

Trauma Registrar Guide

2011

The Trauma Registrar Guide is just that, a guide to indicate necessary areas of knowledge and skill a trauma registrar should acquire in order to be effective, efficient, and accurate in the many areas of trauma data management and trauma system function.

Trauma Registrar Guide-2011

A primary purpose of aggregating trauma related data across the nation and within a state is to provide data for research purposes and to have evidence to direct and improve treatment which can maximize positive outcome for the trauma population. Good data provides evidence for benchmarking and process improvement activities as well as a base from which to develop standards of care. In order to preserve data integrity, each data element must be collected, as closely as possible, by the same definition and according to the same guidelines by each facility that contributes to a state or national database.

The integrity and value of data entered into a trauma registry database will be directly affected by the training and expertise of the Trauma Registrar who abstracts, enters, and manages the data. The American Trauma Society provides a combined Basic and Advanced Course that should be considered the minimum necessary trauma registry training. Knowledge of medical terminology and human anatomy are also important especially in light of the scheduled implementation of ICD-10-CM in 2013. The focus of this manual is to provide clarity of definition and process guidance as the NTDB®, National Trauma Databank, national elements are entered into facility trauma registries for uploading into the state and national databases. Once the data has been entered in a facility trauma registry, the data will then be uploaded directly or be mapped to the corresponding fields at the state and national level; therefore, monitoring data mapping and understanding software functionality will be a necessary task for the trauma registrar in every trauma department.

The Trauma Registrar

The Trauma Registrar position requires a knowledge base in many areas such as medical terminology, coding, pathophysiology, data management and presentation, software functionality, statistics, anatomy, and an understanding of the trauma patient care processes. To remain current the trauma registrar must take responsibility for continuing self education.

Experience in the medical field, whether in a physician's office, in a hospital, or in emergency medicine, is of great benefit to the entry level trauma registrar. Additionally, coursework in coding (ICD-9-CM and ICD-10-CM), data management, statistics, the anatomy of injury, registry software functionality, and trauma related continuing education courses will add to the skill set and understanding of the trauma registrar.

Several organizations offer learning opportunities to assist trauma registrars in developing their knowledge base and skill sets.

1. The American Trauma Society offers the combined Basic and Advanced Trauma Registry course. (CSTR--Certified Specialist in Trauma Registry credential by examination)
2. AAAM offers the AIS, Abbreviated Injury Scaling, course which teaches the coding of traumatic injury.(CAISS--Certified Abbreviated Injury Scale Specialist credential on examination)
3. State registry organizations often offer educational opportunities.

The CSTR, Certified Specialist in Trauma Registry, credential as well as the CAISS, Certified Abbreviated Injury Scale Specialist, credential are evidence of mastery of the core trauma related data and critical care processes which are common to every trauma department and system.

In order to take the CSTR exam one must meet the following requirements:

1. A minimum of a high school diploma or equivalent
2. At least 2 years of full – time or the equivalent (4,000 hours) experience in trauma registry practice.
3. Completion and filing of an Application for the Certification Examination for Trauma Registrars.
4. For more information contact http://www.amtrauma.org/courses/exam_cert.html.

In order to take the CAISS exam with success, it is highly recommended that the Abbreviated Injury Scaling course be completed. It is also recommended that at least one year of coding experience be accumulated in order to understand coding thought processes and be able to accurately code injuries in all 6 body regions.

Trauma Registry Skills

In general there are four basic skill sets that the Registrar will need to master.

1. Data Management – data integrity, reports and data presentation
2. Anatomy and Conditions of Injury
3. Coding and Scoring Concepts
4. Registry Issues – NTDB®, state, and facility

It is necessary to know how to manage data analysis, know anatomy, understand anatomical injury, be able to apply the coding rules and guidelines as provided in the AIS dictionary, and know how the registry software works. Even when the registry software allows text entry and maps to ICD-9 and AIS codes, it is important to know if the mapping is correct and the resulting codes accurately reflect the injury. The ICD-10 coding process, already in use internationally, is scheduled to be implemented in the United States beginning October 1, 2013. Thus, it will be important to understand how to code injuries using both coding systems. For instance, the Injury Severity Scores

(ISS) are dependent on the correct AIS codes which generate the severity digit as the post dot value.

The following discussion will take each of these key registrar skill sets and describe many of the issues that are important for the trauma registrar to know within each of the related topics.

I. Data Management

A. Inclusion Criteria

1. American College of Surgeons Guidelines
The definition of a “Trauma Patient” can be found in the American College of Surgeons: “Resources for Optimal Care of the Injured Patient”, often referred to as the “Bluebook or Greenbook” depending upon the year of publication. Any patient that meets this definition should be entered into the Trauma Registry.
2. Diagnosis Codes 800 – 959.9
The ACS inclusion criteria begins with any patient that has an injury in the code range between 800 and 959.9, but not one of the exclusion codes and meets one of the three event criteria below.¹

Patients are to be excluded if they are coded using ICD-9-CM **exclusion** codes for late effects of injury (905-909.9), superficial injuries, including blisters, contusions, abrasions, insect bites (910-924.9), and foreign bodies (930-939.9).

The event must also include one of the following:
 1. Hospital admission;
 2. Patient transfer via emergency medical services transport from one hospital to another hospital; or,
 3. Death resulting from the traumatic injury.¹
3. Local / State Requirements
Local and State organizations may add additional criteria as desired, for example, Missouri regulations follow NTDB® guidelines and include traumatic hip fractures, and single level fall injuries, regardless of age.
4. Department Change Log
Registry Change Logs – Each Trauma Department should maintain a Registry Log. The Registry Log contains a listing of each change, or update to the Registry software. It is to include the specific changes,

software upgrades, and any changes that are made to the user defined fields, additions and deletions, along with the date of each event. The log should be reviewed at least annually.

Note: NTDB® has an annual change log that is included with the Dictionary updates.

B. Data Abstraction

1. Identification of Required Data Elements Points

Data Abstraction - “**no data is better than bad data,**” if an element is unknown, don’t guess, enter unknown or as appropriate. Follow NTDB® and state guidelines.

Concurrent abstraction - daily abstraction while the patient is in house.

Retrospective abstraction - abstraction after patient discharge.

Hybrid - data entry is begun during the patient encounter but the record is closed after patient discharge.

2. Data Entry and Verification

The American College of Surgeons registry staffing recommendation for manual data entry is 1 full-time equivalent employee dedicated to the registry to process the data for approximately 750 to 1,000 patients annually (ACS). This may vary depending on the amount of data collected and the proportion that can be imported from the hospital information system into the trauma registry.¹

As registries begin to use data imported from the hospital EHR, the registrar responsibilities may expand from mainly data entry to include data validation of the information imported from the various hospital systems as well as from the electronic medical record.¹

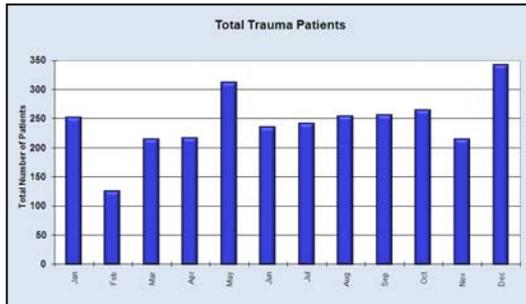
C. Reports

1. Basics

In order to run data for reporting the registrar needs to know several basic details: what information is needed to identify the correct data fields, the time frame that is of interest, any related filters, and what format for display grouping, such as year, month, ISS range, age range, etc.

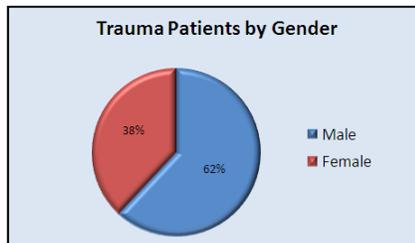
2. Presentation Concepts

- a. Format The way that the viewer wishes to view the result of the data compiled. The format identifies how the data is to be displayed such as paper, website, dashboard, PowerPoint presentation, etc.
 - b. Tables Show the actual data elements arranged in rows and columns.
 - c. Graphics A picture showing the result of data calculations. Graphic displays of information generally work better than tables for faster interpretation of changes, trends, and outliers.
1. Bar Graphs Horizontal or vertical bars proportional to the values of the data. These are used for quick comparison of information.



12

2. Pie Charts Show proportions of a whole or percentage of a whole.



12

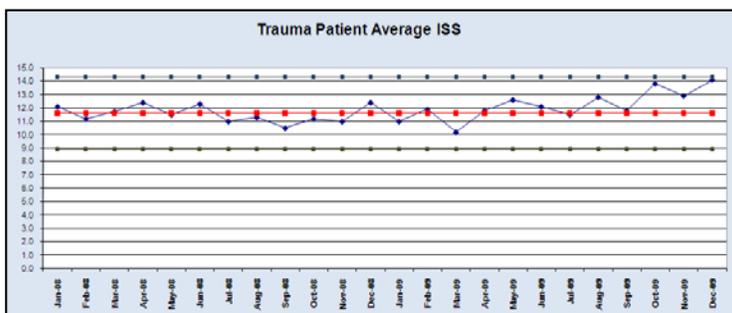
3. Line Graphs Line connecting data points in a sequential order to show a trend over time.



12

4. Others

Control Charts – used to observe performance by studying variation over time and monitors if a process is within control or out of control limits using upper and lower control lines calculated using standard deviation or sigma values with the center line representing the overall average.



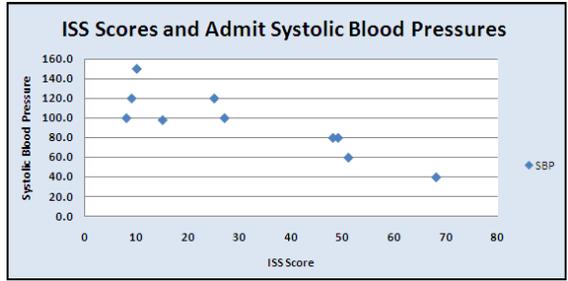
12

Dashboard - a compact visual presentation of critical data, usually at a higher level, to be easily understood at a glance.

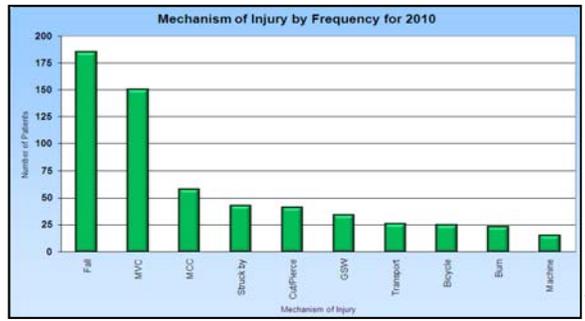
Spreadsheet - a collection of data in columns and rows that hold the data detail -- usually produced in an “Excel” type of document.¹²

	Jan	Feb	Mar	Apr	May	Jun
Patients	251	125	214	216	311	235
Hosp LOS	3.9	8.9	6.4	2.7	5.9	3.8
Ave ISS	11.2	12.3	11.0	12.4	12.0	12.4
Falls	3	5	4	3	4	15

Scatter grams - displays values for two variables showing the distribution of the values.¹²

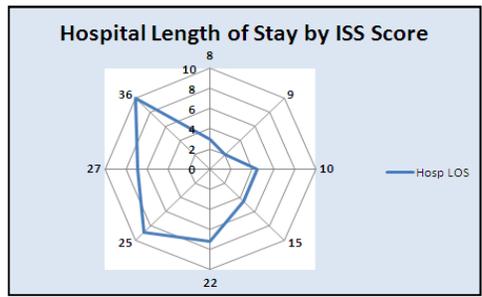


Pareto chart – typically a chart showing data from most to least frequently occurring information from left to right. These are used to clearly identify higher valued items (e.g., The highest frequency or priority for resolution).



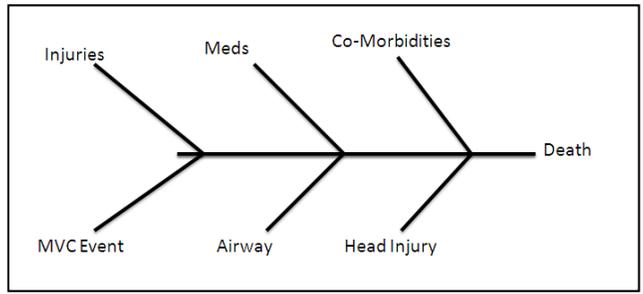
12 Radar

Chart - (same as spider gram) shows the relationship between multiple variables with one or more axis.



12

Tree Chart (Fishbone diagram) – used to identify all of the various issues/tasks that go into development of a single outcome.



3. Interpretation

- a. Volume Data Totals, such as total patients. These can be easily visualized by a bar chart (similar to a histogram) showing different heights depicting variance from comparative items or periods of time.
- b. Trends A trend is a series of consecutive information/data that is all moving upward or downward as time progresses. A trend line can be overlaid onto the chart information/ data for the reader to more easily visualize if there is a trend over time.

D. Performance Improvement

PIPS Process Improvement Patient Safety – Uses the continuous process of recognition, assessment, and correction. This includes processes such as data collection, collation, analysis, modification, and instruction.

1. Standards

- a. American College of Surgeons The **American College of Surgeons** is an educational association of surgeons created in 1913 to improve the quality of care for the surgical patient by setting high standards for surgical education and practice.¹

The American College of Surgeons originated the National Trauma Data Bank. It is a voluntary national data repository of information related to trauma patients. In order to provide standardization of data, the National Trauma Data Bank has published a definition of the “trauma patient”. This definition should be used to guide the trauma registrar in determining which patients are to be included in this database. (Inclusion criteria page 4.)

Additional information can be found regarding the recommendations for PIPS processes through the following ACS website:

<https://www.socialtext.net/acsdemowiki/performanceimprovementandpatientafetyreferencemanual>

- b. Joint Commission of Accreditation of Healthcare Organizations The Joint Commission of Accreditation of Healthcare Organizations (<http://www.jointcommission.org>) was created by merging the Hospital Standardization Program with similar programs run by the American

College of Physicians, the American Hospital Association, the American Medical Association, and the Canadian Medical Association. It is a national organization that provides standards so that hospitals may obtain accreditation for licensure and gain the right to receive payment from Medicaid and Medicare.³

2. Benchmarking

A benchmark is a standard by which something can be measured or judged, comparing like data over time with different organizations, providers, or with a recommended or desired outcome/standard.

Filters: Filters are tools that can be used to gather data into specifically defined groups, or a single item. Filters are used to easily define, view, or calculate subgroups within a larger population such as, all burns, all deaths, age groups, ISS Ranges, etc.

ICU Day = a count of any day, or partial day, that the patient was in an ICU. For example: if the patient was admitted at 11pm on one day, and discharged at 10 am the next day, this will equal 2 (two) ICU days, since the stay included 2 (two) 24 hour days.⁵

For more information, see the NTDB® Data Dictionary which can be found at <http://www.ntdsdictionary.org/dataElements/datasetDictionary.html>

If a calculation is required, it will be necessary to understand how to correctly define the field and/or how to calculate the item in order to compare the information. For example:

Average ICU Days = the number of total ICU Days for the period divided by the total number of patients that had an ICU stay.

Average Ventilator Days = the total number of days that the patients were on a ventilator, divided by the total number of patients that had been on a ventilator.

Mortality Rate = the total number of deaths for the period, divided by the total patient population for that period.

3. PI and Loop Closure

- a. Identification of Issues
Issues can be identified through many different avenues such as, communication from staff, patient satisfaction, risk management, chart review processes, trauma meetings/rounds, and direct patient interaction.
- b. Review of Issues
PI review process whereby the issue is brought to the Trauma Medical Director for evaluation, determination of issue and if there is a need for corrective action.
- c. Corrective Action
When a consistent problem or inappropriate variation is identified, corrective actions must be taken and documented. Examples of corrective actions are: new guidelines, protocol change , or pathway development and review, targeted education, enhanced resources/facilities, or communication, process improvement team implementation, counseling, peer review presentation, change in provider privileges or credentials, or external review.¹
- d. Result Evaluation
Demonstration that a corrective action has the desired effect determined by on-going or repeat evaluation.¹

E. Statistics

- 1. Population Demographics
The demographics of a population involves analysis of differing grouping of items such as the population age, gender, residence, nationality, etc.
- 2. Sampling
The process of taking a small portion of a larger set of data to study in order to obtain a picture of the probable larger total population. This can save time and money.
- 3. Calculations
 - a. Frequencies
Frequency is the number of occurrences of a repeating similar event that is identified within a defined set of reference.
 - b. Averages
Average or mean is the sum of the value of all integers

divided by the total number of integers.

The average or mean is the total all of the values, divided by the count of numbers in the listing of values, e.g., $9+8+7+6+5+5+5+3+2= 50/ 9 = 4.5$.

c. Percentages

Parts of an identified measured whole, typically obtained by taking the total of one group and dividing it by the total of the entire group. For example: The total number of pediatric patients in a group is 20. The total number of patients including pediatrics is 200. To find the percent of pediatric patients: $20/200 = 10\%$ of all patients are pediatric patients.

d. Ranges

The difference between the largest and the smallest number in a series.

e. Ratios

One value as compared to another, i.e., frequency of occurrence as in one in 240, e.g., 1:240.

f. Others

Mean = The same as average.

The median is the integer holding the middle position in a sequential listing of numbers.

The median when arranged : 9 8 7 6 5 5 5 3 2

Mode= the integer that occurs most often (i.e., 5 7 5 9 3 5 2 6 8) in this cluster is 5. Therefore, the mode would be 5.

Standard Deviation: a measure to quantify the difference between the values in the data set.

g. Report Requests

Report requests should be approved by the Trauma Director or IRB (Institutional Review Board) if appropriate. A cover letter with requester identification, the date of request, identification of data requested and purpose, time frame for the data search, and the identification of trauma registrar providing data, as well as contact information should be included with the data. Report requests are usually for aggregate de-identified data.

In all cases HIPAA guidelines should be followed.

II. ANATOMY AND CONDITIONS OF INJURY - Anatomy is VERY important.

To accurately code an injury one must know much more than which bone or organ was injured. Understanding the various descriptors used in documentation and in the detailed anatomy of each particular bone or organ will be necessary to accurately apply codes.

An understanding of the mechanisms and types of Injury will be necessary as well for optimum accuracy in applying ICD 9 and AIS codes.

A. Basic Anatomy

See the reference list and/or search the internet to assist with the identification and location of each bone/organ.

1. Head / Neck

Head: Ethmoid bone, frontal bone, occipital bone, parietal bones x 2, sphenoid bone, temporal bone x 2.

Brain: Adult average brain weighs approximately 3 pounds with 500 milliliters of cerebral spinal fluid (CSF).

Neck: Cervical vertebrae x 7, trachea, esophagus, larynx, pharynx, hyoid bone.

2. Face

Facial bones: 14 stationary bones and a lower jaw bone. Inferior nasal conchae x 2, lacrimal bones x 2, mandible, maxilla x 2, nasal bones and septum, palatine bones x 2, vomer, zygomatic bones x 2, eye, ear.

3. Chest

Chest: Thoracic spine, ribs 1-12, sternum, heart, bronchi and lungs, thoracic aorta, diaphragm, thoracic esophagus.

4. Abdomen

Abdomen: Liver, spleen, colon, rectum, small bowel, pancreas, kidneys, pelvis, uterus, bladder, stomach, gallbladder, retroperitoneum, abdominal aorta and other vessels.

5. Spine

Spinal Column: Cervical--7, thoracic--12, lumbar--5, sacrum—5 (fused), coccyx (tailbone)—2, 3, or 4.

Note: C1 = Atlas, C2 = Axis and has a “dens” (spike-like projection) that projects upward on which the atlas

rotates.

Vertebrae parts: Vertebral body, spinous process, transverse process, pedicle, foramen, lamina, superior and inferior articular processes.

Note: The 5 separate bones of the sacrum begin to fuse during the late teen years and are usually completely fused by 25 or 26 years of age. Coccygeal vertebrae are also fused.

6. Extremities

Upper Extremities:

Shoulder girdle with scapula and clavicle.

Humerus: Median and lateral epicondyle (end of humerus), capitulum, trochlea, coronoid fossa, deltoid tuberosity, greater & lesser tubercle, head & neck. ¹⁰

Ulna: Olecranon process (elbow), coronoid process, ulnar tuberosity, styloid process (projection at the distal end of the ulna).

Radius: also has a styloid process at the distal end.

Hand: Carpal bones x 8 (scaphoid, lunate, triquetrum, pisiform, trapezium, trapezoid, capitate, hamate), metacarpals x 5, and phalanges (proximal x 5, middle x 5, distal x 5).

Joints: Acromioclavicular, carpal bones (wrist), elbow, sternoclavicular, glenohumeral, metacarpophalangeal, interphalangeal.

Lower Extremities:

Pelvic girdle

Pelvis: Ilium, iliac crest, acetabulum, ischium, pubis, sacrum and sacroiliac joints.

Legs: femur, patella (knee cap), tibia, fibula.

Joints: Hip, knee, and ankle.

Ankle Bones: Lateral malleolus, medial malleolus

Foot: Tarsal bones (7), calcaneus (heel bone), talus, cuboid, navicular, first, second and third cuneiform), metatarsals, phalanges.

images of the organ as it functions.

Interventional radiology procedure = a procedure performed by a radiologist, usually in the radiology department, such as arteriography, angiography, or placement of a filter in a vein as a therapy for DVT's.

2. Laboratory

- a. Toxicology
Toxicology can involve either a blood or urine sample. Toxicology labs tests look for levels of alcohol (BAC) or drugs that may have been used.
- b. Chemistry
Chemistry labs typically include electrolyte levels with other options that may vary at different labs. Some of the tests included in a chemistry are: sodium, potassium chloride, calcium, creatinine (blood), glucose(blood sugar), magnesium, phosphorus, etc.
- c. Hematology
Involves testing on the blood itself to determine the patient blood volumes in relation to the normal values. It includes a: CBC (complete blood count) and differential. The CBC includes: WBC, hemoglobin, hematocrit, MCV, platelets, etc. The differential includes such things as neutrophils, lymphocytes, basophils, etc.
- d. Other
Coagulation: Prottime, PTT, INR Studies to determine the length of time for blood to clot for the patient compared to what is expected.
Blood Gases: ABG: Arterial blood gases measure the amount of oxygen, carbon dioxide, sodium bicarbonate, base excess, etc., in the arterial blood. This involves a special blood draw from an artery.
Infection Control: Infection control testing usually involves a culture of a certain part of the body/fluid. This can be a wound culture, urine culture, blood culture, oral culture. It can also include a culture of a foreign body that was in the body/wound, such as a culture of the tip a central line catheter that has been removed.
Urine: Urine testing is done to identify urinary tract infections, for drug screens, or pregnancy testing, etc.

C. Interventions

1. Airway Management

Oral airways, nasopharyngeal airways, oropharyngeal airways, and nasal trumpets are NOT artificial airways. Rather they are pieces of equipment that are inserted into the nose or mouth to simply keep the airway open and clear of soft tissue so that the patient can more easily breathe on their own.

When a patient is no longer able to adequately breathe on their own for any reason, there are a variety of tubes that can be placed into the patient airway to keep the airway open and facilitate a manual exchange of oxygen for the patient via ventilator, or “bagging”.

These airway tubes provide an artificial airway: ET (endotracheal tube), trach tube, LMA (laryngeal mask airway), EOA (esophageal obturator airway), combitube airway, King airway (brand of combitube). (Note: the LMA, EOA, King/combitube airways are typically used for short term events until a longer term ET, or trach tube can be inserted.)

Coding consideration: Codes differ for length of time on the ventilator depending on whether the patient was on the ventilator for more or less than 96 consecutive hours, do not count time in the OR.

2. Fluid Administration

Fluids administered to a trauma patient will consist mainly of crystalloids and blood products.

Examples of crystalloids are:

- NS -- Normal saline
- LR -- Lactated ringers

Blood products include:

- PRBC's -- Packed red blood cells
- FFP -- Fresh frozen plasma
- Platelets

Coding consideration: Code blood products administered in the first 48 hours. Track for documented blood loss <, >, or = to 20% loss.

Follow NTDB® coding guidelines.

20% blood loss: 220 lb wt. = 1500 ml.

165 lb wt. = 1125 ml.
135 lb wt. = 1000 ml.
110 lb wt. = 750 ml.
55 lb wt. = 375 ml.
22 lb wt. = 150 ml.
11 lb wt. = 75 ml.

3. Surgical Procedures
Related to Injury

Any surgical procedures related to the injury should be included in the Trauma Registry data base. All essential, treatment, diagnostic procedures, associated times, and interventions should be entered and coded appropriately. NTDB® list of procedures.

Note: The NTDB® defines many of the “time” data collected for the registry in the NTDB Data Dictionary. For instance, the OR Procedure Time is defined as the incision time.¹⁷

D. Post Trauma Conditions

1. Sequelae

Sequelae - a pathological condition that can be considered “commonly resulting” from the actual disease process, injury, or trauma.³ A few are AIS coded, such as, pneumo-, hemo-, thorax, pneumocephalus, air embolism, brain edema and swelling, blood loss, asphyxia, compartment syndrome of extremity, and others.

Do not confuse sequelae with the presence of a complication.

2. Complications

A complication is an undesired, unintended injury or disease process that occurs to the patient that is not part of the expected result of the injury or disease process. The registrar should only code the complications that occur in your facility during the encounter. Most will require treatment of some sort. An existing complication in a patient transferred from a facility becomes, in most cases, a co -morbidity for the receiving facility encounter.

Death, blindness, miscarriage, deafness, obstruction in organ, swelling and edema (except in brain) are, most often, not complications but sequelae or

outcomes, therefore NOT CODED as a complication.

Note: Do not up-code due to outcome.

III. AIS CODING AND SCORING CONCEPTS- www.Trauma.org

A. Guidelines

Basic Guideline- code conservatively if not clear, must have radiological, CT, MRI or other evidence of injury.

- | | |
|--------------------------|---|
| 1. Documentation Sources | Documentation of Injury- there are multiple sources with a data source hierarchy, but the entire medical record is to be reviewed. Code each injury to the most specific detail. Films and other radiological and diagnostic results from a referring facility can be referenced by the receiving facility, documented as present with evidence and, therefore can be coded as appropriate. |
| 2. Ethical Constraints | Coding and Scoring Concepts: Do not code “rule out”, “suspected”, or “probable”. Do not over- code or up- code due to treatment required or performed. Take care not to code an injury as bilateral when it is unilateral. |

B. Abbreviated Injury Scale

Abbreviated Injury Scale- originally developed by the AAAM, the Association for the Advancement of Automotive Medicine.² AIS is an anatomically based international injury scaling system.

According to the World Health Organization “It is the system of choice for coding single injuries and is the foundation for methods assessing multiple injuries or for assessing cumulative effects of more than one injury.”¹¹ There is a strong correlation between AIS severity and survival (and mortality).²

- | | |
|----------------|--|
| 1. AIS Scoring | An AIS code follows a seven digit format for example, _____ . _ as in 752401.2 The first 6 digits are called the pre-dot code. The single digit after the dot is called the post-dot digit or severity number.

The pre-dot code represents the body area of injury, the anatomical structure(s) involved, the level of injury. |
|----------------|--|

The AIS codes are grouped into 6 main body regions:

1. AIS region 1 = Head/Neck
2. AIS region 2 = Face
3. AIS region 3 = Chest /Thorax
4. AIS region 4 = Abdomen - Lumbar spine
5. AIS region 5 = Extremities, shoulder and pelvic girdles
6. AIS region 6 = External including burn, hypothermia, asphyxiation, drowning, electrocution, explosion full body

The post-dot code is a numerical value that is assigned according to the severity of the injury:

- .1 -- Minor**
- .2 – Moderate**
- .3 – Serious**
- .4 – Severe**
- .5 – Critical**
- .6 – Maximum (not fatal, currently untreatable)**
- A .6 is automatically an ISS = 75, code other injuries but don't add to this highest ISS total**

(.9 -- indicates injury present but no severity value)

To code accurately and successfully using the AIS codes, it is necessary to know detailed anatomy and be able to apply the AIS coding rules and guidelines. AAAM offers AIS courses both face to face and online. Website: www.aaam.org .

2. Concept

AIS severity reflects the severity of one injury for a patient 25-40 years old with no co-morbidities and with timely appropriate care.

C. ICD-9-CM

ICD-9-CM – stands for the International Classification of Diseases, Clinical Modification. There are 3 volumes that are bound into a single book. ICD 9 and

10 were developed by the WHO-World Health Organization to enable the international classification of morbidity and mortality data. Clinical modification was made for use in the USA.

- Volume 1 - Disease tabular list
- Volume 2 - Alphabetic index
- Volume 3 - Procedure tabular

The number after the ICD letters identifies the revised edition. We are currently using the 9th edition in the United States. ICD 10 is presently used internationally and will be implemented in the US beginning October 1, 2013. The anticipated release date for ICD 11 is 2015.

1. E Codes Classify the environmental events, circumstances, and conditions as the cause of injury, poisoning or other adverse event related to the external cause of the injury, such as MOI - mechanism of injury, i.e., MVC, Fire/Burn, Pedal Cyclist, Natural/Environmental, Cut/Pierce, Fall, Firearm, Machinery, etc. Each of these codes begins with an "E" and range from E800 to E999.1.

The first 3 numbers represent the mechanism of injury, or what actually occurred that resulted in an injury.

The first number after the dot (or fourth digit) represents the injured person, specific locations, or descriptors of the event.

For instance, for an MVC (E810-825) the first digit after the dot represents the injured person: E820._

- .0 = Driver of motor vehicle other than motorcycle
- .1 = Passenger of motor vehicle other than motorcycle
- .2 = Motorcyclist
- .3 = Passenger on motorcycle
- Etc.

Or, after E849, it describes the location: E849._

- .0 = Home
- .1 = Farm
- .2 = Mine
- .3 = Industry
- .4 = Recreation
- .5 = Street

Primary E codes are used by the NTDB® for categorization of injury according to the CDC Matrix. The category groupings can be found within the National Trauma Data Bank Annual Report that is published each year by the NTDB®.

<http://www.facs.org/trauma/ntdb/pdf/ntdbannualreport2010.pdf>
www.cdc.gov/injury/wisqars/ecode_matrix.html

Note the intentional and non intentional injury categories.

2. Diagnosis Codes ICD-9-CM Code format = XXX.XX – **diagnosis codes**.
3. V Codes V-Codes indicate the reason for an encounter, or reflect the status of the patient. It is a supplementary Classification of Factors Influencing Health Status and Contact with Health Service (V01-V86).⁹ V codes and the new activity codes are not presently used by the NTDB®.
4. Procedure Codes Procedure Codes are typically two digits, a dot, then one or two more digits, e.g., **07.61** = Partial excision of pituitary gland, transfrontal approach.⁹ The first two digits represent the body part involved with the procedure. The digit(s) after the dot represents what was done to the body part.
 - 01-05 = Operations on the nervous system/brain
 - 06-07 = Operations on the endocrine system
 - 08-16 = Operations on the eye
 - 55-58 = Operations on the urinary system
 - 76-84 = Operations on the musculoskeletal system
 - 87-99 = Miscellaneous diagnostic and therapeutic procedures.³

Note: Code only those procedures done at your facility.

D. Injury Scoring Go to www.Trauma.org - Look under categories then **Scoring systems.**

1. Injury Severity Scoring The Injury Severity Score (ISS) provides a score for patients with multiple injuries. The ISS score can be correlated with the mortality and morbidity of the injuries. Each injury is assigned an Abbreviated Injury Scale (AIS) score and is allocated to one of six body regions (Head/Neck, Face, Chest, Abdomen, Extremities (including Pelvis), and External. Only

the highest AIS score in each body region is used. The 3 most severe injuries in different body regions have their score squared and added together to produce the ISS score.⁴

Region ⁴	Injury Description ⁴	AIS ⁴	Square Top Three ⁴
Head & Neck	Cerebral Contusion	3	9
Face	No Injury	0	
Chest	Flail Chest	4	16
Abdomen	Minor Contusion of Liver, Complex Rupture Spleen	2 5	25
Extremity	Fractured Femur	3	
External	No Injury	0	
Injury Severity Score:			50

1. ISS range = 1 to 75. Ranges: 9-15 = mild, 16-25 = moderate, >25 = severe.
2. If an injury is assigned an AIS of .6 (Maximal) the ISS score is automatically assigned to 75.⁴
3. The ISS score is the scoring system most widely used internationally and correlates **most** linearly with mortality, morbidity, hospital stay and other measures of severity.⁴

2. Revised Trauma Score

The Revised Trauma Score (RTS) is a physiological scoring system, with high inter-rater reliability and demonstrated accuracy in predicting death. It is scored from the first set of data obtained on the patient, and consists of Glasgow Coma Scale, Systolic Blood Pressure and Respiratory Rate.⁴

GCS	Sys BP	Resp Rate	Coded Value
13-15	>89	10-29	4
9-12	76-89	>29	3
6-8	50-75	6-9	2
4-5	1-49	1-5	1
3	0	0	0

RTS-T (triage) is not weighted – Range of 0-12, unweighted. Normal is 12.

RTS-E (evaluation) is heavily weighted toward GCS – Range is .0000 to 7.8408. Normal is 7.8408.

3. Glasgow Coma Scale

Glasgow Coma Scale (GCS) represents an indication of brain function/impairment (Eye/Verbal/Motor). It is important to understand the descriptors of each numerical value, i.e., “1” for verbal means no verbal response; “1” for motor means decorticate posturing.

A patient cannot have a score less than 3: Eye - 1 + Verbal - 1, + Motor - 1 = total of 3.

The range is 3 – 15. Normal is 15.

	Eye	Verbal	Motor
1	no eye opening	no verbal response	no movement
2	opens to pain	incomprehensible	move to pain, extension
3	opens to verbal command	inappropriate	move to pain, flexion
4	opens spontaneously	confused	withdraw to pain
5		oriented	localize to pain
6			move on command

4. Trauma Score

Score for multiple traumatic injuries with a range of 1-16.

There are 5 components that go into calculating this score: : GCS, Systolic BP, Respiratory Rate, Capillary Refill, and Respiratory Effort.

5. Probability of Survival (TRISS)

The TRISS determines the probability of survival from the ISS, RTS and patient’s age.⁴

TRISS Probability:

TRISS > 0.50 = Probability of Survival

TRISS < 0.50 = Probability of Death

For more information reference: “The TRISS Method,”

Journal of Trauma 27:370-378; 1987.

6. Z Scores and W Scores An article on “Trauma Center Maturation” by the Department of Surgery at the University of Pittsburgh Medical Center describes W Scores and Z Scores: “The w score measures the clinical significance and the z score the statistical significance of outcome. The w score represents the difference between the number of patients actually surviving and the number of survivors expected per 100 patients treated. Thus, a w value of +4 indicates that 4 more patients survived per 100 patients than would have been predicted. If z is more negative than -1.96, significantly more patients died than were predicted. If z exceeds +1.96, significantly more patients survived than predicted, and w indicates the number of unexpected survivors per 100 admissions. Thus, the progressive rise in z scores and w values for adults with penetrating or blunt injuries suggests that as the TC matured and the quality of care improved, a measurable improvement in outcome was demonstrated as lives saved.”⁸
7. Injury Classification OIS - Organ Injury Scale (see reference list)
Pelvic Injury Tables-classification of pelvic fractures
Lund - Browder Chart for Burns – burn rule of 9’s.

IV. REGISTRY ISSUES

A. Maintenance of Registry

1. Registry Updates Updates are provided through the registry software provider and should be installed as soon as possible when available. It is important to check for upgrade impact before installing the update. It is necessary that a log of all changes to the registry be maintained that identifies the change and the date of the change.
2. Password Protection Each registry user should have a level of access security whereby there is a secure User Name and

Password to obtain access to the Registry.

3. Data Validation

The data that is entered into the database should be validated at least monthly. Not all data elements need to be validated each time although the entire medical record should be re-abstracted. (5-10% of records ACS).

The ACS does not indicate a percentage of reliability but it is suggested to at least maintain 95% or better concurrence and address those data elements that are not in agreement. This is a key determinant of data value by addressing accuracy, and consistency among abstracters and within the database.

Data identification can also include regularly scheduled identification and review of required data elements.

4. Backup Procedures

When data is entered into a data base, it is typically stored in a local or centralized server. This data can be backed up through a process of copying the data from the main server onto a second or "backup" server which is usually kept in a different remote location. This process should be done on a routine basis so that the data is copied at frequent routine intervals. This protects the data integrity should one server be destroyed or disabled for any reason. This process is typically performed by the facility/business IT department staff.

5. Upload

The process whereby data from the local registry software product is uploaded through an interface (*separate program that matches the location of data points in the two different locations*) **into another** separate software product.

6. Download

The download process brings data into the local registry database **from** another remote software system or database.

Each organizational registry is typically uploaded into the NTDB data base and the related state data base (if available) on a quarterly basis.

Safe electronic transmission especially by email and mobile device involves encryption. There must be

safety measures in place to prevent breach of data confidentiality. (HIPAA)

B. Confidentiality

1. HIPAA Health Information Portability and Accountability Act passed 1996, enacted in 2003.
2. Business Associate Agreements Business associate agreements bind the involved facilities to follow the same confidentiality guidelines. All reasonable means should be used to protect against threats, hazards, and unauthorized use or disclosure of the registry data. Actions to protect the registry information needs to be firmly integrated into the administration of the registry and identifying information should be available only to those people who have a need to know.¹

C. Injury Prevention and Education

Trauma centers should use the trauma registry data to develop their trauma prevention programs by identifying the high-risk groups who may benefit. The registry data should also be used to identify injury prevention priorities that are appropriate for local implementation. The registry data could also be used to measure the effectiveness of the prevention outreach program.¹

D. Population Statistics

Trauma Patient Populations can be defined as the total trauma patients in the registry defined by the NTDB® inclusion criteria using these total patient populations as the denominator for calculations.

Data can also look at only those patients that are seen by the Trauma Service, or various defined subsets of the trauma patient population.

E. Registry Operations

Registrar Staffing Recommendations are based upon the total number of Trauma Patients that are entered into the trauma registry for a year. The American College of Surgeons recommends that one Trauma Registrar can handle a caseload of 500-750 patients per year.¹ The caseload manageable by one Trauma registrar is highly variable dependent on the mandatory fields for each facility registry and any importing of data elements etc.

There is usually additional state and facility required data elements.

Definition of a Current Registry = 80% of records are abstracted and closed within 60 days of patient discharge.¹

For up to date accuracy and data consistency it is important to have the current versions of ICD 9 or 10 and other coding sources available for reference.

The entire medical record should be examined as a source of data with the validity hierarchy indicated in the NTDB dictionary in mind. Often, but not always, the more accurate data is documented by the source closest to the issue i.e. EMS report (as opposed to T flow sheet) for scene data, OP report for injury details.

CONCLUSION

The information contained in this document will give the trauma registrar a basic understanding of many of the concepts that are needed to be successful. There is much more. If you are seeking certification as a Certified Specialist in Trauma Registry the following Reference section lists several valuable resources that will help with a more in depth understanding of these topics. A more thorough understanding of these concepts as they relate to the trauma patient will also help to further integrate the registrar into the process improvement and patient safety cycle which affects trauma patient care.

The process of improving the care of all trauma patients can be a daunting task. It includes many people in many different roles. The Trauma Registrar is a pivotal person in managing the data that tracks the continuum of care. The registrar is that single person that takes the entire traumatic event of a patient and transforms the information into accurate and complete data that can be used by a multitude of organizations to transform trauma care for the future of our society.

REFERENCES

- ¹ Committee on Trauma American College of Surgeons. Resources for Optimal Care of the Injured Patient, 2006". 633 N. Saint Clair St., Chicago, IL 60611-3211: American College of Surgeons, 2006.
- ² Thomas A Gennarelli, MD. AIS 2005, Abbreviated Injury Scale 2005. Barrington, Illinois: Association for the Advancement of Automotive Medicine, ©2005, 2007.
- ³ Wikipedia, the free encyclopedia.
- ⁴ www.Trauma.org. ©2011.
- ⁵ NTDB. National Trauma Data Standard Data Dictionary 2011 Admissions. February 2011. http://www.ntdsdictionary.org/dataElements/documents/NTDS2011_Final_040511.pdf.
- ⁶ _____. "LearnBones: Spine Bones / Bones of the Spine and Vertebral Colum". Creative Commons. Attribution 2.0, 2010-2011. <http://www.learnbones.com/spine-bones-anatomy>.
- ⁷ Mohamed M Radwan and Fikri M Abu-Zidan. "Focussed Assessment Sonograph Trauma (FAST) and CT scan in blunt abdominal trauma"; Surgeon's perspective. Uganda: Makerere Medical School, © 2006. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1831890/>.
- ⁸ Andrew B. Peitzman, MD, Anita P. Courcoulas, MD, Christine Stinson, BC, ART, Anthony O. Udekwa, MD, Timothy R Billiar, MD, and Brian G Harbrecht, MD. Department of Surgery, University of Pittsburgh Medical Center, "Trauma Center Maturation: Quantification of Process and Outcome". Pittsburgh, Pennsylvania, Lippincott Williams & Wilkins, Inc. ©1999. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1420849/>.
- ⁹ Anita C. Hart, RHIA, CCS, CCS-P and Melinda S. Stegman, MBA, CCS. International Classification of Diseases 9th Revision Clinical Modification, Sixth Edition. ICD-9-CM for Hospital. Ingenix, © 2008.
- ¹⁰ _____. "LearnBones: Arm Bones / Bones of the Arm and Forearm". Creative Commons. Attribution 2.0, 2010-2011. <http://www.learnbones.com/arm-bones-anatomy>.
- ¹¹ World Health Organization. Violence and Injury Prevention and Disability (VIP) http://www.who.int/violence_injury_prevention/surveillance/classification/ed/index.html.
- ¹² Charts compiled using fictitious data for examples purposes only using Microsoft Excel software.

REFERENCE WEBSITES FOR MORE DETAILED INFORMATION

www.amtrauma.org

www.ota.org Orthopedic Trauma Association

www.facs.org American College of Surgeons

www.eicd.com/Guidelines/Trauma.htm Trauma Coding Guide

www.trauma.org trauma scores

www.aha.org American Hospital Association

www.aast.org organ injury scale

www.spinal-cord.org/spinal-injury-resources.htm

www.ama-assn.org American Medical Association

www.os.DHHS.Gov HIPAA reference

www.cms.hhs.gov Centers for Medicare and Medicaid

www.east.org Eastern Association of Surgery for Trauma

www.ena.org emergency nurse association

www.ota.org orthopedic trauma association

www.aaam.org AIS website

www.sccm.org Society of Critical Care Medicine

<http://www.jointcommission.org> Joint Commission on the Accreditation of Healthcare Organizations

www.NTDB.org , or email: MNeal@facs.org

www.ptcny.com/PDF/ATSRCB.pdf Handbook for CSTR exam and registration

www.ncbi.nlm.nih.gov/pubmed/12147111 Determining the Most Effective Level of TRISS-Derived Probability of Survival for Use as an Audit Filter.

www.ntdsdictionary.org/dataElements/datasetDictionary.html National Trauma Data Standard Data Dictionary

www.ivy-rose.co.uk/HumanBody/Skeletal/Bones_CranialandFacial.php "Bones of the Human Cranium and Face"

www.learnbones.com/hip-bones-anatomy "LearnBones: Hip Bones / Bones of the Pelvis and Hip". Creative Commons. Attribution 2.0, 2010-2011.

www.learnbones.com/leg-bones-anatomy "LearnBones: Leg bones / Bones of the Leg and thigh". Creative Commons. Attribution 2.0, 2010-2011.

www.answers.com/topic/foot Carlyn Iverson (Photo source). "Foot Injury". American Heritage Dictionary: Foot. Answers.com.

kidshealth.org/kid/htbw/skin.html Nemours. "Your Skin". Kids Health. Nemours Foundation, © 1995-2011.

www.yalemedicalgroup.org/stw/Page.asp?PageID=STW023547 Yale School of Medicine. "Hand Pain and Problems". Yale Medical Group, © 2011.

NOTE: Google, Ask.com, and many other search engines are valuable ways to access resources for definitions, images, illustrations of detailed anatomy, procedures, and medical devices.

NOTES

The Trauma Registrar Guide was co- authored and compiled by Susan Mutto RN, MA, CSTR and Patsye Stanley RHIT, CSTR, CAISS, to guide and encourage Trauma Registrars to become credentialed professionals in a very challenging and rewarding field.

