

Technical Notes

Data Sources²

Mortality data: Connecticut Department of Public Health, Vital Records, death certificate data from calendar years 2000 -2004.

The injury mortality data set here presented includes all Connecticut residents who died—in-state or out-of-state—during calendar years 2000 - 2004, with an underlying cause-of-death of injury, based on injury categories as defined in the *External cause-of-injury mortality matrix based on ICD-10* (National Vital Statistics Reports, Vol. 54, No. 10, January 31, 2006, p. 4.). Non-resident deaths are excluded from the analysis.

Inpatient hospitalization data: Office of Health Care Access (OHCA), hospital discharge data from all 31 non-federal, acute-care, inpatient facilities in the state, for calendar years 2000 – 2004.

The injury hospitalization data set includes all Connecticut residents who were hospitalized during calendar years 2000 – 2004, with a principal diagnosis of injury, plus a valid external cause-of-injury code (E-code) as defined in the STIPDA / CDC *Recommended framework of E-code groupings for presenting injury mortality and morbidity data* (February 16, 2005). Readmissions, transfers and deaths in the hospital are included; the data are not de-duplicated, in keeping with current CDC recommendations. The data do not include Connecticut residents hospitalized out-of-state, and hospitalizations of non-residents are excluded from the analysis. Numbers of hospitalizations represent number of events, not number of individuals hospitalized. During this five-year period, of the 86,967 patient records with an injury diagnosis, 95.8% (83,296) included a valid E-code.

Injury Mortality

Injury death: An injury death is defined as “any death with an ICD-10 code of U01-U03 or V01-Y89 registered as the underlying cause of death on a death certificate”.

Cause of death:³ Death certificates differentiate between the *immediate cause of death* (“the final disease, injury or complication directly causing death”) and the *underlying cause of death* (“the disease or injury that initiated the chain of events that led directly and inevitably to death”). Death certificates also allow for recording other significant diseases, conditions or injuries that “contributed to death, but which did not result in the underlying cause of death”. Injury diagnostic categories are based on the underlying cause of death.

Certification of death: Connecticut death certificates instruct that all deaths “shall be certified by the attending physician or attending Advanced Practice Registered Nurse (APRN)”. In the absence of these medical professionals, or with their approval, “medical certification may be completed and signed by an associate physician, a physician assistant, registered nurse, the chief medical officer of the institution in which the death occurred, or the pathologist who performed an autopsy. Medical certification by a registered nurse of physician assistant is limited to cases in which death was anticipated and such registered nurse or physician assistant made the pronouncement of death”. The cause-of-death information should be the certifying professional’s “best medical opinion”. Note: A condition can be listed as “probable” even if it has not been definitely diagnosed.

Classification of injury deaths:⁴ The classification of injury deaths presented in the external cause-of-injury mortality matrix is based on the underlying cause of death, which is defined by the International Classification of Diseases (ICD) as “(a) the disease or injury which initiated the train of morbid events leading directly to death, or (b) the circumstances of the accident or violence which produced the fatal injury”. For injury deaths, the external cause rather than the injury diagnosis is always selected as the underlying cause because

² A note on ICD codes: the *International Classification of Diseases, 9th Revision, Clinical Modification*, was used for coding both morbidity and mortality data from 1979 through 1998, and continues to be used for coding morbidity data; however, the *ICD 10th Revision* is used for coding mortality data from 1999 and after. Thus care must be taken when making comparisons between data coded under different versions of the ICD due to changes in case definitions; revisions to these codes are implemented in October of each year.

³ State of Connecticut Department of Public Health. *Certificate of Death*. VS-4 REV. 1/04.

⁴ National Vital Statistics Reports, Vol. 54, No. 10, January 31, 2006, p. 4. Hyattsville, MD: National Center for Health Statistics

public health efforts are generally directed at preventing the incident that led to the death (e.g. motor vehicle traffic crash), rather than toward the injury diagnosis (e.g. skull fracture) that could result from a variety of external causes.

Injury Hospitalizations

Injury hospitalization: ⁵ An injury hospitalization is defined as “a patient record that lists the principal reason for admission to a non-federal, acute-care, inpatient facility as an injury, including the late effects of injury. Readmissions, transfers and deaths in the hospital are included in this definition. Excluded from the definition are adverse effects of the therapeutic use of drugs, of medical/surgical care, and the late effects of those adverse effects”. Note: numbers of hospital discharges represent number of events, not number of individuals hospitalized.

This case definition is based on the single diagnostic field for which there is a generally accepted coding rule: the principal diagnosis field, which is reserved for the code corresponding to *the reason for which, after study by the attending physician or nurse, the patient was admitted*. There are no national standards for the order in which codes are assigned in the additional diagnostic fields. Therefore, the presence of an injury diagnosis code in subsequent fields does not necessarily reflect an injury of sufficient severity that it would have led to hospitalization on its own.

Classification of injury morbidity data: ⁶ Injury hospital discharge records are included for analysis based on the creation of a subset of all hospital discharge records for a given calendar year(s), selected to meet the following two criteria (ICD-9-CM codes):

Have an injury diagnosis (nature-of-injury codes 800.0-994.9, 995.5-995.59, or 995.80-995.85, excluding 909.3 and 909.5)

listed in the principal diagnosis field; plus,

A valid external cause-of-injury code (E-codes E800-E999, excluding codes E849, E967, E869.4, E870-E879 and E930-E949)

listed in any one of the additional diagnosis fields.

If more than one external cause code is listed for a given patient record, only the first valid E-code listed in the diagnostic code fields is reported. [Connecticut hospital discharge records currently include 10 diagnostic code fields; unlike many other states, Connecticut does not include a dedicated E-code field.] If the first E-code is invalid, or is E849, E869.4, E870-E879, E930-E949 or E967, the next valid E-code listed in the diagnostic code fields is used.

LOS (Length of Hospital Stay): Length of stay in a hospital measured in days for an injury

Total Hospital Charges: The sum of total charges incurred during hospitalization for an injury. Hospitalization “charges refer to the amount associated with a patient’s entire hospitalization, including, but not limited to, treatment associated with the primary reason for admission, and reflecting charges by the hospital only. Physician fees are not included. Charges are not the same as the actual cost of the treatment or the actual payment received by the hospital”.⁷

Average Hospital Charges: The median of charges incurred during hospitalization for an injury. For explanation on charges, see the above statement regarding hospitalization charges.

⁵ Injury Surveillance Workgroup. *Consensus Recommendations for Using Hospital Discharge Data for Injury Surveillance*. Marietta (GA): State and Territorial Injury Prevention Directors Association (STIPDA); 2003, pp. 7-8.

⁶ Ibid, p. 9.

⁷ Bower, C.E., F.A. Amadeo, and L.M. Mueller. 2002. One Hundred Fifty-First Registration Report for the Year Ended December 31, 1998. Hartford, CT: Connecticut Department of Public Health.

Calculation of Rates

Rates per 100,000 population are calculated by dividing the number of events in a particular population by the total number of people in that population, then multiplying that ratio by 100,000. For example, in order to determine the death rate for a specific age group, the age-specific death rate is calculated, as follows:

$$\text{Age-specific death rate} = \frac{\text{Number of deaths in a specific age group} \times 100,000 \text{ population}}{\text{Total population in that specific age group}}$$

The number of deaths in that specific age group, per 100,000 population in the same age group.

Race & Ethnicity

Ethnicity: A decedent's ethnicity is recorded on Connecticut death certificates "as given by the informant". It is noted that "Hispanic" is not a race, but rather refers to people whose origins are from Spain, Mexico and the Spanish-speaking countries of Central America, South America, and the Caribbean islands; individuals of Hispanic origin can be of any race. ("Origin" includes ancestry, nationality and lineage.)

Race: Race is defined⁸ as "a population of individuals who identify themselves from a common history, nationality, or geographical place". A decedent's race is recorded on Connecticut death certificates according to the following categories: White, Black or African American, Asian Indian, American Indian or Alaska Native, Chinese, Filipino, Japanese, Korean, Vietnamese, Other Asian, Native Hawaiian, Guamanian or Chamorro, Samoan, Other Pacific Islander, or Other.

Definition of ICD Terms & Categories⁹

Mechanism and intent of injury:

Mechanism of injury: the mechanism, or cause, of injury is the way in which the person sustained the injury, how the person was injured, or the process by which the injury occurred.

Intent of injury: the intent, or manner, of injury is whether an injury was caused by an act carried out on purpose by oneself [self-harm or suicide], or by another person(s) [assault or homicide], with the goal of injuring or killing.

Injury categories by mechanism or cause:

Cut/pierce/stab: injury resulting from an incision, slash, perforation, or puncture by a pointed or sharp instrument, weapon or object. This category does not include injury from being struck by or against a blunt object or bite wounds; these injuries fall in the category "struck by/against".

Drowning/near drowning/submersion: suffocation (asphyxia) resulting from submersion in water or another liquid.

Fall: injury received when a person descends abruptly due to the force of gravity and strikes a surface at the same or lower level

Fire/burn/smoke inhalation: severe exposure to flames, heat or chemicals that leads to tissue damage in the skin or places deeper in the body; injury from smoke inhalation to the upper airway, lower airway or lungs.

Firearm gunshot: a penetrating force injury resulting from a bullet or other projectile shot from a powder-charge gun. This category includes gunshot wounds from powder-charged handguns, shotguns and rifles. This category does not include injury caused by a compressed air-powered paint gun or a nail gun, which falls in the "other specified" category.

Inhalation/ingestion/suffocation: inhalation, aspiration or ingestion of food or other object that blocks the airway or causes suffocation; intentional or accidental mechanical suffocation due to hanging, strangulation, lack of air in a closed place, plastic bag or falling earth. This category does not include injury resulting from a foreign body that does not block the airway.

Machinery: injury that involves operating machinery, such as drill presses, fork lifts, large power-saws, jack hammers, and commercial meat slicers. This category does not include injury involving machines not in operation, falls from escalators or moving sidewalks, or injuries from powered lawn mowers or other powered hand tools or home appliances

Natural/Environmental: injury resulting from exposure to adverse natural and environmental conditions, such as severe heat, severe cold, lightning, sunstroke, large storms, and natural disasters, as well as lack of food or water.

⁸ *Ibid*

⁹ WISQARS™ definitions. <http://www.cdc.gov/ncipc/WISQARS>

Other specified causes: injury associated with any other specified cause that does not fit another category. Some examples include causes such as electric current, electrocution, explosive blast, fireworks, overexposure to radiation, welding flash burn, or animal scratch.

Overexertion: working the body or a body part too hard, causing damage to muscle, tendon, ligament, cartilage, joint or peripheral nerve (e.g. common cause of strains, sprains and twisted ankles). This category includes overexertion from lifting, pushing or pulling, or from excessive force.

Poisoning: ingestion, inhalation, absorption through the skin, or injection of so much of a drug, toxin (biologic or nonbiologic), or other chemical, that a harmful effect results, such as drug overdoses. This category does not include harmful effects from normal therapeutic drugs (i.e. unexpected adverse effects to a drug administered correctly to treat a condition) or bacterial illnesses.

Struck by/against or crushed: injury resulting from being struck by (hit) or crushed by a human, animal or inanimate object or force other than a vehicle or machinery; injury caused by striking (hitting) against a human, animal or inanimate object or force other than a vehicle or machinery.

Transportation-related causes: injury involving modes of transportation, such as cars, motorcycles, bicycles and trains. This category is divided into four subcategories according to the person injured: motor vehicle occupant, motorcyclist, pedal cyclist, pedestrian and other transport. This category also involves another factor: whether the injury occurred in traffic (i.e. on a public road or highway).

Unknown/unspecified cause: injury for which the emergency department [hospital or other] report does not provide enough information to describe the cause of injury.

Intentional injury categories:

Suicide / self-inflicted injury: intentionally self-inflicted injury that results in death or injury (attempted suicide).

Homicide / assault: injuries inflicted by another person with intent to injure or kill, by any means. Excludes injuries due to legal intervention and operations of war.

Legal intervention: injuries inflicted by the police or other law-enforcing agents, including military on duty, in the course of arresting or attempting to arrest law-breakers, suppressing disturbances, maintaining order, and other legal actions. Excludes injuries caused by civil insurrections.

Operation of war: injuries to military personnel or civilians caused by war or civil insurrection, including those occurring during the time of war or insurrection and after cessation of hostilities.

Transport accident categories:

Transport accident: any accident involving a device designed primarily for, or being used at the time primarily for, conveying persons or goods from one place to another.

Public highway: land open to the public as a matter of right or custom for purposes of moving persons or property from one place to another.

Traffic accident: any vehicle accident occurring on the public highway. A vehicle accident is assumed to have occurred on the public highway unless another place is specified, except in the case of accidents involving only off-road motor vehicles, which are classified as non-traffic unless the contrary is stated.

Non-traffic accident: any vehicle accident that occurs entirely in any place other than a public highway.

Pedestrian: any person involved in an accident who was not at the time of the accident riding in or on a motor vehicle, railway train, streetcar, etc.

Pedal cycle: any land transport vehicle operated solely by pedals.

Pedal cyclist: any person riding on a pedal cycle or in a sidecar or trailer attached to such a vehicle.

Motorcycle rider: any person riding on a motorcycle or in a sidecar or trailer attached to such a vehicle.