesses treated in the emergency departments of NEISS hospitals are included. Staff recording data in NEISS hospitals review all cases according to a criterion checklist to determine work-relatedness. Those so identified are coded for additional variables gathered for occupational injuries only. NIOSH reviews all cases and codes the injury/illness event according to OIICS. Work-related fall injury estimates are available at varying levels of detail according to the hierarchical structure of the OIICS.

Uses
NEISS includes injuries and illnesses not covered by the BLS SOII, which excludes the self-employed, workers on small farms, government employees, and volunteers.

Strengths
At relatively low cost, the system provides estimates of injuries/illnesses to supplement those captured in other occupational injury surveillance systems. By applying statistical weights, national estimates can be calculated for worker demographics, incident characteristics, and injury/illness characteristics. Follow-up investigations of particular injury types are conducted as part of the NEISS. For example, CPSC and NIOSH have jointly conducted investigations of injuries associated with teenagers working in restaurants, eye injuries at work, and injuries to farmers and construction workers.

Limitations
Like all data derived from NEISS, estimates are based on a sample of hospitals and are therefore subject to sampling error. Thus, NEISS data can not be used to estimate injury rates for industries.

The system does not capture the estimated two-thirds of work injuries treated in ambulatory care settings other than emergency departments, for example, doctors' offices and work-place clinics.

Data on fatal injuries or data at the sub-national level (e.g. states or regions) are not available.

Relevant Web sites
NIOSH maintains an on-line query system for accessing NEISS data on occupational injuries/illnesses at www2a.cdc.gov/risqs/

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Acknowledgements

A special thanks to several individuals who helped to draft this report and assure its accuracy and completeness:

For production of figures, ISW 4 thanks Kimberly Brice, Office of Statistics and Programming, National Center for Injury Prevention and Control, CDC, and Epidemiology and Prevention for Injury Control Branch, California Department of Health Services.

For expertise in fall data extraction in discharge databases and Minimum Data Set, ISW 4 thanks Robert Campbell, JD, MPH, PhD, Health Services Researcher, VISN 8 Patient Safety Center of Inquiry, Adjunct Assistant Professor of Health Law, College of Law, Nova Southeastern University.

For compiling information on users of fall and fall injury data, ISW 4 thanks Anne Esdale, MPH, Fall Prevention Coordinator, Injury & Violence Prevention Section, Michigan Department of Community Health.

For cost data analysis, ISW 4 thanks Doug Hill and Monique Sheppard, Children's Safety Network Economics and Data Analysis Resource Center (NEDARC).

For preparing the first draft of the *Mapping of ICD Cause of Fall-Related Injury Codes,* ISW 4 thanks Thomas Largo, MPH, Epidemiology Bureau, Michigan Department of Community Health.

For work on the graphs and presentations. ISW 4 thanks Issac Romero, New Mexico Department of Health.

A debt of gratitude is also due to five objective reviewers, who offered thoughtful comments and insight on the final draft of the report:

Nancy Bill, Indian Health Service
Marjorie Getz, Bradley University
Deanna Gray Miceli, New Jersey Department of Health and Senior Services
Jon Roesler, Minnesota Department of Health
Sally York, NorthWest Orthopedic Institute

Finally, the members of the ISW on Falls recognize and deeply appreciate our facilitator and compiler of this report, Susan Baker Toal, and Amy Woodward and Allison Lowe Huff along with the rest of the STIPDA staff. They provided steady and extensive support to all of us throughout the project and have assured its successful completion.

Sponsoring Organizations

About STIPDA

The State and Territorial Injury Prevention Directors Association (STIPDA) is a national non-profit organization comprised of professionals committed to protecting the health of the public by sustaining, enhancing and promoting the ability of state, territorial and local health departments to reduce death and disability associated with injuries. To advance this mission, STIPDA engages in activities to increase awareness of injury as a public health problem; provide injury prevention and control education and training; enhance the capacity of public health agencies to conduct injury prevention and control programs; and support public health policies designed to advance injury prevention and control. For more information about STIPDA or the Injury Surveillance Workgroup on Falls, please visit the STIPDA Web site at www.stipda.org.

About CDC/NCIPC

The Centers for Disease Control and Prevention (CDC) is one of the 13 major operating components of the Department of Health and Human Services (HHS), which is the principal agency in the United States government for protecting the health and safety of all Americans and for providing essential human services, especially for those people who are least able to help themselves. CDC began studying home and recreational injuries in the early 1970s and violence prevention in 1983. From these early activities grew a national program to reduce injury, disability, death, and costs associated with injuries outside the workplace. In June 1992, CDC established the National Center for Injury Prevention and Control (NCIPC), with the mission to reduce morbidity, disability, mortality, and costs associated with injuries. As the lead federal agency for injury prevention, NCIPC works closely with other federal agencies; national, state, and local organizations; state and local health departments; and research institutions. For more information, please visit the Web site at www.cdc.gov/ncipc.

About CSTE

For more than five decades, the Council of State and Territorial Epidemiologists (CSTE) and the Centers for Disease Control and Prevention (CDC) have worked in partnership to improve the public's health by supporting the efforts of epidemiologists working at the state and local level in promoting the effective use of epidemiologic data to guide public health practice and improve health. CSTE and its members represent two of the four basic components of public health – epidemiology and surveillance – and provide technical advice and assistance to the Association of State Public Heath Officials and to federal public health agencies including CDC. Since 1951, CSTE has grown into a professional association of over 850 epidemiologists representing all 50 states, 8 territories and Puerto Rico. Areas of expertise include: infectious diseases, immunizable diseases, environmental health, chronic diseases, occupational health, injury control, genomics, and maternal and child health. For more information about CSTE, please visit the Web site at www.cste.org.

About SAVIR

The Society for Advancement of Violence and Injury Research, SAVIR (formerly the National Association of Injury Control Research Centers, NAICRC) is devoted to promoting scholarly activity in injury control and addressing issues relevant to the prevention, acute care and rehabilitation of traumatic injury. These aims are achieved through multiple member activities in research, research dissemination, program development and evaluation, consultation, education and training. For more information about SAVIR, please visit the Web site at www.naicrc.org.

APPENDIX A

National Goals and Objectives for Fall Prevention

In recognition of the public health significance of falls, the U.S. Department of Health and Human Services included two objectives specifically related to falls prevention in *Healthy People 2010:* [2]

15-27 Reduce deaths from falls*

Target: 3.3 deaths/100,000 population
Baseline: 4.7 deaths/100,000 population in 1998

15-28 Reduce hip fractures among older adults (> 64 years old)

Target: 416/100,000 in females
474/100,000 in males
Baseline: 1,056/100,000 in females in 1998
593/100,000 in males in 1998

Additional objectives address conditions often associated with falls, and the promotion of surveillance systems that would improve the documentation of fall injuries. Two objectives of particular relevance are:

15-10 Increase the number of States and the District of Columbia with statewide emergency department surveillance systems that collect data on ECI

Target: All States and the District of Columbia
Baseline: 12 States had statewide ED surveillance systems that collected data on ECI in 1998

15-11 Increase the number of States and the District of Columbia that collect data on ECI through hospital discharge data systems

Target: All States and the District of Columbia
Baseline: 23 States collected data on ECI through hospital discharge data systems in 1998

In addition, the Joint Council on Accreditation of Healthcare Organizations (JCAHO), responsible for evaluating the quality and safety of care for more than 15,000 healthcare organizations, adopted as one of its 2006 Critical Access Hospital and Hospital National Patient Safety Goals and requirements: [32]

Goal #9 Reduce the risk of patient harm resulting from falls.
Requirement Implement a fall reduction program and evaluate the effectiveness of the program.

* All rates are age adjusted

Additional national fall prevention plans can be found from the following sources:

www.healthyagingprograms.org/resources/

www.cochrane.org/reviews/en/ab000340.html

Morris AH, Zuckerman JD; AAOS Council of Health Policy and Practice, USA. American Academy of Orthopaedic Surgeons. National Consensus Conference on Improving the Continuum of Care for Patients with Hip Fracture. J Bone Joint Surg Am 2002 Apr;84-A(4):670-4.

APPENDIX B

Additional Methods for Identifying Fall-Related Injuries

ISW4 considered a number of other data collections systems that use different techniques to identify fall injury cases. At this writing these are still in some stage of development, validation, or early phase of implementation that bear watching and consideration for use in the future. Three are described briefly below along with sources of information that provide more complete implementation details for users.

International Classification of External Causes of Injury (ICECI)

The *International Classification of External Causes of Injury (ICECI)* is a Related Classification in the World Health Organization's Family of International Classification of Diseases and Related Health Problems. The WHO Family of International Classifications is comprised of Reference Classifications and Derived and Related Classifications The Reference Classifications are the main classifications on basic parameters of health; these have been prepared by the World Health Organization and approved by the Organization's governing bodies for international use. The ICD is a reference classification. Related classifications are those that partially refer to reference classifications, or are associated with the reference classification at specific levels of structure only. The ICECI is considered a related classification.

ICECI compliments Chapter XX, External Causes of Morbidity and Mortality of ICD-10. The ICD-10 Framework: External Cause of Injury Mortality Matrix (www.cdc.gov/nchs/about/otheract/ice/matrix10.htm) has been adopted as a bridge between ICECI and ICD-10, making it possible to compare aggregated injury data classified according to either system. (See Appendix C for more information on the relationship between ICECI and ICD-10.)

Table 13. ICECI Fall Codes

Data Source and ID System		Fall Mechanism Codes
International Classification of External Causes of Injury (ICECI)		C2 – 1.5

ICECI is a practical tool for classifying the circumstances in which injuries occur. Thus, it can be used in surveillance and research to support injury prevention and control efforts. Using this tool, one can code the key factors that may be involved in causing injuries. Consequently, injuries can be both *counted* and *described* to yield useful information for setting priorities, making policy decisions, and guiding prevention. For example, ICECI could provide a guide for coding the level of detail that is needed in the medical record.

A key feature of the ICECI is its comprehensive data dictionary and index. ICECI data collection tools can be tailored for use in health interview surveys or in hospital emergency departments, outpatient clinics, or other medical care settings. Users in countries having either adequate or limited resources for injury prevention activities find ICECI useful for capturing injury data.

The ICECI is a multi-axial, modular and hierarchical system. The full ICECI is a rich and extensive system with hierarchical code sets for data elements in the **Core** module, namely, mechanism of injury, intent of injury, object/substance producing the injury, place of occurrence, activity when injured, alcohol use, and psychoactive drug or substance use. Information for most data elements can be /captured at a *basic* (more general) or *expanded* (more detailed) level. ICECI also has supplementary **Transport**, **Violence**, **Place of Occurrence**, **Sport**, and **Occupational** modules designed to capture further details related to these injuries.

The multi-axial structure of the ICECI enables numerous factors to be recorded independently of one another. For example, objects or substances involved in the occurrence of an injury can be coded irrespective of how, or whether, other items have been coded. For instance, *a child on a playground at school who fell from high monkey bars* would be coded as: intent = unintentional, mechanism = falling/stumbling/jumping/pushed from a height 1 meter or more, object = monkey bar, place = playground at school, and activity = play.

The modular structure of the ICECI groups sets of data elements that are likely to be used together. For example, the **Core** module includes items that are generally useful for injury surveillance while the supplementary **Sport** module includes items that might be used when sports injury is a special focus of a data collection, including type of sport/exercise activity, phase of activity, personal countermeasures, and environmental countermeasures.

The hierarchical structure of items in the ICECI allows users to choose from up to three levels of detail for data collection and reporting. The level used can differ between items and modules. For example, if *a person fell at the end of a mountain bike race and was wearing a helmet*, the **Sports** module allows the user to code type of sport/exercise activity = “wheeled non-motored sports” at the first level or “cycling—mountain” at the second level; phase of activity = “competition/participation” at the first level or “last 25 percent of expected event duration” at the second level; personal countermeasure = “helmet;” environmental countermeasures = “unspecified.”

The ICECI can be used in its full form, using all items in all modules at their most detailed coding level. Alternatively, individual modules can be defined as an independent subset at different levels of detail, when that is more convenient or appropriate. Also, for mechanism of injury, there is a short version as well as a long version.

For more information, visit the ICECI Web site at www.iceci.org.

Morse and Hendrichs Fall Scales

Because of the burden of falls and fall-related injuries, fall preventive programs are being implemented throughout healthcare settings, particularly those providing acute and long-term care. Assessment of fall risk is the initial step for these programs, and is the foundation for healthcare interventions and standard procedures when a person is admitted as an inpatient for acute or long-term care. While fall risk assessment is not standardized within or across these healthcare settings, two valid and reliable screening scales are used predominately: The Morse Fall Scale and the Hendrich's Hospital Fall Risk Factors Scale. Both capture similar intrinsic risk factors for falls – such as history of falls, medications, medical instability, cognitive decline, functional decline (balance, gait, and vision) – and extrinsic risks.

Morse Fall Scale

The *Morse Fall Scale*[33] is administered on a person who is admitted as an inpatient for acute or long-term care upon patient admission, change in status and discharge. The Morse Fall Scale is an excellent nursing assessment, because it can be rapidly performed and utilizes such objective measures of risk for falls as history of falling, secondary diagnoses, ambulatory aids, intravenous fluid administration (IVs/heparin locks, intra-venous portals for administering fluids and medications), gait/transferring, and mental status. Upon evaluating a patient, a score is calculated on a scale of 0 (no risk) to 125 (highest risk) for falling.

While questions have been raised regarding some of the factors contained in the Morse Scale, the Scale has been shown to have good sensitivity and specificity across a variety of inpatient populations. It is one of the most widely used fall risk assessment scales available. Questions in the Morse Scale were formulated using a large variety of parameters initially and then collapsed based on statistical interactions. Parameters involving the most objective evaluation of a patient were used. For example, secondary diagnosis can indicate pharmacological issues without the need to determine all the medications a patient is taking, and the use of an IV lock can be a surrogate for acuity level of the patient or an alert to potentially inappropriate use of the IV stand as an assistive device.

Please see the Morse Fall Scale on the next page.

Table 14. Morse Fall Scale

I. Morse Fall Scale		
Risk Factor	**Scale**	**Score**
History of Falls	Yes	25
	No	0
Secondary Diagnosis	Yes	15
	No	0
Ambulatory Aid	Furniture	30
	Crutches / Cane / Walker	15
	None / Bed Rest / Wheel Chair / Nurse	0
IV / Heparin Lock	Yes	20
	No	0
Gait / Transferring	Impaired	20
	Weak	10
	Normal / Bed Rest / Immobile	0
Mental Status	Forgets Limitations	15
	Oriented to Own Ability	0

To obtain the Morse Fall Score, the scores from each category are summed.[33]

Hendrich Fall Risk Scale

Hendrich's Hospital Falls Risk Factors[34] also assesses a patient's fall risk based on intrinsic characteristics (e.g. psychological status, mobility dysfunction, fall history, elimination frequency/dependence, acute/chronic illnesses, and sensory deficits). This scale is used in acute care and some long-term care settings. A recent revision, the Hendrich II Fall Risk Assessment, incorporates medications that contribute to risk as well as the "Rising from a Chair" test (in which patients are asked to rise from a chair 10 times as fast as possible without arm support) used by physical therapists in outpatient and community settings.

A revised Hendrich II Fall Risk Model is also available, and incorporates gender (male) as a separate risk factor along with medications (anti-epileptics and antidepressants) as risk factor, and rising from a chair. From either Hendrich scale, patients only classified as either high-risk or low-risk for falling.

Table 15. Hendrich Fall Risk Assessment

Hendrich Fall Risk Assessment		
Risk Factor	**Scale**	**Score**
Recent History of Falls	Yes	7
	No	0
Altered Elimination (incontinence, nocturia, frequency)	Yes	3
	No	0
Confusion/Disorientation	Yes	3
	No	0
Depression	Yes	4
	No	0
Dizziness/Vertigo	Yes	3
	No	0
Poor Mobility/Generalized Weakness	Yes	2
	No	0
Poor Judgment (if not confused)	Yes	3
	No	0

APPENDIX C

Mapping of ICD Cause of Fall-Related Injury Codes

The following table offers a comprehensive list of all ICD codes for falls and fall-related injuries in the ICD-9-CM, ICD-10 and proposed ICD-10-CM. The codes are accurate as of January 2006, but may need to be updated as new codes are introduced from time to time. For the latest version, consult the ICD Web site: www.who.int/classifications/icd/en/

Description	ICD-9	ICD-9-CM	ICD-10	ICD-10-CM*
Unintentional Falls				
Fall on or from escalator	E880.0	E880.0		W10.0
Fall on or from sidewalk curb		E880.1		W10.1
Fall on or from incline				W10.3
Fall on or from other stairs or steps	E880.9	E880.9		W10.8
Fall from ladder	E881.0	E881.0	W11	W11
Fall from scaffolding	E881.1	E881.1	W12	W12
Fall from or out of building or other structure	E882	E882	W13	
Diving or jumping into water	E883.0	E883.0	W16	
Fall into swimming pool striking water surface causing drowning and submersion				W16.011
Fall into swimming pool striking water surface causing other injury				W16.012
Fall into swimming pool striking bottom causing drowning and submersion				W16.021
Fall into swimming pool striking bottom causing other injury				W16.022
Fall into swimming pool striking wall causing drowning and submersion				W16.031
Fall into swimming pool striking wall causing other injury				W16.032
Fall into natural body of water striking water surface causing drowning and submersion				W16.111
Fall into natural body of water striking water surface causing other injury				W16.112
Fall into natural body of water striking bottom causing drowning and submersion				W16.121
Fall into natural body of water striking bottom causing other injury				W16.122
Fall into natural body of water striking side causing drowning and submersion				W16.131
Fall into natural body of water striking side causing other injury				W16.132
Fall in/into filled bathtub causing drowning and submersion				W16.211
Fall in/into filled bathtub causing other injury				W16.212
Fall in/into bucket of water causing drowning and submersion				W16.221
Fall in/into bucket of water causing other injury				W16.222
Fall into other water striking water surface causing drowning and submersion				W16.311
Fall into other water striking water surface causing other injury				W16.312

Description	ICD-9	ICD-9-CM	ICD-10	ICD-10-CM*
Fall into other water striking bottom causing drowning and submersion				W16.321
Fall into other water striking bottom causing other injury				W16.322
Fall into other water striking wall causing drowning and submersion				W16.331
Fall into other water striking wall causing other injury				W16.332
Fall into unspecified water causing drowning and submersion				W16.41
Fall into unspecified water causing other injury				W16.42
Jumping or diving into swimming pool striking water surface causing drowning and submersion				W16.511
Jumping or diving into swimming pool striking water surface causing other injury				W16.512
Jumping or diving into swimming pool striking bottom causing drowning and submersion				W16.521
Jumping or diving into swimming pool striking bottom causing other injury				W16.522
Jumping or diving into swimming pool striking wall causing drowning and submersion				W16.531
Jumping or diving into swimming pool striking wall causing other injury				W16.532
Jumping or diving into natural body of water striking water surface causing drowning/submersion				W16.611
Jumping or diving into natural body of water striking water surface causing other injury				W16.612
Jumping or diving into natural body of water striking bottom causing drowning and submersion				W16.621
Jumping or diving into natural body of water striking bottom causing other injury				W16.622
Jumping or diving from boat striking water surface causing drowning and submersion				W16.711
Jumping or diving from boat striking water surface causing other injury				W16.712
Jumping or diving from boat striking bottom causing drowning and submersion				W16.721
Jumping or diving from boat striking bottom causing other injury				W16.722
Jumping or diving into other water striking water surface causing drowning and submersion				W16.811
Jumping or diving into other water striking water surface causing other injury				W16.812
Jumping or diving into other water striking bottom causing drowning and submersion				W16.821
Jumping or diving into other water striking bottom causing other injury				W16.822
Jumping or diving into other water striking wall causing drowning and submersion				W16.831
Jumping or diving into other water striking wall causing other injury				W16.832
Jumping or diving into unspecified water causing drowning and submersion				W16.91
Jumping or diving into unspecified water causing other injury				W16.92

Description	ICD-9	ICD-9-CM	ICD-10	ICD-10-CM*
Fall into well	E883.1	E883.1		W17.0
Fall into storm drain or manhole	E883.2	E883.2		W17.1
Fall into hole				W17.2
Fall into empty swimming pool				W17.3
Fall from dock				W17.4
Fall into other hole or other opening in surface	E883.9	E883.9		
Fall from playground equipment	E884.0	E884.0	W09	
Fall on or from playground slide				W09.0
Fall from playground swing				W09.1
Fall on or from jungle gym				W09.2
Fall on or from other playground equipment				W09.8
Fall from cliff	E884.1	E884.1	W15	W15
Fall from chair		E884.2	W07	W07
Fall from chair or bed	E884.2			
Fall from wheelchair		E884.3	W05	
Fall from non-moving wheelchair				W05
Fall from moving wheelchair				V00.811
Fall from bed		E884.4	W06	W06
Fall from other furniture		E884.5	W08	W08
Fall from commode		E884.6		
Fall from or off toilet without subsequent striking against object				W18.11
Fall from or off toilet with subsequent striking against object				W18.12
Other fall from one level to another	E884.9	E884.9	W17	W17.8
Fall from non-motorized scooter		E885.0		
Fall from roller skates		E885.1		
Fall from skateboard		E885.2		
Fall from skis		E885.3		
Fall from snowboard		E885.4		
Fall from other slipping, tripping, or stumbling		E885.9		
Fall involving ice skates, skis, roller skates or skateboards			W02	
Fall on same level involving ice and snow			W00	
Fall on same level involving ice and snow				W00.0
Fall from stairs/steps due to ice and snow				W00.1
Other fall from one level to another due to ice and snow				W00.2
Unspecified fall due to ice and snow				W00.9
Fall on same level – striking against unspecified object with subsequent fall				W18.00
Fall on same level – striking against sports equipment with subsequent fall				W18.01
Fall on same level – striking against glass with subsequent fall				W18.02
Fall on same level – striking against other object with subsequent fall				W18.09
Fall on same level – in/into shower or empty bathtub				W18.2
Fall on same level – not otherwise specified				W18.9
Fall on same level from slipping, tripping, or stumbling	E885		W01	
Fall on same level from slipping, tripping, or stumbling with w/out subsequent striking vs. object				W01.0
Fall on same level from slipping, tripping, or stumbling with				W01.110

Description	ICD-9	ICD-9-CM	ICD-10	ICD-10-CM*
subsequent striking vs. sharp glass				
Fall on same level from slipping, tripping, or stumbling with subsequent striking against power tool or machine				W01.111
Fall on same level from slipping, tripping, or stumbling with subsequent striking against other sharp object				W01.118
Fall on same level from slipping, tripping, or stumbling with subsequent striking against unspecified sharp object				W01.119
Fall on same level from slipping, tripping, or stumbling with subsequent striking against furniture				W01.190
Fall on same level from slipping, tripping, or stumbling with subsequent striking against other object				W01.198
Other fall on same level			W18	
Fall on same level from collision, pushing, or shoving, by/with other person–sports	E886.0	E886.0	W03	
Fall on same level from collision, pushing, or shoving, by/with other person–other & unspecified	E886.9	E886.9	W03	W03
Fall while being carried or supported by other persons			W04	W04
Fall resulting in striking against sharp object		E888.0		
Fall resulting in striking against other object		E888.1		
Other fall		E888.8		
Unspecified fall		E888.9	W19	W19
Other and unspecified fall	E888			
Intentional Self-harm/Suicide				
Jumping from high place			X80	X80
Jumping from high place – residential premises	E957.0	E957.0		
Jumping from high place – other man-made structure	E957.1	E957.1		
Jumping from high place – natural site	E957.2	E957.2		
Jumping from high place – unspecified	E957.9	E957.9		
Assault/Homicide				
Pushing from high place	E968.1	E968.1	Y01	Y01
Undetermined Intent				
Falling, jumping, pushed from high place, undetermined intent			Y30	Y30
Fall from high place – residential premises	E987.0	E987.0		
Fall from high place – other man-made structure	E987.1	E987.1		
Fall from high place – natural site	E987.2	E987.2		
Fall from high place – unspecified site	E987.9	E987.9		

* Codes listed are from a draft classification system that has not yet been formally approved and/or adopted.

Notes on Appendix C

Rationale for Exclusion of ICD-9 Code E887 and Related Expansion of ICD-10 Code X-59

E887, the ICD-9 code for "fracture, cause unspecified" is not used in the definition of falls because it was only meant to be used for fractures when nothing was known about the cause. The ICD-10 contains no comparable code for E887. The closest ICD-10 code, X59 ("exposure to unspecified factor"), is far more encompassing but has also not been included in definition of fall-related injury in this report.

A decision was made by the WHO Update Reference Committee meeting in October 2002 (URC #0201) to expand category X59 by adding a fourth character to separate out fracture, cause unspecified from other unspecified exposures.

After January 1, 2006:

The code titles will be:
X59.0 Exposure to unspecified factor causing fracture
X59.9 Exposure to unspecified factor causing other and unspecified injury

These proposals are acceptable for mortality because in most countries, including the United States, the supplementary characters for place of occurrence are not collected as part of the code, but are already collected as separate variables.

Currently, the use of W19 [Unspecified fall] and X59 [Exposure to unspecified factor] varies so much that comparing statistics is problematic. Again, this applies quite as much to mortality as to morbidity. The numbers of deaths in the United States coded to E887, W19 and X59 show that:

	W19	X59	E887
1998			3694
1999	7807	7459	
2000	7146	6673	
2001	7660	7218	
2002	7654	6550	
2003	8306	6630	

Relationship Between ICECI 1.1 and ICD-10

ICECI (more fully described in Appendix B) can optimally be used as a companion to ICD-10, allowing for more detailed data capture in emergency departments, clinics, and in-patient hospital settings; in ad hoc studies and surveys; and possibly in mortality registration systems. ICECI and ICD-10 ECI (i.e. Chapter XX) have complementary roles. ICD-10-Chapter XX will continue to be the basis for coding official national statistics.

Recommended Framework as Bridge
Making ICECI comparable with ICD-10 ECI codes (Chapter XX) presents several challenges. However, such comparability is highly desirable. Therefore, the international experts who developed ICECI decided that comparability between ICD-10 and ICECI would be achieved by using a bridge: the matrix developed by the Centers for Disease Control and Prevention in the US. This matrix is a recommended framework for injury mortality data and serves as a standard for the uniform tabulation and analysis of injury mortality data classified by ICD. Mechanism (or cause) and Intent of injury are the two key elements of the matrix. The framework is based on international agreement and is intended to report injury events in such a way that the results are valuable for injury prevention. Data coded to either ICECI or ICD-10 Chapter XX can be reported in accordance with the matrix.

Intent and Mechanism of Injury
Comparability with the injury matrix is possible with a limited number of data elements from the core set of data elements. The two data elements that are minimally required for compatibility with the matrix are Intent and Mechanism of Injury. Comparability with the matrix is possible if the first level of Intent and the second level of the short version of Mechanism of Injury are recorded.

For the data dictionary and more information, see www.iceci.org/
For more information on the Matrix see www.cdc.gov/nchs/about/otheract/ice/matrix10.htm

APPENDIX D

Age-Adjusted Rates

When presenting fall-related injury rates to make state-to-state comparisons or track trends over time within a state or nationally, it is important to use age-adjusted rates. For instance, fall-related injuries are more common among the elderly than among any other age group.

Age adjustment is a statistical method for standardizing differences in the age distributions of different populations or the same population at different points in time. Using the age-adjusted rates standardized to the overall US population instead of using a crude rate (number of fall-related injuries/actual population) removes the effect of differences in the age distributions to allow for statistically valid comparisons among population subgroups. When calculating age-adjusted rates, it is important to adjust the injury rates for all geographic areas in the comparison to the same standard year. Currently, the 2000 standard US population is used to report age-adjusted rates based on injury mortality and morbidity data from the National Center for Health Statistics and the National Center for Injury Prevention and Control, CDC.[35] The suggested method for calculating age-adjusted rates is described in ISW3.[25]

Step 5. Calculate *sex-specific age-adjusted rates*, and the total state population for the Barell matrix and the Recommended Framework of E-code Groupings for Presenting Injury Mortality and Morbidity Data. When calculating state rates for comparison with other states, perform age-adjustment to the 2000 standard population using NCHS age distribution #1 (Table 4).

Age adjustment — the application of age-specific rates to a standard age distribution — eliminates differences in crude rates that may result from different age distributions of populations. An age-adjusted rate has no meaning in isolation; it can only be used to compare with another rate standardized in the same way.

Table 4. Standard age groups with age adjustment template using National Center for Health Statistics age distribution #1

Age	State Population	Number of cases in State	State Age-Specific Rate	Weight	Weighted State Age-Specific Rate
<1	pop_1	n_1	n_1/pop_1	0.013818	$(n_1/pop_1) * 0.013818$
1-4	pop_2	n_2	n_2/ pop_2	0.055317	$(n_2/ pop_2) * 0.055317$
5-14	pop_3	n_3	n_3/pop_3	0.145565	$(n_3/pop_3) * 0.145565$
15-24	pop_4	n_4	n_4/pop_4	0.138646	$(n_4/pop_4) * 0.138646$
25-34	pop_5	n_5	n_5/ pop_5	0.135573	$(n_5/ pop_5) * 0.135573$
35-44	pop_6	n_6	n_6/pop_6	0.162613	$(n_6/pop_6) * 0.162613$
45-54	pop_7	n_7	n_7/ pop_7	0.134834	$(n_7/ pop_7) * 0.134834$
55-64	pop_8	n_8	n_8/ pop_8	0.087247	$(n_8/ pop_8) * 0.087247$
65-74	pop_9	n_9	n_9/ pop_9	0.066037	$(n_9/ pop_9) * 0.066037$
75-84	pop_{10}	n_{10}	n_{10}/ pop_{10}	0.044842	$(n_{10}/ pop_{10}) * 0.044842$
85+	pop_{11}	n_{11}	n_{11}/ pop_{11}	0.015508	$(n_{11}/ pop_{11}) * 0.015508$
Total	pop_{12}	n_{12}	———	**1**	**SUM of column = State Age Adjusted Rate**

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