PEDIATRIC ABUSIVE HEAD TRAUMA

RECOMMENDED DEFINITIONS FOR PUBLIC HEALTH SURVEILLANCE AND RESEARCH

National Center for Injury Prevention and Control
Division of Violence Prevention

Pediatric Abusive Head Trauma: Recommended Definitions for Public Health Surveillance and Research

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I. Introduction

The mission of the Centers for Disease Control and Prevention is to create the expertise, information, and tools that people and communities need to protect their health – through health promotion, prevention of disease, injury and disability, and preparedness for new health threats (Centers for Disease Control and Prevention 2010). Among the key objectives used to achieve this mission is working with national and international partners to monitor health and detect and investigate health problems. Monitoring of population health is achieved through public health surveillance, defined as the ongoing and systematic collection, analysis, and interpretation of outcome-specific data for use in the planning, implementation, and evaluation of public health practice (Thacker and Berkelman 1988). Public health surveillance relies on uniform case definitions and data elements that facilitate the collection of data useful for monitoring trends over time and characterizing persons at risk for health outcomes of interest among different subpopulations or geographic areas.

The prevention of child maltreatment and the reduction of abusive injuries and their consequences is an important priority area for CDC. As part of the public health approach in addressing child maltreatment, CDC has launched an effort to develop uniform case definitions and data elements for use in surveillance of child maltreatment and abusive head trauma. In 2008, CDC published Version 1.0 of Child Maltreatment Surveillance: Uniform Definitions for Public Health and Recommended Data Elements (Leeb et al. 2008), which covers all types of child maltreatment. The current report focuses on standard data elements for abusive head trauma—a specific category of child maltreatment that presents unique definitional and measurement challenges. These challenges are discussed followed by a presentation of recommended uniform operational definitions of fatal and nonfatal abusive head trauma based on International Classification of Diseases (ICD-9-CM for morbidity coding and ICD-10 for mortality coding) diagnosis and external- cause-of-injury codes (2001; 2005). Similar processes and formats to that of the Child Maltreatment Surveillance Uniform Definitions and Data Elements have been used in order to maintain consistency and facilitate ease of use.

II. Background

A. The Problem of Abusive Head Trauma in Children

Serious traumatic brain injury in young children is largely the result of abuse and results in significant morbidity and mortality (Administration for Children & Families ; National MCH Center for Child Death Review ; Bruce and Zimmerman 1989; Keenan et al. 2003). Among United States children, abuse is the third leading cause of all head injuries, after falls and motor vehicle crashes (Centers for Disease Control and Prevention 1997; Bishop 2006). For children in the first year of life, the majority of serious head injuries result from abuse (Alexander, Levitt and Smith 2001). Estimates of the incidence of abusive head trauma vary, but most range from 20 to 30 cases per 100,000 children under 1 year of age (Jayawant et al. 1998; Keenan et al. 2003; Barlow et al. 2005; Eisele et al. 2006; Ellingson, Leventhal and Weiss 2008). The incidence rate has been observed to decrease with increasing age (Keenan et al. 2003; Eisele et al. 2006; Duhaime 2008) with substantially higher incidence among those 1 year of age and younger (Agran et al. 2003). The peak incidence and rapid decrease with age are thought to be related to episodes of prolonged, inconsolable, and unpredictable crying that are developmentally normal for infants (Catherine, Ko and Barr 2008; Barr 2009).

Episodes of crying that can trigger shaking behavior among parents and caregivers are known to increase in the first month after birth, peak in the second month, and decrease thereafter. (Barr 1990; Barr 2000; Barr 2006; Barr 2006; Lee et al. 2007). While the majority of victims are under 2 years of age and the peak incidence is typically found from 2-3 months, injuries consistent with abusive head trauma have been found in children as old as 5 years of age. (Ludwig and Warman 1984; Bruce and Zimmerman 1989; Pounder 1997)

The case fatality rate for abusive head trauma has been estimated to exceed 20%, with significant disability for nearly two-thirds of the survivors (Duhaime 2008; Chiesa and Duhaime 2009). Deaths due to abusive head trauma also peak at 1 to 2 months of age, most likely due to higher physiologic vulnerability during early infancy. Infants who have assault-related head injuries at 3-4 months of age or older may be more resilient and more likely to survive their injuries. These children often have long-term consequences of their injuries. Neurologic, behavioral, and cognitive sequelae have been observed in victims of abusive head trauma (Barlow et al. 2005; Chiesa and Duhaime 2009). Serious brain injury in children has been estimated to consume billions of dollars in health care costs each year (Bishop 2006), with significantly higher costs for abused versus non-abused children (Ettaro, Berger and Songer 2004).

B. Challenges to Tracking the Occurrence of Abusive Head Trauma

In order to characterize the most affected populations and evaluate the effectiveness of programs to reduce, and ultimately eliminate, abusive head trauma, reliable methods of monitoring its occurrence over time, using both primary (data collected by the investigator conducting the research) and secondary (data collected by someone other than the user) data sources, are needed. However, there are several challenges that make tracking the occurrence of abusive head trauma difficult, including limitations in available national datasets, inconsistency in definitions of abusive head trauma, and variation in how these definitions are applied.

Historically, national and state-based morbidity datasets have not been adequate for tracking abusive head trauma, due mostly to the lack of completeness and specificity of external-cause-of-injury codes (ICD-9-CM E codes) in injury-related hospitalization and emergency department records (Annest and Fingerhut). In the 2001 National Hospital Discharge Summary dataset (Dennison and Pokras 2000), E codes were only included in approximately 68% of injury-related hospitalization records (Barrett, Steiner and Coben 2004). In the 2004 National Hospital Ambulatory Medical Care Survey dataset (McCaig and Burt 2004), 90 cases (unweighted) of head trauma in children under 5 years of age who attended an emergency room or outpatient hospital clinic were identified, but only one case could be documented as abusive based on E coding (unpublished analyses). However, in some states, the completeness of state-based hospital discharge and emergency department data systems has improved substantially. Evaluation of data for 2008 from the Healthcare Costs and Utilization Project (Barrett, Steiner and Coben 2004) of the Agency for Healthcare Quality and Research suggests that 66.7% of 42 state hospital discharge data systems and 75% of 28 state emergency department data systems collect E codes on 90% or more of their injury-related records (Office of Disease Prevention and Health Promotion; Barrett and Steiner ONLINE November 10, 2010). This Healthcare Costs and Utilization Project evaluation did not include an assessment of E code specificity or use of child abuse codes. However, other studies have documented issues regarding lack of consistency, specificity, and accuracy of external cause coding in hospital records (McKenzie et al. 2009; McKenzie et al. 2009).

A recent review of the literature on abusive head trauma reveals substantial variability in how researchers define both head trauma (using ICD-9-CM or ICD-10 codes) and abuse (using E codes). Specifically, the distinction between shaken baby syndrome (as well as numerous other labels) and abusive head trauma has been cloudy (Dias et al. 2005). The American Academy of Pediatrics provides clarity for this issue and recommends "pediatricians should use the term 'abusive head trauma' rather than a term that implies a single injury mechanism, such as shaken baby syndrome, in their diagnosis and medical communications" (Christian and Block 2009). Some investigators have employed proxy measures (e.g. presence of a subdural hematoma in a young child) (Jayawant et al. 1998; Barlow and Minns 2000) or have analyzed local data using their own definitions of head trauma (e.g., presence of intracranial hemorrhages) (Duhaime et al. 1992) and abuse (e.g., evidence of old fractures of the long bones, inconsistencies between physical exam, and parent/caregiver description of the precipitating injury) (Duhaime et al. 1992; Keenan et al. 2003). Clearly, a standardized method for defining abusive head trauma is needed if data are to be comparable across geographic areas and over time.

An additional challenge in tracking the occurrence of abusive head trauma is underutilization of the ICD-10 maltreatment syndrome codes (T74 or Y07) and the ICD-9-CM shaken baby syndrome code (995.55), which has been demonstrated in several previous studies (McKenzie et al. 2009; McKenzie et al. 2009). This may result from a lack of information about the specific circumstances of the injury event at the time the death certificate was completed or from a reluctance of physicians to diagnose and code for shaken baby syndrome. ICD-10 abuse/maltreatment codes are also very limited in specificity, which limits their ability to capture the circumstances surrounding child assault, abuse, and maltreatment and to further specify the types of perpetrators. The completeness and specificity of cause of death data, especially pertaining to assignment of abuse/maltreatment codes, could be improved if information from law enforcement records and state and local child death review systems was made available to the medical examiner or coroner before they certified the causes of death on the death certificate (Covington, Foster and Rich 2005; Schnitzer et al. 2008). Similarly, completeness of external cause of injury coding can be improved by increasing clinician training and support for assignment of child maltreatment codes.

C. Summary of Challenges

The lack of consistent information about the number of children affected by abusive head trauma limits the ability of the public health community to respond to the problem in several ways. First, it hinders attempts to gauge the magnitude of abusive head trauma in relation to other public health problems. Second, it creates challenges in identifying those groups at highest risk who might benefit from focused intervention or increased services. Third, it hampers efforts to monitor changes in the incidence and prevalence of abusive head trauma over time. In turn, this impedes the ability to monitor the effectiveness of abusive head trauma prevention and intervention activities (Saltzman et al. 2002).

III. Purpose

This report was developed to address the above challenges and improve the quality and consistency of data on abusive head trauma. The core elements of the document are:

- A definition of abusive head trauma in children under the age of 5 years
- A recommended standard set of ICD-9-CM diagnosis and E codes for nonfatal abusive head trauma
- A recommended standard set of ICD-10 diagnosis and external cause of injury codes (Y codes) for fatal abusive head trauma

Use of this definition, recommended ICD-9 CM and ICD-10 code sets, and data elements is voluntary but strongly encouraged in order to improve the comparability of abusive head trauma surveillance data for public health research and practice.

IV. Development of Recommended Definition of Pediatric Abusive Head Trauma

The Centers for Disease Control and Prevention's goal was to identify a common set of ICD-9-CM codes (for morbidity) and ICD-10 codes (for mortality) that could be uniformly implemented to define abusive head trauma among children under 5 years of age. It was anticipated that these definitions would be used most frequently with hospital discharge data and death certificate data as a surveillance tool for monitoring the occurrence of abusive head trauma.

A. Expert Panel Review Process

In March 2008, a panel of pediatricians, child maltreatment experts, abusive head trauma experts, injury surveillance experts, ICD coding experts, and experienced state health department personnel (a list of panel members and their affiliations is included as Appendix A) met at the Centers for Disease Control and Prevention to discuss the codes for inclusion in our definitions. During the initial meeting, panelists devised a working (or operational) definition of nonfatal and fatal abusive head trauma in children and then identified codes for (1) definitive or presumptive abusive head trauma, (2) probable abusive head trauma. These definitions were based on ICD code sets. Panelists also found it useful to create both narrow (increased specificity) and broad (increased sensitivity) definitions of abusive head trauma to support multiple approaches to research and surveillance. While this technique is often used in other areas of public health surveillance, it represents a new opportunity in the classification of abusive head trauma incidents. The differences in codes for broad and narrow case finding should be considered when conducting comparative analyses.

A summary report recounting the discussions and presentations from the expert panel meeting was sent to panel members in April 2008. As a result, minor edits and clarifications but no substantive changes were made to the document. In June 2008, panel members received a detailed listing of all the ICD-9-CM and ICD-10 diagnosis and external cause of injury codes that they had identified as relevant for defining nonfatal and fatal abusive head trauma. Their input was requested regarding inclusion or exclusion of closely related codes that might be captured or missed, depending upon whether general categories of codes, or only specific codes, were to be used.

In October 2009, a draft document containing the uniform abusive head trauma definition, coding scheme/operational definitions, and recommended data elements for surveillance was prepared and sent for external review. Feedback was incorporated, where appropriate, and a comprehensive list of codes was finalized. Based on recommendations from the expert panel, the Centers for Disease Control and Prevention tested the applicability of the proposed coding scheme to population data. Because the coding schemes and operational definitions were distinct for nonfatal and fatal abusive head trauma, the testing was performed separately for each in several locations between August 2008 and July 2011.

B. Testing Applicability of Definition

1. Morbidity Data Sources

The Centers for Disease Control and Prevention evaluated the ICD-9-CM codes using data from the 2003 Healthcare Cost and Utilization Project Kids' Inpatient Database, which provides information on nearly 1.7 million hospital admissions among children aged 0-5 years.

The database includes up to 15 ICD-9-CM diagnosis codes and four E codes per individual; all available codes were searched for the relevant abusive head trauma codes. Analyses were performed to determine whether additional abusive head trauma cases would be identified if the more general three-digit ICD-9-CM codes (that define a category of diagnoses) were used in combination with the fully expanded ICD-9-CM codes that included specific 4th and 5th digits originally chosen by the expert panel. Results indicated that inclusion of the three-digit codes did not lead to identification of additional cases. (unpublished data).

Colleagues at Yale University carried out similar analyses using the 2006 Healthcare Cost and Utilization Project Kids' Inpatient Database data and arrived at the same conclusion regarding the three-digit codes. The researchers at Yale also discovered that there were some abusive head trauma cases with both assault and undetermined external causes codes. Centers for Disease Control and Prevention staff recommend such cases be included in the "definite" group, because they meet the most stringent of the criteria for abusive head trauma. The South Carolina Department of Health performed additional evaluation of the codes by using an inpatient and emergency department hospital database from 2007 containing information on over 216,000 children aged 0-5 years. This database contains up to 10 ICD-9-CM codes and two E codes per individual. Observed results were similar to those described above for the Healthcare Cost and Utilization Project Kids' Inpatient Database data. (unpublished data)

After doing these two initial tests of the data, the Centers for Disease Control and Prevention undertook a final application of the broad operational case definition for nonfatal abusive head trauma and accompanying coding scheme to national hospital discharge data. The Nationwide Inpatient Sample database from the Healthcare Cost and Utilization Project for the combined period 2003-2008 was examined to identify all records meeting the criteria for the operational case definition. Through this third and final analysis, the coding scheme was further refined and the utility of the definition for public health surveillance activities was demonstrated.

2. Mortality Data Sources

The Centers for Disease Control and Prevention evaluated the ICD-10 codes using data from the 2005 and 2006 Multiple Causes of Death from the National Center for Health Statistics. For each year, data were available on over 33,000 deaths among children aged 0-5 years. The Multiple Causes of Death data include up to 20 causes of death per individual in addition to the underlying cause. All available cause of death codes were searched for the relevant abusive head trauma codes. As before, results indicated that inclusion of the more general codes did not result in identification of additional cases. (Parks, S., D. Sugerman, L. Xu and V. Coronado (2012).

In 2011, the Centers for Disease Control and Prevention conducted another study in which the final, broad operational case definition for fatal abusive head trauma was applied to the National Center for Health Statistics National Vital Statistics System (Hoyert et al. 2006; Minino et al. 2007; Kung et al. 2008; Heron et al. 2009; Xu et al. 2010) multiple-cause-of-death data for the combined period 2003–2007. This study demonstrated the utility of the fatal abusive head trauma definition for public health surveillance activities. (Parks et al. 2011)

V. CDC Definition of Pediatric Abusive Head Trauma

Pediatric abusive head trauma is defined as an injury to the skull or intracranial contents of an infant or young child (< 5 years of age) due to inflicted blunt impact and/or violent shaking.

The following are excluded from the case definition:

- Unintentional injuries resulting from neglectful supervision
- Gunshot wounds / stab wounds / penetrating trauma

VI. Implementation of Recommended Definition

With the above case definition as a framework, we developed matrices for classifying nonfatal and fatal abusive head trauma cases depending upon the degree of certainty provided by ICD-9-CM and ICD-10 codes and the desired levels of sensitivity/specificity.

The degrees of certainty include “definite or presumptive” abusive head trauma and “probable” abusive head trauma. ICD-9-CM and ICD-10 codes were deemed to fit into either a broad or narrow definition of abusive head trauma. The narrow definition is more restrictive and generates a more specific estimate of the number of nonfatal and fatal abusive head trauma cases. Conversely, the broad definition builds upon the narrow by incorporating a more generous interpretation of injuries potentially associated with abusive head trauma. The broad definition yields more sensitive abusive head trauma estimates. The choice of narrow or broad definitions will depend on the purpose for which the data are being analyzed. In surveillance or other public health activities that aim to provide population level estimates of numbers and rates of nonfatal and fatal abusive head trauma, it is recommended that the broad definition be applied. The broad definition provides greater sensitivity than the narrow definition and may be more appropriate for surveillance of population-based interventions. The narrow definition provides estimates with greater specificity and may be most appropriate for applications such as evaluating targeted interventions.

Though the definite/presumptive and probable categories are very similar, the external cause codes provide distinction between the levels. Definite or presumptive abusive head trauma cases have assault or maltreatment external cause codes, while probable abusive head trauma cases have undetermined external cause codes.

Figure 1 presents recommended ICD-9-CM diagnosis and external cause of injury codes (or E codes) for identifying nonfatal abusive head trauma at multiple levels. The definite or presumptive abusive head trauma classification requires the presence of an ICD-9-CM code listed either under the narrow or broad definition (Columns 2 or 3) and the presence of an assault-related E code or an abuse code (Column 4). The exception to this is the ICD-9-CM code for shaken baby syndrome (995.55) which requires no E code or abuse code. [Note: the definition reached by the Centers for Disease Control and Prevention expert panel originally contained the following eye injury codes: 361.00-361.05, 361.1, 361.30, 361.33, 361.8, 361.81, 361.89, 361.9, 362.4, and 362.81. Each of these codes must be accompanied by at least one head injury code and an abuse or external cause of injury code. Operationally, inclusion of these codes is superfluous to the required head injury codes, thus they have been removed from the operational definition presented in Figure 1].

Figure 2 presents recommended ICD-10 diagnosis and external cause of injury codes for identifying fatal abusive head trauma. Narrow and broad definitions are also provided. As in Figure 1, the definite or presumptive abusive head trauma classification requires the presence of an ICD-10 code listed either under the narrow or broad definition (Columns 2 or 3) and the presence of an assault E code or an abuse code (Column 4).

In both nonfatal and fatal cases, probable abusive head trauma requires the presence of either a narrow or broad ICD-9CM/ICD-10 code and the presence of an external cause of injury code indicating the injury was of undetermined intent. For nonfatal cases, the ICD-9-CM code for shaken baby syndrome (995.55) is excluded from the probable codes and always presumed to be "definite or presumptive."

A. Applicability of Definition

These coding guidelines can be applied to data from various sources:

1. Nonfatal Data Sources

i. Hospital Emergency Department Data

Hospital emergency department data are generated from uniform hospital billing forms used to bill for hospital services. Injuries treated in emergency departments that are not severe enough to require hospital admission are more common than injury hospitalizations. Therefore, emergency department data can be useful for tracking medically attended injuries that are common but not severe. Emergency department data can also be useful for assessing injury prevention priorities in sparsely populated areas where injury deaths and hospitalizations may occur too infrequently to be useful for epidemiologic purposes.

Examples:

National Hospital Ambulatory Medical Care Survey-Emergency Department Component collects data from hospital emergency departments. Findings are based on a nationally representative sample of visits to the emergency departments of noninstitutional general and short-stay hospitals. Data and documentation available at: www.cdc.gov/nchs/ahcd/ahcd_questionnaires.htm.

State Emergency Department Data are Healthcare Cost and Utilization Project datasets that are available for numerous states and include discharge information on all emergency department visits that do not result in an admission. Data and documentation available at: www.hcup-us.ahrq.gov/seddoverview.jsp.

ii. Hospital Inpatient Discharge Data

Hospital discharge data are also generated from uniform hospital billing forms used in many states to bill for hospital services. This form has dedicated fields for recording an E code. Statewide hospital discharge data sets, like vital records, provide population-based injury data. Hospital discharge data may be more useful than vital records for surveillance in less-populated areas where some causes of injury death occur infrequently.

Examples:

Healthcare Cost and Utilization Project Nationwide Inpatient Sample contains inpatient data from a national sample of over 1,000 hospitals. Researchers and policymakers use the Nationwide Inpatient Sample to identify, track, and analyze national trends in health care utilization, access, charges, quality, and outcomes. Data and documentation available at: www.hcup-us.ahrq.gov/nisoverview.jsp.

Healthcare Cost and Utilization Project Kids' Inpatient Database is a nationwide sample of pediatric inpatient discharges. The Kids' Inpatient Database was specifically designed to permit researchers to study a broad range of conditions and procedures related to child health issues. Data and documentation available at: www.hcup-us.ahrq.gov/kidoverview.jsp.

National Hospital Discharge Survey is a national probability survey designed to meet the need for information on characteristics of inpatients discharged from non-Federal short-stay hospitals in the United States. Data from the National Hospital Discharge Survey are available annually and are used to examine important topics of interest in public health and for a variety of activities by governmental, scientific, academic, and commercial institutions. Data and documentation available at: www.cdc.gov/nchs/nhds.htm.

2. Fatal Data Sources

i. Vital Statistics Data: Death certificate data capture the most severe injuries, and therefore are important for creating and evaluating programs and policies.

Example:

National Vital Statistics System: Mortality data from the National Vital Statistics System provide cause-of-death data by demographic characteristics of the deceased and geographic location (e.g., state and county) of place of residence at the time of death. Data are provided through contracts between the National Center for Health Statistics and vital registration systems operated in the various jurisdictions. Legal authority for the registration of these events resides individually with the 50 States, 2 cities (Washington, D.C., and New York), and 5 territories (Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands). Data and documentation available at: www.cdc.gov/nchs/nvss.htm.

B. Data Analyses

Detailed descriptions of the methods used to apply these guidelines to morbidity and mortality data can be found in two separate peer reviewed manuscripts (Parks et al. 2011; Parks et al. 2012). The methods described below represent the Centers for Disease Control and Prevention's suggested approach to analyzing data on abusive head trauma, though this approach may need to be modified depending upon the characteristics of the data source (e.g., number of diagnosis and E code fields in state-based hospital discharge data systems vary from state to state), resources available for obtaining and analyzing data, the objective, and intended audience.

Alternative approaches to reporting injuries using state-based hospital discharge as well as national and state-based emergency department data systems are described elsewhere and generally rely on defining an injury using only the first-listed diagnosis code and E codes (Injury Surveillance Workgroup 2003; Injury Surveillance Workgroup 5 2007; Injury Surveillance Workgroup 6 2008). In contrast, the approach recommended here for examining and reporting abusive head trauma relies on multiple diagnosis codes and external cause of injury codes because of abusive head trauma's relatively infrequent occurrence. Below are two examples that demonstrate the application of the Centers for Disease Control and Prevention's operational abusive head trauma definitions to nationally representative mortality and morbidity data sets. The results of these applications are published elsewhere or in press.

1. Application of the Centers for Disease Control and Prevention's operational abusive head trauma definition to morbidity data:

- **Objective:** to obtain annualized national estimates of abusive head trauma injuries for children under 5 years old.

- **Data source:** Healthcare Cost and Utilization Project Nationwide Inpatient Sample database. Because abusive head trauma cases are relatively uncommon, data for the combined period 2003–2008 were used.

- **AHT definition used:** In order to obtain a more inclusive estimate of the occurrence of abusive head trauma, the Centers for Disease Control and Prevention panel's broad operational case definition based on ICD-9-CM nature and cause of injury codes were used.

- **Analytic methods:** All 15 clinical diagnoses fields and all four E code fields were searched. If patients had at least one head trauma diagnosis code in any place among the 15 fields as well as one external cause-of-injury code among the four E code fields, or an abuse code among the 15 clinical diagnoses, they were classified into one of two categories of nonfatal abusive head trauma. Cases of abusive head trauma were categorized based on clinical diagnoses and external cause-of-injury/abuse codes as definite or presumptive abusive head trauma or probable abusive head trauma. The comparison group, cases with nonabusive head trauma, was selected if at least one code among the 15 clinical diagnoses met the Centers for Disease Control and Prevention case definition for Traumatic Brain Injury (Faul et al. 2010) in the absence of an external cause of injury or clinical diagnosis code indicating abuse or other inflicted injury.

- **Exclusions:** Several exclusion criteria were applied. Patients with abuse diagnosis codes 995.50 and 995.59 were excluded if they occurred with a fall or unintentional injury code, which includes: E800-E807, E810-E838, E840-E848, E880-E888, and E890-E928. Other conditions and injury mechanisms which can emulate abusive head trauma symptoms (e.g. birth trauma (967), congenital anomalies (740.0-759.9), coagulation defects (286), and unintentional gun-related injuries (E922) were excluded. Patients who died while hospitalized were also excluded.

- **Statistics reported:** Number of hospitalizations, hospitalization rates and 95% confidence intervals for nonfatal abusive head trauma were determined by year, age, sex, and race/ethnicity group using SAS PROC SURVEYFREQ to account for the sample weights and complex sample design and calculate the variance of the estimates. Odds ratios, confidence intervals, and p values were calculated using SAS PROC FREQ. [Note: care should be taken when deciding whether to report estimates for variables with a large amount of missing data. In the Centers for Disease Control and Prevention analyses, results were not reported for race/ethnicity due to a large percentage (~25%) of missing data. (Parks et al. 2012)

2. Application of Centers for Disease Control and Prevention's operational abusive head trauma definition to mortality data:

- **Objective:** to obtain annualized national estimates of abusive head trauma fatalities for children under 5 years old.

- **Data source:** National Vital Statistics System multiple-cause-of-death data. Because fatal abusive head trauma cases are relatively uncommon, data for the combined period 2003–2007 were used.

- **Abusive head trauma definition used:** In order to obtain a more inclusive estimate of abusive head trauma mortality, the Centers for Disease Control and Prevention panel's broad operational case definition, based on ICD-10 nature and cause of injury codes, was used.

- **Analytic methods:** Records for cases under 5 years old with an injury-related underlying cause of death (ICD-10 codes U01-03, V01-Y36, Y85-Y87, Y89) were inspected to determine whether the ICD-10 underlying cause and any of the record axis codes (up to 20 codes) indicated abusive head trauma under the broad operational case definition. Underlying cause and record axis codes were treated equivalently for this purpose. Cases were categorized based on injury/disease code and cause codes as definite or presumptive abusive head trauma or probable abusive head trauma. In each category, a case must have had at least one abusive head trauma injury/disease code and at least one abusive head trauma cause code. [Note: Record-axis codes are based upon original death certificate coding, but have been edited by the National Center for Health Statistics to eliminate contradictions and to define the condition most precisely within the limitations of ICD-10 coding and the available medical information on the death certificate. The National Center for Health Statistics uses record-axis codes for published multiple cause of death statistics. Documentation is available at: www.cdc.gov/nchs/data/dvs/Mort99doc.pdf. The comparison group, cases of fatal traumatic brain injury without abusive head trauma, was selected if any of the 20 record axis codes met the Centers for Disease Control

and Prevention case definition for fatal traumatic brain injury (Faul et al. 2010) and was not assigned to one of the abusive head trauma categories due to the absence of a qualifying underlying cause of injury or clinical diagnosis code. For further comparisons by intent of injury, the traumatic brain injury (without abusive head trauma) cases were further classified (using the underlying cause of death code) as assault-related (ICD-10 codes X85-Y09, Y87.1, U01-U02), unintentional (ICD-10 codes V01-X59, Y85-Y86), or as undetermined intent (ICD-10 codes Y10 – Y34, Y87.2, Y89.9). The traumatic brain injury (without abusive head trauma) cases with undetermined intent were excluded from the analyses.

- **Statistics reported:** Case counts for the combined period 2003–2007 were tabulated by age, sex, race/ethnicity, and calendar month of death. Population-based rates by age, sex, and race/ethnicity were calculated by dividing the tabulated case counts by corresponding mid-year population estimates combined across this same five-year period; all rates were expressed in terms of cases per 100,000 person-years.

C. Conclusion

As with all surveillance utilizing existing data sources, results will depend significantly on the quality of the data. The completeness and specificity of ICD-9-CM, ICD-10, and cause of injury codes will affect estimates of incidence and prevalence. It is critical that users of these codes evaluate the completeness and quality of the data they are using and account for that in presentation of the results.

In August 2008, the Department of Health and Human Services published a Federal Register announcement indicating a proposed rule entitled HIPAA Administrative Simplification: Modification of Medical Data Code Set Standards to Adopt ICD–10–CM and ICD–10–PCS (Department of Health and Human Services 2008). This transition will take place beginning October 1, 2013. Moving to ICD-10-CM for morbidity surveillance in the future will require the addition of a new set of surveillance codes to supplement this volume. The Centers for Disease Control and Prevention will initiate this effort as ICD-10-CM is implemented. Users of this document should ensure they are utilizing the correct codes (ICD-9-CM or ICD-10-CM) for abusive head trauma morbidity surveillance.

VII. Figure 1. ICD-9-CM Codes for Defining NonFatal Abusive Head Trauma in Children under the Age of 5 Years

	Clinical Diagnosis Code		Injury Code
	ICD-9-CM Narrow Definition	ICD-9-CM Broad Definition	ICD-9-CM External Cause of Injury or Abuse Code
Definite or Presumptive Abusive Head Trauma	781.0-781.4, 781.8, 800.1-800.4, 800.6-800.9, 801.1-801.4, 801.6-801.9, 803.1-803.4, 803.6-803.9, 804.1-804.4, 804.6-804.9, 850.0-850.9, 851.0-851.99, 852.0-852.59, 853.0-853.19, 854.0-854.19, 950.0-950.3, 995.55**	781.0-781.4, 781.8, 800, 801, 803, 804.1-804.4, 804.6-804.9, 850, 851, 852.0-852.5, 853.0, 853.1, 854.0, 854.1, 925.1, 950.0-950.3, 959.01, 995.55**	E960.0, E967, E968.1, E968.2, E968.8, E968.9, 995.50*, 995.54, 995.59*
Probable Abusive Head Trauma	All of those above (except 995.55)	All of those above (except 995.55)	E987, E988.8, E988.9

* Exclude case in the presence of a fall or accident code (see Appendix 3)
** Does not require a cause code

VIII. Figure 2. ICD-10 Codes for Defining Fatal Abusive Head Trauma in Children under the Age of 5 Years

	Clinical Diagnosis Code		Injury Code
	ICD-10 Narrow Definition	ICD-10 Broad Definition	ICD-10 External Cause of Injury or Abuse Code
Definite or Presumptive Abusive Head Trauma	S06.0-S06.9, S09.7-S09.8, T90.5	S02, S02.0-S02.1, S02.7-S02.9, S04.0, S06.0-S06.9, S07.1, S07.8-S07.9, S09.7-S09.8, T90.2, T90.5, T90.8-T90.9	Y00, Y01, Y04, Y07.0-Y07.3, Y07.8-Y07.9, Y08, Y09, Y87.1, T74.1, T74.8-T74.9
Probable Abusive Head Trauma	All of those above	All of those above	Y29, Y30, Y33, Y34, Y87.2

IX. REFERENCES

Agran, P. F., Anderson, C., Winn, D., Trent, R. L., Walton-Haynes, & Thayer, S. (2003). Rates of pediatric injuries by 3-month intervals for children 0 to 3 years of age. *Pediatrics, 111 (6 Pt 1)*, e683-692.

Alexander, R., Levitt, C., & Smith, W. (2001). Abusive head trauma. In R. Reece & S. Ludwig (Eds.), *Child abuse: Medical diagnosis and management* (pp. 47-80). Philadelphia, PA: Lippincott, Williams & Wilkins.

Annest, J.L., Fingerhut, L.A., Gallagher, S.S., Grossman, D.C., Hedegaard, H., Johnson, R.L., et al. (2008). Strategies to improve external cause-of-injury coding in state-based hospital discharge and emergency department data systems. Recommendations of the CDC Workgroup for Improvement of External Cause-of-Injury Coding. *MMWR Recommendations and Reports, 57 (RR-1)*, 1-13.

Barlow, K. M., & Minns, R.A. (2000). Annual incidence of shaken impact syndrome in young children. *Lancet 356(9241)*, 1571-1572.

Barlow, K. M., Thomson, E., Johnson, D., & Minns, R.A. (2005). Late neurologic and cognitive sequelae of inflicted traumatic brain injury in infancy. *Pediatrics 116(2)*, e174-185.

Barr, R. (2006). Crying behavior and its importance for psychosocial development in children. In R.E. Tremblay, M. Boivin & R.D. Peters (Eds.), *Encyclopedia on early childhood development* (pp. 1-10). Montreal, QC: Centre of Excellence for Early Childhood Development and Strategic Knowledge Cluster on Early Childhood Development.

Barr, R. (2000). Excessive crying. In A.J. Sameroff, M. Lewis & S.M. Miller (Eds.), *Handbook of developmental psychopathology* (pp. 327-350). New York, NY: Kluwer Academic/ Plenum Press.

Barr, R. G. (1990). The normal crying curve: What do we really know? *Dev Med Child Neurol 32(4)*, 356-362.

Barr, R., Barr, M., Fujiwara, T., Conway, J., Catherine, N., & Brant, R. (2009). Do educational materials change knowledge and behavior about crying and shaken baby syndrome? A randomized controlled trial. *Canadian Medical Association Journal 180*, 727-33.

Barr, R., Trent, R.B., & Cross, J. (2006). Age-related incidence curve of hospitalized Shaken Baby Syndrome cases: Convergent evidence for crying as a trigger to shaking. *Child Abuse Negl 30(1)*, 7-16.

Barrett, M. & Steiner, C. (2010). *Addendum to Healthcare Cost and Utilization Project (HCUP) E code evaluation report.* (HCUP Methods Series Report No. 2004-06). Rockville, MD: U.S. Agency for Healthcare Research and Quality.

Barrett, M., Steiner, C., & Coben, J. (2004). *Healthcare Cost and Utilization Project (HCUP) E code evaluation report.* (HCUP Methods Series Report No. 2004-06), Rockville, MD: U.S. Agency for Healthcare Research and Quality.

Bishop, N. B. (2006). Traumatic brain injury: A primer for primary care physicians. *Curr Probl Pediatr Adolesc Health Care 36(9)*, 318-331.

Bruce, D. A., & Zimmerman, R.A. (1989). Shaken impact syndrome. *Pediatr Ann 18(8)*, 482-484, 486-489, 492-484.19

Catherine, N., Ko, J.J., & Barr, R.G. (2008). Getting the word out: advice on crying and colic in popular parenting magazines. *J Dev Behav Pediatr 29*, 508-511.

Centers for Disease Control and Prevention. (1997). Traumatic brain injury—Colorado, Missouri, Oklahoma, and Utah, 1990-1993. *Morbidity and Mortality Weekly Report 46*, 8-11.

Centers for Disease Control and Prevention. (2010). Vision, mission, core values, and pledge. Retrieved August 31, 2011, from http://www.cdc.gov/about/organization/mission.htm.

Chiesa, A. & Duhaime, A.C. (2009). Abusive head trauma. *Pediatr Clin North Am 56(2)*, 317-331.

Child Welfare Information Gateway. (2011). *Child abuse and neglect fatalities 2009: Statistics and interventions.* Washington, DC: U.S. Department of Health and Human Services, Children's Bureau. Retrieved April 28, 2011, from http://www.childwelfare.gov/pubs/factsheets/fatality.cfm.

Christian, C. W., & Block, R. (2009). Abusive head trauma in infants and children. *Pediatrics 123(5)*, 1409-1411.

Covington, T., Foster, V., & S. Rich (Eds.) (2005). *A program manual for child death review.* Okemos, MI: The National Center for Child Death Review.

Dennison, C., & Pokras, R. (2000). Design and operation of the National Hospital Discharge Survey: 1988 redesign. *Vital Health Stat 1(39).*

Department of Health and Human Services. (2008). HIPAA administrative simplification: Modification to the medical data code set standards to adopt ICD-10-CM and ICD-10-PCS. Proposed rule. Office of the Secretary:73.

Dias, M. S., Smith, K., DeGuehery, K., Mazur, P., Li, V., & Shaffer, M.L (2005). Preventing abusive head trauma among infants and young children: A hospital-based, parent education program. *Pediatrics 115(4)*, e470-477.

Duhaime, A. C. (2008). Demographics of abusive head trauma. *J Neurosurg Pediatr 1(5)*, 349-350.

Duhaime, A. C., Alario, A.J, Lewander, W.J., Schut, L., Sutton, L.N., Seidl, T.S., et al. (1992). Head injury in very young children: Mechanisms, injury types, and ophthalmologic findings in 100 hospitalized patients younger than 2 years of age. *Pediatrics 90(2 Pt 1)*, 179-185.

Eisele, J. A., Kegler, S. R., Trent, R. B., & Coronado, V. G. (2006). Nonfatal traumatic brain injury-related hospitalization in very young children—15 states, 1999. *J Head Trauma Rehabil 21(6)*, 537-543.

Ellingson, K. D., Leventhal, J. M., & Weiss, H. B. (2008). Using hospital discharge data to track inflicted traumatic brain injury. *Am J Prev Med 34(4 Suppl)*, S157-162.

Ettaro, L., Berger, R. P. & Songer, T. (2004). Abusive head trauma in young children: Characteristics and medical charges in a hospitalized population. *Child Abuse Negl 28(10)*, 1099-1111.

Faul, M., Xu, L., Wald, M.M., & Coronado, V.G. (2010). *Traumatic brain injury in the United States: Emergency department visits, hospitalizations and deaths, 2002-2006.* Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

Heron, M. P., Hoyert, D. L., Murphy, S. L., Xu, J. Q., Kochankek, K. D., & Tejada-Vera, B. (2009). Deaths: Final data for 2006. *National Vital Statistics Reports. 57(14).*

Hoyert, D. L., Heron, M.P., Murphy, S.L., & Kung, H. (2006). Deaths: Final data for 2003. *National Vital Statistics Reports. 54(13).*

Injury Surveillance Workgroup. (2003). *Consensus recommendations for using hospital discharge data for injury surveillance.* Marietta, GA: State and Territorial Injury Prevention Directors Association.

Injury Surveillance Workgroup 5. (2007). *Consensus recommendations for injury surveillance in state health departments.* Atlanta, GA: State and Territorial Injury Prevention Directors Association.

Injury Surveillance Workgroup 6. (2008). *Assessing an expanded definition for injuries in hospital discharge data systems.* Atlanta, GA: State and Territorial Injury Prevention Directors Association.

International classification of diseases (9th rev.). (2005). Los Angeles, CA: Practice Management Information Corporation.

Jayawant, S., Rawlinson, A., Gibbon, F., Price, J., Schulte, J., Sharples, P., et al. (1998). Subdural haemorrhages in infants: Population based study. *BMJ 317(7172)*, 1558-1561.

Keenan, H. T., Runyan, D.K., Marshall, S.W., Nocera, M.A., Merten, D.F., & Sinal, S.H. (2003). A population-based study of inflicted traumatic brain injury in young children. *JAMA 290(5)*, 621-626.

Kung, H. C., Hoyert, D.L., Xu, J.Q., & Murphy, S.L. (2008). Deaths: Final data for 2005. *National Vital Statistics Reports. 56(10).*

Lee, C., Barr, R. G., Catherine, N., & Wicks, A. (2007). Age-related incidence of publicly reported shaken baby syndrome cases: Is crying a trigger for shaking? *J Dev Behav Pediatr 28(4)*, 288-293.

Leeb, R., Paulozzi, L., Melanson, C., Simon, T., & Arias, I. (2008). *Child maltreatment surveillance: Uniform definitions for public health and recommended data elements, version 1.0.* Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

Ludwig, S., & Warman, M. (1984). Shaken baby syndrome: A review of 20 cases. *Ann Emerg Med 13(2)*, 104-107.

McCaig, L., & Burt, C. (2004). National hospital ambulatory medical care survey: 2002 emergency department summary. *Advance data from vital and health statistics.* Hyattsville, MD: National Center for Health Statistics.

McKenzie, K., Enraght-Moony, E., Walker, S., McClure, R., & Harrison, J. (2009). Accuracy of external cause-of-injury coding in hospital records. *Injury Prevention 15(1)*, 60-64.

McKenzie, K., Enraght-Moony, E., Waller, G., Walker, S., Harrison, J., & McClure, R. (2009). Causes of injuries resulting in hospitalization in Australia: Assessing coder agreement on external causes. *Injury Prevention 15(3)*, 188-196.

Minino, A. M., Heron, M.P., Murphy, S.L., & Kochankek, K.D. (2007). Deaths: Final data for 2004. *National Vital Statistics Reports. 55(19).*

National MCH Center for Child Death Review. (2011). Child abuse and neglect fact sheet. Retrieved April 28, 2011, from http://www.childdeathreview.org/causesCAN.htm

Office of Disease Prevention and Health Promotion. (2011). Healthy people 2020. Retrieved August 18, 2011, from http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=24

Parks, S., Kegler, S., Annest, J., & Mercy, J. (2011). Characteristics of fatal abusive head trauma among children in the U.S.—2003-2007: An application of the CDC operational case definition to national vital statistics data. *Injury Prevention.* Published online first: October 20, 2011 doi:10.1136/injuryprev-2011-040128

Parks, S., Sugerman, D., Xu, L., & Coronado, V. (2012). Characteristics of hospitalized non-fatal abusive head trauma among children in the U.S.—2003-2008: An application of the CDC operational case definition to national hospital inpatient data. *Injury Prevention.* Manuscript accepted. Published online first: February 10, 2012 doi: 10.1136/injury-2011-040234.

Pounder, D. J. (1997). Shaken adult syndrome. *Am J Forensic Med Pathol 18(4)*, 321-324.

Saltzman, L., Fanslow, J., McMahon, P., & Shelley, G. (2002). *Intimate partner violence surveillance: Uniform definitions and recommended data elements, version 1.0.* Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.

Schnitzer, P. G., Covington, T.M., Wirtz, S.J., Verhoek-Oftedahl, W., & Palusci, V.J. (2008). Public health surveillance of fatal child maltreatment: Analysis of 3 state programs. *Am J Public Health 98(2)*, 296-303.

Thacker, S. B., & Berkelman, R.L. (1988). Public health surveillance in the United States. *Epidemiol Rev 10*, 164-190.

World Health Organization (WHO). (2001). *International classification of diseases* (10th rev.). Geneva, Switzerland.

Xu, J. Q., Kochankek, K.D., Murphy, S.L., & Tejada-Vera, B. (2010). Deaths: Final data for 2007. *National Vital Statistics Repor*

X. APPENDICES

1. ICD-9-CM Codes for Defining NonFatal Abusive Head Trauma in Children under the Age of 5 Years
2. External Cause of Injury Codes for Defining NonFatal Abusive Head Trauma in Children under the Age of Five Years
3. Fall and Accident Codes
4. ICD-10 Codes for Defining Fatal Abusive Head Trauma in Children under the Age of 5 Years
5. Panel Participants
6. External reviewers
7. Centers for Disease Control and Prevention Project Staff

Appendix 1. ICD-9-CM Codes for Defining NonFatal Abusive Head Trauma in Children under the Age of 5 Years

Code	Meaning
781.0	Abnormal involuntary movements
781.1	Disturbances of sensation of smell and taste
781.2	Abnormality of gait
781.3	Lack of coordination
781.4	Transient paralysis of limb
781.8	Neurologic neglect syndrome
800.0	Fracture of vault of skull- Closed without mention of intracranial injury
800.00	Closed without mention of intracranial injury- unspecified state of consciousness
800.01	Closed without mention of intracranial injury- with no loss of consciousness
800.02	Closed without mention of intracranial injury- with brief [less than one hour] loss of consciousness
800.03	Closed without mention of intracranial injury- with moderate [1-24 hours] loss of consciousness
800.04	Closed without mention of intracranial injury- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
800.05	Closed without mention of intracranial injury- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
800.06	Closed without mention of intracranial injury- with loss of consciousness of unspecified duration
800.09	Closed without mention of intracranial injury- with concussion, unspecified
800.1	Fracture of vault of skull- closed with cerebral laceration and contusion
800.10	Closed with cerebral laceration and contusion- unspecified state of consciousness
800.11	Closed with cerebral laceration and contusion- with no loss of consciousness
800.12	Closed with cerebral laceration and contusion- with brief [less than one hour] loss of consciousness
800.13	Closed with cerebral laceration and contusion- with moderate [1-24 hours] loss of consciousness
800.14	Closed with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
800.15	Closed with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
800.16	Closed with cerebral laceration and contusion- with loss of consciousness of unspecified duration
800.19	Closed with cerebral laceration and contusion- with concussion, unspecified
800.2	Fracture of vault of skull- Closed with subarachnoid, subdural, and extradural hemorrhage
800.20	Closed with subarachnoid, subdural, and extradural hemorrhage- unspecified state of consciousness
800.21	Closed with subarachnoid, subdural, and extradural hemorrhage- with no loss of consciousness
800.22	Closed with subarachnoid, subdural, and extradural hemorrhage- with brief [less than one hour] loss of consciousness
800.23	Closed with subarachnoid, subdural, and extradural hemorrhage- with moderate [1-24 hours] loss of consciousness
800.24	Closed with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
800.25	Closed with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level

800.26	Closed with subarachnoid, subdural, and extradural hemorrhage- with loss of consciousness of unspecified duration
800.29	Closed with subarachnoid, subdural, and extradural hemorrhage- with concussion, unspecified
800.3	Fracture of vault of skull- closed with other and unspecified intracranial hemorrhage
800.30	Closed with other and unspecified intracranial hemorrhage- unspecified state of consciousness
800.31	Closed with other and unspecified intracranial hemorrhage- with no loss of consciousness
800.32	Closed with other and unspecified intracranial hemorrhage- with brief [less than one hour] loss of consciousness
800.33	Closed with other and unspecified intracranial hemorrhage- with moderate [1-24 hours] loss of consciousness
800.34	Closed with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
800.35	Closed with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
800.36	Closed with other and unspecified intracranial hemorrhage- with loss of consciousness of unspecified duration
800.39	Closed with other and unspecified intracranial hemorrhage- with concussion, unspecified
800.4	Fracture of vault of skull- closed with intracranial injury of other and unspecified nature
800.40	Closed with intracranial injury of other and unspecified nature- unspecified state of consciousness
800.41	Closed with intracranial injury of other and unspecified nature- with no loss of consciousness
800.42	Closed with intracranial injury of other and unspecified nature- with brief [less than one hour] loss of consciousness
800.43	Closed with intracranial injury of other and unspecified nature- with moderate [1-24 hours] loss of consciousness
800.44	Closed with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
800.45	Closed with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
800.46	Closed with intracranial injury of other and unspecified nature- with loss of consciousness of unspecified duration
800.49	Closed with intracranial injury of other and unspecified nature- with concussion, unspecified
800.5	Fracture of vault of skull- open without mention of intracranial injury
800.50	Open without mention of intracranial injury- unspecified state of consciousness
800.51	Open without mention of intracranial injury- with no loss of consciousness
800.52	Open without mention of intracranial injury- with brief [less than one hour] loss of consciousness
800.53	Open without mention of intracranial injury- with moderate [1-24 hours] loss of consciousness
800.54	Open without mention of intracranial injury- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
800.55	Open without mention of intracranial injury- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
800.56	Open without mention of intracranial injury- with loss of consciousness of unspecified duration
800.59	Open without mention of intracranial injury- with concussion, unspecified
800.6	Fracture of vault of skull- open with cerebral laceration and contusion
800.60	Open with cerebral laceration and contusion- unspecified state of consciousness
800.61	Open with cerebral laceration and contusion- with no loss of consciousness

800.62	Open with cerebral laceration and contusion- with brief [less than one hour] loss of consciousness
800.63	Open with cerebral laceration and contusion- with moderate [1-24 hours] loss of consciousness
800.64	Open with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
800.65	Open with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
800.66	Open with cerebral laceration and contusion- with loss of consciousness of unspecified duration
800.69	Open with cerebral laceration and contusion- with concussion, unspecified
800.7	Fracture of vault of skull- open with subarachnoid, subdural, and extradural hemorrhage
800.70	Open with subarachnoid, subdural, and extradural hemorrhage- unspecified state of consciousness
800.71	Open with subarachnoid, subdural, and extradural hemorrhage- with no loss of consciousness
800.72	Open with subarachnoid, subdural, and extradural hemorrhage- with brief [less than one hour] loss of consciousness
800.73	Open with subarachnoid, subdural, and extradural hemorrhage- with moderate [1-24 hours] loss of consciousness
800.74	Open with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
800.75	Open with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
800.76	Open with subarachnoid, subdural, and extradural hemorrhage- with loss of consciousness of unspecified duration
800.79	Open with subarachnoid, subdural, and extradural hemorrhage- with concussion, unspecified
800.8	Fracture of vault of skull- open with other and unspecified intracranial hemorrhage
800.80	Open with other and unspecified intracranial hemorrhage- unspecified state of consciousness
800.81	Open with other and unspecified intracranial hemorrhage- with no loss of consciousness
800.82	Open with other and unspecified intracranial hemorrhage- with brief [less than one hour] loss of consciousness
800.83	Open with other and unspecified intracranial hemorrhage- with moderate [1-24 hours] loss of consciousness
800.84	Open with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
800.85	Open with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
800.86	Open with other and unspecified intracranial hemorrhage- with loss of consciousness of unspecified duration
800.89	Open with other and unspecified intracranial hemorrhage- with concussion, unspecified
800.9	Fracture of vault of skull- open with intracranial injury of other and unspecified nature
800.90	Open with intracranial injury of other and unspecified nature- unspecified state of consciousness
800.91	Open with intracranial injury of other and unspecified nature- with no loss of consciousness
800.92	Open with intracranial injury of other and unspecified nature- with brief [less than one hour] loss of consciousness
800.93	Open with intracranial injury of other and unspecified nature- with moderate [1-24 hours] loss of consciousness
800.94	Open with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level

800.95	Open with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
800.96	Open with intracranial injury of other and unspecified nature- with loss of consciousness of unspecified duration
800.99	Open with intracranial injury of other and unspecified nature- with concussion, unspecified
801.0	Fracture of base of skull- closed without mention of intracranial injury
801.00	Closed without mention of intracranial injury- unspecified state of consciousness
801.01	Closed without mention of intracranial injury- with no loss of consciousness
801.02	Closed without mention of intracranial injury- with brief [less than one hour] loss of consciousness
801.03	Closed without mention of intracranial injury- with moderate [1-24 hours] loss of consciousness
801.04	Closed without mention of intracranial injury- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
801.05	Closed without mention of intracranial injury- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
801.06	Closed without mention of intracranial injury- with loss of consciousness of unspecified duration
801.09	Closed without mention of intracranial injury- with concussion, unspecified
801.1	Fracture of base of skull- Closed with cerebral laceration and contusion
801.10	Closed with cerebral laceration and contusion- unspecified state of consciousness
801.11	Closed with cerebral laceration and contusion- with no loss of consciousness
801.12	Closed with cerebral laceration and contusion- with brief [less than one hour] loss of consciousness
801.13	Closed with cerebral laceration and contusion- with moderate [1-24 hours] loss of consciousness
801.14	Closed with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
801.15	Closed with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
801.16	Closed with cerebral laceration and contusion- with loss of consciousness of unspecified duration
801.19	Closed with cerebral laceration and contusion- with concussion, unspecified
801.2	Fracture of base of skull- closed with subarachnoid, subdural, and extradural hemorrhage
801.20	Closed with subarachnoid, subdural, and extradural hemorrhage- unspecified state of consciousness
801.21	Closed with subarachnoid, subdural, and extradural hemorrhage- with no loss of consciousness
801.22	Closed with subarachnoid, subdural, and extradural hemorrhage- with brief [less than one hour] loss of consciousness
801.23	Closed with subarachnoid, subdural, and extradural hemorrhage- with moderate [1-24 hours] loss of consciousness
801.24	Closed with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
801.25	Closed with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
801.26	Closed with subarachnoid, subdural, and extradural hemorrhage- with loss of consciousness of unspecified duration
801.29	Closed with subarachnoid, subdural, and extradural hemorrhage- with concussion, unspecified
801.3	Fracture of base of skull- closed with other and unspecified intracranial hemorrhage
801.30	Closed with other and unspecified intracranial hemorrhage- unspecified state of consciousness

801.31	Closed with other and unspecified intracranial hemorrhage- with no loss of consciousness
801.32	Closed with other and unspecified intracranial hemorrhage- with brief [less than one hour] loss of consciousness
801.33	Closed with other and unspecified intracranial hemorrhage- with moderate [1-24 hours] loss of consciousness
801.34	Closed with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
801.35	Closed with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
801.36	Closed with other and unspecified intracranial hemorrhage- with loss of consciousness of unspecified duration
801.39	Closed with other and unspecified intracranial hemorrhage- with concussion, unspecified
801.4	Fracture of base of skull- Closed with intracranial injury of other and unspecified nature
801.40	Closed with intracranial injury of other and unspecified nature- unspecified state of consciousness
801.41	Closed with intracranial injury of other and unspecified nature- with no loss of consciousness
801.42	Closed with intracranial injury of other and unspecified nature- with brief [less than one hour] loss of consciousness
801.43	Closed with intracranial injury of other and unspecified nature- with moderate [1-24 hours] loss of consciousness
801.44	Closed with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
801.45	Closed with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
801.46	Closed with intracranial injury of other and unspecified nature- with loss of consciousness of unspecified duration
801.49	Closed with intracranial injury of other and unspecified nature- with concussion, unspecified
801.5	Fracture of base of skull- open without mention of intracranial injury
801.50	Open without mention of intracranial injury- unspecified state of consciousness
801.51	Open without mention of intracranial injury- with no loss of consciousness
801.52	Open without mention of intracranial injury- with brief [less than one hour] loss of consciousness
801.53	Open without mention of intracranial injury- with moderate [1-24 hours] loss of consciousness
801.54	Open without mention of intracranial injury- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
801.55	Open without mention of intracranial injury- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
801.56	Open without mention of intracranial injury- with loss of consciousness of unspecified duration
801.59	Open without mention of intracranial injury- with concussion, unspecified
801.6	Fracture of base of skull- open with cerebral laceration and contusion
801.60	Open with cerebral laceration and contusion- unspecified state of consciousness
801.61	Open with cerebral laceration and contusion- with no loss of consciousness
801.62	Open with cerebral laceration and contusion- with brief [less than one hour] loss of consciousness
801.63	Open with cerebral laceration and contusion- with moderate [1-24 hours] loss of consciousness
801.64	Open with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level

801.65	Open with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
801.66	Open with cerebral laceration and contusion- with loss of consciousness of unspecified duration
801.69	Open with cerebral laceration and contusion- with concussion, unspecified
801.7	Fracture of base of skull- Open with subarachnoid, subdural, and extradural hemorrhage
801.70	Open with subarachnoid, subdural, and extradural hemorrhage- unspecified state of consciousness
801.71	Open with subarachnoid, subdural, and extradural hemorrhage- with no loss of consciousness
801.72	Open with subarachnoid, subdural, and extradural hemorrhage- with brief [less than one hour] loss of consciousness
801.73	Open with subarachnoid, subdural, and extradural hemorrhage- with moderate [1-24 hours] loss of consciousness
801.74	Open with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
801.75	Open with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
801.76	Open with subarachnoid, subdural, and extradural hemorrhage- with loss of consciousness of unspecified duration
801.79	Open with subarachnoid, subdural, and extradural hemorrhage- with concussion, unspecified
801.8	Fracture of base of skull- open with other and unspecified intracranial hemorrhage
801.80	Open with other and unspecified intracranial hemorrhage- unspecified state of consciousness
801.81	Open with other and unspecified intracranial hemorrhage- with no loss of consciousness
801.82	Open with other and unspecified intracranial hemorrhage- with brief [less than one hour] loss of consciousness
801.83	Open with other and unspecified intracranial hemorrhage- with moderate [1-24 hours] loss of consciousness
801.84	Open with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
801.85	Open with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
801.86	Open with other and unspecified intracranial hemorrhage- with loss of consciousness of unspecified duration
801.89	Open with other and unspecified intracranial hemorrhage- with concussion, unspecified
801.9	Fracture of base of skull- open with intracranial injury of other and unspecified nature
801.90	Open with intracranial injury of other and unspecified nature- unspecified state of consciousness
801.91	Open with intracranial injury of other and unspecified nature- with no loss of consciousness
801.92	Open with intracranial injury of other and unspecified nature- with brief [less than one hour] loss of consciousness
801.93	Open with intracranial injury of other and unspecified nature- with moderate [1-24 hours] loss of consciousness
801.94	Open with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
801.95	Open with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
801.96	Open with intracranial injury of other and unspecified nature- with loss of consciousness of unspecified duration

801.99	Open with intracranial injury of other and unspecified nature- with concussion, unspecified
803.0	Other and unqualified skull fractures- closed without mention of intracranial injury
803.00	Closed without mention of intracranial injury- unspecified state of consciousness
803.01	Closed without mention of intracranial injury- with no loss of consciousness
803.02	Closed without mention of intracranial injury- with brief [less than one hour] loss of consciousness
803.03	Closed without mention of intracranial injury- with moderate [1-24 hours] loss of consciousness
803.04	Closed without mention of intracranial injury- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
803.05	Closed without mention of intracranial injury- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
803.06	Closed without mention of intracranial injury- with loss of consciousness of unspecified duration
803.09	Closed without mention of intracranial injury- with concussion, unspecified
803.1	Other and unqualified skull fractures- closed with cerebral laceration and contusion
803.10	Closed with cerebral laceration and contusion- unspecified state of consciousness
803.11	Closed with cerebral laceration and contusion- with no loss of consciousness
803.12	Closed with cerebral laceration and contusion- with brief [less than one hour] loss of consciousness
803.13	Closed with cerebral laceration and contusion- with moderate [1-24 hours] loss of consciousness
803.14	Closed with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
803.15	Closed with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
803.16	Closed with cerebral laceration and contusion- with loss of consciousness of unspecified duration
803.19	Closed with cerebral laceration and contusion- with concussion, unspecified
803.2	Other and unqualified skull fractures- closed with subarachnoid, subdural, and extradural hemorrhage
803.20	Closed with subarachnoid, subdural, and extradural hemorrhage- unspecified state of consciousness
803.21	Closed with subarachnoid, subdural, and extradural hemorrhage- with no loss of consciousness
803.22	Closed with subarachnoid, subdural, and extradural hemorrhage- with brief [less than one hour] loss of consciousness
803.23	Closed with subarachnoid, subdural, and extradural hemorrhage- with moderate [1-24 hours] loss of consciousness
803.24	Closed with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
803.25	Closed with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
803.26	Closed with subarachnoid, subdural, and extradural hemorrhage- with loss of consciousness of unspecified duration
803.29	Closed with subarachnoid, subdural, and extradural hemorrhage- with concussion, unspecified
803.3	Other and unqualified skull fractures- closed with other and unspecified intracranial hemorrhage
803.30	Closed with other and unspecified intracranial hemorrhage- unspecified state of consciousness
803.31	Closed with other and unspecified intracranial hemorrhage- with no loss of consciousness
803.32	Closed with other and unspecified intracranial hemorrhage- with brief [less than one hour] loss of consciousness

803.33	Closed with other and unspecified intracranial hemorrhage- with moderate [1-24 hours] loss of consciousness
803.34	Closed with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
803.35	Closed with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
803.36	Closed with other and unspecified intracranial hemorrhage- with loss of consciousness of unspecified duration
803.39	Closed with other and unspecified intracranial hemorrhage- with concussion, unspecified
803.4	Other and unqualified skull fractures- closed with intracranial injury of other and unspecified nature
803.40	Closed with intracranial injury of other and unspecified nature- unspecified state of consciousness
803.41	Closed with intracranial injury of other and unspecified nature- with no loss of consciousness
803.42	Closed with intracranial injury of other and unspecified nature- with brief [less than one hour] loss of consciousness
803.43	Closed with intracranial injury of other and unspecified nature- with moderate [1-24 hours] loss of consciousness
803.44	Closed with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
803.45	Closed with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
803.46	Closed with intracranial injury of other and unspecified nature- with loss of consciousness of unspecified duration
803.49	Closed with intracranial injury of other and unspecified nature- with concussion, unspecified
803.5	Other and unqualified skull fractures- open without mention of intracranial injury
803.50	Open without mention of intracranial injury- unspecified state of consciousness
803.51	Open without mention of intracranial injury- with no loss of consciousness
803.52	Open without mention of intracranial injury- with brief [less than one hour] loss of consciousness
803.53	Open without mention of intracranial injury- with moderate [1-24 hours] loss of consciousness
803.54	Open without mention of intracranial injury- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
803.55	Open without mention of intracranial injury- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
803.56	Open without mention of intracranial injury- with loss of consciousness of unspecified duration
803.59	Open without mention of intracranial injury- with concussion, unspecified
803.6	Other and unqualified skull fractures- open with cerebral laceration and contusion
803.60	Open with cerebral laceration and contusion- unspecified state of consciousness
803.61	Open with cerebral laceration and contusion- with no loss of consciousness
803.62	Open with cerebral laceration and contusion- with brief [less than one hour] loss of consciousness
803.63	Open with cerebral laceration and contusion- with moderate [1-24 hours] loss of consciousness
803.64	Open with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
803.65	Open with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
803.66	Open with cerebral laceration and contusion- with loss of consciousness of unspecified duration
803.69	Open with cerebral laceration and contusion- with concussion, unspecified

803.7	Other and unqualified skull fractures- open with subarachnoid, subdural, and extradural hemorrhage
803.70	Open with subarachnoid, subdural, and extradural hemorrhage- unspecified state of consciousness
803.71	Open with subarachnoid, subdural, and extradural hemorrhage- with no loss of consciousness
803.72	Open with subarachnoid, subdural, and extradural hemorrhage- with brief [less than one hour] loss of consciousness
803.73	Open with subarachnoid, subdural, and extradural hemorrhage- with moderate [1-24 hours] loss of consciousness
803.74	Open with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
803.75	Open with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
803.76	Open with subarachnoid, subdural, and extradural hemorrhage- with loss of consciousness of unspecified duration
803.79	Open with subarachnoid, subdural, and extradural hemorrhage- with concussion, unspecified
803.8	Other and unqualified skull fractures- open with other and unspecified intracranial hemorrhage
803.80	Open with other and unspecified intracranial hemorrhage- unspecified state of consciousness
803.81	Open with other and unspecified intracranial hemorrhage- with no loss of consciousness
803.82	Open with other and unspecified intracranial hemorrhage- with brief [less than one hour] loss of consciousness
803.83	Open with other and unspecified intracranial hemorrhage- with moderate [1-24 hours] loss of consciousness
803.84	Open with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
803.85	Open with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
803.86	Open with other and unspecified intracranial hemorrhage- with loss of consciousness of unspecified duration
803.89	Open with other and unspecified intracranial hemorrhage- with concussion, unspecified
803.9	Other and unqualified skull fractures- open with intracranial injury of other and unspecified nature
803.90	Open with intracranial injury of other and unspecified nature- unspecified state of consciousness
803.91	Open with intracranial injury of other and unspecified nature- with no loss of consciousness
803.92	Open with intracranial injury of other and unspecified nature- with brief [less than one hour] loss of consciousness
803.93	Open with intracranial injury of other and unspecified nature- with moderate [1-24 hours] loss of consciousness
803.94	Open with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
803.95	Open with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
803.96	Open with intracranial injury of other and unspecified nature- with loss of consciousness of unspecified duration
803.99	Open with intracranial injury of other and unspecified nature- with concussion, unspecified
804.1	Multiple fractures involving skull or face with other bones- closed with cerebral laceration and contusion

804.10	Closed with cerebral laceration and contusion- unspecified state of consciousness
804.11	Closed with cerebral laceration and contusion- with no loss of consciousness
804.12	Closed with cerebral laceration and contusion- with brief [less than one hour] loss of consciousness
804.13	Closed with cerebral laceration and contusion- with moderate [1-24 hours] loss of consciousness
804.14	Closed with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
804.15	Closed with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
804.16	Closed with cerebral laceration and contusion- with loss of consciousness of unspecified duration
804.19	Closed with cerebral laceration and contusion- with concussion, unspecified
804.2	Multiple fractures involving skull or face with other bones- closed with subarachnoid, subdural, and extradural hemorrhage
804.20	Closed with subarachnoid, subdural, and extradural hemorrhage- unspecified state of consciousness
804.21	Closed with subarachnoid, subdural, and extradural hemorrhage- with no loss of consciousness
804.22	Closed with subarachnoid, subdural, and extradural hemorrhage- with brief [less than one hour] loss of consciousness
804.23	Closed with subarachnoid, subdural, and extradural hemorrhage- with moderate [1-24 hours] loss of consciousness
804.24	Closed with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
804.25	Closed with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
804.26	Closed with subarachnoid, subdural, and extradural hemorrhage- with loss of consciousness of unspecified duration
804.29	Closed with subarachnoid, subdural, and extradural hemorrhage- with concussion, unspecified
804.3	Multiple fractures involving skull or face with other bones- closed with other and unspecified intracranial hemorrhage
804.30	Closed with other and unspecified intracranial hemorrhage- unspecified state of consciousness
804.31	Closed with other and unspecified intracranial hemorrhage- with no loss of consciousness
804.32	Closed with other and unspecified intracranial hemorrhage- with brief [less than one hour] loss of consciousness
804.33	Closed with other and unspecified intracranial hemorrhage- with moderate [1-24 hours] loss of consciousness
804.34	Closed with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
804.35	Closed with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
804.36	Closed with other and unspecified intracranial hemorrhage- with loss of consciousness of unspecified duration
804.39	Closed with other and unspecified intracranial hemorrhage- with concussion, unspecified
804.4	Multiple fractures involving skull or face with other bones- closed with intracranial injury of other and unspecified nature
804.40	Closed with intracranial injury of other and unspecified nature- unspecified state of consciousness
804.41	Closed with intracranial injury of other and unspecified nature- with no loss of consciousness

804.42	Closed with intracranial injury of other and unspecified nature- with brief [less than one hour] loss of consciousness
804.43	Closed with intracranial injury of other and unspecified nature- with moderate [1-24 hours] loss of consciousness
804.44	Closed with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
804.45	Closed with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
804.46	Closed with intracranial injury of other and unspecified nature- with loss of consciousness of unspecified duration
804.49	Closed with intracranial injury of other and unspecified nature- with concussion, unspecified
804.6	Multiple fractures involving skull or face with other bones- Open with cerebral laceration and contusion
804.60	Open with cerebral laceration and contusion- unspecified state of consciousness
804.61	Open with cerebral laceration and contusion- with no loss of consciousness
804.62	Open with cerebral laceration and contusion- with brief [less than one hour] loss of consciousness
804.63	Open with cerebral laceration and contusion- with moderate [1-24 hours] loss of consciousness
804.64	Open with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
804.65	Open with cerebral laceration and contusion- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
804.66	Open with cerebral laceration and contusion- with loss of consciousness of unspecified duration
804.69	Open with cerebral laceration and contusion- with concussion, unspecified
804.7	Multiple fractures involving skull or face with other bones- open with subarachnoid, subdural, and extradural hemorrhage
804.70	Open with subarachnoid, subdural, and extradural hemorrhage- unspecified state of consciousness
804.71	Open with subarachnoid, subdural, and extradural hemorrhage- with no loss of consciousness
804.72	Open with subarachnoid, subdural, and extradural hemorrhage- with brief [less than one hour] loss of consciousness
804.73	Open with subarachnoid, subdural, and extradural hemorrhage- with moderate [1-24 hours] loss of consciousness
804.74	Open with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
804.75	Open with subarachnoid, subdural, and extradural hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
804.76	Open with subarachnoid, subdural, and extradural hemorrhage- with loss of consciousness of unspecified duration
804.79	Open with subarachnoid, subdural, and extradural hemorrhage- with concussion, unspecified
804.8	Multiple fractures involving skull or face with other bones- open with other and unspecified intracranial hemorrhage
804.80	Open with other and unspecified intracranial hemorrhage- unspecified state of consciousness
804.81	Open with other and unspecified intracranial hemorrhage- with no loss of consciousness
804.82	Open with other and unspecified intracranial hemorrhage- with brief [less than one hour] loss of consciousness

804.83	Open with other and unspecified intracranial hemorrhage- with moderate [1-24 hours] loss of consciousness
804.84	Open with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
804.85	Open with other and unspecified intracranial hemorrhage- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
804.86	Open with other and unspecified intracranial hemorrhage- with loss of consciousness of unspecified duration
804.89	Open with other and unspecified intracranial hemorrhage- with concussion, unspecified
804.9	Multiple fractures involving skull or face with other bones- open with intracranial injury of other and unspecified nature
804.90	Open with intracranial injury of other and unspecified nature- unspecified state of consciousness
804.91	Open with intracranial injury of other and unspecified nature- with no loss of consciousness
804.92	Open with intracranial injury of other and unspecified nature- with brief [less than one hour] loss of consciousness
804.93	Open with intracranial injury of other and unspecified nature- with moderate [1-24 hours] loss of consciousness
804.94	Open with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
804.95	Open with intracranial injury of other and unspecified nature- with prolonged [more than 24 hours] loss of consciousness, without return to pre-existing conscious level
804.96	Open with intracranial injury of other and unspecified nature- with loss of consciousness of unspecified duration
804.99	Open with intracranial injury of other and unspecified nature- with concussion, unspecified
850	Concussion
850.0	With no loss of consciousness
850.1	With brief loss of consciousness
850.11	Concussion, with loss of consciousness of 30 minutes or less
850.12	Concussion, with loss of consciousness from 31 to 59 minutes
850.2	With moderate loss of consciousness
850.3	With prolonged loss of consciousness and return to pre-existing conscious level
850.4	With prolonged loss of consciousness, without return to pre-existing conscious level
850.5	With loss of consciousness of unspecified duration
850.9	Concussion, unspecified
851.0	Cerebral laceration and contusion- cortex (cerebral) contusion without mention of open intracranial wound
851.00	Cortex (cerebral) contusion without mention of open intracranial wound- unspecified state of consciousness
851.01	Cortex (cerebral) contusion without mention of open intracranial wound- with no loss of consciousness
851.02	Cortex (cerebral) contusion without mention of open intracranial wound- with brief [less than one hour] loss of consciousness
851.03	Cortex (cerebral) contusion without mention of open intracranial wound- with moderate [1-24 hours] loss of consciousness
851.04	Cortex (cerebral) contusion without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level

851.05	Cortex (cerebral) contusion without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
851.06	Cortex (cerebral) contusion without mention of open intracranial wound- with loss of consciousness of unspecified duration
851.09	Cortex (cerebral) contusion without mention of open intracranial wound- with concussion, unspecified
851.1	Cerebral laceration and contusion- cortex (cerebral) contusion with open intracranial wound
851.10	Cortex (cerebral) contusion with open intracranial wound- unspecified state of consciousness
851.11	Cortex (cerebral) contusion with open intracranial wound- with no loss of consciousness
851.12	Cortex (cerebral) contusion with open intracranial wound- with brief [less than one hour] loss of consciousness
851.13	Cortex (cerebral) contusion with open intracranial wound- with moderate [1-24 hours] loss of consciousness
851.14	Cortex (cerebral) contusion with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
851.15	Cortex (cerebral) contusion with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
851.16	Cortex (cerebral) contusion with open intracranial wound- with loss of consciousness of unspecified duration
851.19	Cortex (cerebral) contusion with open intracranial wound- with concussion, unspecified
851.2	Cerebral laceration and contusion- cortex (cerebral) laceration without mention of open intracranial wound
851.20	Cortex (cerebral) laceration without mention of open intracranial wound- unspecified state of consciousness
851.21	Cortex (cerebral) laceration without mention of open intracranial wound- with no loss of consciousness
851.22	Cortex (cerebral) laceration without mention of open intracranial wound- with brief [less than one hour] loss of consciousness
851.23	Cortex (cerebral) laceration without mention of open intracranial wound- with moderate [1-24 hours] loss of consciousness
851.24	Cortex (cerebral) laceration without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
851.25	Cortex (cerebral) laceration without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
851.26	Cortex (cerebral) laceration without mention of open intracranial wound- with loss of consciousness of unspecified duration
851.29	Cortex (cerebral) laceration without mention of open intracranial wound- with concussion, unspecified
851.3	Cerebral laceration and contusion- cortex (cerebral) laceration with open intracranial wound
851.30	Cortex (cerebral) laceration with open intracranial wound- unspecified state of consciousness
851.31	Cortex (cerebral) laceration with open intracranial wound- with no loss of consciousness
851.32	Cortex (cerebral) laceration with open intracranial wound- with brief [less than one hour] loss of consciousness
851.33	Cortex (cerebral) laceration with open intracranial wound- with moderate [1-24 hours] loss of consciousness
851.34	Cortex (cerebral) laceration with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level

851.35	Cortex (cerebral) laceration with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
851.36	Cortex (cerebral) laceration with open intracranial wound- with loss of consciousness of unspecified duration
851.39	Cortex (cerebral) laceration with open intracranial wound- with concussion, unspecified
851.4	Cerebral laceration and contusion- cerebellar or brain stem contusion without mention of open intracranial wound
851.40	Cerebellar or brain stem contusion without mention of open intracranial wound- unspecified state of consciousness
851.41	Cerebellar or brain stem contusion without mention of open intracranial wound- with no loss of consciousness
851.42	Cerebellar or brain stem contusion without mention of open intracranial wound- with brief [less than one hour] loss of consciousness
851.43	Cerebellar or brain stem contusion without mention of open intracranial wound- with moderate [1-24 hours] loss of consciousness
851.44	Cerebellar or brain stem contusion without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
851.45	Cerebellar or brain stem contusion without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
851.46	Cerebellar or brain stem contusion without mention of open intracranial wound- with loss of consciousness of unspecified duration
851.49	Cerebellar or brain stem contusion without mention of open intracranial wound- with concussion, unspecified
851.5	Cerebral laceration and contusion- cerebellar or brain stem contusion with open intracranial wound
851.50	Cerebellar or brain stem contusion with open intracranial wound- unspecified state of consciousness
851.51	Cerebellar or brain stem contusion with open intracranial wound- with no loss of consciousness
851.52	Cerebellar or brain stem contusion with open intracranial wound- with brief [less than one hour] loss of consciousness
851.53	Cerebellar or brain stem contusion with open intracranial wound- with moderate [1-24 hours] loss of consciousness
851.54	Cerebellar or brain stem contusion with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
851.55	Cerebellar or brain stem contusion with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
851.56	Cerebellar or brain stem contusion with open intracranial wound- with loss of consciousness of unspecified duration
851.59	Cerebellar or brain stem contusion with open intracranial wound- with concussion, unspecified
851.6	Cerebral laceration and contusion- cerebellar or brain stem laceration without mention of open intracranial wound
851.60	Cerebellar or brain stem laceration without mention of open intracranial wound- unspecified state of consciousness
851.61	Cerebellar or brain stem laceration without mention of open intracranial wound- with no loss of consciousness
851.62	Cerebellar or brain stem laceration without mention of open intracranial wound- with brief [less than one hour] loss of consciousness

851.63	Cerebellar or brain stem laceration without mention of open intracranial wound- with moderate [1-24 hours] loss of consciousness
851.64	Cerebellar or brain stem laceration without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
851.65	Cerebellar or brain stem laceration without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
851.66	Cerebellar or brain stem laceration without mention of open intracranial wound- with loss of consciousness of unspecified duration
851.69	Cerebellar or brain stem laceration without mention of open intracranial wound- with concussion, unspecified
851.7	Cerebral laceration and contusion- cerebellar or brain stem laceration with open intracranial wound
851.70	Cerebellar or brain stem laceration with open intracranial wound- unspecified state of consciousness
851.71	Cerebellar or brain stem laceration with open intracranial wound- with no loss of consciousness
851.72	Cerebellar or brain stem laceration with open intracranial wound- with brief [less than one hour] loss of consciousness
851.73	Cerebellar or brain stem laceration with open intracranial wound- with moderate [1-24 hours] loss of consciousness
851.74	Cerebellar or brain stem laceration with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
851.75	Cerebellar or brain stem laceration with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
851.76	Cerebellar or brain stem laceration with open intracranial wound- with loss of consciousness of unspecified duration
851.79	Cerebellar or brain stem laceration with open intracranial wound- with concussion, unspecified
851.8	Cerebral laceration and contusion- other and unspecified cerebral laceration and contusion, without mention of open intracranial wound
851.80	Other and unspecified cerebral laceration and contusion, without mention of open intracranial wound- unspecified state of consciousness
851.81	Other and unspecified cerebral laceration and contusion, without mention of open intracranial wound- with no loss of consciousness
851.82	Other and unspecified cerebral laceration and contusion, without mention of open intracranial wound- with brief [less than one hour] loss of consciousness
851.83	Other and unspecified cerebral laceration and contusion, without mention of open intracranial wound- with moderate [1-24 hours] loss of consciousness
851.84	Other and unspecified cerebral laceration and contusion, without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
851.85	Other and unspecified cerebral laceration and contusion, without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
851.86	Other and unspecified cerebral laceration and contusion, without mention of open intracranial wound- with loss of consciousness of unspecified duration
851.89	Other and unspecified cerebral laceration and contusion, without mention of open intracranial wound- with concussion, unspecified
851.9	Cerebral laceration and contusion- other and unspecified cerebral laceration and contusion, with open intracranial wound

851.90	Other and unspecified cerebral laceration and contusion, with open intracranial wound- unspecified state of consciousness
851.91	Other and unspecified cerebral laceration and contusion, with open intracranial wound- with no loss of consciousness
851.92	Other and unspecified cerebral laceration and contusion, with open intracranial wound- with brief [less than one hour] loss of consciousness
851.93	Other and unspecified cerebral laceration and contusion, with open intracranial wound- with moderate [1-24 hours] loss of consciousness
851.94	Other and unspecified cerebral laceration and contusion, with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
851.95	Other and unspecified cerebral laceration and contusion, with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
851.96	Other and unspecified cerebral laceration and contusion, with open intracranial wound- with loss of consciousness of unspecified duration
851.99	Other and unspecified cerebral laceration and contusion, with open intracranial wound- with concussion, unspecified
852.0	Subarachnoid, subdural, and extradural hemorrhage, following injury- Subarachnoid hemorrhage following injury without mention of open intracranial wound
852.00	Subarachnoid hemorrhage following injury without mention of open intracranial wound- unspecified state of consciousness
852.01	Subarachnoid hemorrhage following injury without mention of open intracranial wound- with no loss of consciousness
852.02	Subarachnoid hemorrhage following injury without mention of open intracranial wound- with brief [less than one hour] loss of consciousness
852.03	Subarachnoid hemorrhage following injury without mention of open intracranial wound- with moderate [1-24 hours] loss of consciousness
852.04	Subarachnoid hemorrhage following injury without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
852.05	Subarachnoid hemorrhage following injury without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
852.06	Subarachnoid hemorrhage following injury without mention of open intracranial wound- with loss of consciousness of unspecified duration
852.09	Subarachnoid hemorrhage following injury without mention of open intracranial wound- with concussion, unspecified
852.1	Subarachnoid, subdural, and extradural hemorrhage, following injury- Subarachnoid hemorrhage following injury with open intracranial wound
852.10	Subarachnoid hemorrhage following injury with open intracranial wound- unspecified state of consciousness
852.11	Subarachnoid hemorrhage following injury with open intracranial wound- with no loss of consciousness
852.12	Subarachnoid hemorrhage following injury with open intracranial wound- with brief [less than one hour] loss of consciousness
852.13	Subarachnoid hemorrhage following injury with open intracranial wound- with moderate [1-24 hours] loss of consciousness
852.14	Subarachnoid hemorrhage following injury with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level

852.15	Subarachnoid hemorrhage following injury with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
852.16	Subarachnoid hemorrhage following injury with open intracranial wound- with loss of consciousness of unspecified duration
852.19	Subarachnoid hemorrhage following injury with open intracranial wound- with concussion, unspecified
852.2	Subarachnoid, subdural, and extradural hemorrhage, following injury- Subdural hemorrhage following injury without mention of open intracranial wound
852.20	Subdural hemorrhage following injury without mention of open intracranial wound- unspecified state of consciousness
852.21	Subdural hemorrhage following injury without mention of open intracranial wound- with no loss of consciousness
852.22	Subdural hemorrhage following injury without mention of open intracranial wound- with brief [less than one hour] loss of consciousness
852.23	Subdural hemorrhage following injury without mention of open intracranial wound- with moderate [1-24 hours] loss of consciousness
852.24	Subdural hemorrhage following injury without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
852.25	Subdural hemorrhage following injury without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
852.26	Subdural hemorrhage following injury without mention of open intracranial wound- with loss of consciousness of unspecified duration
852.29	Subdural hemorrhage following injury without mention of open intracranial wound- with concussion, unspecified
852.3	Subarachnoid, subdural, and extradural hemorrhage, following injury- Subdural hemorrhage following injury with open intracranial wound
852.30	Subdural hemorrhage following injury with open intracranial wound- unspecified state of consciousness
852.31	Subdural hemorrhage following injury with open intracranial wound- with no loss of consciousness
852.32	Subdural hemorrhage following injury with open intracranial wound- with brief [less than one hour] loss of consciousness
852.33	Subdural hemorrhage following injury with open intracranial wound- with moderate [1-24 hours] loss of consciousness
852.34	Subdural hemorrhage following injury with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
852.35	Subdural hemorrhage following injury with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
852.36	Subdural hemorrhage following injury with open intracranial wound- with loss of consciousness of unspecified duration
852.39	Subdural hemorrhage following injury with open intracranial wound- with concussion, unspecified
852.4	Subarachnoid, subdural, and extradural hemorrhage, following injury- Extradural hemorrhage following injury without mention of open intracranial wound
852.40	Extradural hemorrhage following injury without mention of open intracranial wound- unspecified state of consciousness
852.41	Extradural hemorrhage following injury without mention of open intracranial wound- with no loss of consciousness
852.42	Extradural hemorrhage following injury without mention of open intracranial wound- with brief [less than one hour] loss of consciousness

852.43	Extradural hemorrhage following injury without mention of open intracranial wound- with moderate [1-24 hours] loss of consciousness
852.44	Extradural hemorrhage following injury without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
852.45	Extradural hemorrhage following injury without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
852.46	Extradural hemorrhage following injury without mention of open intracranial wound- with loss of consciousness of unspecified duration
852.49	Extradural hemorrhage following injury without mention of open intracranial wound- with concussion, unspecified
852.5	Subarachnoid, subdural, and extradural hemorrhage, following injury- extradural hemorrhage following injury with open intracranial wound
852.50	Extradural hemorrhage following injury with open intracranial wound- unspecified state of consciousness
852.51	Extradural hemorrhage following injury with open intracranial wound- with no loss of consciousness
852.52	Extradural hemorrhage following injury with open intracranial wound- with brief [less than one hour] loss of consciousness
852.53	Extradural hemorrhage following injury with open intracranial wound- with moderate [1-24 hours] loss of consciousness
852.54	Extradural hemorrhage following injury with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
852.55	Extradural hemorrhage following injury with open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
852.56	Extradural hemorrhage following injury with open intracranial wound- with loss of consciousness of unspecified duration
852.59	Extradural hemorrhage following injury with open intracranial wound- with concussion, unspecified
853.0	Other and unspecified intracranial hemorrhage following injury- without mention of open intracranial wound
853.00	Without mention of open intracranial wound- unspecified state of consciousness
853.01	Without mention of open intracranial wound- with no loss of consciousness
853.02	Without mention of open intracranial wound- with brief [less than one hour] loss of consciousness
853.03	Without mention of open intracranial wound- with moderate [1-24 hours] loss of consciousness
853.04	Without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
853.05	Without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
853.06	Without mention of open intracranial wound- with loss of consciousness of unspecified duration
853.09	Without mention of open intracranial wound- with concussion, unspecified
853.1	Other and unspecified intracranial hemorrhage following injury- with open intracranial wound
853.10	With open intracranial wound- unspecified state of consciousness
853.11	With open intracranial wound- with no loss of consciousness
853.12	With open intracranial wound- with brief [less than one hour] loss of consciousness
853.13	With open intracranial wound- with moderate [1-24 hours] loss of consciousness
853.14	With open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level

853.15	With open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
853.16	With open intracranial wound- with loss of consciousness of unspecified duration
853.19	With open intracranial wound- with concussion, unspecified
854.0	Intracranial injury of other and unspecified nature- without mention of open intracranial wound
854.00	Without mention of open intracranial wound- unspecified state of consciousness
854.01	Without mention of open intracranial wound- with no loss of consciousness
854.02	Without mention of open intracranial wound- with brief [less than one hour] loss of consciousness
854.03	Without mention of open intracranial wound- with moderate [1-24 hours] loss of consciousness
854.04	Without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
854.05	Without mention of open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
854.06	Without mention of open intracranial wound- with loss of consciousness of unspecified duration
854.09	Without mention of open intracranial wound- with concussion, unspecified
854.1	Intracranial injury of other and unspecified nature- with open intracranial wound
854.10	With open intracranial wound- unspecified state of consciousness
854.11	With open intracranial wound- with no loss of consciousness
854.12	With open intracranial wound- with brief [less than one hour] loss of consciousness
854.13	With open intracranial wound- with moderate [1-24 hours] loss of consciousness
854.14	With open intracranial wound- with prolonged [more than 24 hours] loss of consciousness and return to pre-existing conscious level
854.15	With open intracranial wound- with prolonged [more than 24 hours] loss of consciousness without return to pre-existing conscious level
854.16	With open intracranial wound- with loss of consciousness of unspecified duration
854.19	With open intracranial wound- with concussion, unspecified
925.1	Crushing injury of face and scalp
950.0	Optic nerve injury
950.1	Injury to optic chiasm
950.2	Injury to optic pathways
950.3	Injury to visual cortex
959.01	Head injury, unspecified
995.50	Child abuse, unspecified
995.54	Child physical abuse
995.55	Shaken baby syndrome
995.59	Other child abuse and neglect

Appendix 2. External Cause of Injury Codes for Defining Nonfatal Abusive Head Trauma in Children under the Age of s5 Years

Code	Meaning
E960.0	Unarmed fight or brawl
E967	Perpetrator of child and adult abuse
E967.0	By father, stepfather, or boyfriend
E967.1	By other specified person
E967.2	By mother, stepmother, or girlfriend
E967.3	By spouse or partner
E967.4	By child
E967.5	By sibling
E967.6	By grandparent
E967.7	By other relative
E967.8	By nonrelated caregiver
E967.9	By unspecified person
E968.1	Pushing from a high place
E968.2	Striking by blunt or thrown object
E968.8	Other specified means
E968.9	Unspecified means
E987	Falling from high place, undetermined whether accidentally or purposely inflicted
E987.0	Residential premises
E987.1	Other manmade structures
E987.2	Natural sites
E987.9	Unspecified site
E988.8	Injury by other and unspecified means, undetermined whether accidentally or purposely inflicted - other specified means
E988.9	Injury by other and unspecified means, undetermined whether accidentally or purposely inflicted - unspecified means

Appendix 3. Fall and Accident Codes

Code	Meaning
E800-E807	Railway accidents
E810-E819	Motor vehicle traffic accidents
E820-E825	Motor vehicle nontraffic accidents
E826-E829	Other road vehicle accidents
E830-E838	Water transport accidents
E840-E845	Air and space transport accidents
E846-E848	Vehicle accidents not elsewhere classified
E880-E888	Accidental falls
E890-E899	Accidents caused by fire and flames
E900-E909	Accidents due to natural and environmental factors
E910-E915	Accidents caused by submersion, suffocation, and foreign bodies
E916-E928	Other accidents

Appendix 4. ICD-10 Codes for Defining Fatal Abusive Head Trauma in Children under the Age of 5 Years

Code	Meaning
S02	Fracture of skull and facial bones
S02.0	Fracture of vault of skull
S02.1	Fracture of base of skull
S02.7	Multiple fractures involving skull and facial bones
S02.8	Fractures of other skull and facial bones
S02.9	Fracture of skull and facial bones, part unspecified
S04.0	Injury of optic nerve and pathways
S06.0	Concussion
S06.1	Traumatic cerebral edema
S06.2	Diffuse brain injury
S06.3	Focal brain injury
S06.4	Epidural 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
S07.1	Crushing injury of skull
S07.8	Crushing injury of other parts of head
S07.9	Crushing injury of head, part unspecified
S09.7	Multiple injuries of head
S09.8	Other specified injuries of head
T74.1	Physical abuse
T74.8	Other maltreatment syndromes
T74.9	Maltreatment syndrome, unspecified
T90.2	Sequelae of fracture of skull and facial bones
T90.5	Sequelae of intracranial injury
T90.8	Sequelae of other specified injuries of head
T90.9	Sequelae of unspecified injury of head
Y00	Assault by blunt object
Y01	Assault by pushing from high place
Y04	Assault by bodily force
Y07	Other maltreatment syndromes
Y07.0	By spouse or partner
Y07.1	By parent
Y07.2	By acquaintance or friend
Y07.3	By official authorities

Y07.8	By other specified persons
Y07.9	By unspecified person
Y08	Assault by other specified means
Y09	Assault by unspecified means
Y29	Contact with blunt object, undetermined intent
Y30	Falling, lying or running before or into moving object, undetermined intent
Y33	Other specified events, undetermined intent
Y34	Unspecified event, undetermined intent
Y87.1	Sequelae of assault
Y87.2	Sequelae of events of undetermined intent

Appendix 5 – Panel Participants*

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