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## An Updated *International Classification of Diseases, 10th Revision, Clinical Modification (ICD–10–CM)* Surveillance Case Definition for Injury Hospitalizations

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### Abstract

The National Center for Health Statistics (NCHS) and National Center for Injury Prevention and Control (NCIPC) have routinely collaborated with injury epidemiology partners to develop standard injury surveillance case definitions based on the *International Classification of Diseases (ICD)*. With the transition in October 2015 to the use of the *ICD, 10th Revision, Clinical Modification (ICD–10–CM)* for reporting medical information in administrative claims data, NCHS and NCIPC proposed an ICD–10–CM surveillance case definition for injury hospitalizations. At the time, ICD–10–CM coded data were not readily available, and the proposed surveillance definition could not be tested using real data. As ICD–10–CM coded data became available, NCHS and NCIPC collaborated with the Council of State and Territorial Epidemiologists, injury epidemiologists from state and local health departments, and the Agency for Healthcare Research and Quality to test the proposed definition. This report summarizes the findings from the testing process and describes how the findings were used to update the proposed case definition. In the updated ICD–10–CM surveillance case definition, injury hospitalizations are identified as hospitalization records with a principal diagnosis of select ICD–10–CM S, T, O, and M codes. The codes must indicate an initial encounter for active treatment of an injury or be missing encounter type information. The selection criteria exclude hospitalization records with an injury as a secondary or subsequent diagnosis (not the principal diagnosis) or that have an external cause-of-injury code but do not have an injury code as the principal diagnosis. The updated ICD–10–CM surveillance case definition for injury hospitalizations provides standardized selection criteria for monitoring differences in hospitalization rates among populations and over time.

**Keywords:** administrative claims data • nonfatal injury

### Introduction

To promote consistency in monitoring trends in fatal and nonfatal injuries in the United States, the National Center for Health Statistics (NCHS) and the National Center for Injury Prevention and Control (NCIPC) at the Centers for Disease Control and Prevention have collaborated with injury surveillance and epidemiology partners to develop standard case definitions and reporting frameworks for injury surveillance (1–7). Surveillance case definitions provide uniform criteria for selecting cases, allowing the comparison of results generated from different data sets and across time (8).

Surveillance case definitions often involve the use of selected codes from the *International Classification of Diseases (ICD)*. For example, case definitions for injury hospitalizations and emergency department (ED) visits based on the *ICD, Ninth Revision, Clinical Modification (ICD–9–CM)* have been in use for more than a decade (2,3). In the ICD–9–CM surveillance definition, injury hospitalizations are defined as those hospitalizations with a principal diagnosis of ICD–9–CM codes 800–994, 995.5, and 995.80–995.85, excluding 909.3 and 909.5. These



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nature-of-injury codes include diagnoses related to anatomic injuries, poisoning and toxic effects, late effects of injuries, traumatic complications, and child and adult maltreatment. Excluded from the definition are adverse effects from therapeutic use of drugs, adverse effects of medical or surgical care, and late effects of those adverse effects. A key feature of the ICD-9-CM definition is selection based on a principal diagnosis of injury. According to coding rules, the principal diagnosis field contains the code corresponding to the reason for the hospitalization as determined by the attending medical provider. The presence of an injury diagnosis code in a subsequent field (i.e., not the principal diagnosis field) does not necessarily identify an injury of sufficient severity to warrant hospitalization on its own. Therefore, the ICD-9-CM surveillance case definition requires that the record have a principal diagnosis of one of the specified nature-of-injury codes. Records that do not have a principal diagnosis of injury are excluded, even if an injury code is mentioned in a subsequent field.

As of October 2015, the U.S. Department of Health and Human Services required all hospitals and health care providers covered by the Health Insurance Portability and Accountability Act to use the *ICD, 10th Revision, Clinical Modification* (ICD-10-CM) rather than the ICD-9-CM to report medical information in administrative data (9,10). In response to this change, NCHS and NCIPC published a proposed ICD-10-CM definition for injury hospitalizations in 2017 (1). To maintain comparability with the ICD-9-CM case definition, the types of codes, general concepts, and decision-making principles used in the ICD-9-CM definition were considered in developing the proposed ICD-10-CM definition. General equivalence mappings, developed by NCHS and the Centers for Medicare & Medicaid Services (CMS) to assist in translating between versions of the ICD (11), were applied to the ICD-9-CM injury hospitalization case definition to generate a set of possible ICD-10-CM codes to include in the proposed case definition (1). This process resulted in the list of ICD-10-CM codes shown in [Table A](#).

**Table A. ICD-10-CM nature-of-injury codes in the 2017 proposed surveillance definition for injury hospitalizations**

ICD-10-CM nature-of-injury code <sup>1</sup>	Types of injuries
All S codes	Anatomic injuries
T07-T34	Foreign bodies, burns, corrosions, frostbite
T36-T50 with a 6th character of 1, 2, 3, or 4 (Exceptions: T36.9, T37.9, T39.9, T41.4, T42.7, T43.9, T45.9, T47.9, and T49.9, which are included if the code has a 5th character of 1, 2, 3, or 4)	Drug poisoning (excludes adverse effects and underdosing)
T51-T65	Toxic effects of substances nonmedicinal as to source
T66-T76	Other and unspecified effects of external causes (radiation, heat, light, hypothermia, hyperthermia, asphyxiation, child and adult abuse, lightning, drowning, motion sickness, etc.)
T79	Certain early complications of trauma, not elsewhere classified

<sup>1</sup>Any 7th character except S (sequelae from previous injury). T30-T32 do not have a 7th character.

SOURCE: "Proposed ICD-10-CM surveillance case definitions for injury hospitalizations and emergency department visits," see reference 1 in this report.

As with the ICD-9-CM definition, the proposed ICD-10-CM definition only includes hospitalizations with a principal diagnosis of one of the codes in [Table A](#). Codes related to adverse effects from therapeutic use of drugs were not included in the proposed definition. Additionally, codes to indicate medical consequences that result from underdosing of drugs used therapeutically (a code subset found in ICD-10-CM but not ICD-9-CM) were not included in the proposed ICD-10-CM definition. A new concept in ICD-10-CM, not found in ICD-9-CM, is the presence of a 7th character in the ICD-10-CM code that indicates the type of encounter when the diagnosis is made. A 7th character of A, B, or C indicates an initial encounter (i.e., active treatment for the condition); a character of D through R indicates a subsequent encounter (i.e., routine care for the condition during the healing or recovery phase); and a character of S indicates sequelae from a previous injury (i.e., complications or residual effects that arise as a direct result of an injury) (12). Because the ICD-9-CM definition did not include sequelae from a previous injury, for comparability with the ICD-9-CM definition, only codes with a 7th character of A through R or missing a 7th character were included in the proposed ICD-10-CM definition. Records with a principal diagnosis of one of the codes listed in [Table A](#) with a 7th character of S were excluded.

At the time the proposed case definition was developed, ICD-10-CM coded data were not available for testing the proposed definition. As ICD-10-CM coded administrative data became available, NCHS and NCIPC collaborated with the Council of State and Territorial Epidemiologists, state and local health departments, the Agency for Healthcare Research and Quality (AHRQ), and others to test the proposed definition. This testing focused on answering four key questions:

1. Are there additional ICD-10-CM codes that should be included in the injury surveillance case definition?
2. Should the case definition be limited to initial encounters only?
3. Should the case definition be expanded to include hospitalizations that mention an external cause-of-injury code, whether or not a nature-of-injury (i.e., injury diagnosis) code is mentioned?
4. Should the case definition be expanded to include any mention of an injury diagnosis code (i.e., not require that the injury diagnosis code be the principal diagnosis)?

The findings from exploration of each of these questions and the final recommendations for an updated surveillance case definition for injury hospitalizations are discussed below.

## Methods

Injury epidemiologists from several states analyzed state-level ICD–10–CM coded hospital discharge data from administrative claims based on the universal billing form (UB–04) (13). Researchers from AHRQ analyzed data from the Healthcare Cost and Utilization Project’s 2016 State Inpatient Databases (SID), which include administrative claims data from 47 states and the District of Columbia (14).

For the analysis, injury hospitalization records were identified using the proposed ICD–10–CM surveillance case definition for injury hospitalizations (1). ICD–10–CM valid external cause codes were identified using the proposed ICD–10–CM external cause-of-injury reporting framework (7). Injury diagnosis codes were grouped into body region and nature-of-injury categories using the proposed ICD–10–CM injury diagnosis reporting framework (4).

Medical record review was conducted in four states (Colorado, Kentucky, Maryland, and Massachusetts). These states received funding from NCIPC as part of the Core State Violence and Injury Prevention Program (CE16–1602) to conduct surveillance quality improvement (15). NCIPC and NCHS collaborated with states to develop the study design, data collection methods and forms, and training materials for abstractors. In each state, researchers selected a random sample of hospital discharge records based on the presence of an injury diagnosis code in a subsequent field (not as the principal diagnosis) or the presence of a valid external cause code. Trained medical records coders, trauma nurses, or clinical coordinators reviewed the patient’s medical record to identify the reasons for the hospitalization, including whether an injury was an important contributor to the hospital stay.

## Results

### Are there additional ICD–10–CM codes that should be included in the injury surveillance case definition?

Chapter 15 of ICD–10–CM includes several codes for injury and poisoning complicating pregnancy and childbirth. These codes include:

- O9A.2, Injury, poisoning and certain other consequences of external causes complicating pregnancy, childbirth and the puerperium;
- O9A.3, Physical abuse complicating pregnancy, childbirth and the puerperium;
- O9A.4, Sexual abuse complicating pregnancy, childbirth and the puerperium; and
- O9A.5, Psychological abuse complicating pregnancy, childbirth and the puerperium.

Because these codes address a population of particular interest (i.e., pregnant women) and are similar in concept to the codes for adult and child abuse, neglect, and other maltreatment (T74 and T76), a decision was made to include these codes in the updated surveillance case definition for injury hospitalizations.

Additionally, analysis of ICD–10–CM coded hospital discharge data identified that a substantial number of patients who were hospitalized for a fall were assigned a principal diagnosis code for periprosthetic fractures (T84.04, Periprosthetic fracture around internal prosthetic joint). A decision was made to include this code in the updated surveillance case definition for injury hospitalizations. In the Federal Fiscal Year 2017 version of ICD–10–CM, which went into effect on October 1, 2016, T84.04 codes were deleted and replaced by M97 codes, Periprosthetic fracture around internal prosthetic joint (16). Both T84.04 (before October 1, 2016) and M97 (after October 1, 2016) are included in the updated ICD–10–CM surveillance case definition for injury hospitalizations.

### Should the case definition be limited to initial encounters only?

Analysis of ICD–10–CM coded data from eight states showed that 90%–96% of the injury diagnosis codes in the principal diagnosis field represented initial encounters (i.e., had a 7th character of A, B, or C), 4%–10% represented subsequent visits (i.e., had a 7th character of D through R), and < 0.5% reflected sequelae from an injury (i.e., had a 7th character of S). Many of the hospitalizations for subsequent visits were for routine follow-up care for orthopedic conditions. A decision was made to modify the proposed injury surveillance case definition, which included both initial and subsequent encounters, to include only records indicating an initial encounter or that were missing encounter type. This modification results in an updated definition that more closely estimates the incidence of injuries requiring hospitalization, one of the purposes of injury surveillance for public health.

### Should the case definition be expanded to include hospitalizations that mention an external cause-of-injury code, whether or not an injury diagnosis is mentioned?

The ICD–9–CM surveillance definition for injury-related ED visits included visits with either (a) a first-listed injury diagnosis based on the Barell matrix definition of an injury (6), regardless of any mention of an external cause-of-injury code, or (b) a valid external cause-of-injury code, based on the recommended framework for external causes of injury (3,17). The process of testing and revising the proposed ICD–10–CM surveillance case definition for injury hospitalizations provided an opportunity to explore whether the selection criteria for injury hospitalizations should also be expanded to include any hospitalization with an ICD–10–CM external cause-of-injury code found in the proposed ICD–10–CM external cause-of-injury framework (7).

While external cause-of-injury codes are most applicable to injuries, the ICD-10-CM coding guidelines state that external cause codes may be used with any code in the range of A00.0–T88.9, and that they are valid for use with such conditions as infections or a heart attack that occurs during strenuous physical activity (12). Analysis of ICD-10-CM coded hospital discharge data from seven states showed that 54%–62% of records with a valid external cause-of-injury code had an injury diagnosis code as the principal diagnosis, 28%–35% had an injury diagnosis code as a secondary diagnosis (i.e., the record had an injury diagnosis code, but it was not the principal diagnosis), and 8%–13% did not have any mention of an injury diagnosis code.

For records with a valid external cause-of-injury code and no injury diagnosis in any field, 65%–70% had an external cause-of-injury code related to a fall (W00–W19) and 9%–15% had an external cause-of-injury code for accidental exposure to other specified and unspecified factors (X58). The principal diagnosis was most frequently from ICD-10-CM chapters for diseases of the circulatory system (I00–I99) (13%–18% of records), diseases of the musculoskeletal system (M00–M99) (11%–12%), infectious and parasitic diseases (A00–B99) (8%–13%), and diseases of the respiratory system (J00–J99) (6%–8%). Results from the medical record review suggested that the injury was an important contributor to the hospitalization in only 11%–24% of these types of records.

Because the majority of these records did not appear to reflect hospitalizations for care of an injury, a decision was made not to expand the surveillance case definition to include records with an external cause-of-injury code but no injury diagnosis code. Findings for records that had a valid external cause-of-injury code and a secondary diagnosis of injury are discussed in the next section, which addresses expansion of the case definition to include any mention of an injury diagnosis code (i.e., eliminates the requirement that the injury code be the principal diagnosis).

## Should the case definition be expanded to include any mention of an injury diagnosis code?

Analysis of ICD-10-CM coded data from eight states showed that expanding the case definition to include any mention of an injury diagnosis code would increase the total number of injury hospitalization cases by 45%–80%.

From 2016 SID data, of the nearly 2.7 million records that had at least one injury diagnosis code (any field), the injury code was the principal diagnosis for 63% of the records and first mentioned in a subsequent field for 37% of the records.

In considering expansion of the case definition to include any mention of an injury diagnosis code, of concern is whether the injury diagnoses found in subsequent fields (not in the principal diagnosis field) represent injuries that contributed to the reason for the hospitalization. Injury diagnosis codes in subsequent fields often reflect relatively minor injuries, such as abrasions and contusions, which might not be severe enough to warrant hospitalization. Because the surveillance case definition for injury hospitalizations is meant to reflect hospitalizations for which care of the injury is a significant contributor to the reason for the hospitalization, a better understanding of the types and severity of the injuries identified in subsequent fields was needed.

To understand the implications of expanding the definition to include any mention of an injury diagnosis code, several approaches were used to better characterize records with an injury diagnosis in fields other than the principal diagnosis field. These included: (a) examination of the types of noninjury diagnoses found in the principal diagnosis field, (b) examination of the types of injury diagnoses first mentioned in a subsequent field, and (c) medical record review to assess whether records with an injury diagnosis first mentioned in a subsequent field represent a true injury hospitalization.

For records with an injury diagnosis in a subsequent field, data from three states indicated that the principal

diagnosis was most frequently from ICD-10-CM chapters for mental and behavioral disorders (F01–F99) (17%–27% of the records), diseases of the circulatory system (I00–I99) (11%–16%), diseases of the respiratory system (J00–J99) (8%–12%), and infectious and parasitic diseases (A00–B99) (7%–12%). Data from one state indicated that the most frequent mental and behavioral disorders found in the principal diagnosis field for records with an injury diagnosis in a subsequent field were F10.23, Alcohol dependence with withdrawal (24.1% of records) and F32, Major depressive disorder, single episode (17.6%).

Analysis of data from the 2016 SID suggests that the types of diagnoses most frequently seen for records with an injury diagnosis in a subsequent field differed from those for records with a principal diagnosis of injury (Table B). For records with a principal diagnosis of injury, the most frequent types of injuries found in the principal diagnosis field included hip fractures, poisoning, traumatic brain injury, lower leg and ankle fractures, and shoulder and upper arm fractures. The most frequent types of injuries first mentioned in records with an injury code in a subsequent field were poisoning, effects of foreign bodies (most frequently aspiration), superficial injuries and contusions to the head, other effects of external causes (nonspecific injuries), and chest fractures (most frequently rib fractures).

Results from the medical record review suggested that the injury was an important contributor to the hospitalization in only 15%–26% of the records with an injury diagnosis in a subsequent field.

Because no compelling evidence to expand the case definition to include records with any mention of an injury diagnosis code was found, a decision was made to continue case selection based on the record having an injury diagnosis code (Table C) as the principal diagnosis.



**Table B. Most frequent types of injury based on field of first mention of an injury diagnosis code (principal diagnosis or subsequent field)**

Rank <sup>1</sup>	Records with an injury as the principal diagnosis		Records with an injury code first mentioned in a subsequent field	
	Body region and nature of injury <sup>2</sup>	Number of records	Body region and nature of injury <sup>2</sup>	Number of records
1	Hip fracture	298,571	Poisoning	80,366
2	Poisoning	252,516	Chest (thorax), effect of foreign body	66,012
3	Traumatic brain injury	188,312	Superficial injury and contusion to head	52,440
4	Lower leg and ankle fracture	135,965	Other effects of external causes	42,460
5	Shoulder and upper arm fracture	69,125	Chest (thorax) fracture	36,003
6	Chest (thorax) fracture	54,575	Open wound to head	34,838
7	Upper leg and thigh fracture	52,771	Unspecified injury	33,170
8	Pelvis fracture	52,081	Unspecified injury to head	25,232
9	Chest (thorax) internal organ injury	41,507	Open wound to wrist, hand, and fingers	24,458
10	Forearm and elbow fracture	40,310	Toxic effects	24,070

<sup>1</sup>Ranks were not tested for statistical significance.

<sup>2</sup>Based on the proposed ICD–10–CM injury diagnosis matrix in reference 4 in this report.

SOURCE: Agency for Healthcare Research and Quality Healthcare Cost and Utilization Project's 2016 State Inpatient Databases.

**Table C. ICD–10–CM nature-of-injury codes in the 2019 updated surveillance definition for injury hospitalizations**

ICD–10–CM nature-of-injury code <sup>1</sup>	Types of injuries
All S codes	Anatomic injuries
T07–T34	Foreign bodies, burns, corrosions, frostbite
T36–T50 with a 6th character of 1, 2, 3, or 4 (Exceptions: T36.9, T37.9, T39.9, T41.4, T42.7, T43.9, T45.9, T47.9, and T49.9, which are included if the code has a 5th character of 1, 2, 3, or 4)	Drug poisoning (excludes adverse effects and underdosing)
T51–T65	Toxic effects of substances nonmedicinal as to source
T66–T76	Other and unspecified effects of external causes (radiation, heat, light, hypothermia, hyperthermia, asphyxiation, child and adult abuse, lightning, drowning, motion sickness, etc.)
T79	Certain early complications of trauma, not elsewhere classified
O9A.2–O9A.5	Injury, poisoning, and certain other consequences of external causes; and physical, sexual, and psychological abuse complicating pregnancy, childbirth, and the puerperium
T84.04 <sup>2</sup>	Periprosthetic fracture around internal prosthetic joint
M97 <sup>2</sup>	Periprosthetic fracture around internal prosthetic joint

<sup>1</sup>Codes must have a 7th character of A, B, C, or missing (i.e., initial encounters or missing information on encounter type). T30–T32 do not have a 7th character.

<sup>2</sup>T84.04 was retired and replaced by M97 in the Federal Fiscal Year 2017 version of ICD–10–CM, which went into effect on October 1, 2016.

SOURCES: National Center for Health Statistics and National Center for Injury Prevention and Control.

## Updated Recommendation

The results noted above were used to update the proposed inclusion criteria for the ICD–10–CM surveillance case definition for injury hospitalizations. In the updated definition, an injury hospitalization is defined as a hospitalization record with a principal diagnosis of one of the nature-of-injury codes from [Table C](#). The injury diagnosis code must have a 7th character indicating an initial visit (i.e., 7th character of A, B, or C) or a missing 7th character. The definition excludes records with an external cause-of-injury code but no injury diagnosis code and records with an injury diagnosis code in a subsequent field but not in the principal diagnosis field.

## Discussion

Standard surveillance case definitions for injury hospitalizations and ED visits are routinely used to facilitate comparison across jurisdictions and over time (2,3,17). In 2017, a proposed ICD–10–CM surveillance case definition for injury hospitalizations was published (1). However, at the time the definition was developed, ICD–10–CM coded hospitalization data were not readily available to test the proposed selection criteria or to understand the implications of the choices made. This report describes the results from testing the proposed definition using ICD–10–CM coded administrative data and provides an updated surveillance definition based on the results.

The 2019 updated surveillance definition varies from the original proposed definition in several ways:

- The list of ICD–10–CM codes included in the definition is expanded by the addition of O9A.2–O9A.5, Injuries complicating pregnancy, childbirth and the puerperium; and T84.04/M97, Periprosthetic fracture around internal prosthetic joint ([Table C](#)).
- The case definition is limited to hospitalizations for initial encounters only (i.e., does not include subsequent encounters for routine follow-up care or for sequelae from previous injuries).

The updated surveillance definition continues to require that the record have an injury diagnosis code (Table C) as the principal diagnosis. For data based on UB-04, the principal diagnosis field is the one diagnostic field for which there is a generally accepted coding rule—it contains the code corresponding to the reason for the hospitalization as determined by the attending medical provider. For the other diagnostic fields, there is no national standard for the order in which the codes are assigned. Therefore, the presence of an injury diagnosis code in other fields does not necessarily identify an injury of sufficient severity to warrant hospitalization. The results from testing possible expansion of the surveillance definition to include any mention of an injury diagnosis code did not provide compelling evidence to change the selection criteria to include any mention of an injury diagnosis code. Therefore, case selection based on principal diagnosis of an injury code was maintained in the 2019 updated ICD-10-CM surveillance case definition for injury hospitalizations.

The requirement that the principal diagnosis be one of the nature-of-injury codes listed in Table C will result in a conservative estimate of the number of injury hospitalizations, as there may be some true injury hospitalizations that might be missed by requiring a principal diagnosis of injury. For example, analysis of administrative data from several states suggests that records with codes for drug poisoning (Table C) or intentional self-harm and suicide attempt (18) often have a principal diagnosis of a mental health or behavioral disorder (F01-F99). While including any mention of an injury diagnosis code is not recommended for the general surveillance definition, special studies that focus on particular types, mechanisms, or intents of injury might require the use of different selection criteria (e.g., inclusion of any mention of ICD-10-CM codes of interest).

In using the updated definition, researchers and epidemiologists should consider that:

- The updated ICD-10-CM surveillance case definition for injury hospitalizations was developed
- The updated surveillance case definition was developed for use with hospital discharge data from administrative claims based on the UB-04. The selection criteria in this surveillance definition might not be directly applicable to other data sets often used for injury morbidity surveillance, such as data from prehospital care (e.g., emergency medical services) reports, ED visits, outpatient visits, or syndromic surveillance systems. Before applying these selection criteria to other data sources, testing and validation should be conducted to determine whether the definition should be modified.
- Each year, NCHS and CMS update the ICD-10-CM code set to add or delete codes, revise descriptions, modify notes on inclusion and exclusion, and make other adjustments as needed. Because the ICD-10-CM code set is updated annually, the ICD-10-CM surveillance case definition for injury hospitalizations will need to be continually updated to address any relevant changes to the ICD-10-CM codes.
- The updated ICD-10-CM surveillance case definition for injury hospitalizations provides standardized case selection criteria for public health surveillance. The performance of the recommended criteria should continue to be monitored, and the selection criteria adjusted, if needed, to address any limitations identified.

## Conclusions

The updated ICD-10-CM surveillance case definition for injury hospitalizations provides standard criteria

for selecting records for which care of an injury was the primary reason for the hospitalization. The definition provides a uniform standard enabling the use of ICD-10-CM coded data to study differences in injury hospitalizations among different populations and over time.

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