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Not-in-Traffic Surveillance (NiTS) System 2008-2010 Noncrash Injuries Database User's Manual

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16. Abstract

The Not-in-Traffic Surveillance (NiTS) system is a virtual data collection system designed to provide counts and details regarding fatalities and injuries that occur in nontraffic crashes and in noncrash incidents.

This document describes the creation of the noncrash injury database using a special study conducted by the Consumer Product Safety Commission's National Electronic Injury Surveillance System All Injury Program (NEISS-AIP) for NHTSA. Frequent types of noncrash injury incidents included injuries while entering or exiting vehicles (boarding or alighting), injuries from closing doors, overexertion while unloading cargo from a vehicle or pushing a disabled vehicle, cuts from parts of the vehicle, striking a vehicle or struck by a part of the vehicle, falls from or against vehicles, incidents involving jacks or hoists, and radiator or antifreeze burns. This document also describes the noncrash injury database, which is available as a Microsoft Excel file.

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1. Not-in-Traffic Surveillance and Noncrash Injuries

Motor-vehicle-related fatalities and injuries can occur in a variety of situations. The three major categories of motor-vehicle-related fatalities and injuries are traffic crashes, nontraffic crashes and noncrash incidents. Since 1975 the National Highway Traffic Safety Administration has collected extensive information on fatalities that occur in traffic crashes through the Fatality Analysis Reporting System (FARS). Additionally, NHTSA's National Automotive Sampling System (NASS) has provided national estimates of the number and nature of traffic crash injuries since 1979. Data regarding fatalities and injuries that occur in nontraffic crashes, which can occur on private roads, driveways, and parking lots, and in noncrash incidents, such as fatalities involving children left in hot vehicles or injuries that occur while repairing a vehicle, have not routinely been collected by NHTSA.

The NiTS system was developed as a virtual system comprised of four major components. One component is a database of fatalities and injuries in nontraffic crashes based predominantly on police reports. A second component is a database of noncrash fatalities based upon death certificate information, and the third component is a database of noncrash injuries based upon a nationally representative sample of emergency department records. The fourth component is a collection of detailed investigations of particular types of crash and noncrash events such as backovers where a driver reverses into a pedestrian or pedalcyclist, power window strangulation, children left in hot vehicles (hyperthermia) and trunk entrapment, which are conducted by NHTSA's Special Crash Investigations (SCI) program.

This document focuses on the noncrash injury component. The noncrash injury database was based upon emergency department records contained in the Consumer Product Safety Commission's National Electronic Injury Surveillance System (NEISS) All Injury Program (NEISS-AIP). This manual begins with an overview of NEISS-AIP. The manual then gives an overview of how the noncrash injury database was created and describes its content. NHTSA has contracted with CPSC to collect information in a special study, the results of which are represented in the current data release.

The database was created through a special study conducted by NEISS-AIP for 2008 to 2010. NHTSA's data use agreement with CPSC prohibits the release of any part of the NEISS-AIP files. Therefore, NHTSA created an aggregate database that provides the number and type of noncrash motor-vehicle-related injuries. The database also contains information about the ages of the victims.

NHTSA determined that it was not practicable to collect information about the make, model, or model year of the vehicles involved. After examining the available information, NHTSA determined that emergency department records were the best method for collecting information about noncrash injuries, for a variety of reasons. The first reason is that NHTSA could use the existing data collection and file creation infrastructure of NEISS-AIP to provide national counts. The second reason is that the emergency department information in the NEISS- AIP is likely to offer the most complete coverage of the type of injury that was serious enough to result in a trip to the emergency department. NHTSA determined that it was not feasible to collect systematic information about injuries that were either treated in other medical facilities or that were not treated by medical professionals.

However, emergency department records do not usually contain information about the vehicle beyond a general vehicle body type such as car or truck. In fact, NHTSA conducted a pilot study through 10 of the NEISS-AIP emergency departments to attempt to collect make and model information. Overall, specific information on the vehicle's make and model was available less than 10 percent of the time, and most of the hospitals provided this information less than 5 percent of the time. This limitation is also true of other sources of noncrash injuries.

2. NEISS-AIP Overview

For over 40 years CPSC has operated a statistically valid injury surveillance and follow-back system known as the National Electronic Injury Surveillance System. The primary purpose of NEISS has been to provide timely data on consumer product-related injuries occurring in the United States. It is made up of 100 hospitals that collect only consumer-product-related injuries. In 2000, CPSC and the Centers for Disease Control and Prevention initiated an expansion of the system to a subsample of 63 of these hospitals that collect data on all injuries.

With this expansion from the original NEISS to the NEISS All Injury Program, the system became an important public health research tool for injury researchers throughout the United States and around the world.

NEISS injury data is gathered from the emergency departments of approximately 100 hospitals selected as a probability sample of all 5,000 U.S. hospitals with emergency departments. The system's foundation rests on a core set of emergency department surveillance data variables. The NEISS-AIP data is collected from a probability subsample of 63 out of the 100 NEISS hospitals. These 63 hospitals use an expanded set of rules and a slightly larger set of codes to capture data on all injuries treated in their emergency departments. The remaining aspects of the NEISS-AIP are identical to the NEISS except that the estimating process must be adjusted to account for the smaller hospital sample.

The data collection process begins when a patient is admitted to the emergency department (ED) of an NEISS hospital. An ED staff member elicits critical information as to how the injury occurred and enters that information in the patient's medical record. At the end of each day, a NEISS hospital coordinator reviews all ED records for the day, selecting those that meet the criteria for inclusion in NEISS. The NEISS coordinator abstracts pertinent data from the selected ED record and transcribes it in coded form to a NEISS coding sheet using rules described in a NEISS Coding Manual.

Identifying the product or products related to the injury is crucial for NEISS. The NEISS coordinator assigns a product code from an alphabetical listing of hundreds of products and recreational activities, with as much specificity as the data allow. The victim's age, gender, injury diagnosis, body parts affected, and incident locale are among other data variables coded. A brief narrative description of the incident is also included. While the NEISS coordinators at the participating hospitals code some of the variables, contractors working for CPSC or CDC code the remaining variables after the data is received at CPSC headquarters.

3. NEISS-AIP Variables

There are four variables entered at the hospital and two variables entered at CPSC that were used by NHTSA to identify and classify passenger vehicle noncrash injuries. The variables coded at the hospital include the product code, the intent variable, the diagnosis variable, and narrative description. The variables coded at CPSC include precipitating mechanism and the occupant variable. The product variable is entered at the hospital. The motor vehicle product code is used whenever a motor vehicle is involved in an incident scenario. The product code on a record shows that the product was mentioned in the incident description, but does not indicate that the product played a direct role in causing the injury. The set of possible noncrash injuries consists of all NEISS-AIP cases with motor vehicle codes.

The intent variable is coded to show the intent of the victim or perpetrator at the time of the incident. The values include assault, self-inflicted (including suicide or suicide attempt), injury related to legal intervention (law enforcement), and unintentional. NiTS follows the convention used by the American National Standards Institute's D16.1 *Manual on Classification of Motor Vehicle Traffic Accidents*, which requires a motor vehicle accident to be unintentional. Therefore, only injuries coded as unintentional in NEISS-AIP are considered possible noncrash injuries.

The diagnosis variable provides a code to identify the nature of the injury that required emergency treatment. If there is more than one injury, the coder is asked to select the code representing the most severe injury. The diagnosis variable is used by NHTSA to classify the noncrash injuries.

The narrative description for each record contains up to two lines (142 characters) of information taken verbatim from the emergency department record to describe how the injury occurred. As is described in more detail in the next section, the narrative variable is used extensively to determine which cases among the potential cases qualify as passenger vehicle noncrash injuries.

The mechanism of injury refers to the way in which the injury was sustained, how the person was injured, or the process by which the injury occurred. Injuries are often the result of a sequence of events. In the NEISS, coders can code both the precipitating and the direct mechanisms of injury. The *precipitating* mechanism is the initiating mechanism that started the chain of events leading to the injury. The *direct* mechanism is the most immediate mechanism that caused the actual physical injury or bodily harm. In most cases there is only a single mechanism and therefore selecting the mechanism is straightforward; in other words, the precipitating and direct mechanisms are the same. Table 1 provides a complete list of mechanism-of-injury categories coded. These categories represent major groupings of external causes used by injury researchers and injury prevention practitioners throughout the world.

Table 1: NEISS-AIP Categories for Classifying Mechanism of Injury

Motor Vehicle Occupant (1)	Drowning/Near Drowning/Submersion
Motorcyclist (2)	Machinery (14)
Pedal Cyclist (3)	Foreign Body (15)
Pedestrian (struck by or against a vehicle) (4)	Dog Bite (16)
Other Transport (5)	Other Bite/Sting (17)
Fall (6)	Firearm Gunshot (18)
Struck by/Against or Crushed (7)	BB/Pellet Gunshot (19)
Cut/Pierce/Stab (8)	Natural/Environmental (20)
Overexertion (strains/sprains without a fall) (9)	Adverse Effects – Therapeutic Drugs (21)
Fire/Burn (including smoke inhalation) (10)	Adverse Effects – Surgical/Medical Care
Poisoning (11)	Other Specified (88)
Inhalation/Ingestion/Suffocation (12)	Unknown/Unspecified (99)

Injuries that occur as a result of a motor-vehicle-related transport incident are coded using one of the motor vehicle mechanism codes (codes 1 through 5). For motor-vehicle-related transport cases, coders code the precipitating mechanism only, and the direct mechanism is left blank. Injuries involving motor vehicles that were not in transport could be coded using both a direct and a precipitating code from Table 1. For most of these cases, only the precipitating cause is coded. Therefore, this user manual defines the precipitating cause as the mechanism (or external cause) of injury.

If the mechanism code indicates a motor vehicle occupant, then the coders code Occupant Status as driver, passenger (inside passenger compartment or cab), person boarding or alighting the vehicle, other specified (such as riding in enclosed bed of pickup truck), or unknown. For the purpose of identifying noncrash injuries, only motor vehicle occupants who were boarding or alighting are potential noncrash injuries. All other transport injuries are captured by NHTSA's crash databases such as FARS, NASS, and the nontraffic crash component of NiTS.

4. Creation of the Noncrash Injury Database

The noncrash injury database was created using the variables described in the previous section and new variables that were added. In particular, the possible noncrash cases for NiTS were identified as unintentional injuries that either occurred in a nontransport accident that involved a motor vehicle or a boarding or alighting injury. It should be noted, however, that NEISS-AIP coding rules do not require that the motor vehicle directly cause the injury; it only requires that the motor vehicle be mentioned in the injury scenario. Therefore, the potential noncrash injuries identified using the product code for a motor vehicle could either indicate the motor vehicle was the source of the injury (patient cut by vehicle door), the injury occurred in a motor vehicle (patient left unattended in hot car), or sometimes even that the injury occurred near a motor vehicle (patient slipped on ice while pushing vehicle from snowbank).
Several additional narrative variables were collected in 2008 in the NHTSA special study of non-crash injuries. Hospital coders were asked to carefully review every part of the emergency department record to identify all available information on the incident and report that information in extra narrative sections in the report. The three extra variables were narrative sections for the coder to enter additional details on the scenario, location of the incident and type of vehicle. The coders did add some extra information to the general NEISS narrative on these cases, but the extra section rarely contained useful additional scenario information. While, the coded sections for location and type of vehicle provided useful information in most cases, the extra narrative sections for location and vehicle type did not usually provide extra useful data.

There were significant changes made to the study in 2009. Review of the 2008 data showed that the extra narrative sections for scenario, location and type of vehicle provided relatively little information that was not already reported in the core NEISS narrative and the coded variables. The 2009 study was changed to drop the extra narrative section for scenario, make the narrative sections for location and vehicle type optional, and add three new variables:

- Hazard pattern,
- Whether vehicle was in motion (if no, was victim boarding/alighting), and
- Whether victim was in/on the vehicle (if yes, was victim driver, passenger, etc.).

These changes were implemented on April 1, 2009. NHTSA contractors used the new definitions to code the hazard pattern data for January 1, 2009, through March 31, 2009, to provide a full year of hazard pattern information in the new coding system.

In 2009, hospital coders and NHTSA contractors classified each case in one and only one hazard pattern using a limited set of 16 major hazard patterns. Many cases could have been classified in more than one pattern, but for the sake of consistency only one pattern was applied. If there was a choice between more than one appropriate hazard pattern, coders were instructed to choose the more specific code starting with hazards associated with a part of the car, continuing with the fall codes, then the more general injury codes with the “Not Specified” code as the last resort.

1. Closing of Vehicle Windows
A body part, usually an extremity, was closed, caught, or rolled up in a vehicle window. While in most cases it could not be determined whether the window was electric, it is assumed that most of these incidents involved power rather than manual windows because of the unlikely event of a person manually closing a window on themselves or others.

2. Heat Stroke in Vehicle
A few incidents involved people who suffered heat-related illness inside vehicles after strenuous outdoor activity or when vehicles became disabled. (A search for cases of hypothermia inside vehicles only produced a handful of cases, which were not enough to produce meaningful estimates.)

3. Carbon Monoxide Poisoning From Vehicle Exhaust
Many of these incidents involved a person inside a vehicle where exhaust entered the vehicle. A few incidents involved a person outside of a vehicle in an enclosed space.

4. Vehicle Fire
These incidents usually involved a person injured inside a vehicle that caught fire or injured when trying to enter a burning vehicle, usually to retrieve property.

5. Hoist or Jack Incident With Tire
These incidents usually involved an injury that occurred while changing a tire, such as a jack slipping or failing.

6. Other Hoist or Jack Incidents
These incidents usually involved an injury that occurred while the person was working on or repairing a vehicle.

7. Other Incidents While Changing Tires
These incidents involved either overexertion or a laceration while changing a tire.

8. Battery Acid Burn
Most of these incidents involved a person working on or repairing a vehicle although a handful involved people attempting to “jump start a dead battery.”

9. Radiator or Antifreeze Burns
These incidents occurred while removing a hot radiator cap or while repairing a vehicle.

10. Muffler and Exhaust Pipe Burns
These cases are similar to the previous category but involve contact with a muffler or exhaust pipe.

11. Chemical Burns
These incidents involved a mix of chemical burns that occurred while repairing, cleaning, painting, or washing a vehicle as well as cases of chemical burns that occurred while pumping or siphoning gasoline. A small number of cases involved a chemical burn from a product inside the vehicle (such as pepper spray) or leaking cargo.

12. Other Heat-Related Burns From Vehicle
These cases involved burns that were not captured by the above categories. These incidents usually involved a patient who was burned by a hot part of the vehicle. Cases involving a blowtorch or fireworks and cases involving hot food or beverages being consumed in the vehicles were excluded.

13. Wheelchair Incident
These incidents usually involved falls from wheelchairs while entering or exiting vehicles (boarding or alighting) or injury involving wheelchairs inside vehicles, typically in vans.

14. Poisoning - Other
The remaining poisoning cases involving motor vehicles involved a variety of situations such as accidental poisoning while repairing a vehicle, exposure to fumes such as from gasoline or cargo while in the vehicle, or children who consumed products found inside the vehicle.

15. Foreign Body – Driving
These cases involved objects that came through open windows and struck the patients, usually in the eye, while the people were driving or riding in vehicles.

16. Foreign Body – Working
In many a case, the person was working under a vehicle or was sanding or grinding the vehicle when the injury occurred.

17. Other Foreign Body or Aspiration
Many of these cases involved eating in vehicles, children placing objects found in vehicles in their ears, noses or mouths, or vague narratives such as “complaint of foreign body in eye.”

18. Injured by Closing Hood
These cases involve patients where the open hoods fell on them while looking under the hoods or repairing the vehicles.

19. Injured by Closing Trunk
These incidents frequently involved extremities caught in closing trunks or patients striking their heads on the trunk lids while unloading or loading cargo.

20. Injured by Closing Door
These cases involved doors closing or otherwise string the patients.

21. Other Door Injury while Boarding or Alighting
These incidents tended to involve patients who struck the doors or door frames while entering or exiting the vehicles.

22. Fall While Boarding or Alighting
Some of the cases involved people entering or exiting vehicles or people exiting the beds of pickup trucks.

23. Fall Against Vehicle
These cases generally involved people who slipped or fell outside of the vehicles and struck the vehicles. In many cases, the people fell in snow or ice.

24. Fall Inside Vehicle
These incidents frequently occurred in the backs of pickups and vans. Occasionally these incidents also involved children playing inside vehicles.

25. Fall From Vehicle
These incidents involved people falling from the hoods, trunks, roofs, or tailgates of vehicles. These incidents also included falls from the backs of trucks where there was no indication that the patients were attempting to enter or exit the vehicles.

26. Cut by Part of Vehicle
These incidents frequently involved people working on vehicles, striking and breaking vehicle windows or mirrors, or people cut by bumpers or license plates.

27. Struck by Other Product
Most of these incidents involved people struck by cargo while loading or unloading vehicles, although a few cases also involved people repairing vehicles.

28. Struck Vehicle or Struck by Part of Vehicle
These incidents frequently involved people who hit, struck, or punched vehicles, often in anger. They also involved people who "ran into" or "bumped" vehicles as well as people who struck or were struck by parts of vehicles while repairing them. (Patients struck by doors, trunk lids, and hoods were covered by other categories.)

29. Other Boarding and Alighting Injuries
These cases were the remaining boarding and alighting cases not captured by the categories above. Most involved overexertion such as strains or sprains while entering or exiting vehicles.

30. Overexertion
These incidents frequently involved overexertion by loading or unloading cargo from vehicles or overexertion by pushing disabled vehicles. Less frequently these incidents involved patient repairing vehicles or overexertion that occurred during long drives.

31. Other Incidents While Working on Vehicle
These incidents frequently did not contain enough information to be classified in another category such as "injured hand while working on vehicle."

The following table contains the annual estimated number of injuries and the actual cases counts. The annual estimates have been rounded to the nearest thousand.

Table 2: Injuries in Noncrash Incidents

Injury Type	Three-Year SAMPLE SIZE	ANNUAL ESTIMATE
Contusions, abrasion	6,232	151,000
Laceration	5,008	112,000
Strain, sprain	4,017	107,000
Fracture	3,093	72,000
Other	2,204	55,000
Internal injury	1,323	24,000
Hematoma	694	12,000
Crushing	664	17,000
Foreign body	431	11,000
Dislocation	324	8,000
Concussion	286	6,000
Burn, scald	268	6,000
Avulsion	222	5,000
Burns, thermal	208	5,000
Amputation	101	2,000
Anoxia	100	2,000
Puncture	80	2,000
Burn, chemical	72	2,000
Poisoning	65	1,000
Derma/conjunct	52	1,000
Nerve damage	49	1,000
Dental injury	48	*
Hemorrhage	21	*
Radiation	18	*
Electric shock	12	*
Ingestion	11	*
Burn, not specified	10	*
Burn, electrical	8	*
Aspiration	8	*
	25,629	*607,330*

* = sample size is too small to make estimate

5. Structure of the NonCrash Injury Database

This section describes the structure and the variables included in the noncrash injury database. Because the data use agreement between CPSC and NHTSA prohibited release of any information about individual injuries, the noncrash injury database contains aggregate information designed to provide information about the number, types and causes of passenger vehicle noncrash injuries. The database is provided as a Microsoft Excel workbook. The variables included in the database indicate the type of incident, the mechanism of injury, the age of the victim, and the location of the incident. The workbook contains four worksheets, one for each variable. The first worksheet provides the annual average injuries by the type of incident. The second worksheet provides the annual average injuries by the type of incident and the injury mechanism. The third worksheet provides the annual average injuries by the type of incident and the (categorized) age of the victim. The fourth worksheet provides the annual average injuries by the type of incident and the location of the incident. All worksheets also contain the sample count from which the estimates were derived. Finally, as discussed above, no estimates are produced for categories with fewer than 20 sampled cases.

The types of incidents are listed in Table 2 and described in the previous section. The three remaining variables are part of the NEISS-AIP system. The mechanisms of injury are listed in Table 1.

The age of the patient was categorized into the following age groups:

- 3 years old or younger;
- 4 to 7 years old;
- 8 to 14 years old;
- 15 to 24 years old;
- 25 to 44 years old;
- 45 to 64 years old;
- 65 to 74 years old;
- 75 to 84 years old; or
- 85 years old and older.

The location of the incident is coded as one of the following:

- Home;
- Farm/ranch;
- Street/highway;
- Other public property;
- Manufactured (mobile) home;
- Industrial place;
- School;
- Place of recreation or sports; or
- Not recorded.

More information about the NEISS-AIP coding may be found in the *NEISS Coding Manual*, which is available at www.cpsc.gov/neiss/completemanual.pdf.

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