



METHODS

Suicide Prevention Resource Center Suicide Prevention Fact Sheets

- States: Alaska, Arizona, California, Colorado, Connecticut, Florida, Idaho, Illinois, Maine, Massachusetts, Missouri, Montana, Nevada, New Hampshire, New Mexico, New York, Oklahoma, Oregon, Tennessee, Texas, Utah, Virginia, West Virginia, Wisconsin, Wyoming, and United States

Injury Types and Definitions

Suicides and non-fatal self-inflicted injuries were defined by the International Classification of Diseases, 10th Revision (ICD-10) and 9th Revision, Clinical Modification (ICD-9-CM) classification schemes for self-inflicted injuries. Self-inflicted external cause groupings are based on CDC recommended framework for presenting mortality and morbidity data. The ICD-9-CM codes used for non-fatal cases are presented in Table 1 and the ICD-10 codes used to define fatal cases are presented in Table 2. Since two different versions of the ICD classification system were used to define the fatal and non-fatal self-inflicted cases presented in each fact sheet's primary data table, **direct comparisons between fatal and nonfatal estimates should not be made.**

Table 1. International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM), External Cause of Injury Codes Used for Categorizing Mechanism or Cause of Non-Fatal Self-Inflicted Injury

Mechanism/Cause of Self-Inflicted Injury	ICD-9-CM External Cause of Injury Codes
Cut/pierce	E956
Firearm	E955.0-.4,.6
Poisoning	E950.0-E952.9
Suffocation	E953.0-.9
Other (includes drowning, fall, fire/burn, environmental, motor vehicle/transport, other, not elsewhere classified)/ Unspecified	E954 E955.5,.7,.9 E957.0-.9 E958.0-.9 E959
All injury	E950-E959

Table 2. International Classification of Diseases, 10th Revision (ICD-10), Codes Used for Categorizing Mechanism or Cause of Suicide

Mechanism/Cause of Self-Inflicted Injury	ICD-10 External Cause of Injury Codes
Cut/pierce	X78
Firearm	X72-X74
Poisoning	X60-X69
Suffocation	X70
Other (includes drowning, fall, fire/burn, environmental, motor vehicle/transport, other, not elsewhere classified)/ Unspecified	X71, X75-X77, X79-X84, U03.0, Y87.0, U03.9
All injury	X60-X84, Y87.0, U03.0, U03.9

Suicides

National Center for Health Statistics (NCHS) mortality data for 1999-2003 were used to determine the average annual suicide counts (N in table) and rate by state, gender, age, method, and race/ethnicity. Average annual suicide counts were rounded to the nearest whole number. Percent totals may not add to 100 percent due to rounding. Population estimates from the Web-based Injury Statistics Query and Reporting System (WISQARS™) were used to compute crude death rates per 100,000 population for the years 1999-2003. Data presented on the leading cause of death and of injury death were obtained from WISQARS™ Leading Causes of Death Reports (available on the National Center for Injury Prevention and Control's website).

Non-Fatal Self-Inflicted Hospital-Admitted Injuries / Attempted Suicides

When available, state hospital discharge data were used to determine the number and the rate of attempted suicides (non-fatal hospital-admitted suicide attempts) by state, gender, age, method, and race/ethnicity. When recent state data were not available, we provided estimates for the number of hospital-admitted suicide attempts. Annual counts and rates for hospitalized attempts are presented on the right side of the primary table in each fact sheet. Population estimates used to compute crude death and hospitalization rates per 100,000 population for the years 1999-2003 were obtained from WISQARS™; population estimates for year 2004 were obtained from the Bureau of Census.

Hospital Discharge Data

Nationwide Hospital Discharge Data

Data regarding nationwide hospitalization for suicide attempts were obtained from the 2003 Nationwide Inpatient Sample (NIS) file which is part of the Healthcare Cost and Utilization Project (HCUP; Agency for Healthcare Research and Quality, Rockville, MD, 2006). Counts of hospitalizations for self-inflicted injury were based on the E codes listed in Table 1.

State Hospital Discharge Data

Hospitalizations for Arizona, Illinois, and Oklahoma: Data regarding hospitalized suicide attempts in 2004 were directly provided by the health departments from these states.

Hospitalizations for California, Colorado, Connecticut, Florida, Maine, Massachusetts, Missouri, Nevada, New Hampshire, New York, Oregon, Tennessee, Texas, Utah, Virginia, and Wisconsin: For these states, data regarding hospitalization for suicide attempts were obtained from the 2003 State Inpatient Database (SID), which is part of the Healthcare Cost and Utilization Project (HCUP; Agency for Healthcare Research and Quality, Rockville, MD, 2006). HCUP is a family of healthcare databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ). HCUP includes hospitalization data from 38 states for data year 2003.

Estimated State Hospital-Admitted Attempted Suicides

State hospital discharge data were not available for several states at the time the fact sheets were created. Consequently, we used three methods to estimate state counts of hospital-admitted suicide counts, contingent upon the nature of data available.

Hospitalizations for suicide attempts were estimated for the following states: Alaska, Idaho, Montana, New Mexico, West Virginia, and Wyoming.

Estimated Hospitalizations for Alaska: Because we had data regarding hospitalizations in Alaska in year 2000, we based our estimation of hospitalization in years 1999-2003 on the ratio of hospitalizations and mortality in year 2000. Ratios across age and gender for 2000 were applied to mortality incidence in years 1999-2003. These ratios provided an estimate for the hospitalizations in Alaska for years 1999-2003 by gender and age. Gender estimates within age group were added together to get the estimated total hospitalized attempts within each age group. To create estimates for each mechanism that, in sum, were consistent with our age group estimates, we multiplied total incidence estimates within gender and across age groups by the proportion of hospitalizations within gender for each mechanism as described in hospitalized suicide attempt data for Alaska in year 2000. Gender estimates within mechanism were subsequently added together to get the estimated total hospitalized attempts within each mechanism.

Estimated Hospitalizations for West Virginia: Although HCUP-SID provides hospital discharge data for West Virginia, there were high percentages of injury cases without E codes and of poisoning cases with undetermined-intent E codes. We provided estimates of hospitalizations that adjusted for suicide attempts that were not E coded. We compared overall hospital admission rates per 1,000 in West Virginia with states that maintained similar admission rates. After matching West Virginia with similarly ranked states we selected the state that was most similar in admission rates and among states included in HCUP-SID, 2003. West Virginia was matched with Missouri in this analysis.

We compared differences in hospitalization rates between Missouri and West Virginia by gender, and created gender-specific scale-up factors for West Virginia. Based on HCUP-SID data, we created tables that described hospital admissions for suicide attempts in West Virginia by age and gender and by mechanism and gender. Finally, to create an estimate that accounts for underreporting of E codes, we applied gender-specific scale-up factors to each cell in age by gender and mechanism by gender tables.

Estimated Hospitalizations for Idaho, Montana, New Mexico, and Wyoming: Recent hospital discharge data were not available for these states. The number and rate of attempted suicides were estimated based on the number of completed suicides and the number hospitalizations in states with similar characteristics. Our selection of similar states was based primarily on overall hospitalization rates, and secondarily on geographic proximity, and urbanicity.

Based on the criteria described above, states with HCUP-SID data were matched with states that did not have available data and, subsequently, used to develop ratios of completed suicides to hospitalizations in 2003. These ratios were then used to estimate the number of hospitalized attempts within each gender for the specific state by age groups and mechanism based on the 1999-2003 average annual incidence of suicide in each respective state.

This method produces slightly different totals for age-group and mechanism estimates. Consequently, average annual incidence for both mechanism and age group were based on age-group incidence estimates. To create estimates for each mechanism that, in sum, were consistent with our age group estimates, we multiplied total incidence estimates within gender and across age groups by the proportion of incidence estimates within gender for each mechanism. Gender estimates were added together to get the estimated total hospitalized attempts within each age group and mechanism. When there were no completed suicides within a given gender category, a ratio could not be used to estimate the number of hospitalized attempts. In these cases, the same ratio method was used to estimate the total number of hospitalized attempts across both genders. The estimated number of hospitalized attempts for the opposite gender was then subtracted from the estimated total number of hospitalized attempts to calculate an estimate for the missing, hospitalized attempt counts.

Injury Costs

We computed unit costs for medical and productivity losses and multiplied these costs by corresponding incidence estimates. As recommended by the Panel on Cost-Effectiveness in Health and Medicine, we report the present value of lifetime costs, computed at a 3% discount rate, and adopt a societal perspective that includes all costs associated with the injuries - costs to victims, families, employers, government, insurers, and taxpayers. In some instances, no cases were recorded; nevertheless, where possible, we provided estimates of what the average cost would have been had there been cases in the state.

Medical Costs

For cost calculations for hospitalized injuries we used 2000 HCUP-NIS data and cost-to-charge ratios from the Agency for Healthcare Research and Quality to compute inpatient facility costs. We then used Medstat's Marketscan® data to quantify non-facility costs incurred during an inpatient admission. Most injuries that require a hospitalization will also require additional treatment after discharge. To develop estimates of short- to medium-term medical costs for injuries requiring an inpatient admission, we multiplied total inpatient costs derived from the HCUP-NIS/Marketscan® data by the ratio of all costs during the first 18 months of injury, on average, to the total inpatient costs for that kind of injury. We derived these ratios from 1996 to 1999 MEPS data. We used an identical strategy to Rice et al. (1989) for estimating long-term medical costs (18+ months). We used multipliers derived from longitudinal 1979-1988 Detailed Claim Information (DCI) data on over 450,000 Worker's Compensation claims. The DCI file was unique and nothing similar has subsequently become available.

National per-case costs for the age groups and mechanisms specified in the fact sheet series were calculated based on a weighted average and were adjusted to year 2005 dollars. Subsequently, costs were calculated for each state based on the hospitalizations among state residents and adjusted to state-specific price levels. Medical costs for were based on state adjusted national costs. Costs estimates were weighted based on the number of hospitalized self-inflicted injuries within the state.

Medical cost of fatalities was estimated taking into account their probability of occurrence at five places of death identified in the 2000 National Vital Statistics System (NVSS) data: death on scene/at home, dead on arrival at the hospital, death in the ED, death in the hospital after inpatient admission, and death at a nursing home. Depending on place of death, the medical costs incurred might include coroner/medical examiner (C/ME), medical transport, ED, inpatient hospital, or nursing home.

Work Loss Costs (Productivity Costs)

Productivity costs include victims' lost wages and the value of lost household work, fringe benefits, and the administrative costs of processing compensation for lost earnings through litigation, insurance, or public welfare programs like food stamps and Supplemental Security Income. Work losses by family and friends who care for injured children also are included.

We quantify temporary or short-term work loss for nonfatal injuries using the approach presented by Lawrence et al. (2000) where the probability of an injury that resulted in lost workdays was combined with the mean workdays lost (conditional on having missed at least one day) per injury estimated. Averaged across all injuries, estimated temporary work loss was 11.1 days per injury. We computed work loss durations for injuries separately for each age category, sex, and mechanism.

To apply a monetary value to temporary work loss, we multiplied estimated work loss days by the average daily wage and fringe benefit costs stratified by age group and sex from the Current Population Survey. Following other studies (Lawrence et al., 2000; Miller et al., 2000; Zaloshnja et al., 2000), we relied on survey data that showed household work is lost on 90% of days that wage work is lost to injury. Using this ratio and the value of household work (Haddix, Teutsh, & Corso, 2003) we also imputed a value for household work lost.

To compute productivity loss due to permanent or long-term disability, we considered permanent total disability and permanent partial disability separately. For death and other permanent total disability, we multiplied the present value of age- and sex-specific lifetime earnings and household production (Rice et al., 1989), by the probability of permanent disability for each type of injury. For permanent partial disability, we multiplied the earnings estimate by the probability of permanent partial disability and an additional factor that identified the percentage of disability that resulted from that type of injury. We then summed the results to compute the net productivity loss associated with permanent disability, including total and partial disability. The probabilities of permanent and partial disability and the percent disabled (by body part and nature of injury) were computed from DCI data by Lawrence et al. (2000). Application of these estimates to our analysis assumes that these probabilities are the same for injuries that do and do not occur on the job and that they have not changed significantly over time. Averaged across all injuries, our estimated percentage of lifetime productivity potential lost due to injury was 0.26% per injury.

For questions or comments, please call the Pacific Institute for Research and Evaluation, Calverton, Maryland, at 301-755-2728.

For further clarification of the methods, please contact Children's Safety Network Economics and Data Analysis Resource Center at 301-755-2728, sheppard@pire.org, or taylor@pire.org.

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Agency for Healthcare Research

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State Health Departments

Our thanks to the State health departments for providing year 2004 data on hospitalization for self-inflicted injuries.

Arizona

Office of Women's and Children's Health
Arizona Department of Health Services

Illinois

Illinois Department of Public Health
Injury and Violence Prevention Program

Oklahoma

Injury Prevention Service
Oklahoma State Department of Health

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