

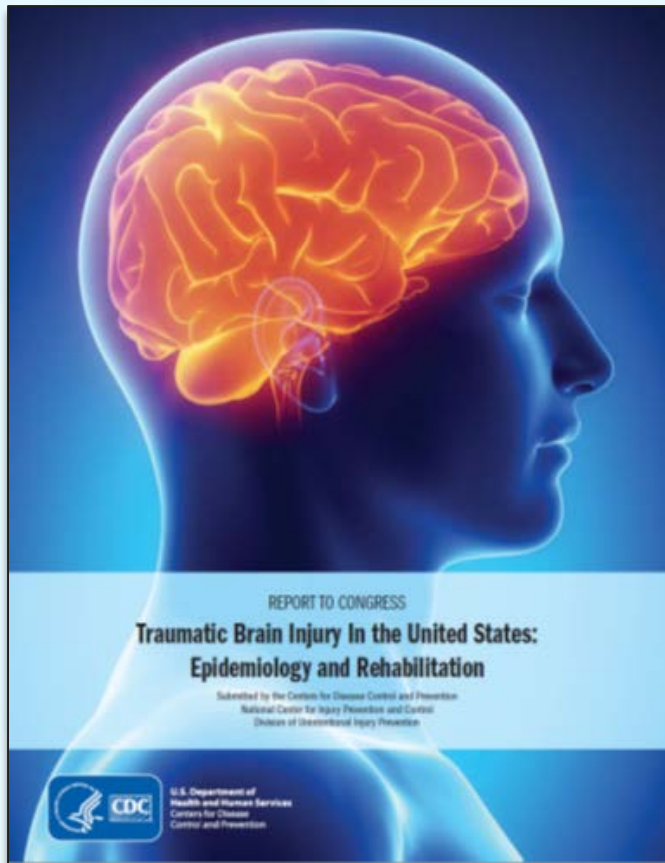
A surveillance case definition for Traumatic Brain Injury using ICD-10-CM

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Webinar, September 17, 2015



A Surveillance Definition for TBI



- Clinical definition vs. surveillance definition of TBI
- Surveillance definition is meant for analysis of data coded using the clinical modification of the International Classification of Diseases (ICD)

What is the International Classification of Diseases (ICD)?

- Classification system established by the World Health Organization for international comparisons
- Multiple revisions and clinical modifications (CM)
- Recent revisions used to code mortality (death)
 - ICD-9, from 1979 to 1998
 - ICD-10, from 1999 forward
- Recent revisions used to code morbidity (e.g., ED visits, hospitalizations)
 - ICD-9-CM, from 1979 to current
 - ICD-10-CM, required beginning Oct 2015

CDC ICD-based Surveillance Definitions for TBI: ICD-9-CM Codes for TBI morbidity

ICD-9-CM Code	Description
800.0-801.9	Fracture of the vault or base of the skull
803.0-804.9	Other and unqualified multiple fractures of the skull
850.0-854.1	Intracranial injury, including concussion, contusion, laceration, and hemorrhage
950.1-950.3	Injury to optic nerve and pathways
995.55	Shaken baby syndrome
959.01	Head injury, unspecified

From: Faul M, Xu L, Wald MM, Coronado VG. *Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations and Deaths 2002–2006*. Atlanta (GA): Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2010.

CDC ICD-based Surveillance Definitions for TBI:

ICD-10 Codes for TBI mortality

ICD-10 Code	Description
S01.0-S01.9	Open wound of the head
S02.0, S02.1, S02.3, S02.7-S02.9	Fracture of the skull and facial bones
S04.0	Injury to optic nerve and pathways
S06.0-S06.9	Intracranial injury
S07.0, S07.1, S07.8, S07.9	Crushing injury of head
S09.7-S09.9	Other unspecified injuries of head
	(Continued on next slide)

From: Faul M, Xu L, Wald MM, Coronado VG. *Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations and Deaths 2002–2006*. Atlanta (GA): Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2010.

CDC ICD-based Surveillance Definitions for TBI: ICD-10 Codes for TBI mortality (continued)

ICD-10 Code	Description
T01.0*	Open wounds involving head with neck
T02.0*	Fractures involving head with neck
T04.0*	Crushing injuries involving head with neck
T06.0*	Injuries of brain and cranial nerves with injuries of nerves and spinal cord at neck level
T90.1, T90.2, T90.4, T90.5, T90.8, T90.9	Sequelae of injuries of head

From: Faul M, Xu L, Wald MM, Coronado VG. *Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations and Deaths 2002–2006*. Atlanta (GA): Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2010.

*For consistency with the World Health Organization (WHO) standards for surveillance of central nervous system injury, these codes are included here. However, these codes are not used in the United States; in the United States, nosologists are instructed to assign separate ICD-10 codes for the injury to the head and the injury to the neck.

Why is a new surveillance definition needed?

- Transition to ICD-10-CM beginning Oct 1, 2015
- Opportunity to consider new concepts and past decisions re: the surveillance definition

Differences between ICD-9-CM and ICD-10-CM for head injury codes

- Unique codes for skull fracture and intracranial injury
 - No combination codes as in ICD-9-CM
- ICD-10-CM codes for some intracranial injuries (e.g., *S06.3, Focal traumatic brain injury*) specify laterality
- Some ICD-10-CM codes provide greater detail than the comparable ICD-9-CM code (e.g., *S06.8, Other specified intracranial injury* includes specific codes for injuries to the intracranial portion of the internal carotid artery)
- ICD-10-CM includes more categories for describing loss of consciousness (LOC)
- In ICD-10-CM, codes for skull fracture do not include a modifier for LOC

Loss of Consciousness (LOC) Modifier

ICD-9-CM	ICD-10-CM
<ul style="list-style-type: none"> • Unspecified state of consciousness • With no LOC • Brief [<1 hour] LOC • Moderate [1-24 hours] LOC • Prolonged [>24 hours] LOC and return to pre-existing conscious level • Prolonged [>24 hours] LOC, without return to pre-existing conscious level • LOC of unspecified duration • Concussion, unspecified 	<ul style="list-style-type: none"> • Without LOC • LOC 30 mins or less • LOC 31 mins to 59 mins • LOC 1 hr to 5 hrs 59 mins • LOC 6 hrs to 24 hrs • LOC>24 hrs w/return to pre-existing conscious level • LOC >24 hrs w/o return to pre-existing conscious level with pt surviving • LOC of any duration w/death due to TBI prior to regaining consciousness • LOC of any duration w/death due to other cause prior to regaining consciousness • With LOC of unspecified duration

Members of the CDC Traumatic Brain Injury ICD-10-CM Surveillance Definition Workgroup

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Considerations in Developing the Proposed ICD-10-CM Surveillance Definition for TBI

- Comparability with:
 - The ICD-9-CM surveillance definition for TBI morbidity
 - The ICD-10 surveillance definition for TBI mortality
- Only include injury diagnosis codes from *Chapter 19, Injury, poisoning and certain other consequences of external causes*
- New components in code structure in ICD-10-CM
 - 7th character for type of encounter
 - A Initial encounter for open fracture
 - B Initial encounter for closed fracture
 - D Subsequent encounter
 - S Sequelae

General Equivalence Maps (GEMs)

- A code-to-code reference dictionary for ICD-9-CM and ICD-10-CM
- Offers possible acceptable translation alternatives
- One ICD-9-CM code can be represented by multiple ICD-10-CM codes and vice versa
- There are new concepts in ICD-10-CM that have no predecessor in ICD-9-CM (e.g., underdosing, blood type, Glasgow Coma Scale)

Where to Find ICD-10-CM GEMs

<http://www.cdc.gov/nchs/icd/icd10cm.htm>

1. Scroll down to “FY 2016 release of ICD-10-CM”
2. Select “General Equivalence Mapping Files”

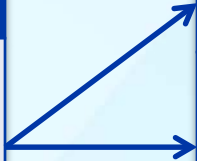
GEMs Example: ICD-9-CM to ICD-10-CM

ICD-9-CM Code
800.22 Closed fracture of vault of skull with subarachnoid, subdural, and extradural hemorrhage, with brief [<1 hour] loss of consciousness

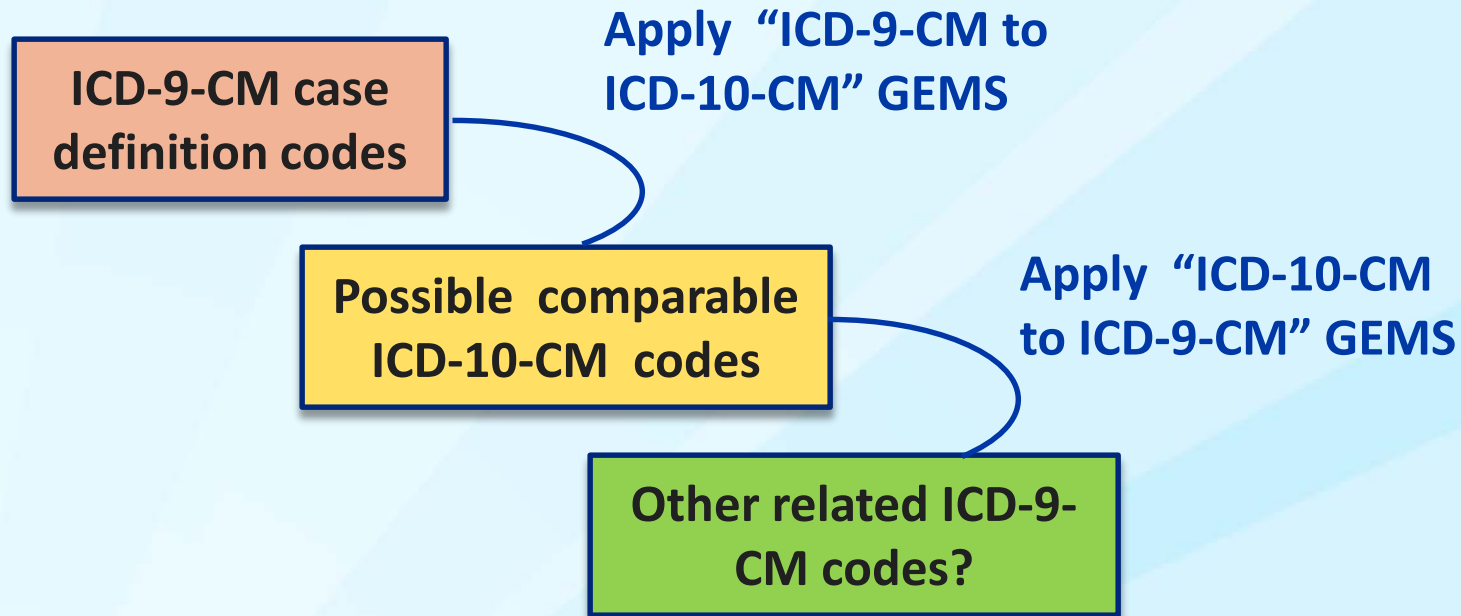
ICD-10-CM Code	
S02.0	Fracture of vault of skull, closed fracture
S06.4x1	Epidural hemorrhage with loss of consciousness of 30 minutes or less
S06.4x2	Epidural hemorrhage with loss of consciousness of 31 minutes to 59 minutes
S06.5x1	Traumatic subdural hemorrhage with loss of consciousness of 30 minutes or less, initial encounter
S06.5x2	Traumatic subdural hemorrhage with loss of consciousness of 31 minutes to 59 minutes
S06.6x1	Traumatic subarachnoid hemorrhage with loss of consciousness of 30 minutes or less
S06.6x2	Traumatic subarachnoid hemorrhage with loss of consciousness of 31 minutes to 59 minutes

GEMs Example: ICD-10-CM to ICD-9-CM

ICD-10-CM Code	ICD-9-CM Code	
S06.1x0 Traumatic cerebral edema without loss of consciousness	348.5	Cerebral edema
	854.01	Intracranial injury of other and unspecified nature without mention of open intracranial wound, with no loss of consciousness



Recommended Process for Using GEMs



1. Review all codes
2. Test sensitivity/specificity using “gold standard”
3. Finalize ICD-10-CM case definition

GEMs applied to ICD-9-CM surveillance definition for TBI morbidity

- 493 unique ICD-9-CM codes in the ICD-9-CM definition resulted in 221 unique ICD-10-CM codes
- Of the 221 unique ICD-10-CM codes, 220 are included in the ICD-10 definition for TBI mortality
 - *T74.4 Shaken Infant Syndrome* not found in mortality definition
- There are ICD-10 codes in the mortality definition that are NOT included in the proposed ICD-10-CM morbidity definition
 - e.g., fractures of facial bones—not considered a TBI in living persons (when coded alone), but suggest TBI in reports of death

Caveats of ICD-10-CM Definition

- Draft definition
- Inability to assess sensitivity and specificity of these codes
- No data yet available
- Full year of data won't be collected until end of 2016; receive data in 2017?

DRAFT Proposed ICD-10-CM Surveillance Definition for Traumatic Brain Injury

ICD-10-CM code	Description
S02.0, S02.1-	Fracture of skull
S02.8, S02.91	Fracture of other specified skull and facial bones; Unspecified fracture of skull
S04.02, S04.03-, S04.04-	Injury of optic chiasm; injury of optic tract and pathways; injury of visual cortex
S06-	Intracranial injury
S07.1	Crushing injury of skull
T74.4	Shaken infant syndrome

“-” indicates any 4th, 5th or 6th character

7th character of A or B for S02.0, S02.1-, S02.8 and S02.91

7th character of A for S04.02, S04.03-, S04.04-, S06- , S07.1 and T74.4

ICD-10 codes in the TBI mortality surveillance definition which are not included in the proposed ICD-10-CM TBI morbidity surveillance definition

ICD-10 code	Description
S01	Open wound of head
S02.3	Fracture of orbital floor
S02.7*	Multiple fractures involving skull and facial bones
S07.0	Crushing injury of face
S07.8	Crushing injury of other parts of head
S07.9	Crushing injury of head, part unspecified
S09.7*	Multiple injuries of head
S09.8	Other specified injuries of head
S09.9	Unspecified injury of face and head
T90.1, T90.2, T90.4, T90.5, T90.8, T90.9	Sequelae of injuries of head

*Code does not exist (has been deactivated) in ICD-10-CM

Unspecified Head Injury

- *S09.90 Unspecified injury of head* is NOT included in the proposed ICD-10-CM code list for TBI morbidity
 - This code is equivalent to the ICD-9-CM code *959.01 Head injury, unspecified*
- A study by Bazarian *et al* found that 75.3% of emergency department records coded with *959.01* did not meet the clinical criteria for TBI
- Before a final decision can be made regarding whether to include *S09.90 Unspecified injury of head* in the ICD-10-CM TBI morbidity surveillance definition, the sensitivity and positive predictive value of this code should be studied when ICD-10-CM data become available

Next Steps

- Review by partners including federal agencies, researchers, epidemiologists, state health departments, etc.
- Test with ICD-10-CM coded data
- Revise as needed
- Explore codes other than those found in the injury diagnosis chapter

Questions?



For more information

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

