

Central Nervous System Injury Surveillance Data Submission Standards—2002

Compiled and Edited by

Angela L. Marr, MPH
Victor G. Coronado, MD

Department of Health and Human Services
Centers for Disease Control and Prevention
National Center for Injury Prevention and Control

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Centers for Disease Control and Prevention

Julie L. Gerberding, MD, MPH
Director

National Center for Injury Prevention and Control

Sue Binder, MD
Director

Division of Injury and Disability Outcomes and Programs

Richard C. Hunt, MD, FACEP
Director

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Minnesota Department of Health

Anna M. Gaichas, MS
Mark R. Kinde, MPH
Jon S. Roesler, MS
John A. Weber

South Carolina Department of Health and Environmental Control

Georgette Demian, MPH

Medical University of South Carolina

Wes J. Gravelle, MPH
JaKook Gu, MSPH
Anbesaw W. Selassie, DrPH

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Introduction

The *Central Nervous System Injury Surveillance Data Submission Standards—2002* will guide users in collecting, formatting, evaluating, and submitting data to the Centers for Disease Control and Prevention (CDC):

- Includes updated sections from the *2001 Annual Data Submission Standards Central Nervous System Injury, Guidelines for the Surveillance of Central Nervous System Injury* (published in 1995), the Technical Reference Document from the 1999 TBI Surveillance Grantees' Meeting, and new information and forms developed since then;
- Replaces portions of the *Guidelines* and the 1999 Technical Reference Document related to data processing and submission;
- Will be updated.

Please read the information carefully. CDC has updated and changed some elements to make the guidance more straightforward and easier to follow.

If you have questions or suggestions for improving this manual, please let us know by contacting:

Wes Rutland-Brown
National Center for Injury Prevention and Control
Centers for Disease Control and Prevention
4700 Buford Highway, NE, Mail Stop F-41
Atlanta, GA 30341-3724
Phone: (770) 488-1476
Fax: (770) 488-4338
E-mail: WFR7@cdc.gov

Overview of Central Nervous System Injury in the United States

Traumatic Brain Injury

(Adapted from *Traumatic Brain Injury in the United States: A Report to Congress*.)

- Traumatic brain injury (TBI) is a leading cause of death and disability among children and young adults in the United States.
- Each year, an estimated 1.5 million Americans sustain a TBI. As a consequence of these injuries:
 - ◆ 230,000 people are hospitalized and survive;
 - ◆ 50,000 people die (Adekoya et al. 2002);
 - ◆ 80,000 to 90,000 people experience the onset of long-term disability.
- An estimated 5.3 million Americans live with a permanent TBI-related disability. However, this estimate does not include people with “mild” TBI who are seen in emergency departments or outpatient encounters, nor those who do not receive medical care.
- The annual economic burden of TBI in the United States has been estimated at \$56.3 billion in 1995 dollars (Thurman DJ 2001); however, human costs of the long-term impairments and disabilities associated with TBI are incalculable.
- Because many TBI related disabilities are not conspicuous deficits, they are referred to as the invisible or silent epidemic. These disabilities, arising from cognitive, emotional, sensory, and motor impairments, often permanently alter a person’s ability to *maximize* daily life experiences. This has profound effects on social and family relationships.
- To implement more effective programs to prevent these injuries, we need reliable data on their causes and risk factors. State surveillance data can be used to:
 - ◆ Identify trends in TBI incidence;
 - ◆ Enable the development of cause-specific prevention strategies focused on populations at greatest risk and monitor the effectiveness of such programs.

Spinal Cord Injury

- Each year, as many as 11,000 new spinal cord injuries (SCI) occur.
- An estimated 190,000 Americans live with paralysis related to spinal cord injury.
- Spinal cord injury in the United States costs an estimated \$9.7 billion each year.
 - ◆ Annual costs for care, equipment, supplies, and services are estimated at \$4.5 billion for persons surviving their first year after injury.
 - ◆ Annual indirect costs of SCI are estimated at \$2.5 billion nationwide.

CDC's Central Nervous System Injury Surveillance Program 1989–2001

Traumatic Brain Injury

- In 1989, CDC began promoting the development of a multistate traumatic brain injury surveillance system after the Federal Interagency Head Injury Task Force Report identified the need for better information about the public health impact of brain injuries.
- In 1995, CDC published *Guidelines for the Surveillance of Central Nervous System Injury* to help ensure that the multistate TBI surveillance system would generate valid and timely information representative of the U.S. population. Also that year, four states were funded for TBI surveillance.
- In 1996, Congress passed Public Law 104-166, the Traumatic Brain Injury Act, which charged CDC with implementing projects to reduce the incidence of traumatic brain injury. Specifically, the legislation mandates that CDC shall:
 - ◆ Develop a uniform reporting system for traumatic brain injuries;
 - ◆ Conduct research to identify effective strategies for preventing traumatic brain injury;
 - ◆ Implement public information and education programs to prevent TBI and broaden public awareness about the public health consequences of TBI;
 - ◆ Provide technical assistance, either directly or through grants and contracts, to public or nonprofit entities for planning, developing, and conducting projects to reduce the incidence of traumatic brain injury.

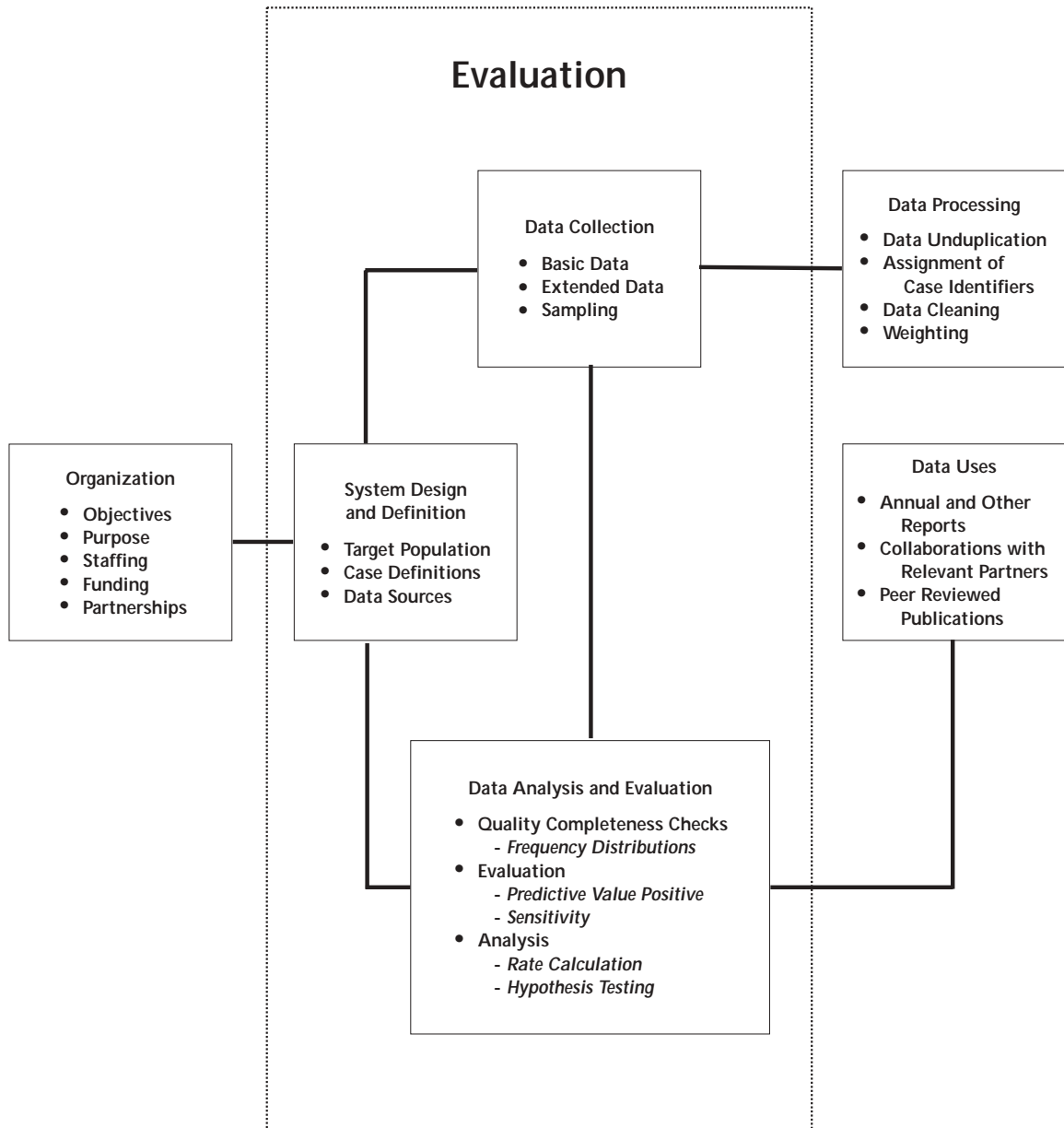
Funding for these activities was authorized at \$3 million for each of the fiscal years since 1997.

- In 1997, 11 additional states were funded for TBI surveillance.
- In 2000, the TBI Act was reauthorized under the Children's Health Act. CDC's mandate to maintain a uniform reporting system for traumatic brain injuries was continued and CDC's involvement in TBI expanded. The 2000 TBI Act also mandated that CDC recommend methods to assess the incidence and prevalence of mild TBI. For this purpose, a surveillance conceptual case definition was produced and operationalized in the *Report to Congress on Mild Traumatic Brain Injury in the United States: Steps to Prevent a Serious Public Health Problem*. No additional funds have yet been appropriated.
- In 2001, the TBI surveillance program was limited to 12 states; of these, 6 conduct medical record review and abstraction (extended surveillance). Two of the 12 states also conduct emergency department-based surveillance.

Spinal Cord Injury

- In 1988, CDC started working with state health departments to conduct surveillance for SCI.
- In 1992, CDC issued its first grant to help prevent secondary conditions among persons living with spinal cord injury.
- In 1993, CDC awarded the first cooperative agreement to look at secondary conditions among a population-based cohort.
- In 1995, with the assistance of state partners, the *Guidelines for the Surveillance of Central Nervous System Injury* was published. This document set standards for collecting spinal cord injury surveillance data and has been critical in developing data sets that are comparable among states.
- In June 1997, CDC initiated a meeting to address potential steps for building on the known body of information about conducting community-level interventions among persons with SCI. Consequently, two community-based interventions were funded.
- In the fall 1999, CDC and health practitioners convened to evaluate specific community interventions.
- In the spring 2001, CDC assembled an Interagency Meeting on Spinal Cord Injury of both federal and non-federal agencies that typically respond to public health issues related to spinal cord injury. Participants reviewed current activities related to public health, identified gaps in public health research and funding, explored future interagency partnerships, and generated recommendations about future public health priorities related to SCI.
- Currently, CDC funds four states to conduct SCI surveillance in conjunction with their TBI surveillance.

Detailed Framework of State Central Nervous System Surveillance Activities



Sources of Data

The following lists the most useful and accessible data sources for central nervous system (CNS) injury surveillance:

For Case Ascertainment:

Multiple Cause-of-Death Data Sets and Death Certificates

Electronic Multiple Cause-of-Death Data Sets

- Are computer databases containing patient's demographics, underlying and contributing causes of death (both nature of injury and external cause), place of death, and date of death;
- Are coded according to the *International Classification of Diseases*, 10th Revision (ICD-10), beginning with 1999 data;
- Are usually the most readily available case sources of CNS injury deaths.

Hardcopy Death Certificates

- Are the source of the information included in the electronic multiple cause-of-death data sets;
- Can be reviewed manually to ascertain cases if an electronic data set is unavailable.

Hospital Discharge Data Sets

- Contain patient's demographics, diagnoses, services provided and charges, and dates of hospital admission and discharge;
- Are coded according to *International Classification of Diseases*, 9th Revision, Clinical Modification (ICD-9-CM);
- Are most useful when information is provided on the cause of injury, coded using ICD-9-CM external cause of injury codes. Information also includes the patient's disposition upon discharge from the hospital.

Emergency Department Admission and Discharge Data Sets

- Contain patient's demographics, diagnoses, services provided and charges, and dates of emergency department admission and discharge;
- Are coded according to ICD-9-CM;
- Are most useful when information is provided on the cause of injury, coded using ICD-9-CM external cause of injury codes. Information also includes the patient's disposition upon discharge from the facility.

Outpatient Encounter Data Sets

- Contain patient's demographics, diagnoses, services provided and charges, and dates of outpatient encounter;
- Are coded according to ICD-9-CM;
- Are most useful when information is provided on the cause of injury, coded using ICD-9-CM external cause of injury codes.

Trauma Registries

- Are separate registries of trauma patients maintained by designated trauma facilities;
- Contain more comprehensive information about severity and etiology than is found in hospital discharge data;
- Often are not population-based and may over represent more severe injuries.

For Abstraction of Extended Variables or Case Confirmation:

Hospital Medical Records

- Are the primary source for abstracting data for extended variables.

Trauma Registries

- Are another potential source for abstracting data for extended variables.

Medical Examiner or Coroner Records

- Contain detailed information about the nature of injury, external cause of injury, and circumstances of injury;
- May contain data neither coded nor entered in computer databases.

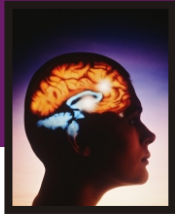
Emergency Department Medical Service Records

- Are maintained by ambulance service workers and emergency medical technicians;
- May contain detailed information about the circumstances of injury and indicators of injury severity.

Note: The emergency department's visit triage logs, when they exist and are available, may be useful for augmenting or verifying services and admissions to this type of facility.

Outpatient Encounter Medical Service Records

- May be maintained by medical records department, individual facilities, or individual physician's office;
- May contain detailed information about the circumstances of injury and indicators of injury severity.



Traumatic Brain Injury Case Definition

June 2003

The application of a consistent electronic case definition among states participating in the multistate traumatic brain injury (TBI) surveillance system is critical to collecting quality TBI surveillance data. Please apply the following code-based definition to electronic data as the case inclusion criteria.

For surveillance year 2002:

TBI Morbidity:

800.0 – 801.9	Fracture of the vault or base of the skull
803.0 – 804.9	Other and unqualified and multiple fractures of the skull
850.0 – 854.1	Intracranial injury, including concussion, contusion, laceration, and hemorrhage
950.1 – 950.3	Injury to the optic chiasm, optic pathways; and visual cortex
959.01	Head injury, unspecified (beginning 10/1/97)
995.55	Shaken Infant Syndrome

TBI Mortality:

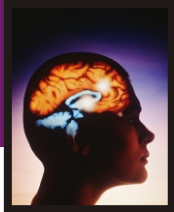
The International Classification of Diseases, 10th Revision (ICD-10), was implemented in 1999. No attempt has been made to determine the predictive value positive (PVP) and sensitivity of these codes, and a number of them are provisional. The ICD-10 codes recommended for inclusion at this time are as follows:

S01.0 – S01.9	Open wound of the head
S02.0, S02.1, S02.3, S02.7 – S02.9	Fracture of 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 and unspecified injuries of head
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 nerve 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.

ICD-10 TBI Coding Recommendation

S01.0 Open Wound of Scalp	S07.0 Crushing Injury of Face
S01.1 Open Wound of Eyelid and Periocular Area*	S07.1 Crushing Injury of Skull
S01.2 Open Wound of Nose*	S07.8 Crushing Injury of Other Parts of Head*
S01.3 Open Wound of Ear*	S07.9 Crushing Injury of Head, Part Unspecified*
S01.4 Open Wound of Cheek and Temporomandibular Area*	S09.7 Multiple Injuries of Head
S01.5 Open Wound of Lip and Oral Cavity*	S09.8 Other Specified Injuries of Head
S01.7 Multiple Open Wounds of Head	S09.9 Unspecified Injury of Head
S01.8 Open Wound of Other Parts of Head	
S01.9 Open Wound of Head, Part Unspecified	T01.0 Open Wounds Involving Head with Neck
	T02.0 Fractures Involving Head with Neck*
S02.0 Fracture of Vault of Skull	T04.0 Crushing Injuries Involving Head with Neck*
S02.1 Fracture of Base of Skull	T06.0 Injuries of Brain and Cranial Nerves with Injuries of Nerves and Spinal Cord at Neck Level
S02.3 Fracture of Orbital Floor*	
S02.7 Multiple Fractures Involving Skull and Facial Bones	
S02.8 Fracture of Other Skull and Facial Bones	T90.1 Sequelae of Open Wound of Head
S02.9 Fracture of Skull and Facial Bones, Part Unspecified	T90.2 Sequelae of Fracture of Skull and Facial Bones
	T90.4 Sequelae of Injury of Eye and Orbit*
S04.0 Injury of Optic Nerves and Pathways	T90.5 Sequelae of Intracranial Injury
	T90.8 Sequelae of Other Specified Injuries of Head
	T90.9 Sequelae of Unspecified Injury of Head
S06.0 Concussion	
S06.1 Traumatic Cerebral Oedema	
S06.2 Diffuse Brain Injury	
S06.3 Focal Brain Injury	
S06.4 Epidural Hemorrhage (Traumatic Extradural Hemorrhage)	
S06.5 Traumatic Subdural Hemorrhage	
S06.6. Traumatic Subarachnoid Hemorrhage	
S06.7 Intracranial Injury with Prolonged Coma	
S06.8 Other Intracranial Injuries	
S06.9 Intracranial Injury, Unspecified	

*Include these codes on a provisional basis until sensitivity and PVP are determined. National Center for Health Statistics is presently conducting a study in which they are double coding the 1996 data to include ICD-10 codes to evaluate these issues. CDC will publish the results of this study when available.



Traumatic Brain Injury Clinical Case Definition

June 2002

For surveillance systems using data from clinical records, there are two ways of defining a case of traumatic brain injury (craniocerebral trauma):

1. An occurrence of injury to the head that is documented in a medical record, with one or more of the following conditions attributed to head injury:^{*}
 - Observed or self-reported decreased level of consciousness[†]
 - Amnesia[‡]
 - Skull fracture
 - Objective neurological or neuropsychological abnormality[§] or diagnosed intracranial lesion[£]
2. An occurrence of death resulting from trauma, with head injury listed on the death certificate, autopsy report, or medical examiner's report in the sequence of conditions that resulted in death.

The clinical definition of traumatic brain injury *excludes* several conditions when criteria above are not met:

- Lacerations or contusions of the face, eye, or scalp, without other criteria listed above
- Fractures of facial bones, without criteria listed above
- Birth trauma
- Primary anoxic, inflammatory, toxic, or metabolic encephalopathies which are not complications of head trauma
- Brain infarction (ischemic stroke)
- Intracranial hemorrhage (hemorrhagic stroke) without associated trauma
- Airway obstruction (e.g., near - drowning, throat swelling, choking, strangulation, or crush injuries to the chest)
- Seizure disorders (Grand mal, etc.)
- Intracranial surgery
- Neoplasms

^{*}**Injuries** to the head may arise from blunt or penetrating trauma or from acceleration-deceleration forces.

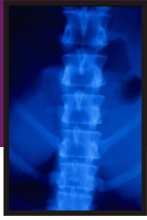
[†] **Decreased level of consciousness** refers to partial or complete loss of consciousness. This includes states described as obtundation, stupor, or coma.

[‡] **Amnesia** may include loss of memory for events immediately preceding the injury (retrograde amnesia), for the injury event itself, and for events subsequent to the injury (posttraumatic amnesia).

[§] **Neurological abnormalities** are determined from neurological examination. Examples include abnormalities of motor function, sensory function, or reflexes; abnormalities of speech (aphasia or dysphasia); or seizures acutely following head trauma.

Neuropsychological abnormalities are determined from mental status and neuropsychological examinations. Examples include disorders of mental status (such as disorientation, agitation, or confusion) and other changes in cognition, behavior, or personality.

[£] Examples of diagnosed **intracranial lesions** include diffuse axonal injury, traumatic intracranial hematomas or hemorrhage (epidural, subdural, subarachnoid, or intracerebral); cerebral contusions or lacerations; or penetrating cerebral injuries (e.g., gunshot wounds). The diagnosis of such intracranial lesions is usually confirmed with a computed tomography (CT), magnetic resonance imaging (MRI) brain scan, or by other neurodiagnostic procedures.



Spinal Cord Case Definition

June 2003

The application of a consistent electronic case definition among states participating in the multistate spinal cord injury (SCI) surveillance system is essential to the collection of quality SCI surveillance data. Please apply the following codes to International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) coded electronic data (hospital discharge or trauma registry) to identify potential cases.

SCI Morbidity:

806.0 – 806.9	Fracture of the vertebral column with spinal cord injury
952.0 – 952.9	Spinal cord injury without evidence of spinal bone injury

SCI Mortality:

Mortality data have not been shown to be a reliable data source for identifying new cases of fatal spinal cord injury. SCI mortality data, for non-hospitalized cases, should not be submitted to CDC.

Evaluations of hospital discharge data (HDD) have found that the predictive value positive (PVP) of these two primary ICD-9-CM codes for spinal cord injury is low (approximately 60%)¹⁻⁴. This means that only 6 out of 10 cases that are identified from HDD using ICD-9-CM codes are true SCI cases. Given this low PVP, it is wise to review medical records to confirm the SCI diagnoses for cases identified from HDD. All *potential* SCI cases that have been identified from HDD should also be confirmed by medical records review.

Clinical Case Definition:

A clinical case of spinal cord injury is defined as the occurrence of an acute traumatic lesion of neural elements in the spinal canal (spinal cord, or cauda equina) resulting in temporary or permanent sensory deficit, motor deficit, or bowel or bladder dysfunction.

The clinical definition of spinal cord injury *excludes* the following:

- Intervertebral disc disease
- Vertebral injuries in the absence of spinal injury
- Nerve root avulsions and injuries to nerve roots and peripheral nerves outside the spinal canal
- Birth trauma
- Cancer, spinal cord vascular disease, and other nontraumatic spinal cord diseases

- ¹ Thurman DJ, Burnett CL, Jeppson L, et al. Surveillance of spinal cord injuries in Utah, USA. *Paraplegia* 1994;32:665-9.
- ² Price C, Makintubee S, Herndon W, et al. Epidemiology of traumatic spinal cord injury and acute hospitalization and rehabilitation charges for spinal cord injuries in Oklahoma, 1988-1990. *Am J Epidemiol* 1994;139:37-47.
- ³ Warren S, Moore M, Johnson MS. Traumatic head and spinal cord injuries in Alaska (1991-1993). *Alaska Med* 1995;37:11-19.
- ⁴ Johnson RJ, Gabella BA, Gerhart KA, et al. Evaluating sources of traumatic spinal cord injury surveillance data in Colorado. *Am J Epidemiol* 1997;146:266-272.

Case Inclusion

Diagnoses and Codes (see the Case Definitions in this section)

Deaths. Include a death case in the surveillance data set if:

- An ICD-10 TBI code consistent with the case definition is listed anywhere in the sequence of events leading to death;
- Late effects of TBI are listed as a cause of death.

Hospitalizations. Include a hospitalized case in the surveillance data set if an ICD-9-CM TBI (or SCI) code consistent with the case definition is listed in any of the diagnosis fields.

Notes: If ICD-9-CM code 310.2 (post-concussion syndrome) is the only code for a TBI, do not include as a case because we lack sufficient evidence that 310.2 cases are true cases of TBI.

Consider SCI cases identified from electronic data *provisional* until the case has been confirmed during a medical record review or abstraction.

Unduplication

Eliminate duplicate records by:

- Linking the death and hospitalization data sets to identify and exclude duplicate cases (this may occur because deaths due to late effects of TBI occur in the same year as the hospital discharge).
- Checking for multiple hospitalizations for the same event and deleting duplicate records.
- Unduplicating all cases identified as duplicate admissions during the medical records abstraction.

Dates

Report cases based on the calendar year of discharge or death (i.e., January 1 through December 31)—*not* the year of occurrence of the injury event.

Any case with an injury date more than 12 months prior to the discharge date should not be considered an incident case.

Note: Waiting until all incident cases are identified based on the calendar year of occurrence introduces additional delays in some state reporting systems; therefore, CDC bases its reporting on the calendar year of hospital discharge or death.

Residency

Residency is based on **the patient's address at the time of diagnosis** (on the HDD or the hospital record for cases identified from registries). Some special situations include:

- *Injuries to out-of-state visitors.* Persons sustaining TBI and receiving medical care while visiting another state should be reported by the surveillance system of the home state or state of residence.
- *Injuries to temporary residents.* Exclude cases if the address on the HDD or hospital record is out-of-state. Include cases with an in-state address on the HDD even if temporary residency is revealed during medical record review.

Because persons with out-of-state addresses are excluded from the surveillance data set, TBI rates will be based on injuries to in-state residents only. Excluding nonresidents from the surveillance data set (numerator) is important because they are not included in population estimates (denominator).

- *Persons injured in-state but hospitalized out-of-state.* At a minimum, each state should investigate and quantify the number of injured residents missed because they are hospitalized in a neighboring state. States should also consider a) working with neighboring states' data system authorities to obtain data, including the purchase of data if necessary; b) obtaining information from neighboring states' trauma centers or major referral centers, particularly those from nearby cities; and c) working with neighboring trauma registry data systems. Strategies to capture these cases will vary by state. States are encouraged to pursue creative solutions and share their experiences with other states.
- *U.S. travelers injured abroad.* Only the few persons who return to their home state for rehabilitation are likely to be identified. They should be included in the surveillance data set if they are identified.
- *TBIs treated at federal facilities.* Attempt to ascertain all TBI cases in the state, including those treated in federal facilities. The proportion of all TBI cases treated in federal facilities and the cooperation of federal facilities in reporting TBI varies considerably by state and type of federal facility. At a minimum, state TBI surveillance programs should characterize federal facilities in the state, determine the number of TBIs treated in these facilities, and develop reporting arrangements with these hospitals (if the numbers of cases are appreciable).

Variable Specifications Chart

Variable Label	Variable Name	Missing Code** (Occasionally Missing Values)	Format Type	Length***
BASIC VARIABLES				
Age	AGE	999	Numeric	8
Case Identification	CASEID	N/A	Numeric	8
County of Injury	CNTYINJ	999	Numeric	8
County of Residence	CNTYRES	999	Numeric	8
Date of Admission	DOADM	99999999	Character/Text	8
Date of Birth	DOB	99999999	Character/Text	8
Date of Death	DOD	99999999	Character/Text	8
Date of Discharge	DODC	99999999	Character/Text	8
Date of Injury	DOINJ	99999999	Character/Text	8
Diagnosis Codes*	ICD1-ICD36	999999	Character/Text	6
Discharge Disposition	DCDISP	9	Numeric	8
External Cause of Injury Codes*	ECODE1-ECODE5	999999	Character/Text	6
Event	EVENT	N/A	Numeric	8
Hispanic	HISPANIC	9	Numeric	8
Payment Source	PAYER1 PAYER2	9 9	Numeric Numeric	8 8
Preadmission Death/ Hospital Size	PAD_HOSP	N/A	Numeric	8
Race	RACE	9	Numeric	8
Sex	SEX	9	Numeric	8
State of Injury	STATEINJ	99	Numeric	8
State of Report	STATERPT	N/A	Numeric	8
State of Residence	STATERES	N/A	Numeric	8
Type of Care	TYPECARE	9	Numeric	8
Work-Relatedness	WORKRLTD	9	Numeric	8
Year	YEARRPT	N/A	Numeric	8

* Please collect and send as many ICD-9 and external cause codes (E-codes) as possible (e.g., if 15 ICD-9 fields are found on the HDD, please send the codes from all 15 fields).

** For always missing values, please input a missing value of (.) if you are using SAS to create your data set.

*** Note that the lengths are SAS default values. If you are not using SAS to create your data set, always leave missing values blank.

Variable Specifications Chart

Variable Label	Variable Name	Missing Code** (Occasionally Missing Values)	Format Type	Length***
EXTENDED VARIABLES				
TBI EXTENDED				
Abbreviated Injury Scale Score–Head	AISHEAD	9	Numeric	8
Glasgow Coma Scale Score	GCS	99	Numeric	8
Glasgow Outcome Scale Score	GOS	9	Numeric	8
Intracranial Lesion	ICLESION	9	Numeric	8
Level of Consciousness	LOC	9	Numeric	8
Length of Time Unconscious–Added	TIMEUCON	9	Numeric	8
Skull Fracture	SKULLFX	9	Numeric	8
SCI EXTENDED				
Abbreviated Injury Scale Score–Spine	AISSPINE	9	Numeric	8
Spinal Cord Injury Extent	SCIEXTNT	9	Numeric	8
Spinal Cord Injury Level	SCILEVEL	9	Numeric	8

* Please collect and send as many ICD-9 and external cause codes (E-codes) as possible (e.g., if 15 ICD-9 fields are found on the HDD, please send the codes from all 15 fields).

** For always missing values, please input a missing value of (.) if you are using SAS to create your data set.

*** Note that the lengths are SAS default values. If you are not using SAS to create your data set, always leave missing values blank.

Variable Specifications Chart

Variable Label	Variable Name	Missing Code** (Occasionally Missing Values)	Format Type	Length***
EXTENDED VARIABLES, CONTINUED				
TBI AND SCI				
Extended				
Abstract	ABSTRACT	N/A	Numeric	8
Blood Alcohol Concentration	BAC	999	Numeric	8
Event–Revised	EVENTREV	99999	Numeric	8
External Cause of Injury Code 1–Revised	ECODERV1	999999	Character/Text	6
External Cause of Injury Code 2– Revised–Added	ECODERV2	999999	Character/Text	6
Motor Vehicle Position	MVPOS	9	Numeric	8
Patient’s Living Status	LIVESTAT	99	Numeric	8
Personal Protective Equipment	PPE1, PPE2, PPE3	9	Numeric	8
Preadmission Death/ Hospital Size– Revised	PADHREV	N/A	Numeric	8
Sports and Recreation–Modified	SPORTREC	99	Numeric	8
Sports and Recreation SPECIFY–Added	S_R_SPEC	N/A	Character/Text	20
Sample Flag	SAMPLE	N/A	Numeric	8

Notes: Any data set that is submitted with incorrect variable labels, format types, or format lengths will be returned for corrections.

Basic variables should be no less than 97% complete upon submission to CDC.

Extended variables (if collected) should be no less than 90% complete.

Introduction to the Variable Dictionary

The following alphabetized list of variables provides standards for CNS injury surveillance. It includes two types of variables:

Basic Variables

- Collected by all CDC-funded states;
- Considered a minimum data set needed to describe these injuries with respect to incidence, demographics, nature of injury, and causes;
- Obtained typically from hospital discharge data sets and multiple cause-of-death data sets.

States should attempt to collect complete information about each of these variables for all cases.

Extended Variables

- Collected only by states with specific funding for this activity;
- Require additional record review and abstraction.

States with this funding should attempt to collect complete information about each of these variables for all sampled cases.

Note: See the Variable Specifications Chart for required variable names, formats, and lengths. All data must be submitted with the required variable name.

Abbreviated Injury Scale (AIS) Score—Head

Variable Name: AISHEAD

Variable Type: TBI EXTENDED

Description: The *most severe* AIS score for the *head region*.

Format Type: Numeric

Values:

- 1 = Minor injury
- 2 = Moderate injury
- 3 = Serious injury—not life threatening
- 4 = Severe injury—life threatening, but survival probable
- 5 = Critical injury—survival uncertain
- 6 = Maximum injury untreatable and virtually unsurvivable
- 8 = Not applicable
- 9 = Unknown

Notes: Coding these variables will require medical records review by a person trained in the use of the *Abbreviated Injury Scale, 1990 Revision, 1998 update*, developed and published by the Association for the Advancement of Automotive Medicine.

These variables are reserved for AIS scoring that is accomplished by reviewing individual medical records. **Do not enter computer-calculated scores derived from ICD-9-CM codes.**

Abbreviated Injury Scale (AIS) Score—Spine

Variable Name:	AISSPINE
Variable Type:	SCI EXTENDED
Description:	The <i>most severe</i> AIS score for the <i>spine region</i> .
Format Type:	Numeric
Values:	1 = Minor injury 2 = Moderate injury 3 = Serious injury—not life threatening 4 = Severe injury—life threatening, but survival probable 5 = Critical injury—survival uncertain 6 = Maximum injury untreatable and virtually unsurvivable 8 = Not applicable 9 = Unknown
Notes:	<p>Coding these variables will require medical records review by a person trained in the use of the <i>Abbreviated Injury Scale, 1990 Revision, 1998 update</i>, developed and published by the Association for the Advancement of Automotive Medicine.</p> <p>These variables are reserved for AIS scoring, accomplished by reviewing individual medical records. Do not enter computer-calculated scores derived from ICD-9-CM codes.</p>

Abstract

Variable Name:	ABSTRACT
Variable Type:	TBI and SCI EXTENDED
Description:	Whether or not medical records abstraction was completed.
Format Type:	Numeric
Values:	<p>1 = Sampled case, successfully abstracted and found to meet the case definition(s) as specified by the EVENT variable.</p> <p>2 = Sampled case, successfully abstracted, but found to meet a different central nervous system injury (CNSI) case definition than specified by the EVENT variable. The revised EVENT code <i>must</i> be specified by the EVENTREV variable. The EVENT variable should not be changed.</p> <p>3 = Sampled case with medical records located, but case not found to meet either CNSI case definition (TBI or SCI). This is a CNSI false positive case (includes prevalent cases).</p> <p>4 = Sampled case, not abstracted (record could not be located).</p> <p>5 = Sampled case, not abstracted (over-sampled TBI case, required number of records already abstracted).</p> <p>6 = Sampled case, record reviewed, case not found to meet state residency criteria.</p> <p>7 = Sampled case, not abstracted for reasons other than specified above (specify on line 7 of the sampling form).</p> <p>8 = Not applicable, not a sampled case (extended TBI states only).</p>
Notes:	<p>SCI: Code for all SCI cases (EVENT = SCI-only or SCI/TBI).</p> <p>TBI Extended states: Code for all cases.</p> <p>TBI Basic states: Include in data set, but leave all values blank.</p> <p><i>Successfully abstracted</i> means the medical record for the CNSI-related admission was located, and reviewed, and that all useable information was recorded.</p>

Age

Variable Name:	AGE
Variable Type:	BASIC
Description:	Patient's age at injury in years for preadmission deaths and patient's age at admission for hospitalized cases.
Format Type:	Numeric
Values:	0-120 = Age in years
Note:	Use the code "0" for infants less than 1 year of age.

Blood Alcohol Concentration

Variable Name:	BAC
Variable Type:	TBI and SCI EXTENDED
Description:	Evidence of alcohol use prior to injury. It includes the injured person's laboratory-determined blood alcohol concentration (BAC), if available.
Format Type:	Numeric
Values:	000–699 = BAC in mg/dL 700 = BAC exceeds 699 mg/dL 777 = BAC not tested or results not found, clinical or other evidence of alcohol use 888 = BAC not tested or results not found, no clinical or other evidence of alcohol use 999 = Unknown. Available information insufficient to code this variable.
Notes:	<p>If more than one blood alcohol concentration level is recorded, record the first laboratory-determined value obtained after the injury.</p> <p>Laboratories may report BAC in grams per deciliter (g/dL) or milligrams per deciliter (mg/dL). A level of 0.08 g/dL corresponds to a level of 80 mg/dL.</p> <p>“Clinical or other evidence of alcohol use” is defined as a smell of alcohol on the breath, a description of alcohol use or intoxication at the time of injury by the injured person or by a witness, a positive breath test, or a positive saliva dipstick test.</p> <p>We do not have evidence that BAC levels and vitreous alcohol levels are the same. If both BAC and vitreous levels are reported, record the BAC. If only a vitreous level is available, record “777” for BAC.</p>

Case Identification

Variable Name:	CASEID
Variable Type:	BASIC
Description:	A required, unique identification code; values are assigned by the state.
Format Type:	Numeric
Values:	Unique numeric code, range of 000001 to 999999
Note:	Eliminate duplicate cases before assigning case identifiers.

County of Injury

Variable Name:	CNTYINJ
Variable Type:	BASIC
Description:	County where the injury occurred, coded using the Federal Information Processing Standards (FIPS).
Format Type:	Numeric
Values:	Each county is assigned a three-digit code based on alphabetical order.
Examples:	121 = Code assigned to Fulton County, GA 999 = County unknown
Note:	For more information about FIPS codes, visit: www.census.gov/geo/www/fips/fips.html .

County of Residence

Variable Name:	CNTYRES
Variable Type:	BASIC
Description:	The injured person's county of residence at the time of injury (NOT the county of injury occurrence); coded using the Federal Information Processing Standards (FIPS).
Format Type:	Numeric
Values:	Each county is assigned a three-digit code based on alphabetical order.
Examples:	121 = Code assigned to Fulton County, GA 999 = County unknown
Notes:	In-state residents who move out of state after the injury (e.g., to live with relatives) are coded according to their county of residence at the time of injury. For more information about FIPS codes, visit: www.census.gov/geo/www/fips/fips.html .

Date of Admission

Variable Name:	DOADM
Variable Type:	BASIC
Description:	Date on which patient was first admitted as a hospital inpatient. If not admitted to a hospital, the date on which the patient was first treated or evaluated.
Format Type:	Character/Text
Values:	Date reported in MMDDYYYY format; "99" can reflect unknown month or day.
Examples:	04212000 = April 21, 2000 04992000 = April 2000, but day of admission is unknown
Note:	If the patient was sent home and later admitted for definitive diagnosis and acute care, enter the date of the later admission.

Date of Birth

Variable Name:	DOB
Variable Type:	BASIC
Description:	Date of birth.
Format Type:	Character/Text
Values:	Date is reported in MMDDYYYY format; "99" can reflect unknown month or day.
Examples:	03212000 = March 21, 2000 03992000 = March 2000, but day of birth is unknown

Date of Death

Variable Name:	DOD
Variable Type:	BASIC
Description:	Date death occurred.
Format Type:	Character/Text
Values:	Date is reported in MMDDYYYY format; "99" can reflect unknown month or day.
Examples:	03212000 = March 21, 2000 05992000 = May 2000, but day of death is unknown
Notes:	<p>Code this field for preadmission deaths. DO NOT use the Date of Discharge (DODC) field.</p> <p>Code this field and the DODC field for hospitalized deaths. The dates should be the same.</p> <p>This variable is not intended to enumerate post-discharge deaths. Without changing the DODC, record the Date of Death (DOD) for post-discharge deaths.</p>

Date of Discharge

Variable Name:	DODC
Variable Type:	BASIC
Description:	Date of discharge from acute care.
Format Type:	Character/Text
Values:	Date is reported in MMDDYYYY format; "99" can reflect unknown month or day.
Examples:	03212000 = March 21, 2000 03992000 = March 2000, but day of discharge is unknown

Notes:

The acute care period includes all time spent in hospital beginning with the first admission through discharge from (a) the acute care service to the rehabilitation service of the same hospital, (b) an acute care hospital to the rehabilitation service of another hospital or extended care facility, or (c) acute care hospital to home.

The acute care period may include time spent at several different acute care hospitals. If the patient is transferred from the acute care service to the rehabilitation service within the *same* hospital, record date of transfer to rehabilitation as the date of discharge.

If the patient is transferred directly from one acute care hospital to another, record the date of discharge from the second (or last) acute care hospital. This is the date the patient leaves the final acute care hospital to go home or enter a rehabilitation unit, rehabilitation hospital, long-term care facility, etc.

DO NOT code this field for preadmission deaths. Instead, use the Date of Death (DOD) field.

Code this field and the DOD field for hospitalized deaths. The dates should be the same.

If the post-discharge death is known, record it in the DOD field. The date in the DODC field should be the same as the hospital date of discharge.

Date of Injury

Variable Name:	DOINJ
Variable Type:	BASIC
Description:	Date the injury occurred.
Format Type:	Character/Text
Values:	Date is reported in MMDDYYYY format; "99" can reflect unknown month or day.
Examples:	03212000 = March 21, 2000 05992000 = May 2000, but day of injury is unknown
Note:	If the date of injury is not stated, assign either the date of admission to the first acute care facility or the date of death for preadmission deaths.

Diagnosis Codes

Variable Name:	ICD1-ICD36
Variable Type:	BASIC
Description:	<p>The nature of all medical conditions related to hospitalization or death. Values are coded according to the <i>International Statistical Classification of Diseases and Related Health Problems (ICD)</i>.</p> <ul style="list-style-type: none">• For hospitalizations, use: ICD-9-CM (9th Revision; Clinical Modification).• For deaths, use: ICD-10 (10th Revision).
Format Type:	Character/Text
Values:	Refer to ICD-9-CM or ICD-10
Notes:	<p>States should submit all diagnosis codes (previously, eight were requested). ICD-10 codes (used on death certificates) are four digits in length, whereas ICD-9-CM codes (used in hospital discharge coding) may be four or five digits in length.</p> <p>If only a four-digit ICD-9-CM code has been assigned, leave the fifth-digit space blank. Do not use the value “0” to fill in this space because it may change the meaning of the code. Do not include any “.” (periods).</p>

Discharge Disposition

Variable Name:	DCDISP
Variable Type:	BASIC
Description:	Disposition of the patient at the time of discharge from the treating acute care hospital.
Format Type:	Numeric
Values:	<p>0 = Transfer to other acute care hospital (data not available from other hospital)</p> <p>1 = Returned home—self care, or returned home requiring non-skilled assistance, or level of care unspecified</p> <p>2 = Returned home—with home health services (including home IV or outpatient rehabilitation)</p> <p>3 = Residential facility—Skilled Nursing Facility (SNF), Intermediate Care Facility (ICF), includes nursing home</p> <p>4 = Transferred to inpatient rehabilitation facility</p> <p>5 = Against medical advice (AMA)</p> <p>6 = Correctional facility—includes prison, jail, and detention centers</p> <p>7 = Died</p> <p>8 = Other</p> <p>9 = Unknown</p>
Notes:	<p>Code all fatalities “7.”</p> <p>Code “0” only if the patient has been transferred from one acute care hospital to another, but does not have records available from the second hospital. If records are available for all acute care received, code this variable according to the discharge disposition from the hospital at which acute care is concluded.</p> <p>Code patients leaving a hospital against medical advice “5,” even if the record specifies their destination (home, for example, which includes any private residence).</p>

Event

Variable Name:	EVENT
Variable Type:	BASIC
Description:	Event code for the injury being reported, assigned when case is first identified.
Format Type:	Numeric
Values:	42010 = Spinal cord injury only 42020 = Traumatic brain injury only 42030 = Both traumatic brain injury and spinal cord injury
Note:	Once assigned, do not change EVENT. If any case is found to have a different CNSI diagnosis than originally indicated by EVENT, code this difference using EVENTREV.

Event—Revised

Variable Name:	EVENTREV
Variable Type:	EXTENDED
Description:	Variable used to indicate that a case was found during medical records abstraction to have a different CNSI diagnosis than originally indicated by EVENT.
Format Type:	Numeric
Values:	42010 = Spinal cord injury only 42020 = Traumatic brain injury only 42030 = Both traumatic brain injury and spinal cord injury
Notes:	Assign this variable whenever the ABSTRACT variable is coded as “2.” Complete this variable only if one or more cases are found to have a different CNSI diagnosis than originally indicated by the EVENT variable. If no cases are found to have an incorrect EVENT code, include this variable in your data set, but leave all values blank. When appropriate, discuss questionable cases with your CDC Project Officer.

External Cause of Injury Codes

Variable Name:	ECODE1–ECODE5
Variable Type:	BASIC
Description:	<p>The nature of all medical conditions related to hospitalization and death. Values are coded according to the <i>International Statistical Classification of Diseases and Related Health Problems</i> (ICD).</p> <ul style="list-style-type: none">• For hospitalizations, use: ICD-9-CM (9th Revision; Clinical Modification).• For deaths, use: ICD-10 (10th Revision).
Format Type:	Character/Text
Values:	Refer to ICD-9-CM or ICD-10
Notes:	<p>Use leading letters to help CDC distinguish between an external cause code and a diagnosis code.</p> <p>E = For hospitalizations (ICD-9-CM) V, W, X, or Y = For deaths (ICD-10)</p>

Missing or Nonspecific External Cause Code:

For abstracted cases with no external cause code in ECODE1 or ECODE2, states should now assign external cause codes and list them under the new variables ECODERV1 and ECODERV2. The exception is Sports/Recreation; this replaces the collection of ETIOLCDC on all cases.

For cases with a nonspecific external cause code in ECODE1 (e.g., 888, Other, and Unspecified Fall) for which more detailed cause information is found during abstraction, states should assign a more specific external cause code and list it under the new variable ECODERV1. List additional external cause codes under ECODERV1 or ECODERV2. Do not change ECODE1 or ECODE2. See External Cause of Injury Code 1/2– Revised/ Added for coding rules.

Coding Guidelines:

Follow the National Center for Health Statistics (NCHS) E-coding guidelines; formal training in external cause coding is advised. Assign the external cause code most related to the TBI. In assigning external cause codes, be as accurate as possible using the information from available records and best coding practices. When appropriate, discuss questionable cases with your CDC Project Officer.

List the external cause code for cause as ECODE1.

List the external cause code for place of occurrence as ECODE2.

Leave the fifth-digit space blank if external cause coding is carried only to four digits. Leave the fourth- and fifth-digit spaces blank if coding is carried only to three digits. Do not include any “.” (periods).

If a hospital reports more than one external cause code, select the code most closely associated with the TBI. Usually, this will be the first listed external cause code. Note that for deaths coded using ICD-10, place is incorporated into the fourth digit.

If abstracted cause information reveals two or more events are related to the TBI, **select the external cause code according to the following order:**

1. Child and adult abuse take priority over all other external cause codes.
2. Cataclysmic events take priority over all other external cause codes, *except* child and adult abuse.
3. Transport-related events take priority over all other external cause codes *except* cataclysmic events and child and adult abuse.

Analyses comparing ECODE1 with ECODERV1 may reveal suggestions to improve external cause coding within the state.

External Cause of Injury Code 1—Revised

Variable Name:	ECODERV1
Variable Type:	TBI and SCI EXTENDED
Description:	Abstractor-assigned external cause code, coded only for cases with: <ul style="list-style-type: none">• No external cause code for the cause of the injury (ECODE1).• A nonspecific external cause code for cause of the injury (ECODE1).
Format Type:	Character/Text
Values:	Refer to ICD-9-CM or ICD-10
Notes:	<p>For cases with no external cause code in ECODE1, assign an external cause code and list it under this new variable. This cause code replaces the collection of ETIOLCDC, except for sports. For cases with a nonspecific external cause code in ECODE1 (e.g., 888, Other and Unspecified Fall) for which more detailed cause information is found during abstraction, assign a specific external cause code and list it under this new variable. List additional external cause codes under this variable, and <i>do not change</i> ECODE1. If there are no cases discovered with an incorrect external cause code, include this variable in your data set, but leave all values blank.</p> <p>In assigning external cause codes, states should be as accurate as possible, using information from available records and applying best coding practices. When appropriate, discuss questionable cases with your CDC Project Officer.</p> <p>See “External Cause of Injury Codes” for coding rules.</p>

External Cause of Injury Code 2—Revised (Added)

Variable Name:	ECODERV2
Variable Type:	TBI and SCI EXTENDED
Description:	Abstractor-assigned external cause code, coded only for cases with: <ul style="list-style-type: none">• No external cause code for the cause of the injury (ECODE2).• A nonspecific external cause code for cause of the injury (ECODE2).
Format Type:	Character/Text
Values:	Refer to ICD-9-CM or ICD-10

Notes: For cases with no external cause code in ECODE2, assign an external cause code and list it under this new variable. This cause code replaces the collection of ETIOLCDC, except for sports. For cases with a nonspecific external cause code in ECODE2 (e.g., 888, Other and Unspecified Fall) for which more detailed cause information is found during abstraction, assign a specific external cause code and list it under this new variable. List additional external cause codes under this variable, and *do not change* ECODE2. If there are no cases discovered with an incorrect external cause code, include this variable in your data set, but leave all values blank.

In assigning external cause codes, states should be as accurate as possible, using information from available records and applying best coding practices. When appropriate, discuss questionable cases with your CDC Project Officer.

See “External Cause of Injury Codes” for coding rules.

Glasgow Coma Scale Score

Variable Name:	GCS
Variable Type:	TBI EXTENDED
Description:	Severity of the traumatic brain injury (TBI) according to the Glasgow Coma Scale (GCS) total score.
Format Type:	Numeric
Values:	03–15 = Glasgow Coma Scale Score 88 = Not applicable 99 = Unknown (see Level of Consciousness—LOC)
Notes:	<p>Code preadmission deaths as “88.”</p> <p>A case seen in both an emergency department and a hospital may have more than one GCS score recorded in the medical record. In that event, select the lowest score found in the (a) emergency medical services run report (i.e., the EMS report), (b) emergency department record, or (c) the hospital admission record.</p> <p>For cases seen only in a hospital, enter the first GCS score recorded in the medical record after arrival at the hospital.</p> <p>The GCS score is valid only after the injured person has been resuscitated (i.e., heart rate, blood pressure, and respiration are stable) and only when sedative or paralytic drugs have not been administered. These cases should be coded as 88 (not applicable).</p> <p>For patients whose GCS score deteriorates after hospital admission (e.g., in intensive care) record the score obtained on admission even if the later score is lower than the admission score.</p>

Glasgow Outcome Scale Score

Variable Name:	GOS
Variable Type:	TBI EXTENDED
Description:	Functional outcome of the traumatic brain injury (TBI) as assessed at the time of discharge from acute care hospitalization using the Glasgow Outcome Scale (GOS).
Format Type:	Numeric
Values:	1 = Death 2 = Persistent vegetative state (coma) 3 = Severe disability (conscious and at least somewhat responsive, but disabled and dependent for daily support) 4 = Moderate disability (disabled, but independent with respect to daily life; able to participate in activities indicating self-sufficiency beyond dressing and minimal self-care) 5 = Good recovery (independent, may have minor deficits which do not prevent resumption of “normal” life; actual return to work at pre-injury levels or return to work at all is not a requirement) 8 = Not applicable 9 = Unknown
Notes:	If medical records of TBI cases do not already contain a GOS score, coding this variable will require medical records review by a person with knowledge of clinical descriptions. Code in-hospital deaths as “1.”

Hispanic

Variable Name:	HISPANIC
Variable Type:	BASIC
Description:	Hispanic ethnicity.
Format Type:	Numeric
Values:	1 = Yes; evidence of Hispanic ethnicity found in record 2 = No; other ethnicity specified (e.g., Bosnian) 9 = Unknown; ethnicity not specified
Note:	Knowing the race of the patient does not provide sufficient evidence to code the Hispanic variable.

Intracranial Lesion

Variable Name:	ICLESION
Variable Type:	TBI EXTENDED
Description:	Trauma-related intracranial lesion, documented by imaging, neurosurgical procedure, or autopsy.
Format Type:	Numeric
Values:	0 = No intracranial lesion found by brain imaging or autopsy 1 = Intracranial lesion documented by brain imaging, neurosurgery, or autopsy 8 = No imaging, neurosurgery, or autopsy performed 9 = Unknown
Notes:	<p>Imaging procedures include computed tomography (CT) brain scans, magnetic resonance imaging (MRI) brain scans, positron emission tomography (PET), cerebral angiography, etc. Intracranial lesions can also be inferred from skull X-ray studies showing penetrating bodies.</p> <p>An intracranial lesion is broadly defined as any acute, injury-related abnormality within the cranium. Skull fractures alone should not be coded as intracranial lesions. Examples of trauma-related intracranial lesions include the following:</p> <ul style="list-style-type: none">• Epidural and subdural hematomas• Traumatic subarachnoid hemorrhage• Contusions, lacerations, traumatic hemorrhages, or trauma-induced edema of the brain or brainstem• Lacerations of dura matter (a pneumocephalus implies a laceration of the dura matter)• Intracranial densities (both hyper and hypo) consistent with trauma <p>Craniocerebral injury on the death certificate even with no autopsy reported is a proxy for intracranial lesion for surveillance purposes.</p> <p>Foreign objects not medically implanted found intracranially are indicative of intracranial lesion.</p> <p>Coding this variable will require medical records review by a person with knowledge of clinical descriptions.</p>

Length of Time Unconscious—Added

Variable Name:	TIMEUCON
Variable Type:	TBI EXTENDED
Description:	Quantitative description of the injured person's length of loss of consciousness. The length of time of unconsciousness should be measured starting at the time of the injury and stopping at the moment the patient regains consciousness. This variable refers to any observed or self-reported period of unconsciousness.
Format Type:	Numeric
Values:	1 = Loss of consciousness less than 5 minutes 2 = Loss of consciousness 6 to 30 minutes. 3 = Loss of consciousness 31 to 60 minutes 4 = Loss of consciousness between 61 minutes and 24 hours 5 = Loss of consciousness more than 24 hours 6 = No loss of consciousness 7 = Not applicable due to use of sedative or paralytic drugs 9 = Unknown or inadequate documentation
Note:	Coding this variable will require medical records review by a person with knowledge of clinical descriptions.

Level of Consciousness

Variable Name:	LOC
Variable Type:	TBI EXTENDED
Description:	Qualitative description of the injured person's level of consciousness at the time of presentation to the hospital. A code in the range of 1 to 3 is required for the sampled case only if the Glasgow Coma Scale (GCS) score is unknown.
Format Type:	Numeric
Values:	<p>1 = Coma. Patients who do not open eyes, obey commands, or utter words. Should correspond to a GCS score of 8 or less.</p> <p>2 = Moderate impairment of consciousness. Patients who are difficult to arouse (e.g., require noxious stimuli), who cannot obey simple commands, or who speak in a manner inappropriate or incomprehensible. Should correspond to a GCS score of 9 to 12.</p> <p>3 = Minimal or no impairment of consciousness. Patients who are awake or easily aroused by verbal stimuli, who can obey some simple commands, and who can speak comprehensibly. Some disorientation may or may not be present. Should correspond to a GCS score of 13 to 15.</p> <p>8 = Not coded; GCS score used instead, or death occurred prior to admission.</p> <p>9 = Unknown or inadequate documentation</p>
Notes:	<p>Code this variable to reflect the patient's lowest level of consciousness during examination in an emergency department or admission to a hospital.</p> <p>Coding this variable will require medical records review by a person with knowledge of clinical descriptions.</p>

Motor Vehicle Position

Variable Name:	MVPOS
Variable Type:	TBI and SCI EXTENDED
Description:	Injured person's position in motor vehicle-related event.
Format Type:	Numeric
Values:	<ul style="list-style-type: none">1 = Driver/operator of motor vehicle other than motorcycle2 = Passenger in motor vehicle other than motorcycle3 = Occupant of motor vehicle, other than motorcycle, driver/or passenger not specified4 = Passenger in cargo area (e.g., back of pickup truck) or outside vehicle (e.g., car surfing)5 = Motorcyclist or passenger on a motorcycle6 = Pedal cyclist or passenger7 = Pedestrian8 = Not applicable, injury not related to motor vehicle9 = Unknown motor vehicle position, motor vehicle-related event

Patient's Living Status

Variable Name:	LIVESTAT
Variable Type:	TBI and SCI EXTENDED
Description:	Patient's residence at time of admission.
Format Type:	Numeric
Values:	<ul style="list-style-type: none">1 = Private residence such as a house, apartment, mobile home (trailer), except for foster home2 = Group home or transitional living center3 = Assisted-living facility4 = Correctional institution5 = Nursing home or other long-term care facility6 = Foster home7 = Inpatient psychiatric hospital8 = Homeless or homeless shelter9 = Military barracks or college dormitory10 = Other99 = Unknown

Payment Source

Variable Names:	PAYER1, PAYER2
Variable Type:	BASIC
Description:	Principal and supplemental sources of payment for acute care hospital costs, coded according to an adaptation of the 1992 Uniform Bill (UB-92), a revision to the Uniform Hospital Discharge Data Set.
Format Type:	Numeric (for up to two fields)
Values:	1 = Private/commercial insurance (including private PPO/HMO or other liability) 2 = Medicare 3 = Medicaid 4 = Workers compensation 5 = Other governmental program (TRICARE, formerly CHAMPUS, and CHAMPVA) 6 = Self pay 7 = Other 8 = Automobile insurance 9 = Unknown
Note:	The previous classification for these variables was EXTENDED.

Personal Protective Equipment (PPE)

Variable Name:	PPE1, PPE2, PPE3
Variable Type:	TBI and SCI EXTENDED
Description:	Use of safety belts, child restraints, airbags, or helmets by the injured person at time of injury.
Format Type:	Numeric (for up to three fields)
Values:	0 = No personal protective equipment used 1 = Safety belt (lap or shoulder belt) or child safety seat/booster seat 2 = Airbag (front or side) 3 = Helmet 4 = Hard hat 5 = Eyewear 6 = Other PPE used 8 = Not applicable 9 = Unknown whether personal protective equipment was used
Examples:	1 = Safety belt worn by individual involved in automobile crash 8 = Injury is a result of diving; protective equipment use is not applicable
Note:	Safety belt, child restraint, and airbag use is relevant to automobile- and truck-related trauma. Helmet use is relevant to trauma associated with motorcycles, bicycles, all-terrain vehicles (ATVs), and snowmobiles, as well as some sports and recreational activities. Use of helmets and other personal protective equipment is also relevant to some work-related injuries.

Preadmission Death/Hospital Size

Variable Name:	PAD_HOSP
Variable Type:	BASIC
Description:	Categorizes cases according to hospital size (for hospital discharges and in-hospital deaths) or preadmission death status; used to stratify sampled cases.
Format Type:	Numeric
Values:	0 = Preadmission death 1 = Small hospital (< 100 beds) 2 = Large hospital (\geq 100 beds)
Notes:	PAD_HOSP is required for all cases, even from states that do not sample or collect extended data. Do not change the value of PAD_HOSP if abstraction reveals that a case should be in a different stratum (see PADHREV).

Preadmission Death/Hospital Size—Revised

Variable Name:	PADHREV
Variable Type:	TBI and SCI EXTENDED
Description:	Indicates that a case found during medical records abstraction belongs to a different stratum than was initially assigned in the PAD_HOSP variable.
Format Type:	Numeric
Values:	0 = Preadmission death 1 = Small hospital (< 100 beds) 2 = Large hospital (\geq 100 beds)
Note:	Code this variable only for cases that had a change in PAD_HOSP. If all cases are located in the correct stratum, include this variable in the data set, but leave the values blank.

Race

Variable Name: RACE

Variable Type: BASIC

Description: Race, coded according to U.S. Census 2000 categories.

Format Type: Numeric

Values:

- 1 = American Indian/Alaska Native
- 2 = Asian
- 3 = Black or African American
- 4 = Native Hawaiian or other Pacific Islander
- 5 = White
- 8 = Other
- 9 = Unknown

Sample Flag

Variable Name:	SAMPLE
Variable Type:	TBI and SCI EXTENDED
Description:	Indicates whether or not a case was sampled. (See Sampling Guidance Section for more information.)
Format Type:	Numeric
Values:	0 = Case not sampled 1 = Case sampled
Notes:	All states must submit this variable whether or not they sample or collect extended data. States that do not sample or collect extended data should enter "0" for all cases.

Sex

Variable Name: SEX
Variable Type: BASIC
Description: Patient's sex
Format Type: Numeric
Values:
1 = Male
2 = Female
9 = Unknown

Skull Fracture

Variable Name:	SKULLFX
Variable:	TBI EXTENDED
Description:	Specifies whether a skull fracture is diagnosed, based on examination of the patient or on imaging.
Format Type:	Numeric
Values:	<p>1 = Skull fracture diagnosed or confirmed by imaging, neurosurgery, or autopsy.</p> <p>2 = Skull fracture diagnosed, but neither confirmed nor documented in the records by imaging.</p> <p>3 = No skull fracture diagnosed (includes insufficient information).</p>
Notes:	<p>All types of skull fractures are included under this variable. Types of skull fractures may sometimes be described as “depressed,” “non-depressed,” “open,” “closed,” or “basilar.” Even if not directly visualized by imaging, skull fractures may be inferred by the presence of air inside the cranium or by physical signs present on examination.</p> <p>Coding this variable will require medical records review by a person with knowledge of clinical descriptions.</p>

Spinal Cord Injury (SCI) Extent

Variable Name:	SCIEXTNT
Variable Type:	SCI EXTENDED
Description:	Extent of the spinal cord lesion at the time of discharge from the treating acute care hospital.
Format Type:	Numeric
Values:	1 = Complete 2 = Incomplete/non-functional 3 = Incomplete/functional 4 = Normal 8 = Not applicable (traumatic brain injury only) 9 = Unknown
Notes:	<p>Do not submit data in this field unless you receive SCI surveillance funding from CDC. If you do not receive SCI funding, submit this variable leaving all fields blank.</p> <p>These categories are adapted from the Impairment Scale of the American Spinal Injury Association (ASIA-IS).</p> <p>Complete is defined as an injury having no preserved motor or sensory function in the sacral segments S4–S5 (ASIA-IS Class A).</p> <p>Incomplete/non-functional is defined as an injury having any preserved sensory or voluntary motor function below the neurological level of the injury, including sacral segments, but without useful preservation of motor function below this level. For example, most key muscle groups in the affected segments are too weak to perform against gravity (ASIA-IS Classes B and C).</p> <p>Incomplete/functional is defined as an injury having preserved voluntary motor activity below the neurological level of injury that is useful functionally. For example, most essential muscle groups in the affected segments have sufficient strength to perform against gravity (ASIA-IS Class D).</p> <p>Normal is defined as the full return of motor, sensory, and autonomic function. Minimal reflex abnormalities alone may persist (ASIA-IS Class E).</p>

Spinal Cord Injury (SCI) Level

Variable Name:	SCILEVEL
Variable Type:	SCI EXTENDED
Description:	Level of the spinal cord injury as reflected by the lowest (most caudal) neurological segment with normal motor and sensory function.
Format Type:	Numeric
Values:	1 = Paraplegia 2 = Tetraplegia (quadriplegia) 8 = Not applicable (traumatic brain injury only) 9 = Unknown

Notes: Do not submit data in this variable unless you receive SCI surveillance funding from CDC. If you do not receive SCI funding, submit this variable leaving all fields blank.

Paraplegia refers to impairment or loss of motor or sensory function as a result of injury to the thoracic, lumbar, or sacral segments of the spinal cord, conus medullaris, or cauda equina. Upper extremity function is spared, but some impairment of trunk, lower extremity, or pelvic organ (bowel or bladder) function is present.

Tetraplegia (quadriplegia) refers to impairment or loss of motor or sensory function as a result of injury to cervical segments of the spinal cord. Upper extremity function is impaired, in addition

tion

to lower extremity and pelvic organ function.

The terms “paraparesis” and “tetraparesis” or “quadriparesis” are sometimes used to denote incomplete degrees of paraplegia or tetraplegia.

Sports and Recreation—Modified

Variable Name:	SPORTREC
Variable Type:	TBI and SCI EXTENDED
Description:	Code for supplemental sports cause categories that are not well described by external cause codes.
Format Type:	Numeric
Values:	<ul style="list-style-type: none">1 = Baseball or softball2 = Basketball3 = Biking4 = Combative exercise (e.g., boxing, wrestling or Tae Kwan Do)5 = Football6 = Gymnastics or cheerleading7 = Ice hockey8 = Horseback riding9 = Playground equipment10 = Skateboard or scooter11 = Skate—ice (not ice hockey)12 = Skate—in-line, other specified13 = Soccer14 = Snow ski or snowboard15 = Toboggan—sled, tube16 = Water sports—swimming, water ski, water tube, surf, personal watercraft17 = Other specified (billiards, bowling, fishing, non-powder gun, track and field, trampoline, golf, etc.)88 = Not sports related99 = Unknown

Notes:

When an injury is associated with a sport or recreation *and* a vehicle, code the injury as vehicular. When an injury is associated with a sport or recreation *and* a fall, code the injury as a sport or recreation.

If value “17: Other specified” is selected, complete the Sports and Recreation SPECIFY variable.

Changes in the *CNSI Data Submission Standards—2002* for Sports and Recreation follow:

- Toboggan is now listed prior to water sports to maintain the alphabetical listing.
- ATV was dropped as a sports and recreation category and should be coded as vehicular.

Sports and Recreation SPECIFY—Added

Variable Name:	S_R_SPEC
Variable Type:	TBI and SCI EXTENDED
Description:	Enter if the response to SPORTREC is value “17: Other specified” (billiards, bowling, fishing, non-powder gun, track and field, trampoline, golf, etc.).
Format Type:	Character/Text
Values:	Enter information for up to 20 characters in length

State of Injury

Variable Name:	STATEINJ
Variable Type:	BASIC
Description:	State or territory in which the injury occurred, coded using the Federal Information Processing Standards (FIPS).
Format Type:	Numeric
Values:	Each state is assigned a two-digit code
Examples:	01 = Alabama 90 = State unknown, injury occurred within United States 96 = Canada 97 = Mexico 98 = Other country 99 = Country unknown
Note:	For more information about FIPS codes, visit: www.census.gov/geo/www/fips/fips.html .

State of Report

Variable Name:	STATERPT
Variable Type:	BASIC
Description:	State or territory making the report, coded using the Federal Information Processing Standards (FIPS).
Format Type:	Numeric
Values:	Each state is assigned a two-digit code
Examples:	02 = Alaska 04 = Arizona 06 = California 08 = Colorado 24 = Maryland 27 = Minnesota 31 = Nebraska 34 = New Jersey 36 = New York 40 = Oklahoma 45 = South Carolina 49 = Utah
Note:	For more information about FIPS codes, visit: www.census.gov/geo/www/fips/fips.html .

State of Residence

Variable Name:	STATERES
Variable Type:	BASIC
Description:	State or territory where the patient resides at the time of diagnosis, coded using the Federal Information Processing Standards (FIPS).
Format Type:	Numeric
Values:	Each state is assigned a two-digit code
Example:	01 = Alabama
Notes:	<p>Only cases of patients who reside in the reporting state should be reported to CDC. States should use the address listed at the time of diagnosis (on HDD or hospital record for registry cases). Include temporary residents. Exclude cases only if the information in the medical record confirms that the patient is a permanent out-of-state resident, but not if they are a temporary resident.</p> <p>For more information about FIPS codes, visit: www.census.gov/geo/www/fips/fips.html.</p>

Type of Care

Variable Name:	TYPECARE
Variable Type:	BASIC
Description:	Type of medical care or evaluation received by the injured person.
Format Type:	Numeric
Values:	<p>1 = Preadmission death. This includes persons found to be dead on arrival at hospital emergency departments (ED).</p> <p>2 = Hospitalized. This includes persons with injury who are admitted as inpatients to hospital acute care wards or intensive care units. Injured patients who die in a hospital are also coded in this category.</p> <p>3 = Emergency department care only—observation greater than or equal to 24 hours. This includes injured persons who receive hospital ED care and observation lasting 24 hours or more, but who are not admitted to a hospital inpatient service. It may include fatalities occurring after 24 hours.</p> <p>4 = Emergency department care only—observation less than 24 hours. This includes injured persons who are evaluated and treated in a hospital ED then released, without being admitted to a hospital inpatient service. It also includes injured patients who die while being treated in an ED before being admitted to a hospital.</p> <p>5 = Other medical care. This includes injured persons who only receive care or evaluation at other medical facilities, such as a physician's office or outpatient clinic.</p> <p>9 = Unknown. Medical care or evaluation received is unknown.</p>

Notes: The discharge disposition (DCDISP) variable distinguishes patients who survive from those who die during hospital and ED care.

States that are not funded for ED surveillance should code ED deaths as "1." Do not submit data values of "3" or "4" in this variable unless you receive ED surveillance funding from CDC.

Work-Relatedness

Variable Name:	WORKRLTD
Variable Type:	BASIC
Description:	Indication of whether the injury occurred in the course of employment.
Format Type:	Numeric
Values:	1 = Yes 2 = Not work-related, some other setting specified (i.e., mowing lawn at home) 9 = Unknown, not specified; insufficient information to determine work-relatedness
Example:	Injury occurred in a motor vehicle crash while the injured person was at work (in the course of employment). This case is work-related.
Notes:	<p>If the hospital payment source is listed as “Workers Compensation,” assume that the injury is work-related.</p> <p>If “Workers Compensation” is not listed as a hospital payment source and no other information regarding work-relatedness is available, code the case “9 = Unknown.”</p> <p>If additional information about work-relatedness is available from medical records or other injury reports, use the criteria in the <i>Operational Guidelines for Determination of Injury at Work</i> (developed jointly by the Association for Vital Records and Health Statistics and CDC) to code this variable.</p>

Year

Variable Name: YEARRPT
Variable Type: BASIC
Description: Year of report submission.
Format Type: Numeric
Values: Last two digits of year, must be greater than or equal to 00

Instructions for Sampling and Creating Related Variables for Traumatic Brain Injury Surveillance

General Guidance

- This document replaces the *2001 Annual Data Submission Standards*.
- All states should carefully review the material in this document.
- Sampling instructions apply primarily to states with funding to collect (abstract) extended data for TBI cases. Discuss sampling plans in advance with CDC. Contact your Project Officer, who will refer your request to the appropriate CDC staff.
- If you do not have funding to collect extended data for TBI cases, you still need to provide the appropriate values for PAD_HOSP and SAMPLE and submit all other extended variables. This allows your data to be categorized in the same way as data from other states that sample and abstract (see Methods of Sample Allocation and Data Preparation for Submission to CDC in this section).
- As a reminder, three basic types of cases are recognized under CNSI surveillance guidelines: TBI only, TBI/SCI, and SCI only. The SAMPLE variable should be coded with a “0” or “1” for every case considered to be TBI-related (TBI only or TBI/SCI) at the time of TBI sampling. This includes all preadmission death cases considered to be TBI-related, even though these cases should no longer be sampled for abstraction. The SAMPLE variable is not applicable for SCI-only cases. If your state is funded to collect extended data for SCI cases, please leave the SAMPLE variable as missing for your SCI-only cases, but provide the appropriate values for PAD_HOSP and ABSTRACT.

Notes:

- Preadmission deaths are not abstracted under the current funding cycle. States may continue to abstract preadmission deaths for their own purposes, but they will not count toward the CDC goal of 1,000 successfully abstracted TBI cases per state.
- A TBI sampling program (in SAS) is provided in this document, replacing the program appearing in the June 1999 *TBI Surveillance Grantees Meeting Summary*. **Do not use the older sampling program.**
- Cases determined to be CNSI false positives during abstraction should now be INCLUDED in the data set submitted to CDC. (In some earlier surveillance years, false positive cases were excluded from the data delivery.) Use the ABSTRACT variable to indicate these cases.
- Plans for developing an emergency department sampling scheme are currently underway and will appear in future data submission guidelines.

Reminders about Sampling

- A sample is defined as a *selected group of cases for which additional information is collected*.
- A sample should be representative (i.e., data collected from the sample should apply to the entire case population).
- If the sample is representative, the data collected from it can be weighted and estimates calculated for the entire case population.
- The general goal is to successfully abstract extended data for 1,000 TBI cases.
- If your state has **1,200 or fewer** hospitalized TBI cases that qualify for sampling and abstraction in a surveillance year, try to abstract extended data on all qualifying TBI cases. Effectively, this means that all qualifying TBI cases are sampled, so a formal sampling step is not required. However, you still need to include the variables PAD_HOSP, SAMPLE, and ABSTRACT in your data delivery.
- If your state has **more than 1,200** hospitalized TBI cases that qualify for sampling and abstraction in a surveillance year, begin with a sample of 1,200 cases. (Due to prevailing false positive rates and other factors, this number is expected to result in the successful abstraction of extended data for approximately 1,000 TBI cases.)

Prior experience may suggest that your state sample other than 1,200 cases to ensure that records for 1,000 TBI cases can be found and abstracted. If you intend to vary from the recommended sample size, please consult your CDC Project Officer first.

Methods of Sample Allocation

When selecting a representative sample of TBI cases for abstraction, please use a *stratified* sampling approach. In stratified sampling, the case population is divided into *strata*, or groups of cases having certain characteristics in common, before the sample is selected. For TBI surveillance purposes, each case will be assigned to a *stratum* according to whether it is considered a preadmission death (PAD), a discharge from a small hospital, or a discharge from a large hospital. (Discharges from small or large hospitals include in-hospital deaths.)

The steps described in this section will help you complete the following TBI Sample Allocation Table, which will show the allocation of the total sample across the various strata.

TBI Sample Allocation Table

PAD_HOSP (Stratum)	Summary of Cases Sampled				
	(A) Stratum Size	(B) Proportion of Total in (A) [(A)/Total(A)]	(C) Target Number of Cases to Abstract in Stratum [(B) x 1,000]	(D) Extra Cases Available From Oversampling [(B) x 200]	(E) Total Number of Cases Selected in Stratum [(B) x 1,200]
0 (Preadmission deaths)	Preadmission deaths should no longer be abstracted.				
1 (Small hospitals)					
2 (Large hospitals)					
TOTAL					

1. Determine the stratum for *each* case in the basic data set and assign the corresponding value to the PAD_HOSP variable. (The PAD_HOSP variable replaces the STRATUM variable used in previous years.)
 - Determine the correct stratum for each case in the basic data set (each case can belong to only one stratum). The recognized strata are:
 - TBI-related preadmission deaths
 - TBI-related cases discharged from small hospitals (< 100 licensed beds for acute care)
 - TBI-related cases discharged from large hospitals (\geq 100 licensed beds for acute care)

Notes:

- ♦ Code deaths occurring before hospital admission as preadmission deaths (including those occurring in the emergency department).
- ♦ For cases with multiple acute care admissions, select the hospital where *definitive care* was received. Definitive care is defined as *having occurred in the hospital in which the person with the TBI spent the longest portion of their total hospital stay* (excluding time in an emergency department, rehabilitation facility, or hospital rehabilitation program).

Create the PAD_HOSP variable and assign the correct stratum value to PAD_HOSP for each case in the data set, according to the following scheme:

- 0 = Preadmission death
- 1 = Small hospital discharge
- 2 = Large hospital discharge

Note:

Every case in the data set, whether or not it falls within a stratum from which cases will be sampled and abstracted, should have a value assigned to PAD_HOSP. Specifically, all preadmission death cases should be assigned the appropriate stratum designation.

If you intend to abstract all qualifying cases, skip directly to Case Abstraction. Otherwise, complete all remaining steps in this section.

2. Calculate the proportion of cases in each qualifying stratum.

Once you have completed the PAD_HOSP variable, calculate the proportion of cases in each qualifying stratum:

- a) Determine the total number of cases in each stratum. There are several ways to do so, including using the following SAS program segment:

```
PROC FREQ DATA = substitute your basic data set name here;
  TABLES PAD_HOSP;
  RUN;
```

- b) For the strata that qualify for sampling, enter the case totals into column (A) of the TBI Sample Allocation Table. For example, consider the case counts appearing in column (A) of the table below:

TBI Sample Allocation Table

PAD_HOSP (Stratum)	Summary of Cases Sampled				
	(A) Stratum Size	(B) Proportion of Total in (A) [(A)/Total(A)]	(C) Target Number of Cases to Abstract in Stratum [(B) x 1,000]	(D) Extra Cases Available From Oversampling [(B) x 200]	(E) Total Number of Cases Selected in Stratum [(B) x 1,200]
0 (Preadmission deaths)	Preadmission deaths should no longer be abstracted.				
1 (Small hospitals)	1,000				
2 (Large hospitals)	4,000				
TOTAL	5,000				

- c) The calculation of the stratum proportions immediately follows. In this example, the case counts entered in column (A) indicate a total of 5,000 TBI cases eligible for abstraction. Each entry in column (A) is divided by this total, resulting in the corresponding stratum proportion:

$$\text{Proportion in Stratum 1} = (1,000 / 5,000) = 0.2$$

$$\text{Proportion in Stratum 2} = (4,000 / 5,000) = 0.8$$

The calculated proportions have been entered in column (B) of the TBI Sample Allocation Table:

TBI Sample Allocation Table

PAD_HOSP (Stratum)	Summary of Cases Sampled				
	(A) Stratum Size	(B) Proportion of Total in (A) [(A)/Total(A)]	(C) Target Number of Cases to Abstract in Stratum [(B) x 1,000]	(D) Extra Cases Available From Oversampling [(B) x 200]	(E) Total Number of Cases Selected in Stratum [(B) x 1,200]
0 (Preadmission deaths)	Preadmission deaths should no longer be abstracted.				
1 (Small hospitals)	1,000	0.2			
2 (Large hospitals)	4,000	0.8			
TOTAL	5,000	1.0			

3. Allocate the sample across the qualifying strata.

The allocation of the total sample (n= 1,200) across the strata should reflect the proportion of cases in each qualifying stratum. Using the entries in column (B) in the running example, the allocation of the total sample follows:

$$\text{Allocation for Stratum 1} = 0.2 \times 1,200 = 240$$

$$\text{Allocation for Stratum 2} = 0.8 \times 1,200 = 960$$

The resulting allocation has been entered in column (E) of the example table.

TBI Sample Allocation Table

PAD_HOSP (Stratum)	Summary of Cases Sampled				
	(A) Stratum Size	(B) Proportion of Total in (A) [(A)/Total(A)]	(C) Target Number of Cases to Abstract in Stratum [(B) x 1,000]	(D) Extra Cases Available From Oversampling [(B) x 200]	(E) Total Number of Cases Selected in Stratum [(B) x 1,200]
0 (Preadmission deaths)	Preadmission deaths should no longer be abstracted.				
1 (Small hospitals)	1,000	0.2			240
2 (Large hospitals)	4,000	0.8			960
TOTAL	5,000	1.0			1,200

Although it is not required for the sampling phase, it is convenient to complete columns (C) and (D) of the TBI Sample Allocation Table at this point. Column (C) indicates the minimum number of cases in each stratum that should be *successfully* abstracted, while column (D) indicates the oversampling within each stratum.

To calculate the entries for column (C), apply the stratum proportions to the target number (n= 1,000) of successfully abstracted cases:

$$\text{Abstraction Goal for Stratum 1} = 0.2 \times 1,000 = 200$$

$$\text{Abstraction Goal for Stratum 2} = 0.8 \times 1,000 = 800$$

To calculate the entries for column (D), apply the stratum proportions to the number (n= 200) of oversampled cases:

$$\text{Oversampling for Stratum 1} = 0.2 \times 200 = 40$$

$$\text{Oversampling for Stratum 2} = 0.8 \times 200 = 160$$

These calculations have been entered into columns (C) and (D) of the TBI Sample Allocation Table, which is now complete.

TBI Sample Allocation Table

PAD_HOSP (Stratum)	Summary of Cases Sampled				
	(A) Stratum Size	(B) Proportion of Total in (A) [(A)/Total(A)]	(C) Target Number of Cases to Abstract in Stratum [(B) x 1,000]	(D) Extra Cases Available From Oversampling [(B) x 200]	(E) Total Number of Cases Selected in Stratum [(B) x 1,200]
0 (Preadmission deaths)	Preadmission deaths should no longer be abstracted.				
1 (Small hospitals)	1,000	0.2	200	40	240
2 (Large hospitals)	4,000	0.8	800	160	960
TOTAL	5,000	1.0	1,000	200	1,200

Due to rounding, your table entries may not add up exactly. The most important allocation is the one appearing in column (E) of the TBI Sample Allocation Table; the entries in columns (C) and (D) provide benchmark information.

Sample Selection

Select a simple random sample (SRS) from each qualifying stratum, according to the allocation determined in the preceding section. The following explanation will help you select an SRS from each stratum, according to the allocation that has been determined.

Notes:

- Use appropriate randomization procedures to select the sample. Some sampling strategies can yield biased samples. Consult your CDC Project Officer if you have questions about randomization.
- Use an effective approach to selecting an SRS in each qualifying stratum:
 - a) Randomize the order of TBI cases within each stratum.
 - b) Select the indicated number of TBI cases for each stratum beginning at the top of the randomized list for each stratum. For example, if 240 cases are to be sampled from stratum 1, select cases in positions 1 through 240 *after* randomization.

Randomization and selection can be accomplished using various software. Following is an example using SAS and the scenario presented earlier.

It is assumed at this point the variable PAD_HOSP has been created and has been assigned a stratum value for every case in the data set. It is also assumed each case record can be uniquely identified based on the variable CASEID. The following block of SAS code will make a temporary copy of your data set, randomize the order of cases within each stratum, select the appropriate number of cases, and then print the selected sample:

```
%LET NO = 0; /* preadmission death stratum sample size */
%LET N1 = 240; /* small hospital stratum sample size */
%LET N2 = 960; /* large hospital stratum sample size */

DATA RANDLIST;
  KEEP CASEID PAD_HOSP RANDSORT;
  SET substitute your basic data set name here ;
  RANDSORT = UNIFORM(-1);

PROC SORT DATA = RANDLIST;
  BY PAD_HOSP RANDSORT;

DATA SAMPLE;
  SET RANDLIST;
  BY PAD_HOSP RANDSORT;

  IF FIRST.PAD_HOSP THEN POSITION = 0;
  POSITION + 1;

  IF (PAD_HOSP = 0) AND (POSITION <= &NO)
    THEN SELECTED = 1;
  ELSE IF (PAD_HOSP = 1) AND (POSITION <= &N1)
    THEN SELECTED = 1;
  ELSE IF (PAD_HOSP = 2) AND (POSITION <= &N2)
    THEN SELECTED = 1;
  ELSE SELECTED = 0;

  IF (SELECTED = 1);

PROC PRINT DATA = SAMPLE;
  VAR PAD_HOSP CASEID;
```

Once you have obtained a list of sampled cases, you may also wish to confirm that the correct number of cases has been selected from each stratum. This can be done using the following SAS program fragment:

```
PROC FREQ DATA = SAMPLE;  
    TABLES PAD_HOSP;
```

The results should correspond to the stratum sample sizes assigned to the SAS macro variables “&N1” and “&N2.”

Case Abstraction

Attempt abstraction for *all* sampled cases, keeping track of the CASEIDs for the following:

- TBI cases that were sampled but could not be abstracted because the records could not be located. Enter the total number of such cases by stratum on the Sampling Form Grid (see section on Data Submission Guidance and Forms).
- TBI cases that were not abstracted because the year of discharge was incorrect (discovered during record abstraction). Enter the total number of such cases by stratum on the Sampling Form Grid.
- TBI cases that were determined to be *false positives*. False positives are cases that are determined during abstraction not to be TBI-related. (Identifying false positives is covered in the section on Evaluation and Quality Assurance.) Enter the total number of such cases by stratum on the Sampling Form Grid.
- TBI cases that were sampled but not abstracted because they did not meet state residency requirements.
- TBI cases that were sampled but not abstracted for other reasons. Enter the total number of such cases by stratum on the Sampling Form Grid along with the reason(s).

Notes:

- ◆ If, while abstracting, you discover that a case already classified as a member of one stratum (PAD, small hospital, or large hospital) in fact belongs in another stratum, DO NOT change the value of the PAD_HOSP variable. Instead, use the PADHREV variable to indicate the corrected stratum information with the same coding scheme (0,1,2) as used for PAD_HOSP.
- ◆ Do not terminate the abstraction process early, even if the target count of cases indicated in column (C) of the TBI Sample Allocation Table has been reached for all qualifying strata.
- ◆ Since sampled cases are often abstracted in clusters, stopping before the sample has been exhausted can introduce undetectable biases into the sample. Plans to stop before all sampled cases are abstracted should be discussed with your CDC Project Officer.

Data Preparation for Submission to CDC

1. Exclude selected types of cases discovered during abstraction from the data set to be submitted to CDC:
 - Cases indicating a discharge year different from the surveillance year;
 - Cases in which the patient is not considered to be a state resident;
 - Cases disqualified for other reasons.
2. Include false positive cases.
3. Create the SAMPLE variable and assign the appropriate value for each case using these codes:

0 = case not sampled

1 = case sampled

Notes:

- ◆ The SAMPLE variable should indicate the status of the case at the time of sampling and not reflect the results of the abstraction process. The ABSTRACT variable (see below) should be used to indicate the results of abstraction.
 - ◆ The SAMPLE variable should have a value of 0 or 1 for every case in the data set you submit to CDC, even if a case is part of a stratum from which *no* cases were sampled (i.e., preadmission deaths).
 - ◆ Create the SAMPLE variable even if abstraction was attempted for all cases in a stratum.
4. Create the ABSTRACT variable and assign the appropriate value for every sampled case. (Refer to the ABSTRACT page in the Variable Dictionary for variable specifications.)

Code the ABSTRACT variable for all TBI cases. If your state is funded to submit SCI data, complete the ABSTRACT variable for all SCI cases (SCI-only, SCI, or TBI), whether or not they have been sampled, because all SCI cases should be abstracted for case confirmation.

5. Do not calculate or submit weights. Weighting is no longer required. Weights will be calculated at CDC. If you would like help in developing an appropriate WEIGHT variable for use in analyzing your data, please consult your CDC Project Officer.

Basic Guidance for Abstracting Data for Extended Variables

- Ideally, abstracting should be conducted by a trained medical records abstractor. At a minimum, the person hired for abstracting should have formal training in diagnosis coding (especially external cause coding) and assigning Abbreviated Injury Scores.
- Although not all information relating to the extended variables will be found, it is important to obtain as much data for as many of these variables as possible.
- Each individual state is expected to develop its own Abstraction Form and Procedures Manual. Some states use direct computer entry methods to collect the data, while others use hard copy forms and then enter the data later.
- At a minimum, states are expected to abstract data for the extended variables listed in the *CNSI Data Submission Standards—2002*. Additional data collected for the states' own purposes should not be submitted to CDC.
- States that have no experience abstracting TBI data may find it useful to consult with other, more experienced states. Additional guidance for specific extended variables is also included in this section.

Background Information for Specific Extended Variables: Severity and Outcome Measures

Severity—An injury severity assessment is primarily based on the injured person’s diagnostic evaluation and neurological findings.

Coded indices of severity include:

Glasgow Coma Scale (GCS) — (Teasdale and Jennett 1974)

- Widely used assessment among persons with traumatic brain injury and frequently included in medical records.
- Not reported in hospital discharge data.
- May be uninterpretable among sedated patients, acutely intoxicated patients, or patients on respirators.
- May be determined and recorded at multiple times for a patient.

Abbreviated Injury Score (AIS) — (Association for the Advancement of Automotive Medicine 1990)

- AIS for the head region can be determined directly by reviewing the medical record.
- Scoring procedure is time consuming and requires training.
- Computer software (ICDMAP 1997) is available that converts ICD-9-CM scores to AIS scores and then calculates the ISS score. Computer-derived scores tend to be lower than direct scores. **Do not submit computer-generated scores to CDC.**

Other indicators of severity include:

- The presence of prolonged unconsciousness.
- Documented intracranial or intraspinal traumatic lesions.
- Documented abnormalities of neurologic function.

Outcome—For surveillance systems, as assessment of the patient’s degree of recovery when released from hospital acute care.

Some data elements that may be used to describe outcome:

Survival status

- Survived or died.

Discharge disposition

- Dispositions other than a return to home may indicate an incomplete recovery at the time of discharge.

Glasgow Outcome Scale — (Jennett and Bond 1975) (See also Glasgow Outcome Scale Score in the Variable Dictionary.)

- Provides a crude indication of the level of function achieved by a head-injured patient at the time the patient is released from acute care.
- Relatively simple to use.
- Sometimes recorded in medical records, but is not included in hospital discharge data.

Frankel classification and level of spinal cord injury

- Characterizes level of injury (spinal segment affected) or the presence of paraplegia or tetraplegia (quadriplegia).
- A modification of the Frankel classification describes the degree of neurologic deficit below the level of injury (American Spinal Injury Association 2000).
- Usually found in medical records; information contained in hospital discharge data alone may be incomplete.

Evaluation and Quality Assurance

Recommended Approaches for Evaluating Central Nervous System Surveillance Systems and Data Quality

To ensure the high quality and standardization of Central Nervous System Injury (CNSI) data, CDC requests that all states participating in the CNSI Surveillance System conduct evaluation and quality assurance activities before submitting data.

- **Check data quality** for completeness and validity. Thoroughly review all cases to make sure they meet the electronic case inclusion criteria. Verify that individual variables are correctly formatted and contain accurate values.
- **Calculate crude death and hospitalization incidence rates** so these data may be compared to those of prior years. By preparing and monitoring data annually, one can quickly observe increases or decreases that may have occurred.
- **Calculate predictive value positive (PVP)** for hospitalized patients. PVP is defined as *the proportion of reported cases that actually have the CNSI under investigation*. Calculating PVP is requested from all states, but it is required of each state funded to conduct extended surveillance. States may accomplish this by conducting a case confirmation process for a sample of cases.
- **Calculate a marker of sensitivity.** Sensitivity is defined as *the proportion of CNSI cases that are detectable by the surveillance system*. To accurately calculate sensitivity, it would be ideal to compare the data source used for surveillance to an external data source that contains the “universe” of CNSI cases. Because no such standardized source exists among the states, CDC requests that states calculate a marker based on cases of hospitalized deaths associated with traumatic brain injury (TBI). All states are requested to provide a marker of sensitivity.

Specific instructions for conducting these activities follow.

Conducting Data Quality Checks

States should conduct quality assurance checks before submitting data. At a minimum, states should (1) check cases to make sure they meet the electronic case inclusion criteria, and (2) check variables to make sure they are formatted correctly and contain accurate values. CDC recommends that states supplement this list with quality checks that address issues specific to their data.

Case Inclusion Checks

- Surveillance Year**—Do all cases have a discharge or death date that confirms they are in the data set for the correct surveillance year?

- Case Definition**—Do all cases conform to the revised case definition sheet of June 2003? Include only cases in which the patient was hospitalized or died. All cases require an appropriate ICD-9 or ICD-10 code to designate either a TBI or Spinal Cord Injury (SCI).

- Residential Case**—Do all cases represent residents of the reporting state?

- Duplicate Record**—Have all cases been unduplicated?

Variable Formatting and Validity Checks

- Date Field**—Have date conflicts, impossible date combinations, or out-of-scope dates been corrected?

- Variable List**—Are all required variables properly coded (as shown on the Variable Specifications Chart and listed in the Variable Dictionary)?

- Variable Completeness**—Have basic frequencies on all variables been run and reviewed?

Has a copy of the computer output for the frequencies (excluding dates and case IDs) been included with the data submission? (See Data Submission Guidance and Forms, “What to submit with your data.”)

- False Positives**—Have false positives been included in the submission and coded according to instructions contained in Sampling Guidance?

- ❑ **ICD-9 and ICD-10 Fields**—Have codes from all available ICD-9 and ICD-10 fields been submitted?
- ❑ **ICD-10 Leading Letter**—Have ICD-10 codes been submitted with the leading letter as part of the code?
- ❑ **External Cause Code Leading Letter**—Have external cause codes been submitted with the leading letter as part of the code?
- ❑ **External Cause Code Field**—Have external cause codes been placed in the proper external cause code field?
- ❑ **Missing Value**—Have missing values been properly coded as “always missing” or “occasionally missing,” as described in the Variable Dictionary?
- ❑ **Variable Type and Length**—Has a list of variables (correct types and lengths) been compiled and included with the data submission?
- ❑ **Default Value**—Do default values for HISPANIC and WORKRLTD meet the requirements of the *CNSI Data Submission Standards—2002*?

Calculating Crude Death and Hospitalization Incidence Rates

States should calculate and submit crude death and hospitalization rates. Annual monitoring of these rate changes can provide insight into injury trends and data quality issues.

$$\text{Incidence rate per 100,000} = \frac{\text{Number of new injury cases occurring in a population during specified period of time}}{\text{Number of persons exposed to risk of injury during that period of time}} \times 100,000$$

Calculating Predictive Value Positive

Predictive value positive (PVP) is defined as *the probability that a person classified by the reporting system as having an injury actually has the injury.*

States are requested to determine the PVP of their hospital discharge data to ascertain TBI and SCI cases. PVP should be reported separately for TBI and SCI.

The following table illustrates how surveillance data are incorporated into the PVP calculation:

Detected by Surveillance	Condition Present		
	Yes	No	
Yes	True Positive A	False Positive B	A + B
No	False Negative C	True Negative D	C + D
	A + C	B + D	Total

$$\begin{array}{l}
 \text{PVP} \left[\begin{array}{l}
 = \frac{\text{True Positives}}{\text{(True Positives + False Positives)}} \\
 = \frac{(A)}{(A+B)}
 \end{array} \right.
 \end{array}$$

Note: States should enter the number of false positives on the cover letter and sampling form (refer to Data Submission Guidance and Forms or the accompanying CD-ROM).

Identifying False Positives among Cases Identified from Hospital Discharge Data Sets

It is essential to verify the accuracy of a TBI or SCI diagnosis when calculating PVP. The following discussion will help you decide whether a case meets the case definition.

Overview

The physician's CNSI diagnosis presides over all other chart information in determining whether a case meets the case definition.

In general, CDC's clinical case definitions are not intended to be used as the primary validation method for cases initially identified using the electronic data systems case definition (i.e., from hospital discharge data sets). For this reason, **apply CDC's clinical case definitions only if a TBI or SCI has been coded in the hospital discharge data (HDD), but the physician's diagnosis does not include TBI or SCI.**

Abstractor's Guidance

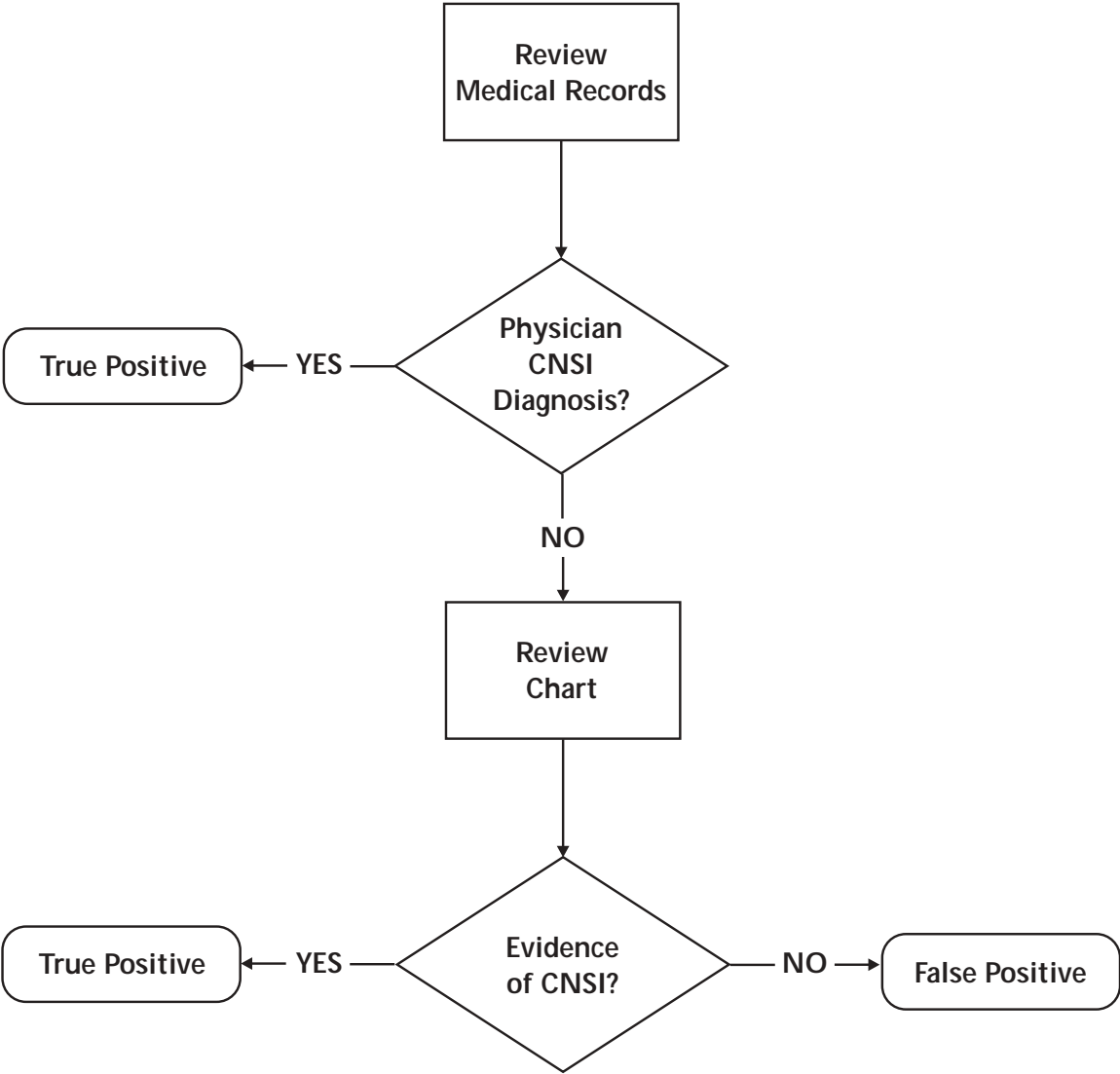
The abstractor should compare the ICD-9-CM diagnosis code(s) with the physician's narrative description of the diagnosis (usually found in the discharge summary). If the physician's written diagnosis is either a TBI or SCI, the case meets the case definition and no further checking is required.

Exception—if the admitting diagnosis is the only available information, do not count the case as a TBI or SCI. *The admitting diagnosis is an unconfirmed diagnosis.* If the physician's written diagnosis is neither TBI nor SCI (e.g., it is a diagnosis of leg fracture), then one can assume the ICD-9-CM TBI or SCI code has been assigned in error and should take further efforts to verify the diagnosis.

1. Check the clinical chart notes—such as the history, physical exam, and consultant's notes;
2. Check the diagnostic testing forms (X-rays, CAT scans, MRIs, etc.);
3. Check clinical chart notes, test results, or other chart contents to verify the presence of a TBI or SCI (to ensure that the case meets CDC's TBI or SCI clinical case definition).
4. Verify the classification of false positives. If the discharge summary does not list TBI or SCI as one of the physician's diagnoses **and** no other record in the chart indicates that the patient was diagnosed at admission with a TBI or SCI, the case should be classified as a false positive.

Enter the number of false positives on line 5 of the Summary Report of Record Abstraction (GRID) and code the Abstract variable accordingly.

Flowchart for Verifying Central Nervous System Injury Diagnosis



Calculating a Sensitivity Marker for Death Data:

$$\begin{aligned} \text{Sensitivity of death data for hospitalized death} &= \frac{\text{(Number of TBI death cases reported as hospitalized)}}{\text{(Total number of unduplicated cases identified by both systems)}} \\ &= \frac{(Y)}{(X + Y - Z)} \end{aligned}$$

Following are three examples that use the total number of cases approach (values X, Y, and Z) to prepare a sensitivity marker:

	Examples		
	1	2	3
Number of hospitalized cases reported as having died (X)	180	120	190
Number of death cases reported as hospitalized (Y)	120	180	190
Cases identified by both hospital discharge and death data (Z)	100	100	180
Total number of cases identified	200	200	200

Example 1: Substantially more cases reported from hospital discharge data:

$$\begin{aligned} \text{Sensitivity (hospital discharge data for inpatient TBI death)} &= \frac{(X)}{(X + Y - Z)} \\ &= \frac{(180)}{(180 + 120 - 100)} \\ &= \frac{180}{200} = 90\% \end{aligned}$$

$$\begin{aligned} \text{Sensitivity (death data for TBI death among inpatients)} &= \frac{(Y)}{(X + Y - Z)} \\ &= \frac{(120)}{(180 + 120 - 100)} \\ &= \frac{120}{200} = 60\% \end{aligned}$$

Example 2: Substantially more cases reported from death data:

$$\begin{aligned}\text{Sensitivity (hospital discharge data for inpatient TBI death)} &= \frac{(X)}{(X + Y - Z)} \\ &= \frac{(120)}{(120 + 180 - 100)} \\ &= \frac{120}{200} = 60\%\end{aligned}$$

$$\begin{aligned}\text{Sensitivity (death data for TBI death among inpatients)} &= \frac{(Y)}{(X + Y - Z)} \\ &= \frac{(180)}{(120 + 180 - 100)} \\ &= \frac{180}{200} = 90\%\end{aligned}$$

Example 3: Only a few cases missed by each system:

$$\begin{aligned}\text{Sensitivity (hospital discharge data for inpatient TBI death)} &= \frac{(X)}{(X + Y - Z)} \\ &= \frac{(190)}{(190 + 190 - 180)} \\ &= \frac{190}{200} = 95\%\end{aligned}$$

$$\begin{aligned}\text{Sensitivity (death data for TBI death among inpatients)} &= \frac{(Y)}{(X + Y - Z)} \\ &= \frac{(190)}{(190 + 190 - 180)} \\ &= \frac{190}{200} = 95\%\end{aligned}$$

2. Traditional Two-by-Two Approach

This approach applies a traditional 2x2 model. It combines all cases of hospital death identified by both the hospital discharge data system and the death data system. By combining these data, it serves as the gold standard for this type of evaluation method.

Q = cases identified **only** by hospital discharge data
(equals X–Z above)

R = cases identified **only** by death data
(equals Y–Z above)

S = cases identified by **both** discharge and death data
(equals Z above)

Calculating a Sensitivity Marker for Hospital Discharge Data

		Gold Standard (All Identified Cases)		
		+ (Identified)	- (Not Identified)	
Hospital Discharge Data	+	(Identified)	A = (Q + S)	B = 0
	-	(Not Identified)	C = R	D = 0
		Q + R + S		

$$\begin{aligned}
 \text{Sensitivity of hospital discharge data for hospitalized death} &= \frac{\text{(Number of TBI death cases reported by hospital discharge data)}}{\text{(Total number of cases identified by both systems)}} \\
 &= \frac{A}{(A + C)} \\
 &= \frac{(Q + S)}{(Q + S + R)}
 \end{aligned}$$

Calculating a Sensitivity Marker for Death Data

		Gold Standard (All Identified Cases)		
		+ (Identified)	- (Not Identified)	
Death Data	+	(Identified)	A = (R + S)	B = 0
	-	(Not Identified)	C = Q	D = 0
		Q + R + S		

$$\begin{aligned}
\text{Sensitivity of death data for hospitalized death} &= \frac{\text{(Number of TBI death cases reported by hospital discharge data)}}{\text{(Total number of cases identified by both systems)}} \\
&= \frac{A}{(A + C)} \\
&= \frac{(R + S)}{(Q + S + R)}
\end{aligned}$$

The following three examples use the 2x2 method (values Q, R, and S) to calculate a sensitivity marker:

	Examples		
	1	2	3
Cases identified by hospital discharge data only (Q)	80	20	10
Cases identified by death data only (R)	20	80	10
Cases identified by both hospital discharge and death data (S)	100	100	180
Total number of cases identified	200	200	200

Example 1: Substantially more cases reported from hospital discharge data:

$$\begin{aligned}
\text{Sensitivity (hospital discharge data for inpatient TBI death)} &= \frac{(Q + S)}{(Q + S + R)} \\
&= \frac{(80 + 100)}{(80 + 20 + 100)} \\
&= \frac{180}{200} = 90\%
\end{aligned}$$

$$\begin{aligned}
\text{Sensitivity (death data for TBI death among inpatients)} &= \frac{(R + S)}{(Q + S + R)} \\
&= \frac{(20 + 100)}{(80 + 20 + 100)} \\
&= \frac{120}{200} = 60\%
\end{aligned}$$

Example 2: Substantially more cases reported from death data:

$$\begin{aligned} \text{Sensitivity (hospital discharge data for inpatient TBI death)} &= \frac{(Q + S)}{(Q + S + R)} \\ &= \frac{(20 + 100)}{(80 + 20 + 100)} \\ &= \frac{120}{200} = 60\% \end{aligned}$$

$$\begin{aligned} \text{Sensitivity (death data for TBI death among inpatients)} &= \frac{(R + S)}{(Q + S + R)} \\ &= \frac{(80 + 100)}{(80 + 20 + 100)} \\ &= \frac{180}{200} = 90\% \end{aligned}$$

Example 3: Only a few cases missed by each system:

$$\begin{aligned} \text{Sensitivity (hospital discharge data for inpatient TBI death)} &= \frac{(Q + S)}{(Q + S + R)} \\ &= \frac{(10 + 180)}{(80 + 20 + 100)} \\ &= \frac{190}{200} = 95\% \end{aligned}$$

$$\begin{aligned} \text{Sensitivity (death data for TBI death among inpatients)} &= \frac{(R + S)}{(Q + S + R)} \\ &= \frac{(10 + 180)}{(80 + 20 + 100)} \\ &= \frac{190}{200} = 95\% \end{aligned}$$

Proving Equivalency of the Two Methods

The following mathematical exercise demonstrates that both approaches to calculating a sensitivity marker produce the same result.

$$\text{Sensitivity (hospital discharge data for inpatient TBI death)} = \frac{(Q + S)}{(Q + S + R)}$$

$$\begin{aligned} \text{Or, when substituting the values from Method 1} &= \frac{[(X - Z) + Z]}{[(X - Z) + (Y - Z) + (Z)]} \\ \text{(Total number of cases approach)} &= \frac{(X)}{(X + Y - Z)} \end{aligned}$$

$$\text{Sensitivity (death data for TBI death among inpatients)} = \frac{(R + S)}{(Q + S + R)}$$

$$\begin{aligned} \text{Or, when substituting the values from Method 1} &= \frac{[(Y - Z) + Z]}{[(X - Z) + (Y - Z) + (Z)]} \\ &= \frac{(Y)}{(X + Y - Z)} \end{aligned}$$

Data Submission Guidance

When to Submit Your Data

Send your data so CDC receives them no later than 18 months after the end of the year under surveillance. For example, CDC should receive data for TBI-related deaths or hospital discharges occurring during 2002 no later than June 30, 2004.

Notify your CDC Project Officer as early as possible of expected delays in submitting data.

How to Submit Your Data

Make sure your data set is in one of the approved file formats (see list in this section).

Send your data by e-mail, on a 3 1/2-inch diskette, or on CD-ROM. CDC cannot accept ZIP diskettes.

Submitting Data by E-Mail

Send data to your CDC Project Officer, with a copy to the Data Manager.

Submitting Data by Mail

Send data to your CDC Project Officer. It is a good idea to e-mail both your CDC Project Officer and the Data Manager to let them know that the file is on its way.

What to Submit with Your Data

Submit the following forms and materials with your data (this applies to both initial submissions and resubmissions):

Forms

(Included in this section; electronic versions are on enclosed CD-ROM.)

- Checklist
- Cover Letter
- Sampling Form

Other Materials

- List of variables submitted, including Variable Name, Type, and Length
- Frequency output for all basic and extended variables (except for dates and case ID due to the high volume of output)
- Results of Evaluation
 - Predictive Value Positive
 - Crude Death and Hospitalization Rates
 - Optional – Marker for Sensitivity (see Evaluation and Quality Assurance)

Acceptable Formats for Submitting Central Nervous System Injury Surveillance Data Files to CDC

1. Access (*.mdb)
2. ASCII (*.dat, *.txt, *.csv, *.lst, *.prn)
3. dBase 2 (*.dbf)
4. dBase 3, Fox Pro, Clipper, or Xbase (*.dba)
5. dBase 4 (*.dbf)
6. Paradox 2 to 3.5 (*.db)
7. Paradox 4 and 4.5 (*.db)
8. Paradox 5 to 7 (*.db)
9. SAS for Windows 6.08 to 6.12 (*.sd2)
10. SAS for Windows 7/8 (*.sd7)
11. SAS for Windows 7/8 (*.sas7bdat)
12. SAS for PC/DOS 6.04 (*.ssd)
13. SAS for SUN, HP, AIX V6 (*.ssd01)
14. SAS for SUN, HP, AIX V7/8 (*.sas7bdat)
15. SAS for DEC/Alpha (*.ssd04)
16. SAS for VAX/VMS (*.saseb\$data)
17. SAS Transport (*.v5x)
18. SAS Transport V6 (*.v6x)
19. SAS Transport V6 Compressed (*.v6x)
20. SAS Xport Transport Engine (*.v5x)
21. SPSS/PC + for PC/DOS (*.sys)
22. SPSS for OS/2 (*.sav)
23. SPSS for Windows (*.sav)
24. SPSS for Windows (Compressed) (*.sav)
25. SPSS for Unix (*.sav)
26. SPSS for Macintosh (*.)
27. SPSS Portable (*.por)
28. Stata Version 2.0 (*.dta)
29. Stata V2.1 (*.dta)
30. Stata V2.1 (8 byte doubles) (*.dta)
31. Stata V4/V5 (8 byte doubles) (*.dta)
32. Stata V4/V5 (4 byte floats) (*.dta)
33. Stata V6 (8 byte doubles) (*.dta)
34. Stata V6 (4 byte floats) (*.dta)
35. Visual FoxPro (*.dbf)

TBI Surveillance Sampling Form

Level I: States that *Do Not* Abstract Medical Records

Background

Your state was not asked to abstract data from medical records in 2002. However, all states must submit extended variables (in addition to the required basic variables). Even if you didn't collect data for the extended variables, we still need them as "placeholders" so that we can 1) Run the CDC Quality Assurance (QA) checks on your data (the QA program only runs on data sets that have all of the properly-named variables), and 2) Combine your data with those from other states that *do* sample and collect data on extended variables.

What to do

- I. Include *all* of the variables in your data set, with the specific values indicated for each, shown in the following chart. If your state is funded for SCI variable abstraction, complete ABSTRACT, PADHREV, and EVENTREV as instructed in the Variable Dictionary for SCI cases (SCI and SCI/TBI).

Sampling Variable Names <small>(Be sure to use the exact name listed below per the Variable Specifications Chart, <i>CNSI Data Submission Standards—2002.</i>)</small>	Value to Put in Your Data Set <small>(Be sure to use the correct type and length for all variables per the Variable Specifications Chart, <i>CNSI Data Submission Standards—2002.</i>)</small>	Purpose
PAD_HOSP	0 (Preadmission death) 1 (Small hospital, < 100 accredited acute care beds) 2 (Large hospital, ≥ 100 accredited acute care beds)	Indicates the stratum in which each case belongs. We need to know this for every case so that we can analyze you data along with data from states that select stratified samples.
SAMPLE	0 Case not sampled	Indicates that you did not sample any of your cases.
ABSTRACT	Leave values blank for all cases.*	Indicates that no abstraction was attempted for any cases.
PADHREV	Leave values blank for all cases.*	Indicates that no revisions were made to the initial PAD_HOSP value as a result of information obtained during abstraction.
EVENTREV	Leave values blank for all cases.*	Indicates that no revisions were made to the initial EVENT value as a result of information obtained during abstraction.

* The SAS default for a missing numeric value is . ("dot").

II. Answer the following questions about your initial data set:

A. Does the year 2002 data set you submitted contain any SCI-only cases?

Yes

No

B. Did you *limit* your data set to:

1. Cases with a discharge date or date of death in the year 2002?

Yes

No Explain _____

2. Cases that were state residents?

Yes Number of cases excluded _____

No Explain _____

3. Cases that appeared to meet the case definition?

Yes

No Explain _____

4. Unduplicated cases?

Yes Number of duplicate records excluded _____

No Explain _____

Describe, in detail, the process you used to unduplicate your cases (e.g., the variables used, whether you unduplicated admissions only in the same hospital or across all hospitals, the time frame during which admissions were considered duplicates).

C. Did you include in your data set *all* of the variables listed in the variable specifications chart?

Yes

No Explain

D. Did you use the correct values for PAD_HOSP, SAMPLE, ABSTRACT, PADHREV, and EVENTREV?

Yes

No Explain

E. Did you use the correct values for the extended variables?

Yes

No Explain _____

Principal Investigator Date

Data Manager Date

Revised 7/7/03

TBI Surveillance Sampling Form

Level II: States that Abstract *All* Medical Records

Background

Use this form in conjunction with the Instructions for Sampling and Creating Related Variables (see *CNSI Data Submission Standards—2002*).

Because your state has 1,200 or fewer hospitalized traumatic brain injury (TBI) cases per year, you should attempt to abstract the medical records for *all* hospitalized TBI cases and thus sample 100% of these cases. Abstraction is defined as *actually reviewing medical records and recording information from them that is not available from the electronic data source*.

All states must submit extended variables (in addition to the required basic variables). CDC needs these variables to 1) Run the CDC Quality Assurance (QA) checks on your data (the QA program only runs on data sets that include all variables) and 2) Combine your data with those from all other states.

For the data year 2002, we want to know as much as possible about your cases and how you conducted your abstraction.

What to do

I. Answer the following questions about your initial data set (i.e., before you begin abstracting records):

A. Does the year 2002 data set you submitted contain any SCI-only cases?

Yes

No

B. Before abstracting any records, did you *limit* your data set to:

1. Cases with a discharge date or date of death in the year 2002?

Yes

No

Explain

2. Cases that were state residents?

Yes Number of cases excluded _____

No Explain _____

3. Cases that appeared to meet the case definition?

Yes

No Explain _____

4. Unduplicated cases?

Yes Number of duplicate records excluded _____

No Explain _____

Describe, in detail, the process you used to unduplicate your cases (e.g., the variables used, whether you unduplicated admissions only in the same hospital or across all hospitals, the time frame in which admissions were considered duplicates).

II. Answer the following questions:

A. Did you include in your data set *all* of the variables listed in the Variable Specifications Chart (in the *CNSI Data Submission Standards—2002*)?

Yes

No Explain _____

B. Did you use the correct values for PAD_HOSP, SAMPLE, ABSTRACT, PADHREV, and EVENTREV?

Yes

No Explain _____

C. Did you use the correct values for the extended variables?

Yes

No Explain _____

III. Review the following instructions for recording and reporting information about *all* sampled cases for which you were *not* able to abstract the medical records. Then answer the related questions and fill in the table.

What are some of the reasons records were not abstracted in 2002? You may not have abstracted medical records because you couldn't find them, or because a review of actual records showed that some cases didn't meet the case definition.

CDC requests details of cases you were unable to abstract in order to properly calculate case weights. Information about false positives is necessary to calculate the Predictive Value Positive (PVP) for your data. Please enter all information on the enclosed Summary Reports and submit them with your data set.

State: _____ Data Year: _____ Date Submitted: _____

Data Submission: 1st _____ 2nd _____ 3rd _____

Summary Report of TBI Record Abstraction

Level II: States that Abstract All Medical Records

	Number of Cases			
	Stratum 0 (PADs)	Stratum 1 (Small Hospitals)	Stratum 2 (Large Hospitals)	Total
Before Abstraction				
1. Total number of TBI and TBI/SCI cases in the initial data set.				
Discovered During Record Abstraction				
2. Number of cases not abstracted because record could not be located.				
3. Number of cases not abstracted because of incorrect year of discharge (discovered during record abstraction).				
4. Number of cases discovered during abstraction that did not meet the case definition (false positives).				
5. Number of cases discovered during abstraction that did not meet state residency criteria.				
6. Number of cases not abstracted for other reasons. Please specify: _____ _____ _____				
7. Total number of cases for which a record was abstracted.				
How to calculate using data from the table above: Item (1) – Item (2) – Item (3) – Item (4) – Item (5) – Item (6) = Item (7)				

C. Did you exclude *all* cases in No. 5 (did not meet state residency criteria) from the year 2002 data set you submitted to CDC?

Yes

No Explain and provide CASEIDs

D. If you had cases in No. 6 (not abstracted for other reasons), did you *include* or *exclude* them from the year 2002 data set you submitted to CDC?

Included Explain

Excluded Explain

Principal Investigator Date

Data Manager Date

TBI Surveillance Sampling Form

Level III: States That Abstract a SAMPLE of Medical Records

Background

Use this form in conjunction with the Instructions for Sampling and Creating Related Variables (see *CNSI Data Submission Standards—2002*).

Because your state has a large number of hospitalized TBI cases per year ($> 1,200$), you should successfully abstract information from medical records for a representative sample of at least 1,000 TBI cases. Submit data for the extended variables for all abstracted cases. Abstraction is defined as *actually reviewing medical records to identify information that is not available from the electronic data source*. Briefly, sampling involves several steps:

1. Identifying the list of cases from which the sample will be selected (the sampling frame); in your case, it includes all TBI and TBI/SCI hospitalizations that:
 - a. Have a date of discharge from acute care occurring during the year of interest,
 - b. Are state residents,
 - c. Appear initially to meet the case definition, and
 - d. Have been unduplicated.

2. Dividing the cases in the sampling frame into strata according to hospital size (preadmission deaths, small hospitals, and large hospitals). Small hospitals have < 100 accredited acute care beds and large hospitals have ≥ 100 accredited acute care beds.

3. Selecting a random sample of cases from the small and large hospital strata.

For CDC to understand your sampling scheme, you must submit the five sampling-related variables (PAD_HOSP, SAMPLE, ABSTRACT, PADHREV, and EVENTREV). States must also submit *all* of the extended variables (in addition to the required basic variables). CDC needs these variables to 1) Run the CDC Quality Assurance (QA) checks on your data (the QA program only runs on data sets that include all variables) and 2) Combine your data with those from all other states.

We want to review with you specifically which variables you should submit with your data set and what format to use. We also want to know as much as possible about how you selected your cases and conducted your sampling and abstraction to help us with weighting the data.

What to do

I. Answer the following questions about your initial data set (i.e., before you selected your sample for abstraction):

A. Does the year 2002 data set you submitted contain any SCI-only cases?

Yes

No

B. Before sampling, did you *limit* your data set to:

1. Cases with a discharge date or date of death in the year 2002?

Yes

No Explain _____

2. Cases that were state residents?

Yes Number of cases excluded _____

No Explain _____

3. Cases that appeared to meet the case definition?

Yes

No Explain _____

4. Unduplicated cases?

Yes Number of duplicate records excluded _____

No Explain _____

Describe, in detail, the process you used to unduplicate your cases (e.g., the variables used, whether you unduplicated admissions only in the same hospital or across all hospitals, the time frame in which admissions were considered duplicates).

II. Answer the following questions:

A. Did you include in your data set *all* of the variables listed in the Variable Specifications Chart (in the *CNSI Data Submission Standards—2002*)?

Yes

No Explain _____

B. Did you use the correct values for PAD_HOSP, SAMPLE, ABSTRACT, PADHREV, and EVENTREV?

Yes

No Explain _____

C. Did you use the correct values for the extended variables?

Yes

No Explain _____

D. Did you submit your data with extra variable(s) *not* requested by CDC that are related to sampling or abstraction?

Yes Explain _____

No

E. How did you conduct your sampling? Did you...

1. First, *limit* your sampling frame to TBI and TBI/SCI cases (excluding SCI only cases)?

Yes

No Explain _____

2. Divide the sampling frame population into the three required strata (preadmission deaths, small hospitals, and large hospitals ≥ 100 beds)?

Yes

No Explain _____

3. Select a *simple random sample* from both of the hospitalized strata? (Note: If you are unsure, please describe your selection method.)

Yes

No/Not sure Explain _____

4. Select the number of cases from each hospitalized stratum *in the same proportion* as they occur among all hospitalized cases? Fill in the description of your *sampling allocation* in the table that follows.

Note: If your sampling strata were different than those required in the following table, please submit a separate chart detailing each of your strata, including the percentages.

TBI Sample Allocation Table

PAD_HOSP (Stratum)	Summary of Cases Sampled				
	(A) Stratum Size	(B) Proportion of Total in (A)	(C) Target Number of Cases to Abstract in Stratum	(D) Extra Cases Available From Oversampling	(E) Total Number of Cases Selected in Stratum
		$[(A)/\text{Total}(A)]$	$[(B) \times 1,000]$	$[(B) \times 200]$	$[(B) \times 1,200]$
0 (Preadmission deaths)	Preadmission deaths should no longer be abstracted.				
1 (Small hospitals)					
2 (Large hospitals)					
TOTAL					

Please fill in columns A to E according to the Instructions for Sampling and Creating Related Variables (in the *CNSI Data Submission Standards—2002*).

III. Review the following instructions for recording and reporting information about *all* sampled cases for which you were *not* able to abstract the medical records. Then answer the related questions and fill in the table.

What are some of the reasons records were not abstracted in 2002? You may not have abstracted medical records because you couldn't find them, or because a review of actual records showed that some cases didn't meet the case definition.

CDC requests details of cases you were unable to abstract in order to properly calculate case weights. Information about false positives is necessary to calculate the Predictive Value Positive (PVP) for your data. Please enter all information on the enclosed Summary Reports and submit them with your data set.

Note: Use the Supplemental Summary form if you submitted surveillance year 2002 data with non-standard strata.

State: _____ Data Year: _____ Date Submitted: _____

Data Submission: 1st _____ 2nd _____ 3rd _____

Summary Report of TBI Record Abstraction for States that Stratified by Preadmission Death and Hospital Size

Level III: States that Abstract a *Sample* of Medical Records

	Number of Cases			
	Stratum 0 (PADs)	Stratum 1 (Small Hospitals)	Stratum 2 (Large Hospitals)	Total
Before Abstraction				
1. Total number of TBI and TBI/SCI cases in the initial data set.				
2. Cases sampled for abstraction.				
Discovered During Record Abstraction				
3. Number of cases not abstracted because record could not be located.				
4. Number of cases not abstracted because of incorrect year of discharge (discovered during record abstraction).				
5. Number of cases discovered during abstraction that did not meet the case definition (false positives).	Preadmission Deaths should no longer be abstracted.			
6. Number of cases discovered during abstraction that did not meet state residency criteria.				
7. Number of cases not abstracted for other reasons. Please specify: _____ _____ _____				
8. Total number of cases for which a record was abstracted.				
How to calculate using data from the table above: Item (2) – Item (3) – Item (4) – Item (5) – Item (6) – Item (7) = Item (8)				

State: _____ Data Year: _____ Date Submitted: _____

Data Submission: 1st _____ 2nd _____ 3rd _____

Supplemental Summary Report of TBI Record Abstraction for States that Stratified by Another Method

Level III: States that Abstract a *Sample* of Medical Records

	Number of Cases			
	Stratum 0* _____	Stratum 1* _____	Stratum 2* _____	Total
Before Abstraction				
1. Total number of TBI and TBI/SCI cases in the initial data set.				
2. Cases sampled for abstraction.				
Discovered During Record Abstraction				
3. Number of cases not abstracted because record could not be located.				
4. Number of cases not abstracted because of incorrect year of discharge (discovered during record abstraction).				
5. Number of cases discovered during abstraction that did not meet the case definition (false positives).				
6. Number of cases discovered during abstraction that did not meet state residency criteria.				
7. Number of cases not abstracted for other reasons. Please specify: _____ _____ _____				
8. Total number of cases for which a record was abstracted. How to calculate using data from the table above: Item (2) – Item (3) – Item (4) – Item (5) – Item (6) – Item (7) = Item (8)				

*Please label each stratum. Copy this sheet to accommodate additional strata as needed.

IV. Answer the following questions based on the information from the preceding table:

A. Did you exclude *all* cases in No. 4 (with an incorrect year of death or discharge) from the year 2002 data set you submitted to CDC?

Yes

No Explain and provide CASEIDs

B. Did you include *all* cases in No. 5 (false positives) in the year 2002 data set you submitted to CDC?

Yes

No Explain

C. Did you exclude *all* cases in No. 6 (did not meet state residency criteria) from the year 2002 data set you submitted to CDC?

Yes

No Explain and provide CASEIDs

D. If you had cases in No. 7 (not abstracted for other reasons), did you *include* or *exclude* them from the year 2002 data set you submitted to CDC?

Included Explain

Excluded Explain

Principal Investigator Date

Data Manager Date

Revised 7/7/03

5. **Specifics of Variables:**

A. How many variables are included in the data set? _____

B. How many ICD fields are in the data submission? _____

C. Check the following categories describing the data set (check all that apply):

- Basic data
- Extended data
- Spinal cord injury extended data

6. **Case Information:**

A. Total number of cases reported as TBI only _____

B. Total number of cases reported as SCI only _____

C. Total number of cases reported as both TBI and SCI _____

D. Total number of cases reported (A + B + C) _____

7. **Rates:**

A. Crude Rate

1. Crude Rate Formula

$$\left[\frac{\text{Number of TBI Cases}}{\text{State Total Population}} \right] \times 100,000 = \text{TBI Crude Rate}$$

2. Example

$$\left[\frac{4369}{5291155} \right] \times 100,000 = 82.57$$

3. Fill in the crude rate for your state below.

$$\left[\frac{\text{_____}}{\text{_____}} \right] \times 100,000 =$$

B. Case Fatality Rate

1. Case Fatality Rate Formula

$$\left[\frac{\text{Number of TBI Deaths}}{\text{Total Number of TBI Cases}} \right] \times 100 = \text{TBI Fatality Rate}$$

2. Example

$$\left[\frac{1208}{4369} \right] \times 100 = 27.64$$

3. Fill in the fatality rate for your state below.

$$\left[\frac{\quad}{\quad} \right] \times 100 =$$

8. Background:

Please provide general information about your data set (e.g., list of original data sources, extended data sources, uses of trauma registry data).

9. Miscellaneous — Additional Information:

Please provide additional information, not previously requested, that you feel may be relevant to the data submission. Note any deviations from the *CNSI Data Submission Standards—2002* such as the submittal of extended data on non-sampled cases.

Checklist for Submitting 2002 TBI Surveillance Data

*Include this document with every data submission or
resubmission to CDC*

Case Inclusion Checks

- Surveillance Year** All cases have a discharge or death date that confirms they are in the data set for correct surveillance year.
- Case Definition** All cases meet case definition criteria based on the revised case definition sheet (June 2003); only cases of patients who were hospitalized or died are included; all cases have an appropriate ICD-9 or ICD-10 code for TBI or SCI.
- Residential Case** All cases are residents of the reporting state.
- Duplicate Record** All cases have been unduplicated.

Variable Formatting and Validity Checks

- Date Field** Date conflicts, impossible date combinations, or dates out-of-scope have been corrected.
- Variable List** All variables as listed on the Variable Specifications Chart are provided.
- Variable Completeness** Basic frequencies have been run and reviewed on all variables prior to submission to check for completeness; a copy of the computer output for the frequencies (with the exception of Dates and Case ID), is included with the data submission—see the following list of required submission items.
 - False Positives** False positives have been INCLUDED in the submission and coded according to instructions in the revised Sampling Guidance.
 - ICD-9 and ICD-10 Fields** Codes from all available ICD-9 and ICD-10 fields have been submitted.
 - ICD-10 Leading Letter** ICD-10 codes are submitted WITH the leading letter as part of the code.

- External Cause Code Leading Letter** External cause codes are submitted WITH the leading letter as part of the code.
- External Cause Code Field** External cause codes have been moved and placed in the proper E-code field.
- Missing Value** Missing values have been properly coded as “always missing” or “occasionally missing” as described in the Variable Specifications Chart.
- Variable Type and Length** A list of variables with the correct types and lengths has been compiled and included with the data submission.
- Default Value** Default values for HISPANIC and WORKRLTD meet the requirements of the *CNSI Data Submission Standards—2002*.

Required Items to be Submitted with the Data

Forms:

- Checklist** (This Document)
- Cover Letter**
- Sampling Form**

Other Materials

- List of Variables Submitted** Including Variable Name, Type, and Length

- Frequency Output for All Basic and Extended Variables** EXCEPT for Dates and Case ID, because of the high volume of output

- Results of Evaluation**
 - Predictive Value Positive**

 - Crude Death and Hospitalization Rates**

 - Optional – Marker for Sensitivity**

Signed By:

Project Manager or Principal Investigator

Date

Data Manager

Date

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Additional Reading

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Spinal Cord Injury

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ALASKA:**Principal Investigator**

Mark S. Johnson, MPA
 Section Chief
 Alaska Department of Health and Social Services
 and Community Health and Emergency
 Medical Services
 Division of Public Health
 410 Willoughby Avenue – Room 101
 Post Office Box 110616
 Juneau, AK 99811-0616
 Phone: 907-465-3027
 Fax: 907-465-4101
 E-mail: markj@health.state.ak.us

Contact Person

Martha Moore
 Injury Surveillance and Prevention
 Program Manager
 Alaska Department of Health and Social
 Services and Community Health and
 Emergency Medical Services
 Division of Public Health
 410 Willoughby Avenue – Room 101
 Post Office Box 110616
 Juneau, AK 99811-0616
 Phone: 907-465-8631
 Fax: 907-465-4101
 E-mail: Martha Moore@health.state.ak.us

Data Collected and Type of Surveillance

Traumatic Brain Injury — Basic
 Traumatic Brain Injury — Extended
 Spinal Cord Injury — Extended

ARIZONA:**Principal Investigator**

Timothy Flood, MD
 Bureau Medical Director
 Arizona Department of Health Services
 Bureau of Public Health Statistics
 1740 West Adams Street – Suite 410
 Phoenix, AZ 85004-2602
 Phone: 602-542-7331
 Fax: 602-542-2940
 E-mail: tflood@hs.state.az.us

Contact Person

Ardis Decker
 TBI Program Manager
 Arizona Department of Health Services
 Bureau of Public Health Statistics
 1740 West Adams Street – Suite 410
 Phoenix, AZ 85004-2602
 Phone: 602-542-1125
 Fax: 602-364-0296
 E-mail: adecker@hs.state.az.us

Data Collected and Type of Surveillance

Traumatic Brain Injury — Basic

CALIFORNIA:**Principal Investigator**

Robert B. Trent, PhD
 Section Chief
 California Department of Health Services
 Epidemiology and Prevention for
 Injury Control Branch
 1616 Capitol Avenue – Suite 74.420
 MailStop 7214
 Post Office Box 942732
 Sacramento, CA 94234-7320
 Phone: 916-552-9800 Ext. 9858
 Fax: 916-552-9810
 E-mail: rtrent@dhs.ca.gov

Contact Person

Julie Cross, PhD
 TBI Program Manager
 California Department of Health Services
 Epidemiology and Prevention for
 Injury Control Branch
 1616 Capitol Avenue – Suite 74.420
 MailStop 7214
 Post Office Box 942732
 Sacramento, CA 94234-7320
 Phone: 916-552-9800
 Fax: 916-552-9810
 E-mail: jcross@dhs.ca.gov

Data Collected and Type of Surveillance

Traumatic Brain Injury — Basic

COLORADO:**Principal Investigator**

Barbara Gabella, MSPH
 TBI Surveillance Director
 Colorado Department of Public Health and
 Environment – EMSP-IE-A2
 4300 Cherry Creek Drive, South
 Denver, CO 80246-1530
 Phone: 303-692-3003
 Fax: 303-691-7901
 E-mail: barbara.gabella@state.co.us

Contact Person

Holly Hedegaard, MD, MSPH
 Medical Epidemiologist and SCI Surveillance
 Colorado Department of Public Health and
 Environment – EMSP-IE-A2
 4300 Cherry Creek Drive, South
 Denver, CO 80246-1530
 Phone: 303-692-3005
 Fax: 303-691-772-7901
 E-mail: holly.hedegaard@state.co.us

Data Collected and Type of Surveillance

Traumatic Brain Injury — Basic
 Traumatic Brain Injury — Extended

MARYLAND:**Principal Investigator**

Lori Demeter
 Office of Injury Prevention and
 Health Assessment
 Maryland Department of Health and
 Mental Hygiene
 201 West Preston Street – Room 300
 Baltimore, MD 21201
 Phone: 410-767-5780
 Fax: 410-333-5030
 E-mail: demeterl@dhmh.state.md.us

Contact Person

Tracey Serpi
 Office of Injury Prevention and
 Health Assessment
 Maryland Department of Health and
 Mental Hygiene
 201 West Preston Street – Room 300
 Baltimore, MD 21201
 Phone: 410-767-5780
 Fax: 410-333-5030
 E-mail: serpit@dhmh.state.md.us

Data Collected and Type of Surveillance

Traumatic Brain Injury — Basic

MINNESOTA (Continued):**Contact Person**

John Weber
 Systems Analyst Unit Supervisor
 Injury and Violence Prevention Unit
 Minnesota Center for Health Promotion
 Minnesota Department of Health
 85 East Seventh Place — Suite 300
 Post Office Box 64882
 St. Paul, MN 55164-0882
 Phone: 651-281-9834
 Fax: 651-215-8959
 E-mail: john.weber@health.state.mn.us

Contact Person

Anna Gaichas, MS
 Research Analyst Intermediate
 Injury and Violence Prevention Unit
 Minnesota Center for Health Promotion
 Minnesota Department of Health
 85 East Seventh Place — Suite 300
 Post Office Box 64882
 St. Paul, MN 55164-0882
 Phone: 651-281-9812
 Fax: 651-215-8959
 E-mail: Anna.Gaichas@health.state.mn.us

MINNESOTA:**Principal Investigator**

Mark Kinde, MPH
 Injury and Violence Prevention Unit
 Minnesota Center for Health Promotion
 Minnesota Department of Health
 85 East Seventh Place – Suite 300
 Post Office Box 64882
 St. Paul, MN 55164-0882
 Phone: 651-281-9832
 Fax: 651-215-8959
 E-mail: mark.kinde@health.state.mn.us

Contact Person

Jon Roesler, MS
 Senior Epidemiologist and Co-PI
 Injury and Violence Prevention Unit
 Minnesota Center for Health Promotion
 Minnesota Department of Health
 85 East Seventh Place – Suite 300
 Post Office Box 64882
 St. Paul, MN 55164-0882
 Phone: 651-281-9841
 Fax: 651-215-8959
 E-mail: jon.roesler@health.state.mn.us

Data Collected and Type of Surveillance

Traumatic Brain Injury — Basic
 Traumatic Brain Injury — ED Registry
 Spinal Cord Injury — Extended

NEBRASKA:**Principal Investigator**

Steve Frederick
 Section Administrator, Data Management
 Division of Public Health Assurance
 Department of Regulation and Licensure
 Nebraska Health and Human Services System
 301 Centennial Mall South
 Post Office Box 95007
 Lincoln, NE 68509-5007
 Phone: 402-471-0147
 Fax: 402-471-9728
 E-mail: steve.frederick@hss.state.ne.us

Contact Person

Pat Fredrickson, RHIA
 Surveillance Coordinator
 Nebraska Head and Spinal Cord Injury Registry
 Division of Health Data Management
 Nebraska Health and Human Services
 Regulations and Licensure
 301 Centennial Mall South
 Post Office Box 95007
 Lincoln, NE 68509-5007
 Phone: 402-471-0321
 Fax: 402-471-9728
 E-mail: pat.fredrickson@hss.state.ne.us

Data Collected and Type of Surveillance

Traumatic Brain Injury — Basic
 Traumatic Brain Injury — Extended

NEW JERSEY:**Principal Investigator**

Katherine Hempstead, PhD
 New Jersey Department of Health and
 Senior Services
 Market and Warren Streets
 Post Office Box 360
 Trenton, NJ 08625-0360
 Phone: 609-292-9353
 Fax: 609-984-7633
 E-mail: khempstead@doh.state.nj.us

Data Collected and Type of Surveillance

Traumatic Brain Injury — Basic
 Spinal Cord Injury — Extended

NEW YORK:**Principal Investigator**

Julie Eisele, PhD
 New York State Department of Health
 Bureau of Injury Prevention
 Empire State Plaza
 Corning Tower Building – Room 557
 Albany, NY 12237-0677
 Phone: 518-473-1143
 Fax: 518-474-3067
 E-mail: jae07@health.state.ny.us

Contact Person

Michael Bauer, MS
 New York State Department of Health
 Bureau of Injury Prevention
 Empire State Plaza
 Corning Tower Building – Room 557
 Albany, NY 12237-0677
 Phone: 518-473-1143
 Fax: 518-474-3067
 E-mail: mjb13@health.state.ny.us

Data Collected and Type of Surveillance

Traumatic Brain Injury — Basic
 Traumatic Brain Injury — Extended
 Spinal Cord Injury — Extended

OKLAHOMA:**Principal Investigator**

Sue Mallonee, MPH
 Chief of Injury Prevention Service
 Oklahoma State Department of Health
 Injury Prevention Service
 1000 NE Tenth Street
 Oklahoma City, OK 73117-1299
 Phone: 405-271-3430
 Fax: 405-271-2799
 E-mail: suem@health.state.ok.us

Contact Person

Pam Archer, MPH
 Assistant Director of Injury Prevention Service
 Oklahoma State Department of Health
 Injury Prevention Service
 1000 NE Tenth Street
 Oklahoma City, OK 73117-1299
 Phone: 405-271-3430
 Fax: 405-271-2799
 E-mail: pama@health.state.ok.us

Data Collected and Type of Surveillance

Traumatic Brain Injury — Basic

SOUTH CAROLINA:**Principal Investigator**

Lou-Ann Carter, MS
 Director, Division of Injury and
 Violence Prevention
 Division of Community Health
 1751 Calhoun Street
 Post Office Box 101106
 Columbia, SC 29211-0106
 Phone: 803-898-0314
 Fax: 803-253-4001
 E-mail: carterlp@dhec.sc.us

Contact Person

Anbesaw W. Selassie, DrPH
 Department of Biometry and Epidemiology
 Medical University of South Carolina
 135 Rutledge Avenue – Suite 1110
 Post Office Box 250551
 Charleston, SC 29425
 Phone: 843-876-1140
 Fax: 843-876-1126
 E-mail: Selassie@musc.edu

Data Collected and Type of Surveillance

Traumatic Brain Injury — Basic
 Traumatic Brain Injury — Extended
 Traumatic Brain Injury — ED Registry

SOUTH CAROLINA (Continued):

Contact Person

Georgette Demain, MPH
Data Manager
South Carolina Department of Health and
Environmental Control
Division of Injury and Violence Prevention
Mills/Jarrett Complex
1751 Calhoun Street
Post Office Box 101106
Columbia, SC 29211-0106
Phone: 803-898-0681
Fax: 803-253-4001
E-mail: demiangs@dhec.sc.gov

Contact Person

JaKook Gu
Department of Biometry and Epidemiology
Medical University of South Carolina
135 Rutledge Avenue – Suite 1110
Post Office Box 250551
Charleston, SC 29425
Phone: 843-876-1140
Fax: 843-876-1126
E-mail: jack.gu@hotmail.com

Contact Person

Wes Gravelle, MPH
Project/Database Manager
South Carolina Traumatic Brain Injury
Follow-up Registry
Medical University of South Carolina
DDSN, HASCI Division
3440 Harden Street Ext.
Post Office Box 4706
Columbia, SC 29240
Phone: 803-935-5307
Fax: 803-935-5943
E-mail: gravelle@muscc.edu

UTAH:

Principal Investigator

Patricia Keller, RN, MPH
Utah Department of Health
288 North 1460 West
Post Office Box 14420
Salt Lake City, UT 84114-2106
Phone: 801-538-6901
Fax: 801-538-6510
E-mail: trishakeller@utah.gov

Contact Person

Patrick Pocock, MPH
Epidemiologist
Violence Injury and Prevention Program
Utah Department of Health
288 North 1460 West
Post Office Box 142106
Salt Lake City, UT 84114-2106
Phone: 801-538-9124
Fax: 801-538-9134
E-mail: ppocock@utah.gov

Data Collected and Type of Surveillance

Traumatic Brain Injury — Basic
Traumatic Brain Injury — Extended

UTAH:

Principal Investigator

Donald Mudgett
TBI Surveillance Project Director
Violence Injury and Prevention Program
Utah Department of Health
288 North 1460 West
Post Office Box 142106
Salt Lake City, UT 84114-2106
Phone: 801-538-6864
Fax: 801-538-9134
E-mail: dmudgett@utah.gov

Contact Person

Michele Erickson, RHIT
Research Analyst
Violence Injury and Prevention Program
Utah Department of Health
288 North 1460 West
Post Office Box 142106
Salt Lake City, UT 84114-2106
Phone: 801-538-6426
Fax: 801-538-9134
E-mail: michelleerickson@utah.gov

Data Collected and Type of Surveillance

Traumatic Brain Injury — Basic
Traumatic Brain Injury — Extended