Trauma Registrar Guide

2017

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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-2017

       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. 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-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.

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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.
4. Some software vendors offer training specific to the trauma registry software.

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

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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-10 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 is used internationally, 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 "Orange book" depending upon the year of publication. Any patient that meets this definition should be entered into the Trauma Registry.

2. Diagnosis Codes S00-T79

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-10-CM **exclusion** codes for late effects of injury superficial injuries, including blisters, contusions, abrasions, insect bites ,and foreign bodies.

The event must also include one of the following:

1. Hospital admission;

2. Patient transfer via emergency medical services transport from one hospital to

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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 1full-time equivalent employee dedicated to the registry to process the data for approximately 500 to 750 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

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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.
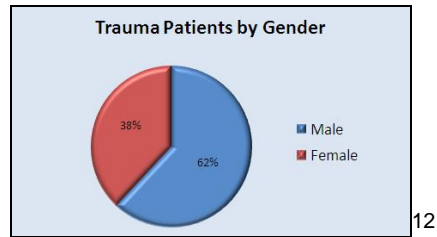
1. Bar Graphs

Horizontal or vertical bars proportional to the values of the data. These are used for quick comparison of information.
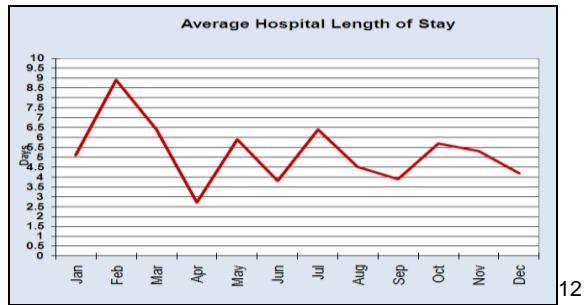
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Total Trauma Patients

12
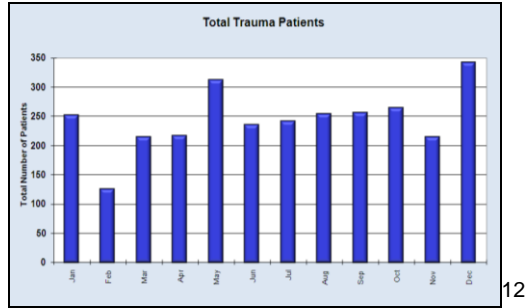
2. Pie Charts   Show proportions of a whole or percentage of a whole.

Trauma Patients by Gender

12

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

Average Hospital Length of Stay

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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.

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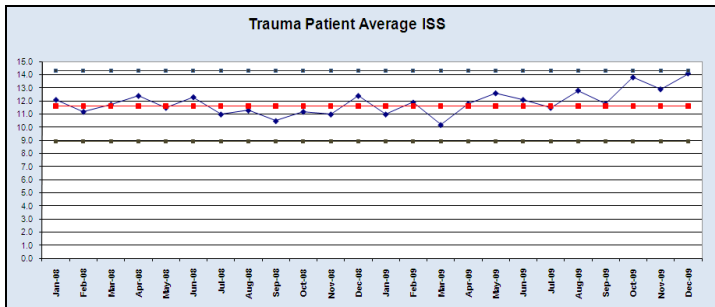
Dashboard - a compact visual presentation of critical data, usually at a higher level, to be easily understood at a glance.

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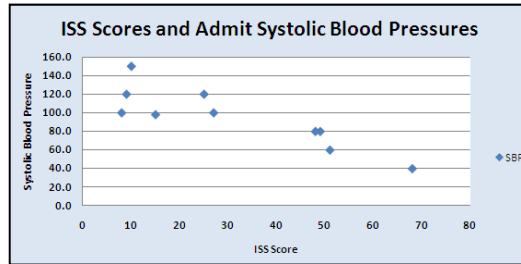
Pareto chart – typically a chart showing data from most to least frequently occurring information from left to right. These are used to clearly identify higher valued items (e.g., The highest frequency or priority for resolution).

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Mechanism of Injury by Frequency for 2010
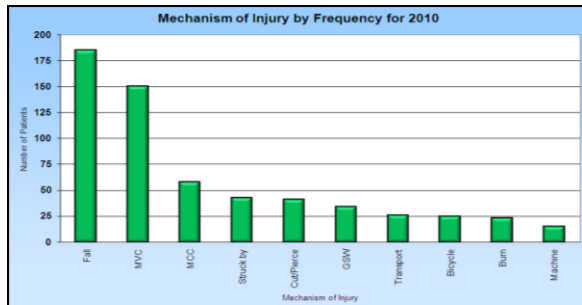
12

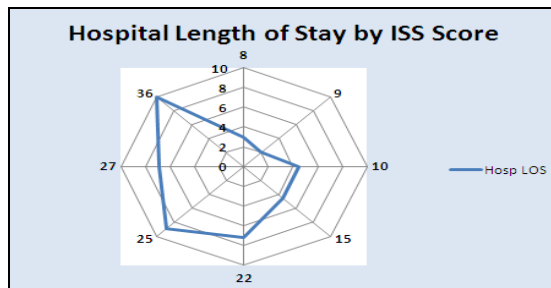Radar Chart - (same as spider gram) shows the relationship between multiple variables with one or more axis.

Hospital Length of Stay by ISS Score

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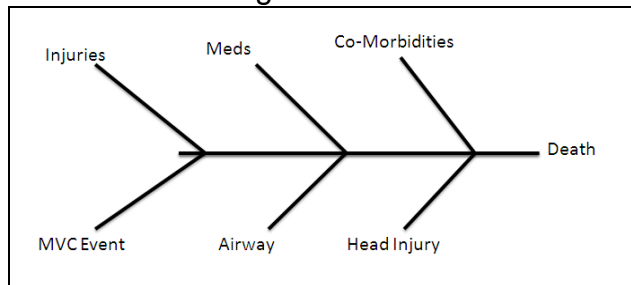
3. Interpretation

    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

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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/performanceimprovement_and_patient_safety_reference_manual

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

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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.

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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.

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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

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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 - <u>Anatomy is VERY important.</u>

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 10 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

<u>Head:</u> Ethmoid bone, frontal bone, occipital bone, parietal bones x 2, sphenoid bone, temporal bone x 2.

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

<u>Neck:</u> Cervical vertebrae x 7, trachea, esophagus, larynx, pharynx, hyoid bone.

2. Face

<u>Facial bones:</u> 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

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

4. Abdomen

<u>Abdomen:</u> Liver, spleen, colon, rectum, small bowel, pancreas, kidneys, pelvis, uterus, bladder, stomach,

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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, locate, 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

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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.

7. Skin

The largest organ, approximately 8 pounds for adult. Three layers: epidermis, dermis, hypodermis.

8. Whole Area

There are typically 206 bones in the body, though there may be up to about 226. There are approximately 5 liters of blood in the average adult male of 75 kg.

B. Testing

1. Radiology Identification

a. Plain films

Regular x-rays. Good for injuries involving bones and joints.

b. Ultrasound

FAST = Focused Assessment with Sonography for Trauma is used as an initial diagnostic tool to identify intraperitoneal or pericardial free fluid.

c. CT Scan

CT = Computed Tomography. Best diagnostic tool for hemodynamically stable patients. CT Scans are used to identify free air, free fluid, identify solid organ injuries and bone/cervical abnormalities not visible on a plain film.[7]

d. MRI

Magnetic resonance imaging (MRI), nuclear magnetic resonance imaging (NMRI), or magnetic resonance tomography (MRT) is used to visualize detailed internal structures. It is especially useful in brain,

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spinal cord, muscles, and heart, compared with other medical imaging techniques. MRI uses no ionizing radiation. Instead it uses a powerful magnetic field to align the magnetization of some atoms in the body, then uses radio frequency fields to systematically alter the alignment of this magnetization. This causes the nuclei to produce a rotating magnetic field detectable by the scanner—and this information is recorded to construct an image of the scanned area of the body. [3]

    e. Other

DPL = diagnostic peritoneal lavage is a test that can be used to diagnose intraperitoneal fluid.

PET scans -- Positron Emission Tomography, or PET scan, uses a radioactive isotope injection along with a radiology scanning to obtain structural detailed 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,

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basophils, etc.

d. Other	Coagulation: Protime, 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

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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:

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

Blood products include:

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

Coding consideration: Code blood products administered in the first 24 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

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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

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A. Guidelines

Basic Guideline- code conservatively if not clear, must have radiological, CT, MRI or other evidence of injury. Autopsy to be completed if radiology isn't completed prior to patient expiration.

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, and 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 .
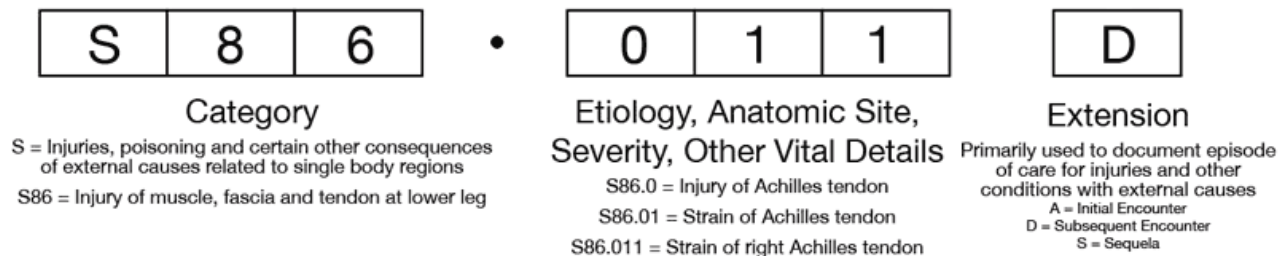
2. Concept

AIS severity reflects the severity of one injury for a patient 25-40 years old with no co-morbidities and with timely appropriate care. Whereas an ISS score reflects a complete value of the total of up to 3 injuries. (See

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ICD-10-CM

Codes in the ICD-10-CM code set can have three, four, five, six, or seven characters.
Many three-character codes are used as headings for categories of codes; these three-
character codes can further expand to four, five, or six characters to add more specific
details regarding the diagnosis.

| S | 8 | 6 | • | 0 | 1 | 1 | D |

Category
S = Injuries, poisoning and certain other consequences
of external causes related to single body regions
S86 = Injury of muscle, fascia and tendon at lower leg

**Etiology, Anatomic Site,
Severity, Other Vital Details**
S86.0 = Injury of Achilles tendon
S86.01 = Strain of Achilles tendon
S86.011 = Strain of right Achilles tendon

Extension
Primarily used to document episode
of care for injuries and other
conditions with external causes
A = Initial Encounter
D = Subsequent Encounter
S = Sequela

The first three characters of an ICD-10 code designate the category of the diagnosis. In
this instance, the letter "S" designates that the diagnosis relates to "Injuries, poisoning
and certain other consequences of external causes related to single body regions." "S,"
used in conjunction with the numerals "8" and "6," indicates that the diagnosis falls into
the category of "Injury of muscle, fascia and tendon at lower leg." A three-character
category that has no further subdivision (i.e., no greater specificity) can stand alone as a
code. In this case, however, greater specificity is possible, and you should fill in as
many "blanks" as you can.

The next three characters (characters three through six) correspond to the related
etiology (i.e., the cause, set of causes, or manner of causation of a disease or
condition), anatomic site, severity, or other vital clinical details. So, in this case, the
numbers "0," "1," and "1" indicate a diagnosis of "Strain of the right Achilles tendon."

Seventh character extensions for injuries include:
A - Initial encounter. This describes the entire period in which a patient is receiving
active treatment for the injury, poisoning, or other consequences of an external cause.

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So, you can use "A" as the seventh character on more than just the first claim. In fact, you can use it on multiple claims.

D - Subsequent encounter. This describes any encounter after the active phase of treatment, when the patient is receiving routine care for the injury during the period of healing or recovery. (This generally includes rehabilitation therapy.) In the example above, let's assume a physician referred the patient to a physical therapist for rehabilitation of the patient's strained Achilles tendon. Rehab therapy would be considered part of the healing and recovery phase, so you would code for "subsequent encounter," thus assigning the seventh character "D."

S - Sequela. The seventh character extension "S" indicates a complication or condition that arises as a direct result of an injury. An example of a sequela is a scar resulting from a burn.

1. International Classification of Diseases, Tenth Revision **(ICD-10-CM):**

- **S00-S99 with 7th character modifiers of A, B, or C ONLY.** (Injuries to specific body parts - initial encounter)
- **T07** (unspecified multiple injuries)
- **T14** (injury of unspecified body region)
- **T20-T28 with 7th character modifier of A ONLY** (burns by specific body parts - initial encounter)
- **T30-T32** (burn by TBSA percentages)
- **T79.A1-T79.A9 with 7th character modifier of A ONLY** (Traumatic Compartment Syndrome - initial encounter)
- **Excluding the following isolated injuries:**
- **ICD-10-CM:**
- **S00** (Superficial injuries of the head)
- **S10** (Superficial injuries of the neck)
- **S20** (Superficial injuries of the thorax)
- **S30** (Superficial injuries of the abdomen, pelvis, lower back and external genitals)
- **S40** (Superficial injuries of shoulder and upper arm)
- **S50** (Superficial injuries of elbow and forearm)
- **S60** (Superficial injuries of wrist, handand fingers)
- **S70** (Superficial injuries of hip and thigh)

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- **S80** (Superficial injuries of knee and lower leg)
- **S90** (Superficial injuries of ankle, foot and toes)
- **Late effect codes, which are represented using the same range of injury diagnosis codes but with the 7th digit modifier code of D through S, are also excluded.**

- **AND MUST INCLUDE ONE OF THE FOLLOWING IN ADDITION TO (ICD-10-CM S00-S99, T07, T14, T20-T28, T30-T32, and T79.A1-T79.A9)**:
- Hospital admission as defined by your trauma registry inclusion criteria
    - **and/or**:
- Patient transfers via EMS transport (including air ambulance) from one hospital to another hospital (even if later discharged from the emergency department)
    - **and/or**:
- Death resulting from the traumatic injury (independent of hospital admission or hospital transfer status)

D. Injury Scoring categories then

Go to Error! Hyperlink reference not valid. **Look under**

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	2 **5**	25

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	Rupture Spleen		
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 l**inearly 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"

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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

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

4. Trauma Score

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

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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

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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

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safety measures in place to prevent breech 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.

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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 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 and radiology reports 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.

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[11] World Health Organization. Violence and Injury Prevention and Disability (VIP) http://www/who.int/violence_injury_prevention/surveillance/classification/ed/index.html .

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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.

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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.

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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.

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