Michigan Trauma Registrar Course

MARCH 15, 2016

LANSING COMMUNITY COLLEGE - WEST CAMPUS

BETP

Bureau of EMS, Trauma & Preparedness

Welcome

Eileen Worden

State Trauma Manager

Welcome!

Objectives

▶ Overview of Michigan's trauma system

▶ Understanding the roles and responsibilities of the trauma registrar

▶ Introduction to data collection and data entry into the registry

▶ ImageTrend™

Trauma Data

▶ Trauma remains the leading cause of death under age 44, more than AIDS and stroke combined

▶ In 2011 there were 43 million ER visits for injury

▶ In Michigan the most common cause of traumatic injuries and deaths is accidental fall

▶ The second most common cause of traumatic injuries and deaths is motor vehicle crashes

▶ Motor vehicle crash related deaths costs for Michigan in 2013 were $1.2 billion

▶ A recent study of non-helmeted motorcyclists in Michigan showed a significant increase in inpatient mortality (10% vs 3%)

CDC http://www.cdc.gov/nchs/fastats/injury.htm
Michigan Trauma Registry
Striker, Rebecca H., et al. "Repeal of the Michigan helmet law: the evolving clinical impact." *The American Journal of Surgery* (2015).

Introduction

Michigan's Trauma System was established by statute in 2004

"Statewide trauma care system" means a comprehensive and integrated arrangement of the emergency services personnel, facilities, equipment, services, communications, medical control authorities, and organizations necessary to provide trauma care to all patients within a geographic region.

Trauma System Driven by Data

- ▶ Regional Trauma Networks (RTNs)
- ▶ Verification and designation of trauma facilities
- ▶ Registry
- ▶ Triage and transport
- ▶ Performance improvement
- ▶ System evaluation

Michigan Criteria for Designation
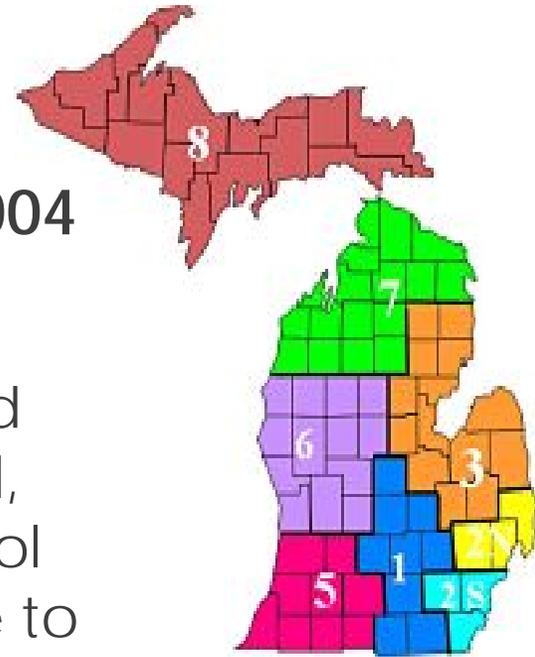
Michigan Criteria for Trauma Facility Designation

The Michigan Trauma Administrative Rules acknowledges that certain criteria are integral to the establishment and continued development of a regionalized, coordinated and accountable trauma system in the state. Data, performance improvement and injury prevention are considered fundamental trauma facility functions. These same criteria are also fundamental to establishing and maintaining a trauma system as is the need to provide support to community trauma facilities (Level III) and trauma support facilities (Level IV) so that an integrated all inclusive trauma system can be maintained. These criteria have been identified as critical in nature and the failure of the healthcare facility to meet these criteria is considered a Michigan critical deficiency (MI-CD). A Michigan critical deficiency shall result in the healthcare facility not being recommended for designation and recommendations will be made for remediation.

The Michigan Administrative Rule 325.130 Rule (6) a-d states "The department shall designate the existing trauma resources of all participating healthcare facilities in the state based on the following categories:

- Comply with data submission requirements in R 325.133 and R 325.134
- Develop and submit a performance improvement plan based on standards that are incorporated by reference in these rules, pursuant to R 325.133 and R 325.134
- Participate in coordinating and implementing regional injury prevention plans
- Level I and Level II only: Provide staff assistance to the department in the designation and verification process of community trauma facilities (Level III) and trauma support facilities (Level IV).

I.   **Data Collection and Submission**

Collection and submission of trauma patient data into the State Trauma Registry is a foundational component of all local, regional, and statewide trauma systems performance improvement and patient safety initiatives.

A.   All healthcare facilities with an emergency center shall participate in data submission. Administrative Rule 325.133

MI-CD 1-1: Failure of the healthcare facility to participate in the submission of data on patients who meet trauma inclusion criteria as defined in this section shall be considered a critical deficiency.

B.   Data is collected on all trauma patients who meet inclusion criteria as defined in the most current version of the American College of Surgeons National Trauma Data Bank "National Trauma Data Standard: Data Dictionary". This document may be found online at: http://www.ntdsdictionary.org/dataElements/datasetDictionary.html.

C.   All data which meets inclusion criteria as described above is submitted electronically into the State Trauma Registry (ImageTrend®). Ref: Administrative Rule 325.134 (2) (a).

Michigan Criteria for Designation

ImageTrend® is the State sponsored software program approved for use as the statewide trauma registry. Other nationally recognized trauma software registries may be used by the healthcare facility for data warehousing. However, all trauma data must be uploaded to the State Trauma Registry (ImageTrend®). This process is outlined in the document "State Trauma Registry (ImageTrend®) Access" found on the MDCH Trauma Section website.

1) Twelve (12) months of data must be submitted into the State Trauma Registry prior to applying for designation as a Michigan trauma facility for the first time. The healthcare facility may determine the twelve (12) month time frame but it must start no earlier than fifteen (15) months from the date of application for ACS verified facilities or scheduled site review for facilities seeking in-state verification.

MI-CD 1-2: Failure of the healthcare facility to submit data into the State Trauma Registry as described in C.1. above shall be considered a critical deficiency.

2) To maintain designation as a Michigan trauma facility, data is to be submitted electronically into the State Trauma Registry (ImageTrend®) quarterly by the following dates: March 15, June 15, September 15, December 15.

MI-CD 1-3: Failure of the healthcare facility to continue to submit data into the State Trauma Registry on a regular basis after submission of the initial twelve (12) months of data shall be considered a critical deficiency.

D. Each healthcare facility is required to designate a person responsible for trauma registry activities. This person should have the minimal training necessary to maintain the registry. This need not be a dedicated position.

MI-CD 1-4: Failure of the healthcare facility to designate a person responsible for trauma registry activities shall be considered a critical deficiency.

Data Driven Performance Improvement

II.   **Performance Improvement Plan**

Performance improvement is integral in ensuring a highly functioning trauma program and a statewide trauma system. The Michigan Administrative Rules reflect this emphasis on continually evaluating performance as does the American College of Surgeons Committee on Trauma (ACS-COT). Healthcare facilities seeking designation as a Michigan trauma facility must do so in accordance with the following expectations:

A.   Demonstrate participation in the regional trauma network performance improvement as described in the Regional Trauma Network work plan. Minimally, this includes demonstrating that the healthcare facility is participating in regional data collection (audit filters), analysis and sharing. A brief description of planned or ongoing participation in the Regional Trauma Network performance improvement initiatives must be submitted with the designation application.

B.   **Healthcare facilities seeking in-state verification as a Level III trauma facility** must meet performance improvement criteria for Level III referenced by Rule 325.135 and outlined in the American College of Surgeons Committee on Trauma "Resources for the Optimal Care of the Injured Patient 2014" in a written plan.

C.   **Healthcare facilities seeking in-state verification as a Level IV trauma facility** shall develop and submit a performance improvement plan based on standards that are incorporated by reference to Rule 325.135 and the American College of Surgeons Committee on Trauma "Resources for the Optimal Care of the Injured Patient 2014". The standards include:

1)   A written performance improvement plan, which addresses the following:

   a. A process of event identification and levels of review which result in the development of corrective action plans, methods of monitoring, re-evaluation, risk stratified benchmarking must be present and this process must be reviewed and updated annually.
   b. Problem resolution, outcome improvements and assurance of safety (loop closure) must be readily identifiable through methods of monitoring, re-evaluation, benchmarking and documentation.
   c. All criteria for trauma team activation have been determined by the trauma program and evaluated on an ongoing basis in the PI process.
   d. Audit Filters - the PI program identifies and reviews documents, findings, and corrective action on the following five (5) audit filters which must be addressed in the PRQ:
      - Any system and process issues
      - Trauma deaths in house or in emergency department
      - Any clinical care issues, including identifying and treatment of immediate life threatening injuries
      - Any issues regarding transfer decision
      - Trauma team activation times to trauma activation

2)   A policy in place to review issues that revolve predominately around (1) system and process issues such as documentation and communication; (2) clinical care including identification and treatment of immediate life threatening injuries (ATLS); and (3) transfer decisions.

Resources for the Optimal Care of the Injured Patient-2014, AKA: The Orange Book

Uses of a Trauma Registry:

1. Performance improvement
2. Public health
3. Injury prevention
4. Trauma systems
5. Outcomes measurement
6. Resource utilization and cost analysis
7. Research
8. Meeting requirements for verification and designation

Orange Book

"It is important to acknowledge that high-quality data begin with high-quality data entry, and it is the trauma registrar who is responsible for performing this task."

Orange Book

"The trauma registrar is a vital member of the trauma team."

Trauma Registry Overview

Allen Stout

State Trauma Registrar & Epidemiologist

Trauma Registry History

▶ In 1969, the first computerized trauma registry in the U.S. began in Chicago at Cook County Hospital

▶ This system later evolved into the Illinois Trauma Registry which aggregated data from all trauma centers in the state

▶ A milestone in the development of U.S. trauma registries came in 1989 with the establishment of the National Trauma Data Bank (NTDB) by the American College of Surgeons (ACS)

From *Injury Prevention, Violence Prevention, and Trauma Care: Building the Scientific Base* at www.cdc.gov/mmwr

Why Do We Collect Data?

▶ Monitor progress & outcomes

▶ Quality & performance improvement

▶ Injury prevention activities

▶ Required reporting

▶ Public health surveillance of the causes and consequences of traumatic injury

Data Affects Change

▶ Modify practice based on evidence

▶ Implement new systems to improve patient outcomes

▶ Change triage criteria

▶ Think of registry as more than "repository" …registry is a key tool

Trauma Registry Defined

The CDC defines a trauma registry as a data collection system that includes:

- A file of uniform data elements that describe the injury event

- Demographics

- Pre-hospital information

- Care given

- Patient outcomes

- Costs of treatment for injured patients
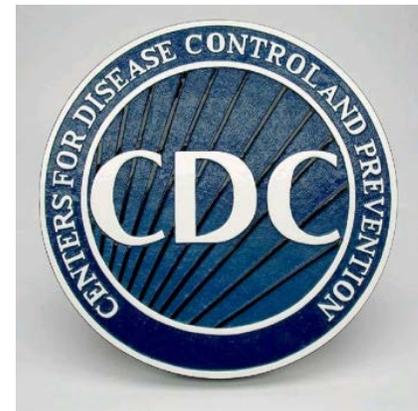
Hospital Trauma Registries

▶ Abstract data from multiple sources

▶ Maintains data in a single data base that may be exported to other registries

▶ Collects relevant incident data

▶ Can be customized to meet hospital needs

Flow of Information in Hospitals
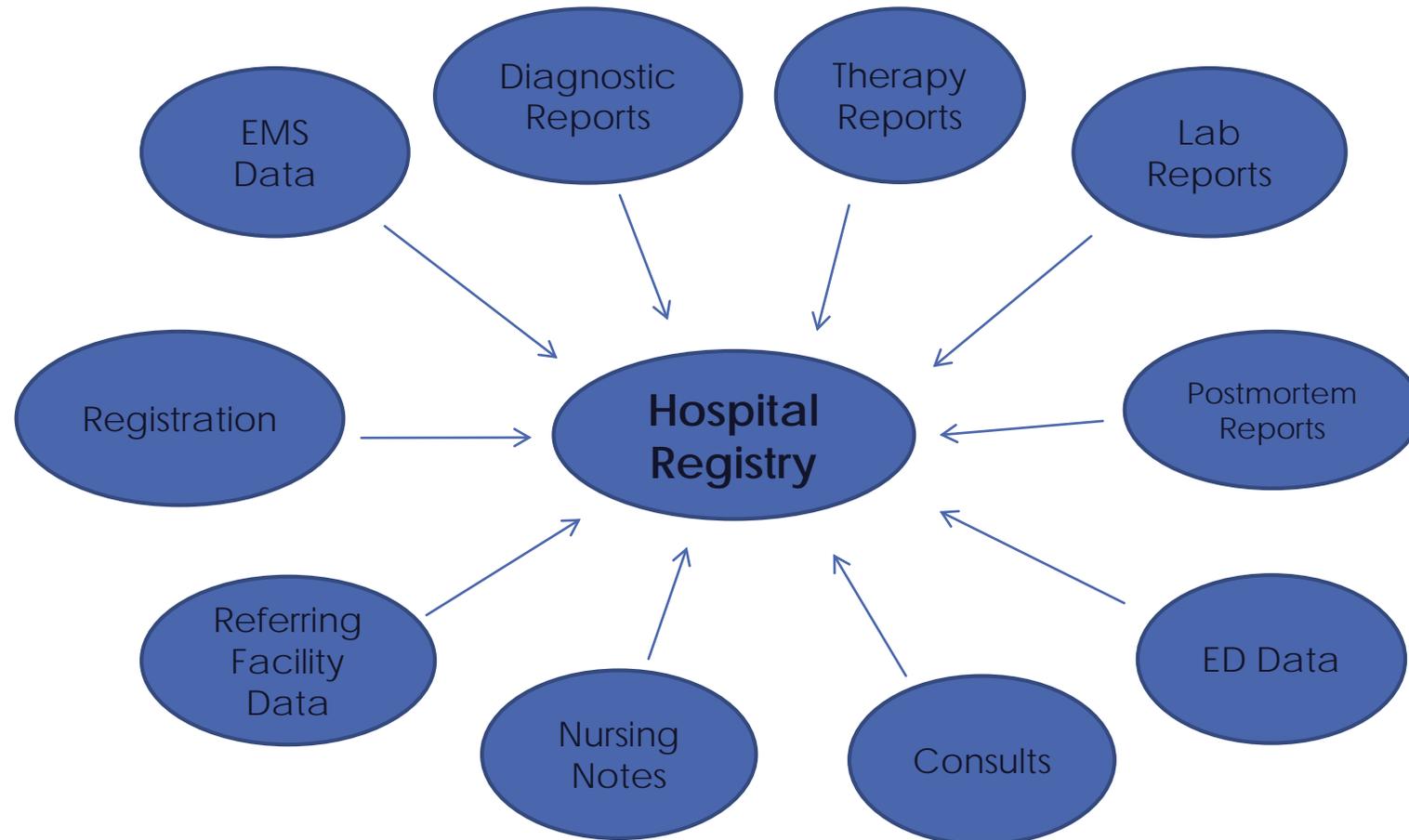
Hospital Trauma Registries

Support:

- Clinical review of trauma cases

- Verification and designation

- Performance improvement

- Research

- Injury prevention and outreach

State Trauma Registries

▶ Support public policy and systems development, evaluation and performance improvement

▶ Prevention and outreach efforts

▶ Surveillance

▶ Research

State of Michigan Trauma System Data Collection

▶ ImageTrend™ Patient Registry is the registry software provided free of charge by the State of Michigan for trauma data collection

▶ Michigan uses ImageTrend™ EMS State Bridge for pre-hospital data collection as well as MI-EMSIS: Michigan EMS Information System

▶ Data can be loaded into the ImageTrend™ Patient Registry from other registry software via NTDB import files

▶ Registry participation is a required activity for state designation

State of Michigan Trauma System Data Collection

► Hospital Bridge is a module of the EMS State Bridge which allows hospital personnel to access the EMS Patient Care Records (PCRs) that are entered or uploaded to MI-EMSIS repository

► Fax completed forms to Kevin Putman at (269) 337-6475 or email to kevin.putman@med.wmich.edu

MI-EMSIS HOSPITAL BRIDGE ACCESS FORM

Hospital Bridge is a module of the EMS State Bridge which allows hospital personnel the ability to access EMS PCR that are entered or uploaded to MI-EMSIS repository. This module allows the hospital representative to search for PCRs of patients that have been delivered to his or her facility by EMS. The PCRs will be presented as an Adobe Acrobat PDF which can be printed or saved for later attachment to the electronic health record.

To ensure compliance with HIPAA and privacy statues, each person that will be accessing Hospital Bridge will be required to have his or her own individual login. Also, to ensure that the individuals are truly affiliated with the facility, ONLY those individuals with corporate email addresses associated with the desired facility will be setup for access. If this poses a problem, then please contact Kevin Putman at (269) 337-4291 or kevin.putman@med.wmich.edu for further instruction on obtaining access.

PLEASE TYPE INFORMATION

Hospital:_____
Address:_____
City:_____ State:_____ Zip:_____
Phone:_____ Fax:_____
Website:_____

Individual Users

	NAME	TITLE	EMAIL ADDRESS
1:			
2:			
3:			
4:			
5:			

Please fax to Kevin Putman at (269) 337-6475 or email information to the above address.

Who is Included?

National Trauma Data Standard (NTDS) Patient Inclusion Criteria

To ensure consistent data collection across States into the NTDS, a trauma patient is defined as a patient sustaining a traumatic injury and meeting the following criteria:

- At least one of the following injury diagnostic codes:
  - ICD-9-CM: 800-959.9 **or** 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)

National Trauma Data Standard Inclusion Criteria
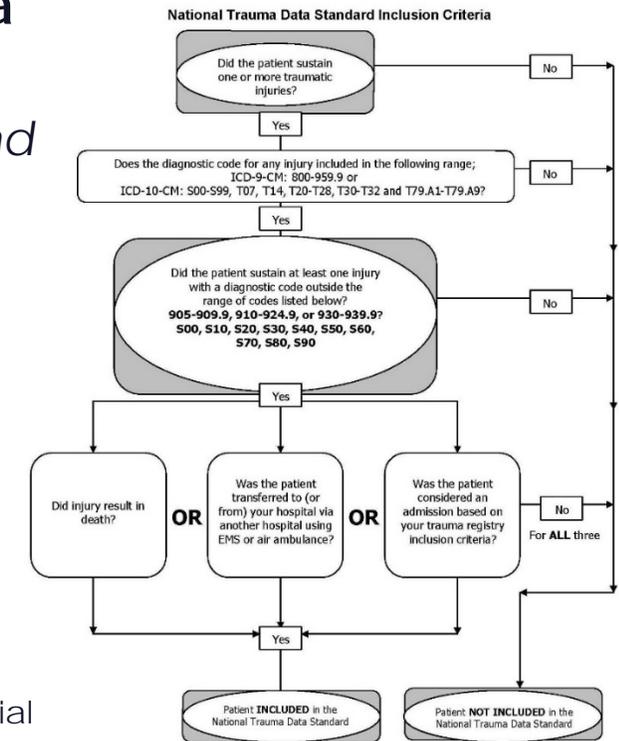
Who is Included?

National Trauma Data Standard (NTDS) Patient Inclusion Criteria

- Excluding the following isolated injuries:
  - ICD-9-CM: 905-909.9,910-924.9, 930-939.9 **or** 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, hand and fingers)
    - S70 (Superficial injuries of hip and thigh)
    - 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.
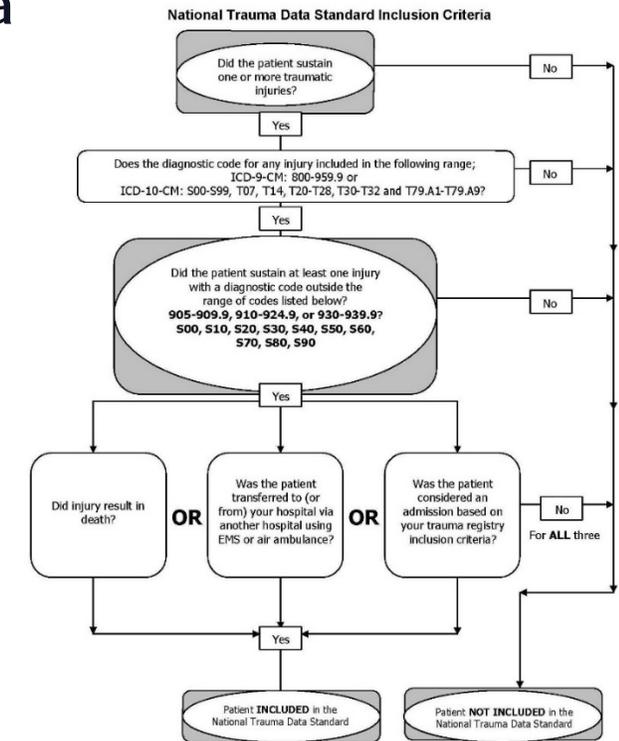
Who is Included?

National Trauma Data Standard (NTDS) Patient Inclusion Criteria

- **AND** must Include one of the following:
  - Hospital admission as defined by your trauma registry inclusion criteria; **OR**
  - Patient transfer via EMS transport (including air ambulance) from one hospital to another hospital; **OR**
  - Death resulting from the traumatic injury (independent of hospital admission or hospital transfer status)

- *Consider including all Trauma Team Activations for Performance Improvement purposes (Not an NTDS requirement)*

National Trauma Data Standard Inclusion Criteria
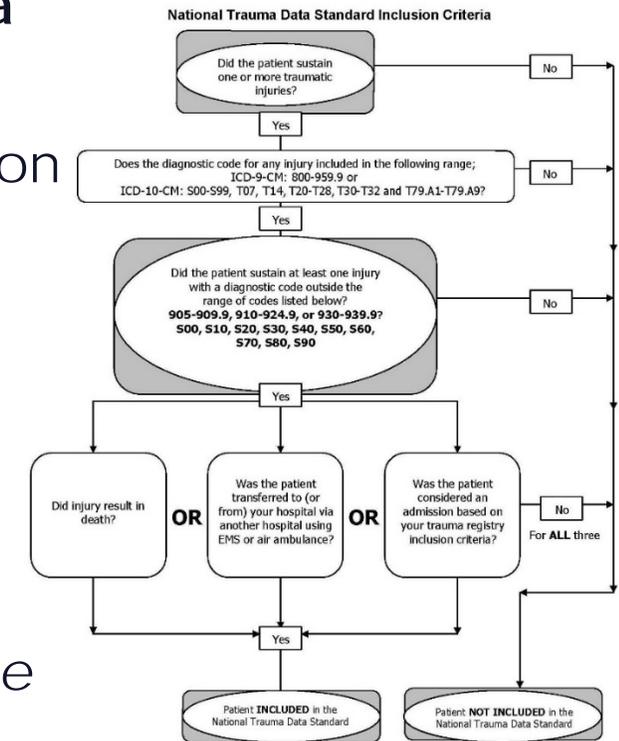
What Kind of Data is Collected?

Data Points include:

- Demographic
- Pre-hospital
- Event Data
- Hospital Data
- Providers
- Procedures
- Referring Facility
- E-codes
- Comorbid Conditions
- Hospital Complications
- Diagnosis
- Injury Severity Score
- Custom Data Points

Data Collection

Utilize several sources to find and collect data:

- EMS agencies

- Hospital medical records

- Trauma flow sheets

- Members of trauma team

- Unit and ICU staff

- Medical Examiner office

- Transferring facilities

When Do You Collect Data?

▶ Concurrent real time data

▶ Point of care

▶ Retrospective

▶ Collection can start in your ER log

▶ Information can be collected from your billers and coders

▶ A dedicated trauma registrar is not mandatory; identified staff may be anyone who has received training to maintain the registry

Michigan Designation Data Requirements

▶ Designation by the State of Michigan requires twelve months of data be entered into the state trauma registry (no older than fifteen months from date of application)

▶ To maintain designation status data must be submitted to the state trauma registry quarterly

▶ Trauma registries should be concurrent with a minimum of 80% of cases entered within 60 days of discharge

Where Do We Send Data?

▶ Internally

▶ State Trauma Registry (ImageTrend™)
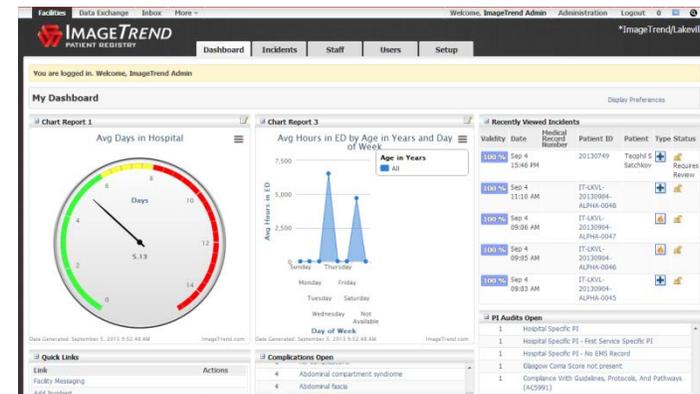
▶ National Trauma Data Bank (NTDB)

{*American College of Surgeons Committee on Trauma verified facilities only*}

Internal Data Use

Process and Performance Improvement

- Peer Review
- Mortality & Morbidity

Quality Initiatives

- Measuring Outcomes

Injury Prevention

- Trends

Research Projects

- Retrospective

Institutional Reporting

- Administrative
- Financial

Terminology & Anatomy Basics

Chris Mullen

Regional Trauma Coordinator – 2 North

A Little Anatomy Review

▶ Positioning

▶ Location

▶ Placement

" Directional Information if you will"

Directional Terminology

- **Superior or cranial** - toward the head end of the body; upper (example, the hand is part of the superior extremity)

- **Inferior or caudal** - away from the head; lower (example, the foot is part of the inferior extremity)

- **Anterior or ventral** - front (example, the kneecap is located on the anterior side of the leg)

Directional Terminology

- **Posterior or dorsal** - back (example, the shoulder blades are located on the posterior side of the body)

- **Medial** - toward the midline of the body (example, the middle toe is located at the medial side of the foot)

- **Lateral** - away from the midline of the body (example, the little toe is located at the lateral side of the foot)

Directional Terminology

- **Proximal** - toward or nearest the trunk or the point of origin of a part (example, the proximal end of the femur joins with the pelvic bone)

- **Distal** - away from or farthest from the trunk or the point or origin of a part (example, the hand is located at the distal end of the forearm)

Planes of the Body

- **Coronal Plane (Frontal Plane)** - A vertical plane running from side to side; divides the body or any of its parts into anterior and posterior portions
- **Sagittal Plane (Lateral Plane)** - A vertical plane running from front to back; divides the body or any of its parts into right and left sides
- **Axial Plane (Transverse Plane)** - A horizontal plane; divides the body or any of its parts into upper and lower parts
- **Median plane** - Sagittal plane through the midline of the body; divides the body or any of its parts into right and left halves

Sagittal Plane

Coronal Plane

Transverse Plane

Body Planes
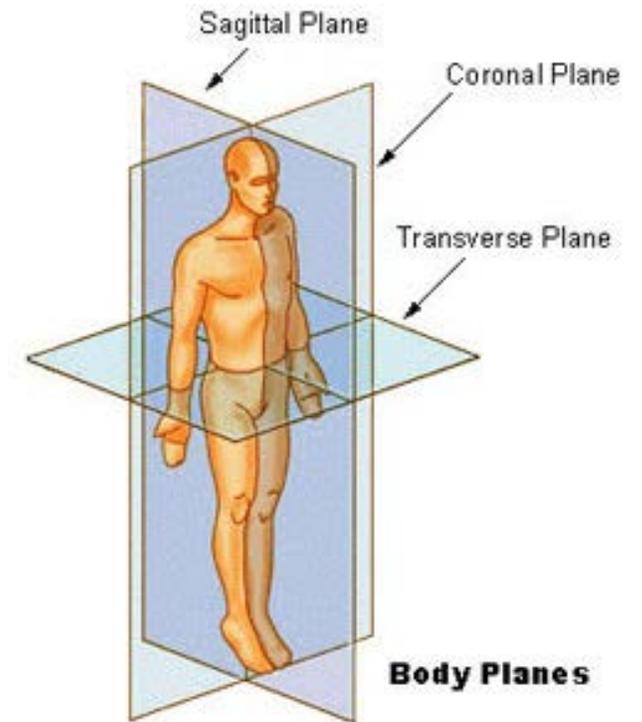
Body Cavities
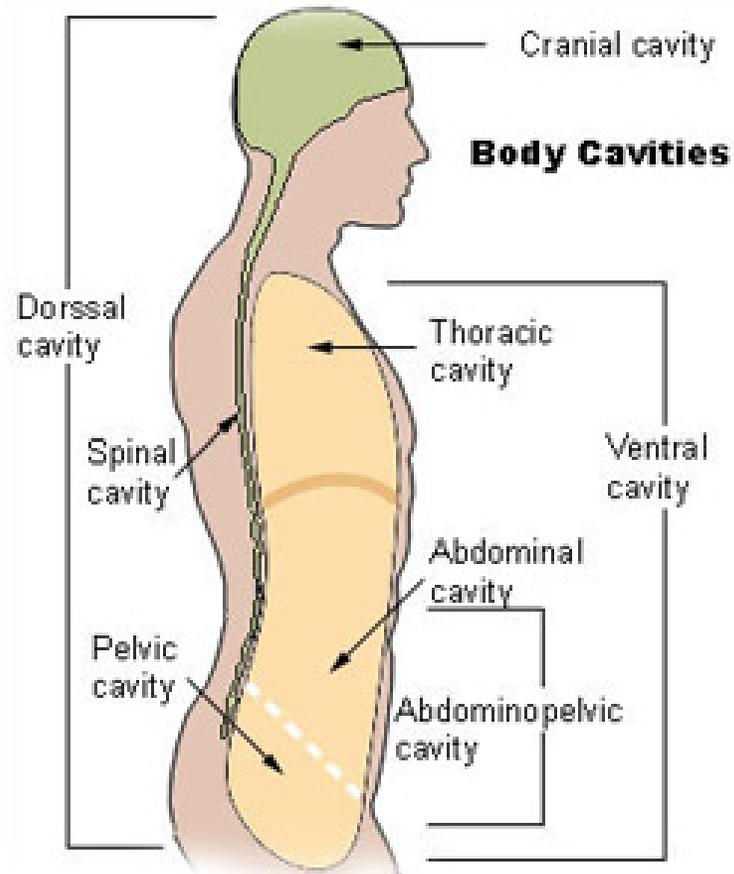
Cranial Anatomy

- Bones
- Nerves
- Brain

Spinal Nerves and Cauda Equina

- Spinal nerves
  - 20 pairs between brain stem and T12
  - voluntary movement
  - involuntary movement
- Cauda equina
  - starts at T12-L1 to coccyx
  - 11 pairs of spinal nerves
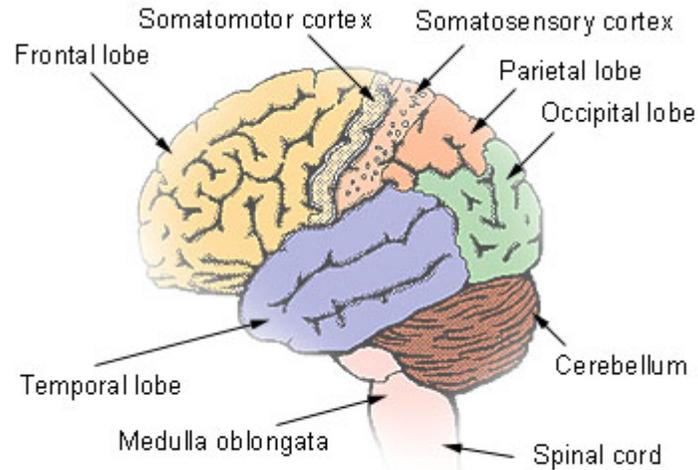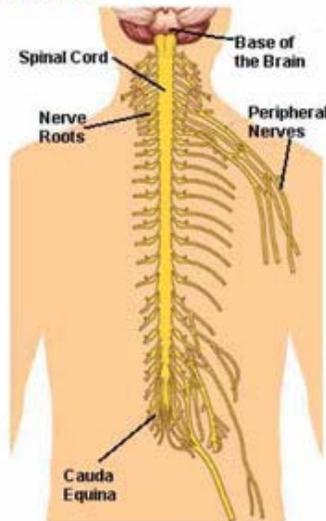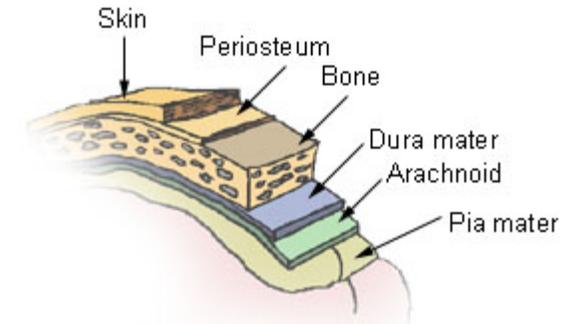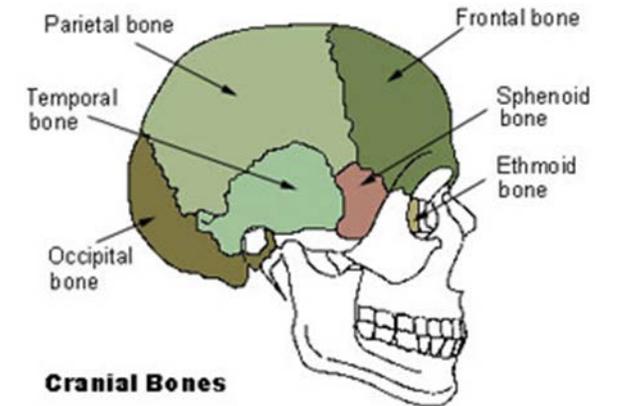
Spinal Cord — Base of the Brain
Nerve Roots — Peripheral Nerves
Cauda Equina

Lobes of the cerebrum

Somatomotor cortex — Somatosensory cortex
Frontal lobe — Parietal lobe — Occipital lobe
Temporal lobe
Medulla oblongata — Cerebellum — Spinal cord

Meninges of the CNS

Skin — Periosteum — Bone — Dura mater — Arachnoid — Pia mater

Cranial Bones

Parietal bone — Frontal bone
Temporal bone — Sphenoid bone
Occipital bone — Ethmoid bone

From *SEER Training Modules*
by National Cancer Institute at the NIH – cancer.gov

Thoracic Anatomy

- ▶ Bones
- ▶ Muscle
- ▶ Organs

Internal View of the Heart

Pulmonary valve

Aorta (arch)

Pulmonary arteries

Pulmonary veins

Left atrium

Right atrium

Mitral valve

Tricuspid valve

Aortic valve

Right ventricle

Left ventricle

Sternum

Ribs

Thoracic Cage
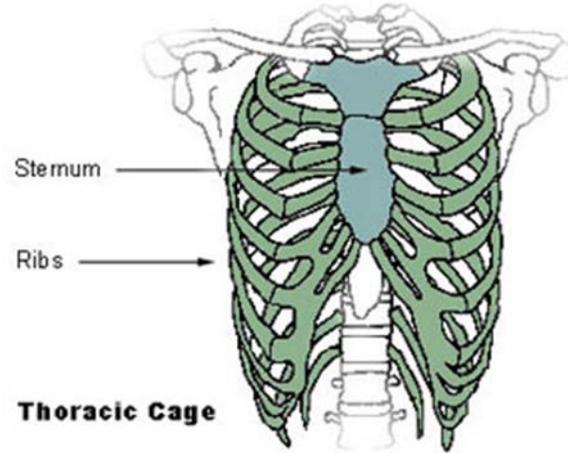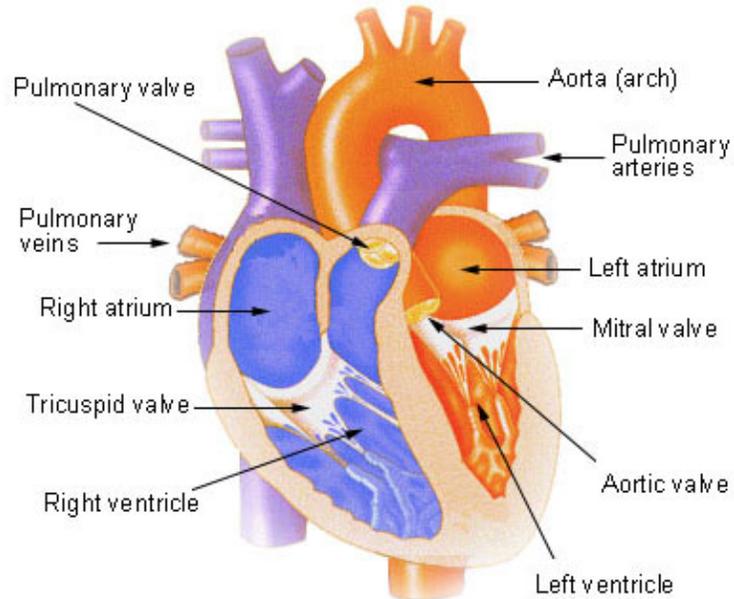
Bronchi, Bronchial Tree, and Lungs

Larynx

Primary bronchi

Secondary bronchi

Tertiary bronchi

Bronchioles

Cardiac notch

Pulmonary vein

Pulmonary artery

Trachea

Alveolar duct   Alveoli

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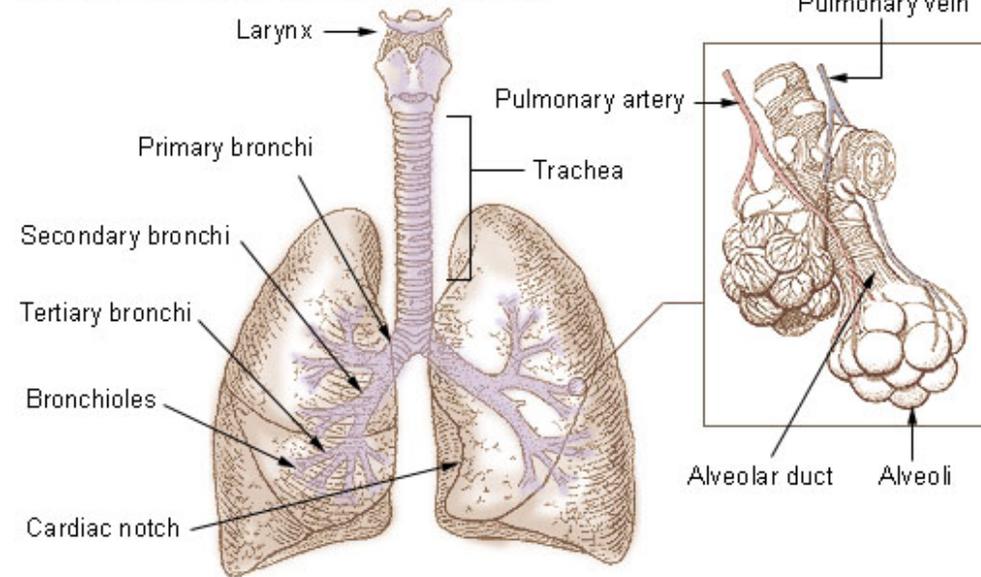
Abdominal/Pelvic Anatomy

- Bones
- Muscle
- Organs
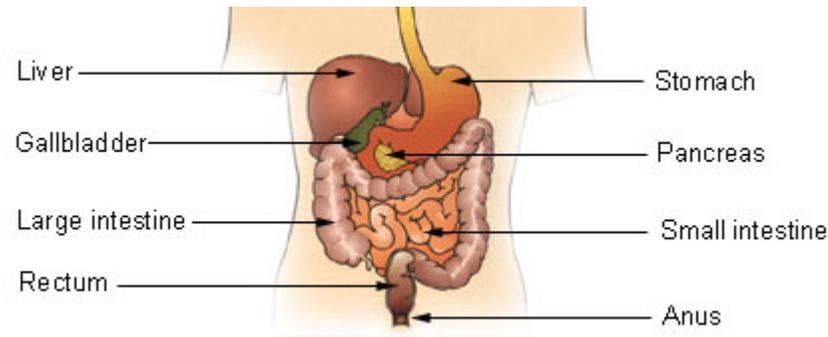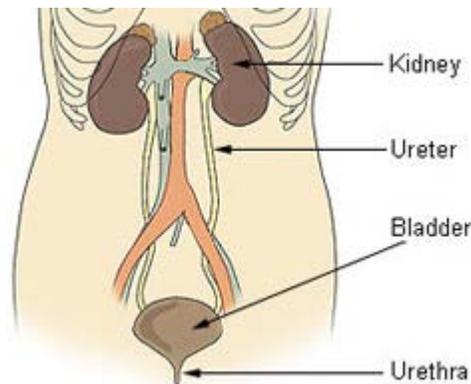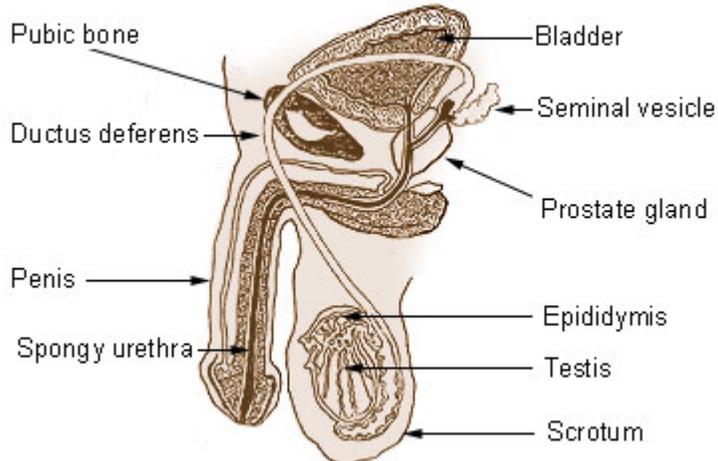
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Muscle Groups

Muscles of the Trunk

Pectoralis major

Rectus abdominis

External oblique

Internal oblique

Transverse abdominis
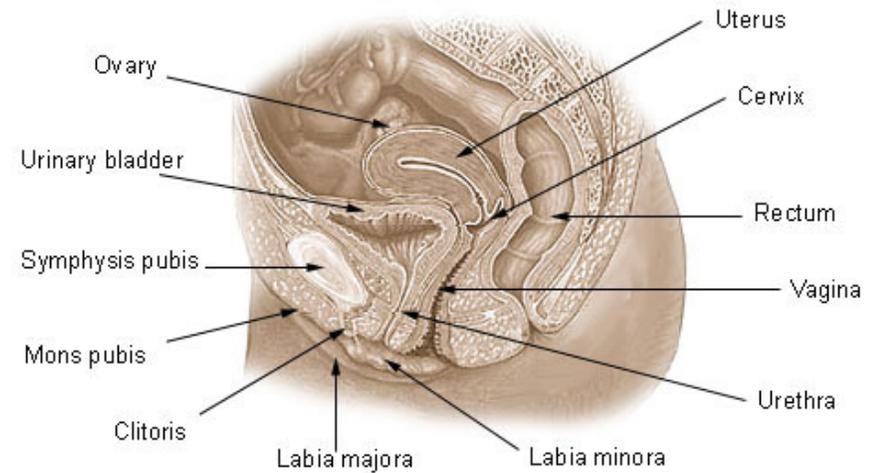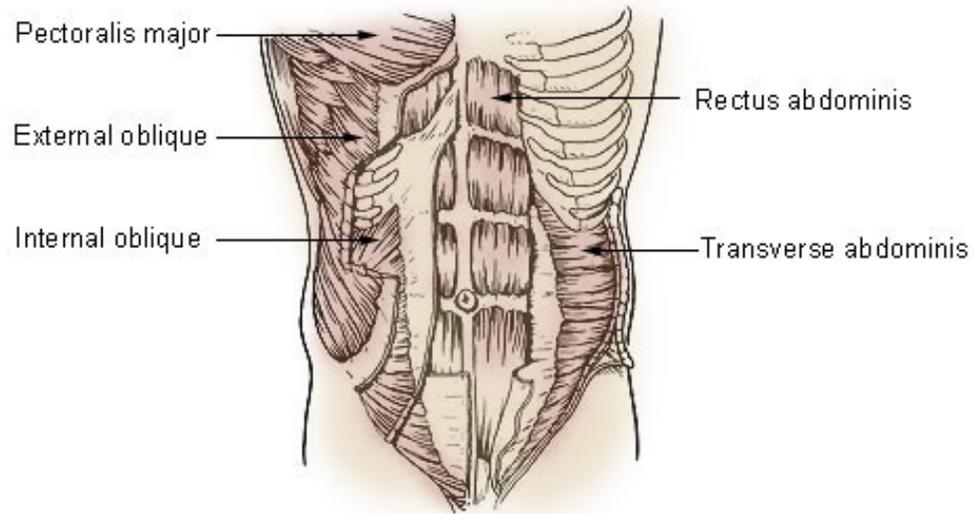
Muscles of the Head and Neck

Frontalis

Temporalis

Orbicularis oculi

Zygomaticus

Masseter

Orbicularis oris

Buccinator

Trapezius

Sternocleidomas
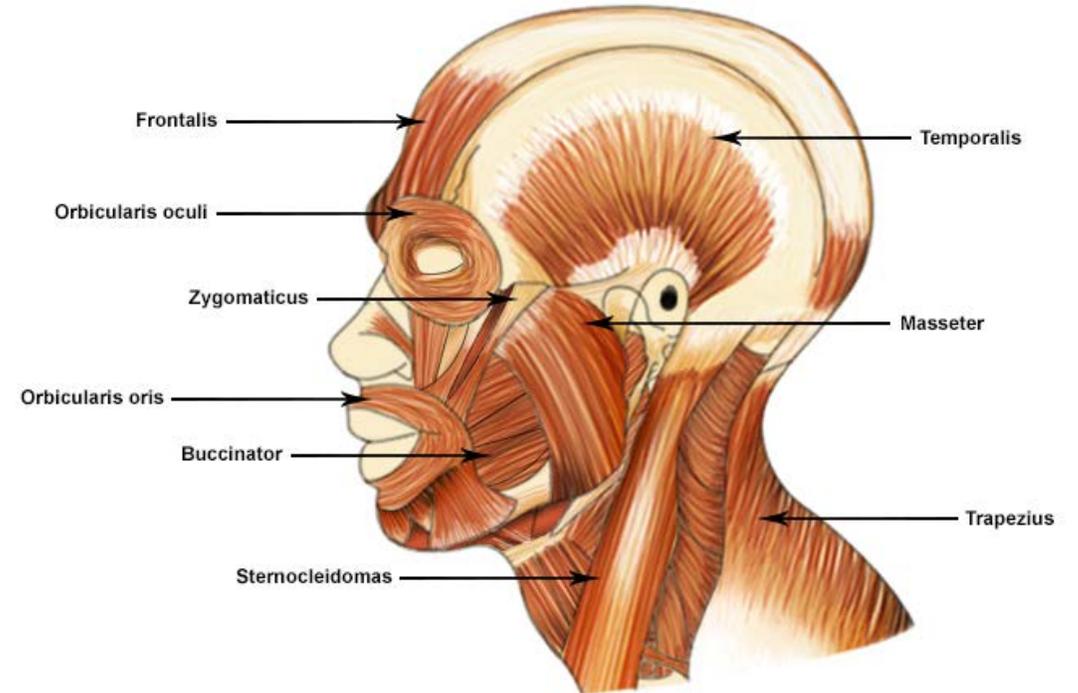
Muscle Groups

Muscles of the Upper Extremity

- Deltoid
- Bicpes Brachii
- Brachioradialis
- Triceps brachii
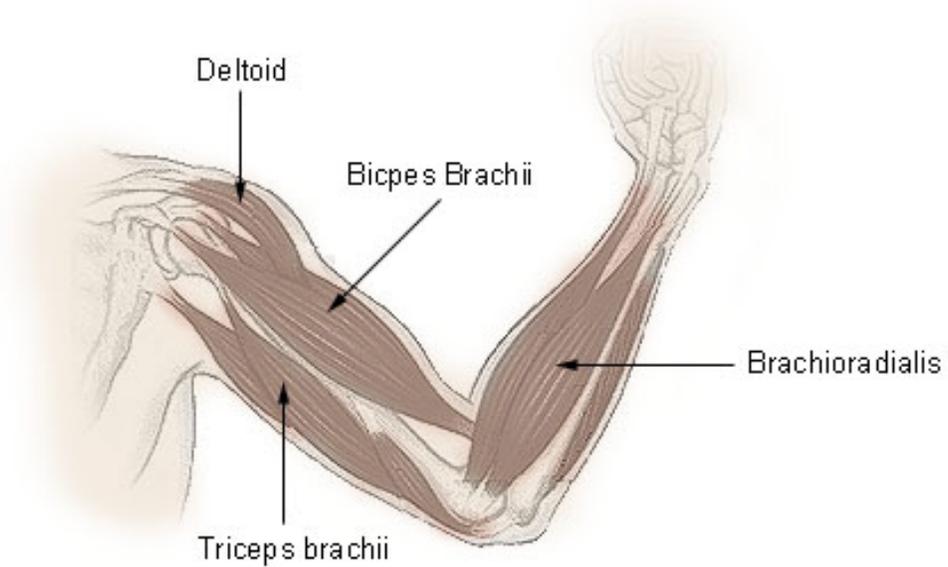
Muscles of the Lower Extremity

- Sartorius
- Rectus femoris
- Vastus lateralis
- Vastus medialis
- Gastrocnemius
- Tibialis anterior
- Soleus

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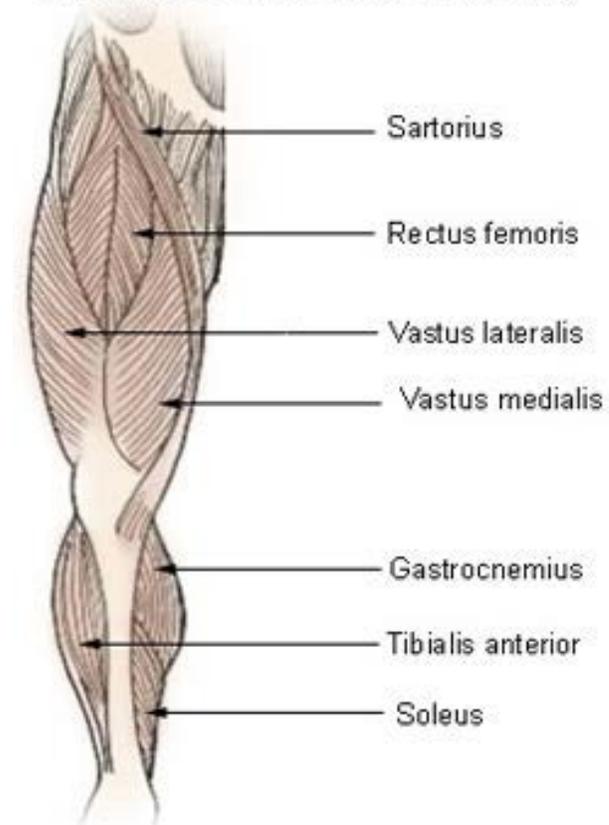
Axial Skeleton (80 bones)

Vertebral Column
- Cervical vertebrae (7)
- Thoracic vertebrae (12)
- Lumbar vertebrae (5)
- Sacrum (1)
- Coccyx (1)

Vertebral Column
Cervical curve
Cervical vertebrae
Thoracic vertebrae
Thoracic curve
Lumbar vertebrae
Lumbar curve
Sacrum
Sacral curve
Coccygeal vertebrae

Auditory Ossicles
- Malleus (2)
- Incus (2)
- Stapes (2)

Malleus Incus Stapes

Cranial Bones
- Parietal (2)
- Temporal (2)
- Frontal (1)
- Occipital (1)
- Ethmoid (1)
- Sphenoid (1)

Parietal bone Frontal bone
Temporal bone Sphenoid bone
Occipital bone Ethmoid bone
Cranial Bones
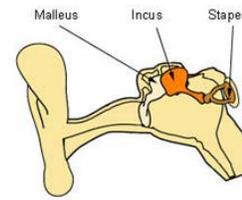
Facial Bones
- Maxilla (2)
- Zygomatic (2)
- Mandible (1)
- Nasal (2)
- Platine (2)
- Inferior nasal concha (2)
- Lacrimal (2)
- Vomer (1)

Facial Bones
Frontal bone
Parietal bone
Sphenoid bone
Temporal bone
Nasal bone
Zygomatic bone
Vomer bone
Maxilla
Mandible

Thoracic Cage
- Sternum (1)
- Ribs (24)

Sternum
Ribs
Thoracic Cage

From *SEER Training Modules*
by National Cancer Institute at the NIH – cancer.gov

Appendicular Skeleton (126 bones)

Pectoral girdles
- Clavicle (2)
- Scapula (2)

Scapula

Clavicle

Pectoral Girdles

Pelvic Girdle
- Coxal, innominate, or hip bones (2)

Pelvic Girdle

Ilium

Iliac crest

Ischium

Asetabulum
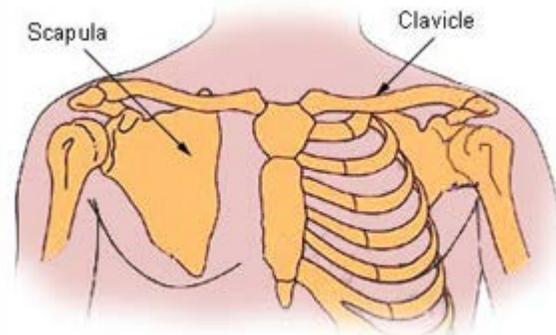
Pubis

Upper Extremity
- Humerus (2)
- Radius (2)
- Ulna (2)
- Carpals (16)
- Metacarpals (10)
- Phalanges (28)

Phalanges

Metacarpals

Carpals

Radius

Ulna

Humerus
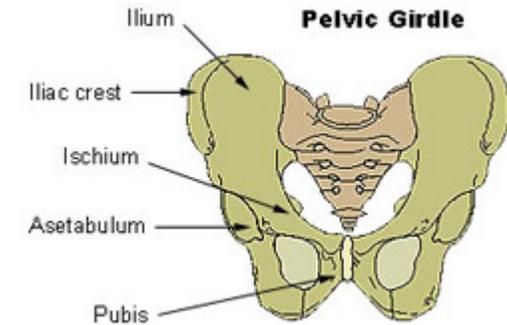
Upper Extremity

Lower Extremity
- Femur (2)
- Tibia (2)
- Fibula (2)
- Patella (2)
- Tarsals (14)
- Metatarsals (10)
- Phalanges (28)

Lower Extremity

Femur

Patella

Tibia

Fibula

Tarsals

Metatarsals

Phalanges
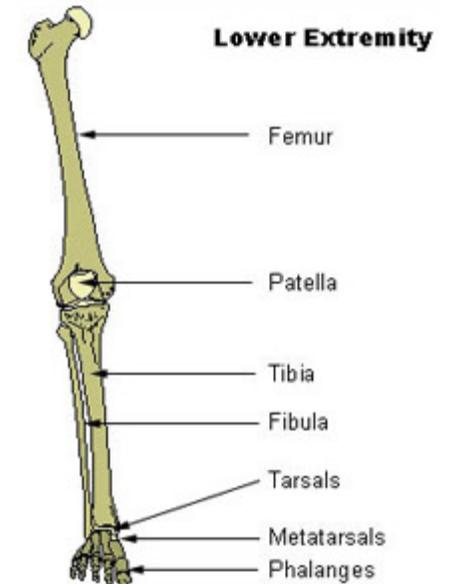
Introductory Medical Terms

- **Anatomy:** structure of something

- **Physiology:** study of function

- **Etiology:** cause of the disease

- **Idiopathic disease:** disease with unknown cause

- **Iatrogenic disease:** disease caused by human intervention

- **Nosocomial disease:** disease acquired in a healthcare facility

  - **In Greek:** noso for disease; komos for one who tends the sick

- **Congenital diseases:** diseases occurring at birth

- **Symptoms of disease:** subjective findings (patient's history)

- **Signs of disease:** objective findings (patient's physical exam)

- **Syndrome:** common cause of different signs & symptoms

Introductory Medical Terms

- **Remission:** period when symptoms of disease abate

- Organic versus functional disorders or diseases

- **Organic disorder:** physical changes are present

- **Functional disorder:** no physical changes to explain symptoms

- **Diagnosis:** nature of the disorder

  - **Etiology:** cause of the disorder

- **Prognosis:** what is in the future for this problem

- **Eponym:** "named after"

- **Acronym:** word formed from initial letter of major parts of term

- **Incubation:** latent period of the disease

  - before develop signs & symptoms

Body Systems

- **Skeletal**: Bones, axial skeleton, appendicular skeleton, and joints

- **Muscular**: Muscles and tendons

- **Integumentary**: Skin, hair, nails, and glands in skin

- **Sensory**: Eyes, ears, nose, skin receptors, and mouth

- **Cardiovascular**: Heart, blood vessels, and blood

Body Systems

- **Lymphatic**: Tonsils, spleen, thymus, lymph nodes, lymphatic vessels, and lymph fluid

- **Respiratory**: Nose, pharynx, larynx, trachea, bronchi, and lungs

- **Gastrointestinal**: Mouth, esophagus, stomach, small and large intestines, pancreas, liver, and gallbladder

Body Systems

- **Endocrine**: Hormones, pituitary gland, thyroid, adrenal glands, pancreas, and gonads

- **Nervous**: Brain, spinal cord, ganglia, nerves, and sensory organs

- **Urinary**: Kidneys, ureters, bladder, and urethra

- **Reproductive**: Ovaries, uterine tubes, uterus, and vagina in females; testes, ducts, penis, urethra, and prostate in males

Terminology

- ▶ Why is it so complex?

- ▶ Origin

- ▶ Standardization

4 Parts to a Medical Term

(1) Word Roots = base of a word

> Most word roots used as combining forms (e.g. cardiology)

(2) Combining Forms = Word Root & Combining Vowel

- ❖ Used to connect a word root ---to--- a suffix
- ❖ Used to connect a word root --- to --- a word root

> Rules for use of combining vowels (usually an "O")

- ❖ Don't use when suffix begins with a vowel (e.g. dermat/itis)
- ❖ Use if suffix begins with a consonant (e.g. rhino/plasty)
- ❖ Use if connecting a word root to a word root (e.g. gastro/esophageal)

  * this makes a <u>COMPOUND WORD</u>

(3) Prefixes = at beginning of word root

(4) Suffixes = at end of word root (usually with combining vowel)

Medical Terms

A combining form is a word root plus a combining vowel.

| GASTR | + | O | = | GASTR/O (stomach) |
| root | | vowel | | combining form |
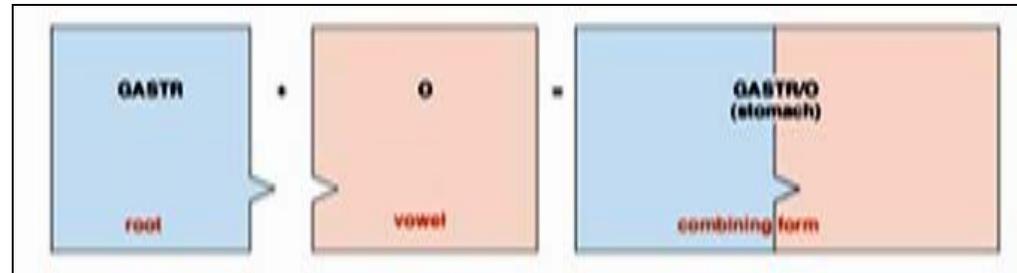
Terms are built from a variety of prefixes, roots and suffixes.

| EPI | + | GASTR | + | IC | = | EPIGASTRIC (above the stomach) |
| prefix | | root | | adjective suffix | | new term |
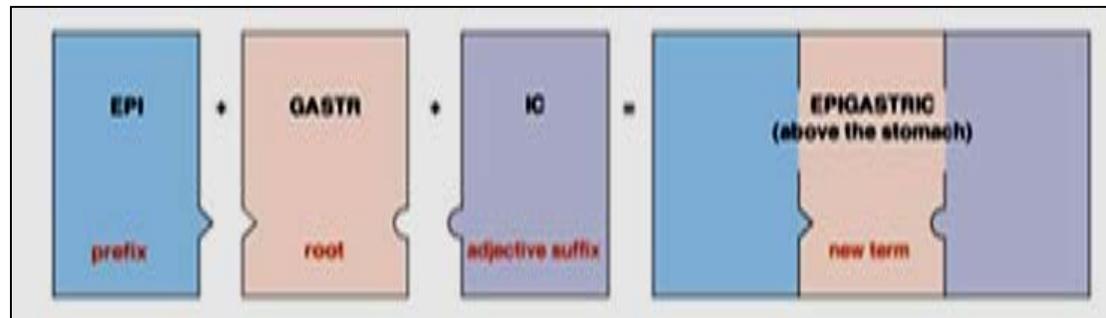
Common Medical Root Words

- Abdomin/o: Abdomen

- Aden/o: Gland

- Anter/o: Front

- Arteri/o: Artery

- Audi/o: Hearing

- Bio: Life

- Brachi/o: Arm

- Bronch/i, bronch/o: Bronchus

From *Medical Terminology For Dummies, 2nd Edition*
by Beverley Henderson, Jennifer Lee Dorsey

Common Medical Root Words

- Carcin/o: Cancer

- Cardi/o: Heart

- Col/o: Colon

- Cyt/o: Cell

- Derm/a, derm/o, dermat/o: Skin

- Dors/i, dors/o: Back or posterior

- Encephal/o: Brain

- Gastr/o: Stomach

Common Medical Root Words

- Gynec/o: Female

- Hemat/o: Blood

- Hist/o, histi/o: Tissue

- Intestin/o: Intestine

- Lapar/o: Abdomen, loin or flank

- Lymph/o: Lymph vessels

- My/o: Muscle

- Neur/o: Nerve

Common Medical Root Words

- Ocul/o: Eye

- Ophthalm/o: Eyes

- Optic/o, opt/o: Seeing, sight

- Or/o: Mouth

- Ot/o: Ear

- Path/o: Disease

- Pharmac/o: Drug

- Pulmon/o: Lungs

Common Medical Root Words

- Sept/o: Infection

- Thorac/o: Chest/thorax

- Thyr/o: Thyroid gland

- Trachel/o: Neck or necklike

- Trich/o: Hair or hairlike

- Ventr/i, ventr/o: Front of body

- Viscer/o: Viscera (internal organs)

Prefixes

▶ Word parts placed at the beginning of a word or word root and usually indicates location, (direction), number, or time

▶ Directional prefixes

Note:

Meta = after or beyond

Trans = through

Intra = within

Contra = against

Directional prefixes
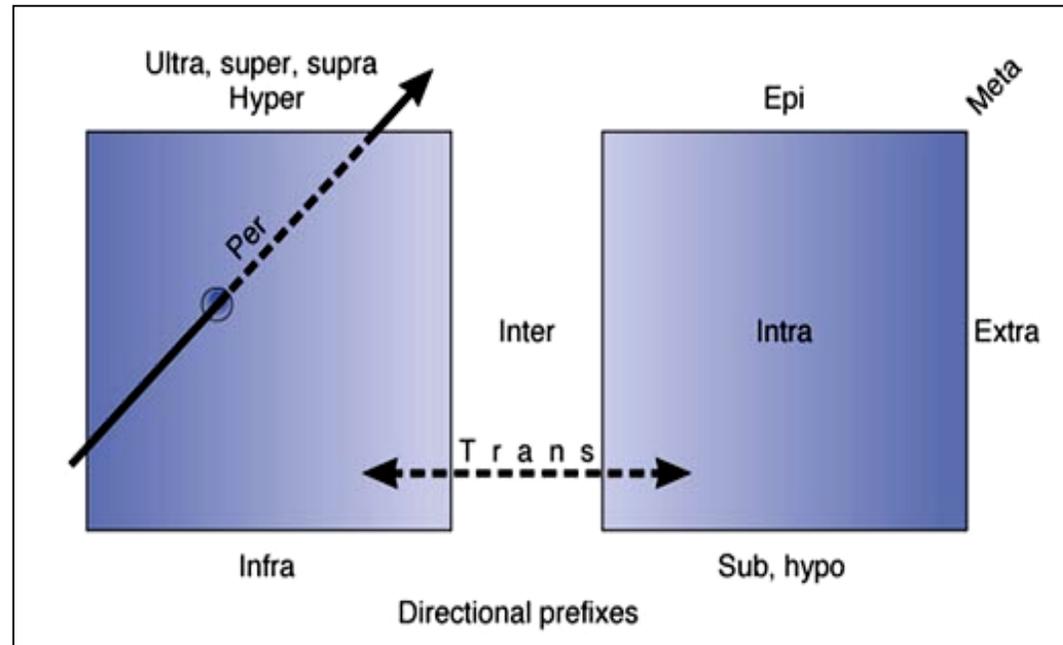
Common Medical Prefixes

Prefix	What It Means
A-, an-	Lack of, without, not
Ante-	Before, in front of, or forward
Anti-	Opposing or against
Bi-	Double, two, twice, both
Co-, con-, com-	Together or with
De-	Down, or from
Di-	Twice or two
Extra-, extro-	Beyond, outside of, or outward
Hemi-, semi-	Half, half of
Hyper-	Above, excessive, beyond
Hyp-, hypo-	Below, beneath, deficient

Common Medical Prefixes

Prefix	What It Means
Infra-	Below or beneath
Inter-	Between
Intra-	Within, inside
Intro-	Into, or within
Macro-	Large
Micro-, micr-	Tiny, small
Post-	After, or following, behind
Pre-, pro-	In front of, before, preceding
Retro-	Behind, backward
Semi-	Half
Trans-	Through or across
Tri-	Three
Ultra-	Excessive, beyond

Suffixes

Suffixes usually indicate condition, procedure, or disease; can make a root word either a noun or an adjective; can change the tense of a verb (-ed &-ing)

- ▶ Noun suffixes
  - ➤ -ism: condition (e.g. giantism)
  - ➤ -osis: abnormal condition (e.g. arteriosclerosis)
  - ➤ -ist: one who
  - ➤ -er: one who
  - ➤ -it is: inflammation of
- ▶ Adjective suffixes
  - ➤ -ous: pertaining to (e.g. eryththematous)
  - ➤ -ic: pertaining to

Common Medical Suffixes

Suffix	What It Means
-ac, -ic, -al, -ous, -tic	Related to, or pertaining to
-ate, -ize	Subject to, use
-ent, -er, -ist	Person, agent
-genic	Produced by
-gram	A written record
-graph	Instrument used to record
-graphy	Process of recording
-ism	Condition or theory
-itis	Inflammation

Common Medical Suffixes

Suffix	What It Means
-ologist	One who studies, specialist
-ology	Study of, process of study
-oma	Tumor
-pathy	Disease, disease process
-phobia	Morbid fear of or intolerance
-scope	Instrument used to visually examine
-scopy	Process of visual examination

Singular & Plural Endings

- Word ends with **"a"**
  - Vertebra -------- a to ae -------------------- just add e
- Word ends with **"x"**
  - Appendix ------- ix to appendices
  - Apex ------------- ex to apices   KEY = ix/ ex -to- ices
  - Phalanx ---------- nx to ges   nx -to- ges
- Word ends with **"is"**
  - diagnosis -------- diagnoses --------------------is to es
  - testis -------------- testes
  - metastasis ---------metastases
- Word ends with **"on"** or **"um"** ---------------- just change to "a"
  - Ganglion -------- ganglia
  - Ovum------------- ova
  - Atrium -----------atria
- Word ends with **"us"** -------------------------- just change to "i"
  - Alveolus ---------alveoli
  - Nucleus ----------nuclei

Key to plurals:

In Greek & Latin

General rule = end of word
                        changes to "a"

In English

General rule = end of word
                        changes to "s"

Singular & Plural Endings

Words ending in	Singular	Plural
-a	vertebra	vertebrae
-ax	thorax	thoraces
- ex or -ix	appendix	appendices
	apex	apices
-is	metastasis	metastases
	diagnosis	diagnoses
	testis	testes
-ma	sarcoma	sarcomata
-nx	phalanx	phalanges
-on	ganglion	ganglia
-us	nucleus	nuclei
-um	ovum	ova
-y	biopsy	biopsies

A medical term may be taken apart to determine its meaning.

OTORHINOLARYNGOLOGY
(study of the ears, nose and throat)

= **OT/O**
(ear)

+ **RHIN/O**
(nose)

+ **LARYNG**
(throat)

+ **-OLOGY**
(study of)
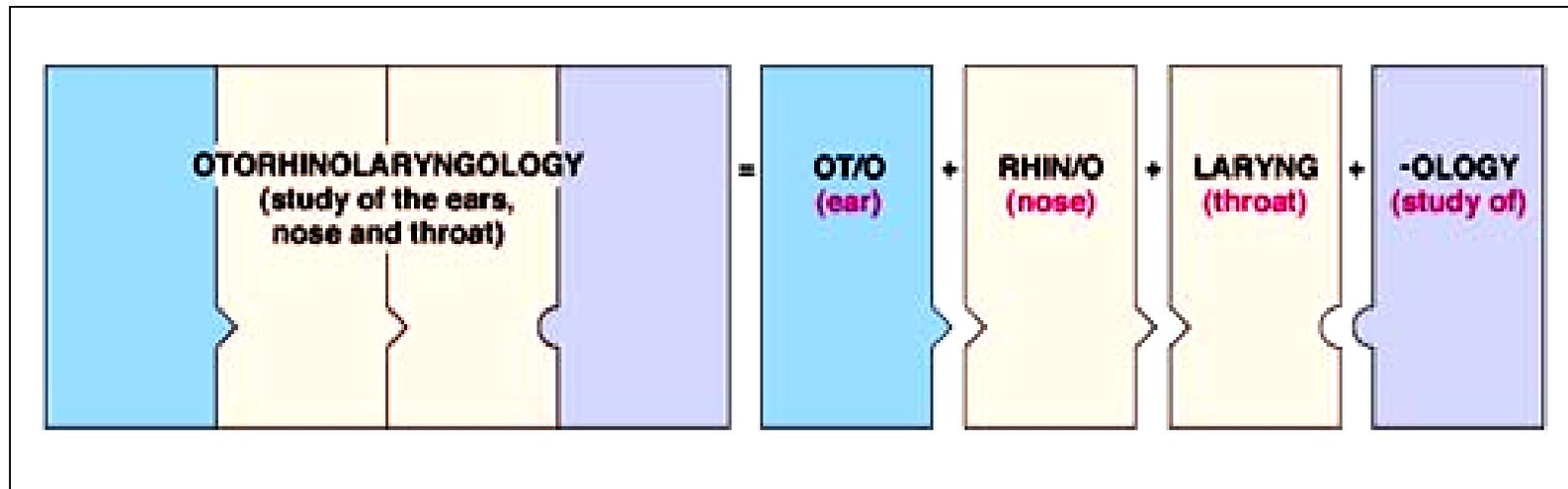
Got All of That?

OK, Lets Take The Test

CHART ABSTRACTION

Jill Jean
Lead Trauma Registrar

WHERE DO I START??

HOW DO I IDENTIFY WHICH PATIENTS GO IN MY REGISTRY???

National Trauma Data Standard

National Trauma Data Standard Inclusion Criteria
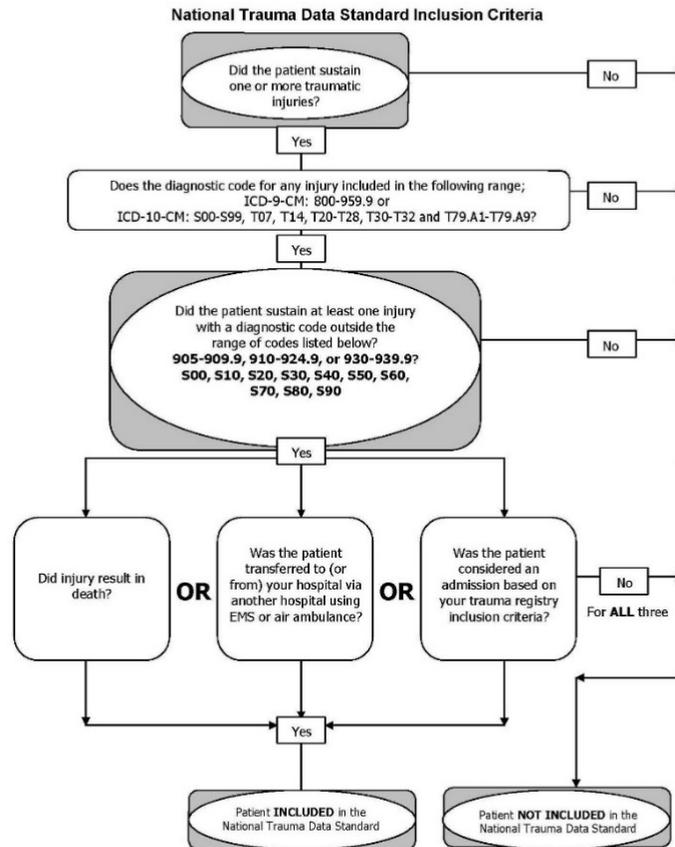
Approach to Chart Abstraction

▶ Be systematic

▶ Be consistent

▶ Follow established hierarchies

▶ Seek clarification…don't make assumptions

▶ Don't take shortcuts…you are the expert!

▶ READ the data dictionary…often
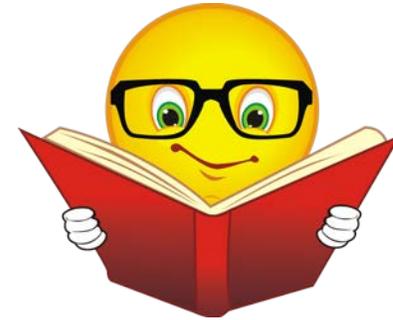
Types of Abstraction

▶ **Manual**: standard approach, but labor intensive and susceptible to human error
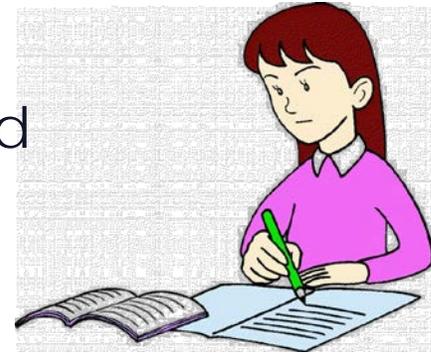
▶ **Electronic**: ideal approach, but not necessarily feasible due to system integration issues…human error on initial data entry still a concern!

Data to Abstract

- Demographic information

- Injury information

- Pre-hospital information

- Emergency Department information

- Hospital procedure information

- Diagnosis information

- Injury severity information

- Outcome information

- Financial information

- Quality assurance information

- Other data deemed necessary for your program…

Data Source Hierarchy

▶ Consult ACS NTDB National Trauma Data Standard: Data Dictionary for specific elements…variable hierarchy depending on element…sources include:

- EMS run report

- Triage/trauma flow sheet

- Nursing notes/flow sheet

- History & physical

- Progress notes

- Billing sheet

- Discharge summary

- Lab results/radiology

- Operative reports (note: use "cut time" <u>NOT</u> time entered OR)

Key Points in Chart Abstraction

▶ An organized approach is essential

▶ Facility specific data dictionary highly recommended for continuity and consistency

▶ Automate data collection wherever possible, but verify the source!

▶ Ensure timely data abstraction (within 60 days of patient discharge) to elicit accurate data

▶ Become "buddies" with your Medical Records coding staff, they will be a great resource for your Registry

Do Not Reinvent the Wheel

▶ Use tools that are already out there, e.g. data abstraction sheet, blood usage sheet, 3M encoder

▶ Network with other Registrars in your region and ask questions - there are NO dumb questions

▶ Stay involved, attend meetings via phone or in person whenever possible

ICD-10 Overview

Lauren Vredeveld

Trauma Registrar

Let's See Where We're At..

▶ How many of you have started ICD-10 trauma coding?

▶ How many of you have an encoder system?

▶ How many of you code from the book?

▶ How many of you use the codes your coders select? Or, how many of you code the patient's record all on your own?

ICD-10 Transition

"Please plan to make the ICD-10 transition in accordance with the government deadline. To give hospitals ample time to convert from ICD-9 to ICD-10, we will continue to accept ICD-9-CM for hospital admissions through December 31, 2016. *Beginning with January 1, 2017 admissions, we will no longer accept ICD-9-CM codes* and any files submitted with ICD-9-CM coding will fail the Validator."

Coding Basics

- **ICD-10-CM**: Clinical Modification
- **ICD-10-PCS**: Procedure Coding System
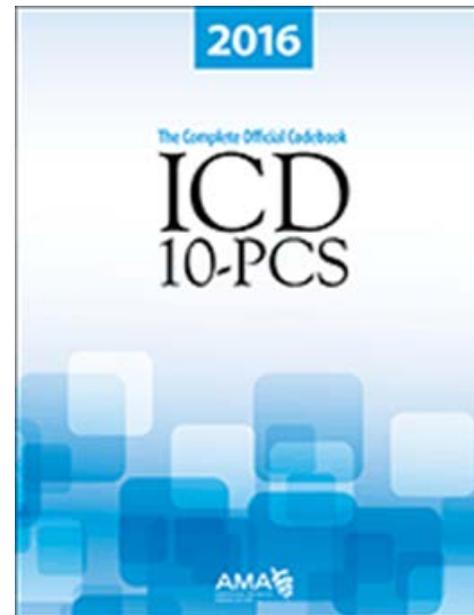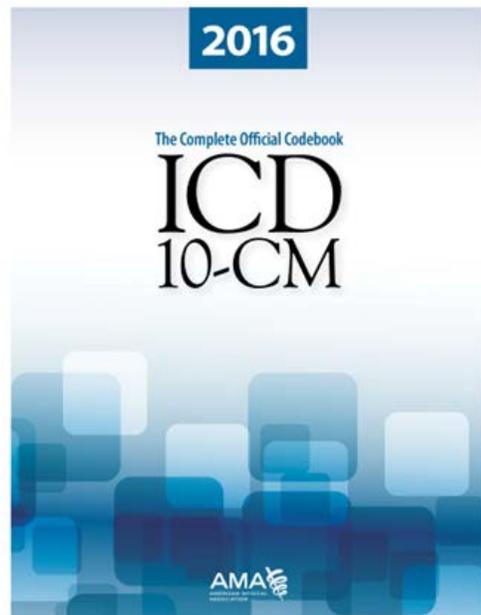
ICD-10-CM

▶ Diseases and Injuries

▶ External Cause of Injuries

▶ https://www.cms.gov/Medicare/Coding/ICD10/2016-ICD-10-CM-and-GEMs.html

ICD-10-CM: Code Structure

ICD-10-CM: Code Structure

- Characters for categories, subcategories and codes may be either a letter or a number

- All categories are 3 characters

- A three-character category that has no further subdivision is equivalent to a code

- Subcategories are either 4 or 5 characters

- Codes may be 3, 4, 5, 6 or 7 characters

- A code that has an applicable 7th character is considered invalid without the 7th character

- The "X" is used as a placeholder for certain codes to allow for future expansion

ICD-10-CM: Code Structure Trauma Related Diagnoses

- S00-S09 Injuries to the head

- S10-S19 Injuries to the neck

- S20-S29 Injuries to the thorax

- S30-S39 Injuries to the abdomen, lower back, lumbar spine, pelvis and external genitals

- S40-S49 Injuries to the shoulder and upper arm

- S50-S59 Injuries to the elbow and forearm

- S60-S69 Injuries to the wrist, hand and fingers

- S70-S79 Injuries to the hip and thigh

- S80-S89 Injuries to the knee and lower leg

- S90-S99 Injuries to the ankle and foot

- T07 Injuries involving multiple body regions

- T14 Injury of unspecified body region

- T20-T25 Burns and corrosions of external body surface, specified by site

- T26-T28 Burns and corrosions confined to eye and internal organs

- T30-T32 Burns and corrosions of multiple and unspecified body regions

- T79 Certain early complications of trauma

ICD-10-CM: Code Structure
External Causes of Morbidity

- V00-X58 Accidents

- V00-V99 Transport accidents

- V00-V09 Pedestrian injured in transport accident

- V10-V19 Pedal cycle rider injured in transport accident

- V20-V29 Motorcycle rider injured in transport accident

- V30-V39 Occupant of three-wheeled motor vehicle injured in transport accident

- V40-V49 Car occupant injured in transport accident

- V50-V59 Occupant of pick-up truck or van injured in transport accident

- V60-V69 Occupant of heavy transport vehicle injured in transport accident

- V70-V79 Bus occupant injured in transport accident

- V80-V89 Other land transport accidents

- V90-V94 Water transport accidents

- V95-V97 Air and space transport accidents

- V98-V99 Other and unspecified transport accidents

- W00-X58 Other external causes of accidental injury

- W00-W19 Slipping, tripping, stumbling and falls

ICD-10-CM: Code Structure
External Causes of Morbidity

- W20-W49 Exposure to inanimate mechanical forces

- W50-W64 Exposure to animate mechanical forces

- W65-W74 Accidental non-transport drowning and submersion

- W85-W99 Exposure to electric current, radiation and extreme ambient air temperature and pressure

- X00-X08 Exposure to smoke, fire and flames

- X10-X19 Contact with heat and hot substances

- X30-X39 Exposure to forces of nature

- X52-X58 Accidental exposure to other specified factors

- X71-X83 Intentional self-harm

- X92-Y08 Assault

- Y21-Y33 Event of undetermined intent

- Y35-Y38 Legal intervention, operations of war, military operations, and terrorism

- Y62-Y84 Complications of medical and surgical care

- Y62-Y69 Misadventures to patients during surgical and medical care

- Y70-Y82 Medical devices associated with adverse incidents in diagnostic and therapeutic use

- Y83-Y84 Surgical and other medical procedures as the cause of abnormal reaction of the patient, or of later complication, without mention of misadventure at the time of the procedure

- Y90-Y99 Supplementary factors related to causes of morbidity classified elsewhere

From *ICD-10-CM Tabular List of Diseases and Injuries* at www.cms.gov

ICD-10-PCS

▶ Medical Procedures

▶ https://www.cms.gov/Medicare/Coding/ICD10/2016-ICD-10-PCS-and-GEMs.html

▶ A 'not elsewhere classified' option is allowed for new devices and substances

▶ All substantially different procedures are defined

ICD-10-PCS: Code Structure
Medical and Surgical Section
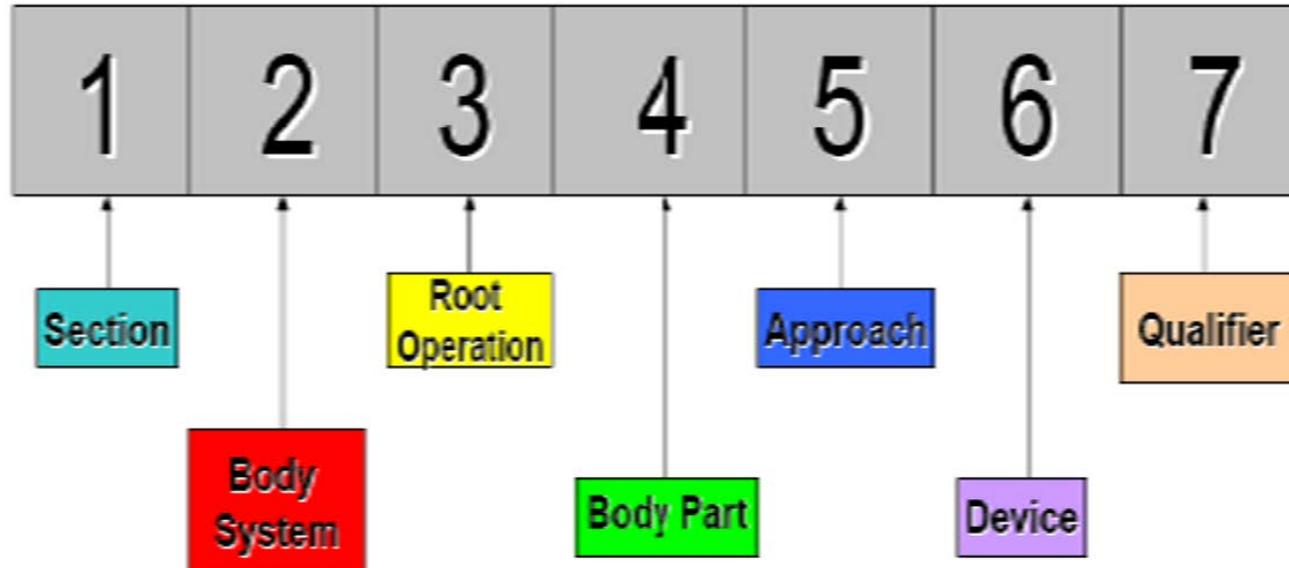
ICD-10-PCS: Code Structure

▶ Codes are comprised of seven components; each component is called a "character"

  – All codes are **seven** characters long

▶ Individual units for each character are represented by a letter or number

  – Each unit is called a "value"

▶ 34 possible values for each character

  – Digits 0-9

  – Letters A-H, J-N, P-Z

ICD-10-PCS: Code Structure Medical and Surgical Section

▶ 1st Character = Section

▶ 2nd Character = Body System

▶ 3rd Character = Root Operation

▶ 4th Character = Body Part

▶ 5th Character = Approach

▶ 6th Character = Device

▶ 7th Character = Qualifier

From *ICD-10-PCS Reference Manual*
at www.cms.gov

ICD-10-PCS: Code Structure
1st Character = Section

- 0 Medical and Surgical

- 1 Obstetrics

- 2 Placement

- 3 Administration

- 4 Measurement and Monitoring

- 5 Extracorporeal Assistance and Performance

- 6 Extracorporeal Therapies

- 7 Osteopathic

- 8 Other Procedures

- 9 Chiropractic

- B Imaging

- C Nuclear Medicine

- D Radiation Therapy

- F Physical Rehabilitation and Diagnostic Audiology

- G Mental Health

- H Substance Abuse Treatment

- X New Technology

From *ICD-10-PCS Reference Manual* at www.cms.gov

ICD-10-PCS: Code Structure
2nd Character = Body System

- 00 Central Nervous System
- 01 Peripheral Nervous System
- 02 Heart and Great Vessels
- 03 Upper Arteries
- 04 Lower Arteries
- 05 Upper Veins
- 06 Lower Veins
- 07 Lymphatic and Hemic Systems
- 08 Eye
- 09 Ear, Nose, Sinus
- 0B Respiratory System

- 0C Mouth and Throat
- 0D Gastrointestinal System
- 0F Hepatobiliary System and Pancreas
- 0G Endocrine System
- 0H Skin and Breast
- 0J Subcutaneous Tissue and Fascia
- 0K Muscles
- 0L Tendons
- 0M Bursae and Ligaments
- 0N Head and Facial Bones

- 0P Upper Bones
- 0Q Lower Bones
- 0R Upper Joints
- 0S Lower Joints
- 0T Urinary System
- 0U Female Reproductive System
- 0V Male Reproductive System
- 0W Anatomical Regions, General
- 0X Anatomical Regions, Upper Extremities
- 0Y Anatomical Regions, Lower Extremities

ICD-10-PCS: Code Structure
3rd Character = Root Operation

- **Alteration:** Modifying the anatomic structure of a body part without affecting the function of the body part
- **Bypass:** Altering the route of passage of the contents of a tubular body part
- **Change:** Taking out or off a device from a body part and putting back an identical or similar device in or on the same body part without cutting or puncturing the skin or a mucous membrane
- **Control:** Stopping, or attempting to stop, postprocedural bleeding
- **Creation:** Making a new structure that does not physically take the place of a body part
- **Destruction:** Eradicating all or a portion of a body part
- **Detachment:** Cutting off all or a portion of an extremity
- **Dilation:** Expanding an orifice or the lumen of a tubular body part
- **Division:** Separating, without taking out, a body part
- **Drainage:** Taking or letting out fluids and/or gases from a body part
- **Excision:** Cutting out or off, without replacement, a portion of a body part
- **Extirpation**: Taking or cutting out solid matter from a body part
- **Extraction**: Pulling or stripping out or off all or a portion of a body part
- **Fragmentation**: Breaking solid matter in a body part into pieces

ICD-10-PCS: Code Structure
3rd Character = Root Operation

- **Fusion**: Joining together portions of an articular body part rendering the articular body part immobile
- **Insertion**: Putting in a non-biological device that monitors, assists, performs or prevents a physiological function but does not physically take the place of a body part
- **Inspection**: Visually and/or manually exploring a body part
- **Map**: Locating the route of passage of electrical impulses and/or locating functional areas in a body part
- **Occlusion**: Completely closing an orifice or the lumen of a tubular body part
- **Reattachment**: Putting back in or on all or a portion of a separated body part to its normal location or other suitable location
- **Release**: Freeing a body part
- **Removal**: Taking out or off a device from a body part
- **Repair**: Restoring, to the extent possible, a body part to its normal anatomic structure and function

From *ICD-10-PCS Reference Manual* at www.cms.gov

ICD-10-PCS: Code Structure
3rd Character = Root Operation

- **Replacement**: Putting in or on biological or synthetic material that physically takes the place of all or a portion of a body part
- **Reposition**: Moving to its normal location or other suitable location all or a portion of a body part
- **Resection**: Cutting out or off, without replacement, all of a body part
- **Restriction**: Partially closing an orifice or the lumen of a tubular body part
- **Revision**: Correcting, to the extent possible, a malfunctioning or displaced device
- **Transfer**: Moving, without taking out, all or a portion of a body part to another location to take over the function of all or a portion of a body part
- **Transplantation**: Putting in or on all or a portion of a living body part taken from another individual or animal to physically take the place and/or function of all or a portion of a similar body part

ICD-10-PCS: Code Structure
4th Character = Body Part

- If a procedure is performed on a portion of a body part that does not have a separate body part value, code the body part value corresponding to the whole body part

- If the prefix "peri" is used with a body part to identify the site of the procedure, the body part value is defined as the body part named

- If the procedure documentation uses a body part to further specify the site of the procedure, the body part value is defined as the body part on which the procedure is performed

ICD-10-PCS: Code Structure
5th Character = Approach

- **Open**: Cutting through the skin or mucous membrane and any other body layers necessary to expose the site of the procedure
- **Open Endoscopic**: Cutting through the skin or mucous membrane and any other body layers necessary to expose a body part, and introduction of instrumentation to reach and visualize the site of the procedure
- **Percutaneous**: Entry, by puncture or minor incision, of instrumentation through the skin or mucous membrane and any other body layers necessary to reach the site of the procedure
- **Percutaneous Endoscopic**: Entry, by puncture or minor incision, of instrumentation through the skin or mucous membrane and any other body layers necessary to reach and visualize the site of the procedure
- **Via Natural or Artificial Opening**: Entry of instrumentation through a natural or artificial external opening to reach the site of the procedure
- **Via Natural or Artificial Opening Endoscopic**: Entry of instrumentation through a natural or artificial external opening to reach and visualize the site of the procedure
- **Open with Percutaneous Endoscopic Assistance**: Cutting through the skin or mucous membrane and any other body layers necessary to expose the site of the procedure, and entry, by puncture or minor incision, of instrumentation through the skin or mucous membrane and any other body layers necessary to aid in the performance of the procedure
- **External**: Procedures performed directly on the skin or mucous membrane and procedures performed indirectly by the application of external force through the skin or mucous membrane

ICD-10-PCS: Code Structure
6th Character = Device

- A device is coded only if a device remains after the procedure

- Materials such as sutures, ligatures, radiological markers and temporary post-operative wound drains are considered integral to the performance of a procedure and are not coded as devices

- A separate procedure to put in a drainage device is coded to the root operation drainage with the device value drainage device

- If, as part of a procedure, an autograft is obtained from a different body part, a separate procedure is coded

ICD-10-PCS: Code Structure
7th Character = Qualifier

- Defines an additional attribute of the procedure performed, if applicable

Let's Look at the ICD-10 Book

Section	0	Medical and Surgical
Body System	R	Upper Joints
Operation	R	Replacement: Putting in or on biological or synthetic material that physically takes the place and/or function of all or a portion of a body part

Body Part	Approach	Device	Qualifier
0 Occipital-cervical Joint 1 Cervical Vertebral Joint 3 Cervical Vertebral Disc 4 Cervicothoracic Vertebral Joint 5 Cervicothoracic Vertebral Disc 6 Thoracic Vertebral Joint 9 Thoracic Vertebral Disc A Thoracolumbar Vertebral Joint B Thoracolumbar Vertebral Disc C Temporomandibular Joint, Right D Temporomandibular Joint, Left E Sternoclavicular Joint, Right F Sternoclavicular Joint, Left G Acromioclavicular Joint, Right H Acromioclavicular Joint, Left L Elbow Joint, Right M Elbow Joint, Left N Wrist Joint, Right P Wrist Joint, Left Q Carpal Joint, Right R Carpal Joint, Left S Metacarpocarpal Joint, Right T Metacarpocarpal Joint, Left U Metacarpophalangeal Joint, Right V Metacarpophalangeal Joint, Left W Finger Phalangeal Joint, Right X Finger Phalangeal Joint, Left	0 Open	7 Autologous Tissue Substitute J Synthetic Substitute K Nonautologous Tissue Substitute	Z No Qualifier
J Shoulder Joint, Right K Shoulder Joint, Left	0 Open	0 Synthetic Substitute, Reverse Ball and Socket 7 Autologous Tissue Substitute K Nonautologous Tissue Substitute	Z No Qualifier
J Shoulder Joint, Right K Shoulder Joint, Left	0 Open	J Synthetic Substitute	6 Humeral Surface 7 Glenoid Surface Z No Qualifier

What is the root operation for "Stopping, or attempting to stop, postprocedural bleeding?"

ICD-10 PCS Trivia

► Answer: *Control*

Examples of a control procedure in the trauma coding world include fulguration after an operative procedure where bleeding persists.

What is the root operation for the "Joining together portions of an articular body part rendering the articular body part immobile?"

ICD-10 PCS Trivia

▶ Answer: *Fusion*

Examples of fusion in the trauma coding world include spinal fusions, or vertebral joint fusions. **Fusion procedures are ONLY performed on the joints, not the bones or vertebrae.**

Traditional Ankle Fusion

Tibia

Talus
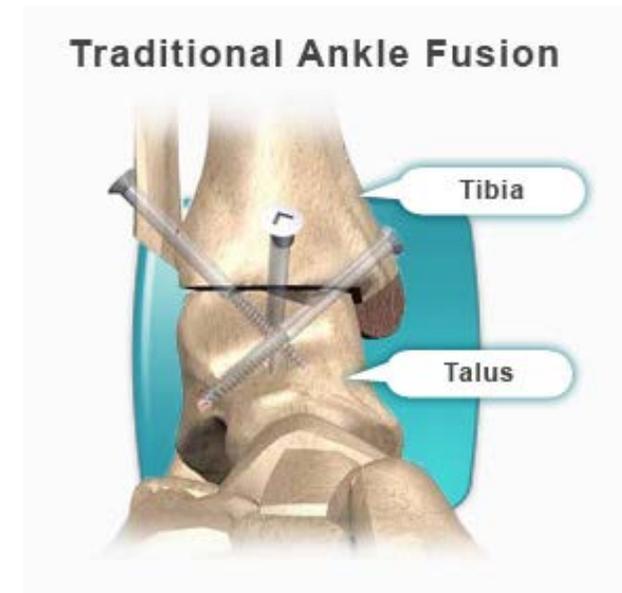
What is the root operation for "Putting back in, or on, all or a portion of a separated body part to its normal location or other suitable location?"

ICD-10 PCS Trivia

▶ Answer: *REATTACHMENT*

Examples of reattachment in the trauma coding world include reattachment of a severed ear, reattachment of an amputated limb, replantation of avulsed teeth, etc.

What is the root operation for "Moving to it's normal location or other suitable location all or a portion of a body part?"
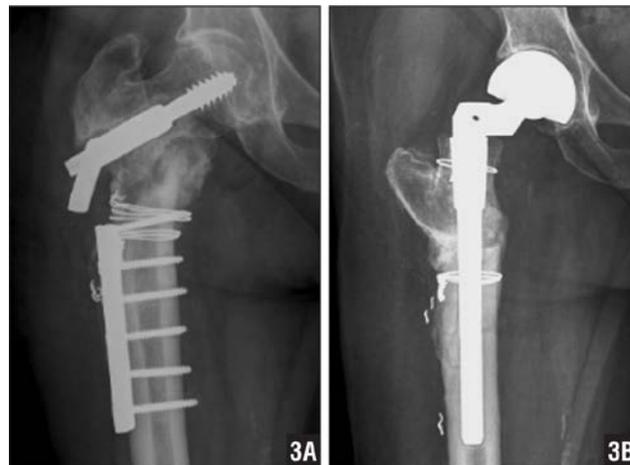
ICD-10 PCS Trivia

▶ Answer: *REPOSITION*

Examples of reposition in the trauma coding world include closed reductions, ORIF's, etc.

ICD-10 PCS Trivia

▶ Answer: *"Cutting through the skin or mucous membrane and any other body layers necessary to expose the site of the procedure"*

ICD-10 PCS Trivia

What approach am I?

"Entry, by puncture or minor incision, of instrumentation through the skin or mucous membrane and any other body layers necessary to reach and visualize the site of the procedure"

ICD-10 PCS Trivia

▶ Answer: **_Percutaneous Endoscopic_**

ICD-10 PCS Trivia

A patient is intubated in the ER with a size 8.0 ET tube? What approach would this procedure be coded to?
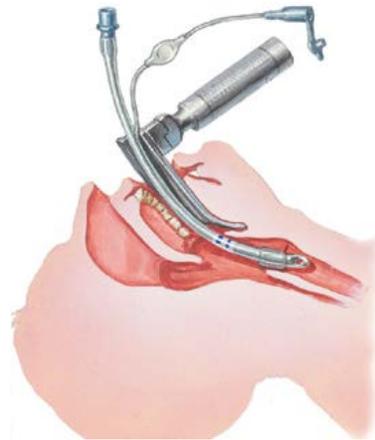
ICD-10 PCS Trivia

► Answer: *Via Natural or Artificial Opening*

"Entry of instrumentation through a natural or artificial external opening to reach the site of the procedure."

ICD-10 PCS Trivia

What are some of the most common ROOT OPERATIONS we as trauma coders see?

ICD-10 PCS Trivia

Inspection

Repair

Drainage

Excision
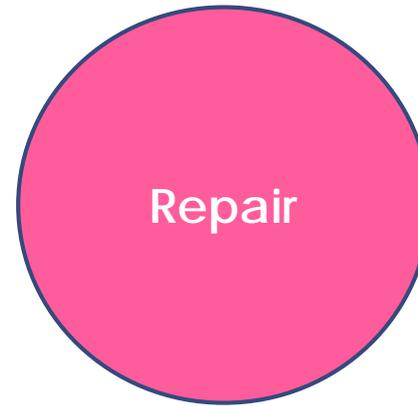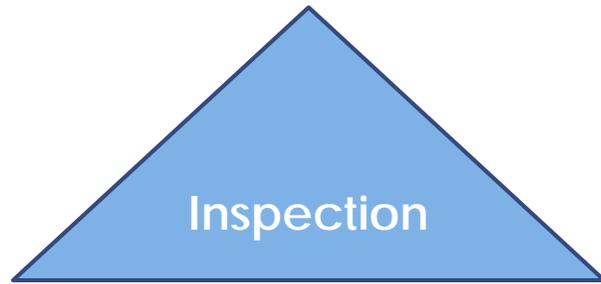
Abbreviated Injury Scale (AIS) Overview

Allen Stout

State Trauma Registrar & Epidemiologist

Abbreviated Injury Scale (AIS)

▶ The AIS is an **anatomically-based, consensus-derived, global** severity scoring system that classifies each injury by body region according to its relative importance on a **6-point ordinal scale**

▶ Ordinal Scale – Ranking of severity in numerical order (not linear in magnitude…e.g. 4 is NOT twice as severe as 2):

  ➢ 1 = minor

  ➢ 2 = moderate

  ➢ 3 = serious

  ➢ 4 = severe

  ➢ 5 = critical

  ➢ 6 = maximum (currently untreatable…NOT "Death")

Abbreviated Injury Scale (AIS)

▶ Chapters in the AIS Dictionary (Body Region):

- 1 Head

- 2 Face

- 3 Neck

- 4 Thorax

- 5 Abdomen

- 6 Spine

- 7 Upper Extremity

- 8 Lower Extremity

- 9 External and Thermal Injuries and Other Trauma

AIS: Code Structure
7-Digit Unique Numerical Identifier

▶ 1st Character = Body Region

▶ 2nd Character = Type of Anatomic Structure

▶ 3rd & 4th Character = Specific Anatomic Structure

▶ 5th & 6th Character = Level of injury within the specific body region and anatomic structure

▶ 7th Character = AIS Severity Number

▶ NOTE: First 6 digits are considered "Pre-Dot Code"

AIS: Code Structure
7-Digit Unique Numerical Identifier

EXAMPLE: **853000**.3

- Body Region = 8 (Lower Extremity)

- Type of Anatomic Structure = 5 (Skeletal)

- Specific Anatomic Structure = 30 (Femur)

- Level of injury within the specific body region and anatomic structure = 00 (NFS)

- AIS Severity Number = 3 (serious)

- NOTE: First 6 digits are considered "Pre-Dot Code"

Injury Severity Score (ISS)

▶ AIS assesses the severity of single injuries

▶ Patients generally sustain multiple injuries in traumatic events

▶ The Injury Severity Score (ISS) is a weighted system that uses the highest AIS severity code between AIS 1 and AIS 5 in 3 different body regions

▶ The ISS is the sum of the squares of the highest AIS in each of the three (3) most severely injured ISS body regions:

$$A^2 + B^2 + C^2 = ISS$$

$$3^2 + 2^2 + 4^2 = ISS$$

$$9 + 4 + 16 = 29$$

Injury Severity Score (ISS)

▶ ISS body regions are not necessarily the same as AIS body regions / AIS chapters

▶ Six ISS Body Regions:

  ➢ 1 Head and Neck

  ➢ 2 Face

  ➢ 3 Chest

  ➢ 4 Abdominal and Pelvic Contents

  ➢ 5 Extremities and Pelvic Girdle

  ➢ 6 External

▶ ISS > 15 is generally considered "severe trauma"

Data Validation

Deanne Krajkowski

Trauma Registrar

Data Validation

▶ High-quality data begin with high-quality data entry, and it is the trauma registrar who is responsible for performing this task

▶ The amount of time and effort that will be necessary to maintain the registry should not be underestimated

▶ A designated and well-trained trauma registrar is critical to the success of a registry

From *Resources For Optimal Care Of The Injured Patient* by ACS Committee on Trauma

Data Validation

▶ The information provided by a trauma registry is only as valid as the data entered

▶ Strategies for monitoring data validity are essential

▶ A scheme for internal validation helps to detect errors in data entry or coding

▶ Many trauma registry software packages include mechanisms to ensure consistency

From *Resources For Optimal Care Of The Injured Patient* by ACS Committee on Trauma

Data Validation

▶ A plan for ensuring that the data entered are accurate and reflect the observations made on the patient should be established

▶ Strategies for monitoring data validity are essential (CD 15–10). This is a required criteria for Level I, II, III and IV Trauma Centers

▶ The medical director, trauma program manager, and trauma registrar can perform a systematic review of the differences to establish levels of inter-rater reliability

▶ Ongoing review and evaluation are important to ensure the quality, reliability, and validity of local registry data

Accuracy of Data

Strategies for monitoring data validity are essential and can be accomplished through:

- ▶ Productivity reports, including number of cases completed along with time required to complete

- ▶ Inter-rater reliability re-abstraction of patient records (5-10% per month)

  - ➤ Barrier in facilities with few staff

- ▶ Adherence to NTDB/State/TQIP/MTQIP definitions

- ▶ Reporting on "logical" fields

- ▶ Reporting on missing data elements

Data Validation Policy

Creating a Data Validation Policy

- ▶ Threshold for accuracy
  - ➢ Typically 95%
- ▶ Have an objective
  - ➢ Ensuring data accuracy
- ▶ Validation procedure
  - ➢ Random selection of % of patients to re-abstract
  - ➢ Formula to determine accuracy rate
  - ➢ Total # correct data elements/Total # of all data elements x 100
    - ❖ (329/340)*100=97%

Sample Data Validation Policy

St. Elsewhere Medical Center
Trauma Manual
Trauma Registry Data Validation
Policy Number: 100

Objective: To define the process for verifying the accuracy of data entered into the Trauma Registry.
Scope: Trauma Program and Registry Data

Policy:

The information provided by a trauma registry is only as valid as the data entered into it and requires strategies for monitoring data validity. Data elements chosen for review can be modified based on the needs of the program. The Trauma Program will provide a monthly data review of selected trauma patients' charts to ensure accuracy of data entered into the trauma registry. The selection of patient charts will be random and will include 5% of all patients entered for that given month. Re-abstraction of selected data elements, injury descriptions and ICD-9 and AIS codes will be done to check for accuracy. The minimum accuracy rate will be at least 95%.

Procedure:

A random selection of 5% of trauma patients for a given month will be reviewed.
Re-abstraction will be done by the reviewer.
Inter-rater reliability audit will be determined using the following formula:

Total # of correct data elements/Total # of data elements reviewed multiplied by 100 is equal to the accuracy percentage. Example:

$$(329/340)*100=97\%$$

Discrepancies found during the data validation process will be reviewed by the Trauma Program Manager and the Trauma Registrar(s) and corrected immediately thereafter.
A summary report of the monthly data validation will be generated and kept on file.

Related Policies & Procedures: Trauma Service

Reviewed by: Trauma Program Manager
Trauma Program Medical Director
Trauma Program Operational and Process Improvement Committee

Effective date: 02/2016
Approval:

_____   _____

Dr. McDreamy   **Date**

Data Validation Worksheet

Design a worksheet which identifies data to re-abstract

- ▶ Include names of original abstractor and re-abstractor
- ▶ Data elements to be re-abstracted
- ▶ Number of data elements correct and total data elements
- ▶ Validate entire chart versus selected data
- ▶ Choose "key" data elements to validate based on:
  - ➤ Logic
  - ➤ Probability of survival
  - ➤ Performance improvement
  - ➤ Outcomes
  - ➤ Coding
  - ➤ Procedures
- ▶ Adherence to NTDB/State/TQIP/MTQIP definitions
- ▶ Reporting on missing data elements

Sample Data Validation Worksheet

St. Elsewhere Medical Center			
Trauma Registry Data Validation Worksheet			
Original Abstractor			
Verifying Abstractor			
Month/Year			
Registry ID#			
Total Data Correct			
Total Data Abstracted			
Data Element	Original Abstractor	Verifying Abstractor	Discrepancy
ED Disposition Code			
Inpatient Disposition Code			
ICU Days			
Vent Days			
Protective Devices			
AIS Codes			
Comorbid Conditions			

Data Validation Tracking

▶ Create a Data Tracking Sheet that lists all abstractors and their rates of validity

▶ Track each month's rate

▶ Keep in a book to produce for verification visits to show compliance

	2016 Data Validation					
	Stacey Smith			Jane Jones		
	Number of Patients in Registry	Number Validated	Percent Accurate	Number of Patients in Registry	Number Validated	Percent Accurate
January	100	5	95%	100	5	98%
February						
March						

Ongoing Practices to Assure Quality Data

▶ Review of NTDB data definitions

▶ Understanding of values "N", "NA", "not"

▶ Validate new fields

▶ Team involvement

▶ Create internal data dictionary

▶ Electronic data import

▶ Involve your data validity rate in performance improvement

▶ "Phone a friend"

Data Analytics & Report Writing

Allen Stout
State Trauma Registrar & Epidemiologist

Shauna Di Pasquo
Trauma Registrar

Data Analytics & Report Writing

Data Analytics & Report Writing References:

A Guide to Measuring Health & Safety Performance – UK Health & Safety Executive

Causation and Causal Inference in Epidemiology – Rothman & Greenland

Epidemiology: Principles & Methods – MacMahon & Trichopoulous

Introduction to Epidemiology – Paneth

Trend Analysis and Interpretation – Rosenberg

Fundamentals of Biostatistics – Rosner

Types of Data Analysis & Reports

- Descriptive Statistics (e.g. trend analysis, cross-tabulation)

- Explanatory Analytics (e.g. causal inferential statistical analyses)

- Predictive Analytics (e.g. Risk-Adjusted Benchmarking)

Key Concepts in Trend Analysis

- Examining trends over time is one of the most basic tools of epidemiology

- As our knowledge base and technological skills grow over time, there should be a corresponding improvement in outcomes

- As new hazards emerge, or as familiar hazards reach new populations, some indicators may regress or deteriorate over time

- Exploring whether outcomes experience actual change over time is essential to evaluating processes and performance

Key Concepts in Trend Analysis

- Statistical approaches aim to "smooth" the data by reducing their "jagged" appearance (stabilizing rate)

- Various forms of averaging (e.g. Year-To-Date rates, multiple month/year rates, moving averages, and regression procedures) can accomplish the desired smoothing

- Collapsing data across time periods increases the stability of rates by increasing the sample size at each time point, though it can make it difficult to discern patterns

Key Concepts in Trend Analysis

Smoothing Examples
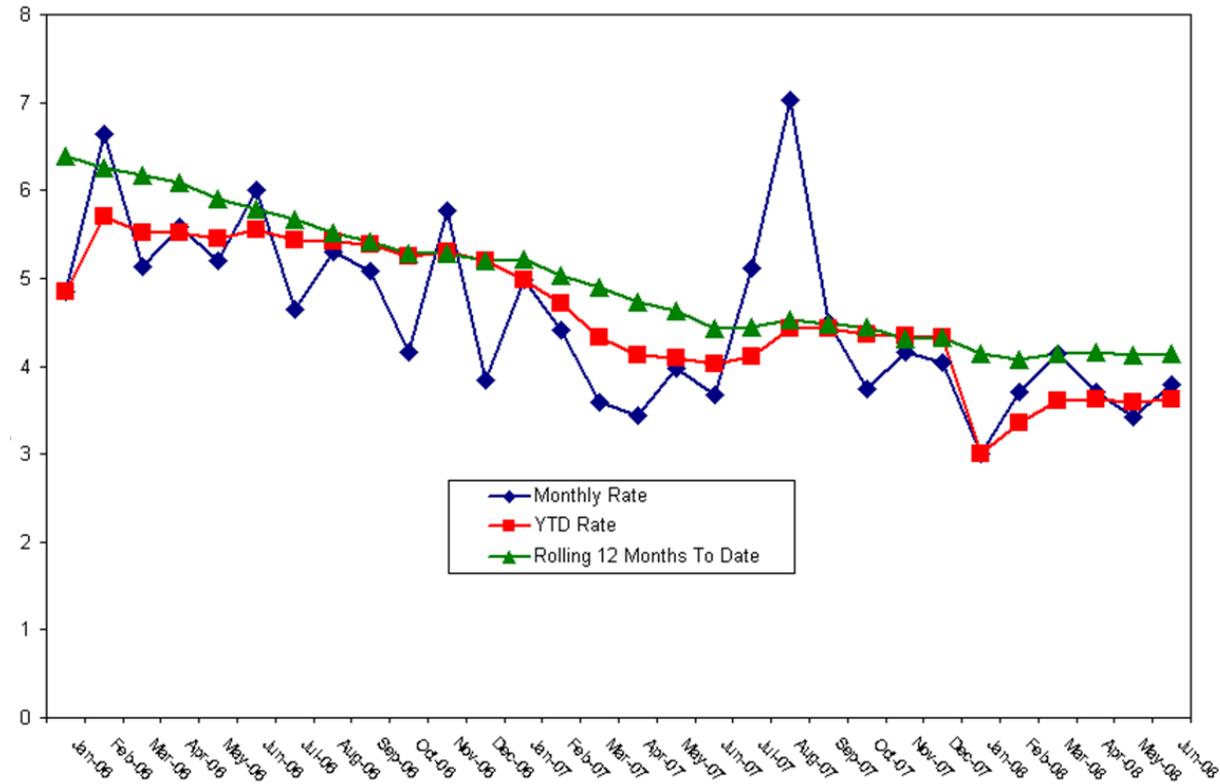
Key Concepts in Trend Analysis

- Deciding which results to present and the form in which to present them is an important aspect of turning the data into information

- Examining the data in multiple and varied forms allows for exploration of different presentation strategies, and is necessary for selecting an effective and useful approach

- In addition, having multiple analyses provides a pool from which to draw depending on the audience and circumstances of the presentation

Key Concepts in Trend Analysis

- Trend data provide a dynamic rather than a fixed view of performance and of the inputs that can have an impact on outcomes

- For trend data to be most useful, it is critical that an analysis be conceptually tied to specific programs/issues

- The job of the analyst, therefore, is to present graphs, tables, statistical results, and narrative that make these connections

- In particular, the ability to appropriately analyze and interpret trends for finite populations (e.g. pediatric patients) is essential if program intervention strategies are to be more targeted and thus more effective

Key Concepts in Statistical Inference

- Though scorecards/reports are typically presented as descriptive statistics (showing what is happening NOT why it is happening), inferences/generalizations are often made by the audience

- These inferential conclusions are often based on how the data are presented, explained, and how well the presenter/audience understand the nuances of trend data

- It is critical to understand that even though changes in performance over time can be linked to changes in the environment to which the observed population has been exposed, it is first necessary to exclude possible alternative explanations

Key Concepts in Statistical Inference

Some common reasons for apparent changes in secular (long-term) trends:

1. Changes in the **completeness of the source of data** (it is a common phenomenon to see incidence rates rising for several years after the start of a new registry, the introduction of a new diagnostic technique, or publicity attending the use of such a technique)

2. Changes in **diagnostic ability** of physicians and others contributing relevant data due to experience, training and/or technology

3. Changes of practice in **data classification**

4. **Demographic changes** in the population in which the trend is being observed (e.g. age distribution trending older)

5. **Concomitant changes** in environmental circumstances

6. Gradual **changes in clinical concepts, diagnosis, and terminology**

Key Concepts in Statistical Inference

- Two types of errors can occur in Statistical Inference:

  - Type 1 – observing a difference when in truth there is none

  - Type 2 – failing to observe a difference when there is one

- Both Type 1 & 2 errors can arise due to the following:

  - Random Error/Variation due to the operation of chance (**rare events are especially vulnerable**)

  - Bias due to some artifact in the data (e.g. seasonal variability in mechanism of injury)

Key Concepts in Statistical Inference

Strategies for reducing Type 1 & 2 errors due to Random Error/Variation and Bias:

- **Statistical significance testing** (e.g. confidence intervals)

Note: "Non-significant" findings (such as a result with less than 95% confidence / p-values greater than 0.05) can still be very instructive or directional and even evidence of an exposure-response continuum. Also, these findings may only be "non-significant" because of the lack of sufficient cases due to rare event outcomes or because of complex multicausality.

Key Concepts in Statistical Inference

Strategies for reducing Type 1 & 2 errors due to Random Error/Variation and Bias (continued):

- **Data smoothing** (e.g. YTD averaging)

- Presentation of data with **meaningful time units** (e.g. quarterly vs. monthly) …graphically this is even more important as the horizontal axis (time units) and/or vertical axis (quantitative units) can skew perceptions

- **Long term secular trends** vs. cyclical/seasonal trends vs. month-to-month variation (i.e. tail-chasing)

- Data stability (e.g. rare events unstable)…**reporting period/frequency should be appropriate**

Key Concepts in Statistical Inference

Significance/Smoothing/Time Unit/Secular Trend Example

January 2007 to November 2010
MONTHLY

Key Concepts in Statistical Inference

Significance/Smoothing/Time Unit/Secular Trend Example

January 2007 to November 2010
QUARTERLY
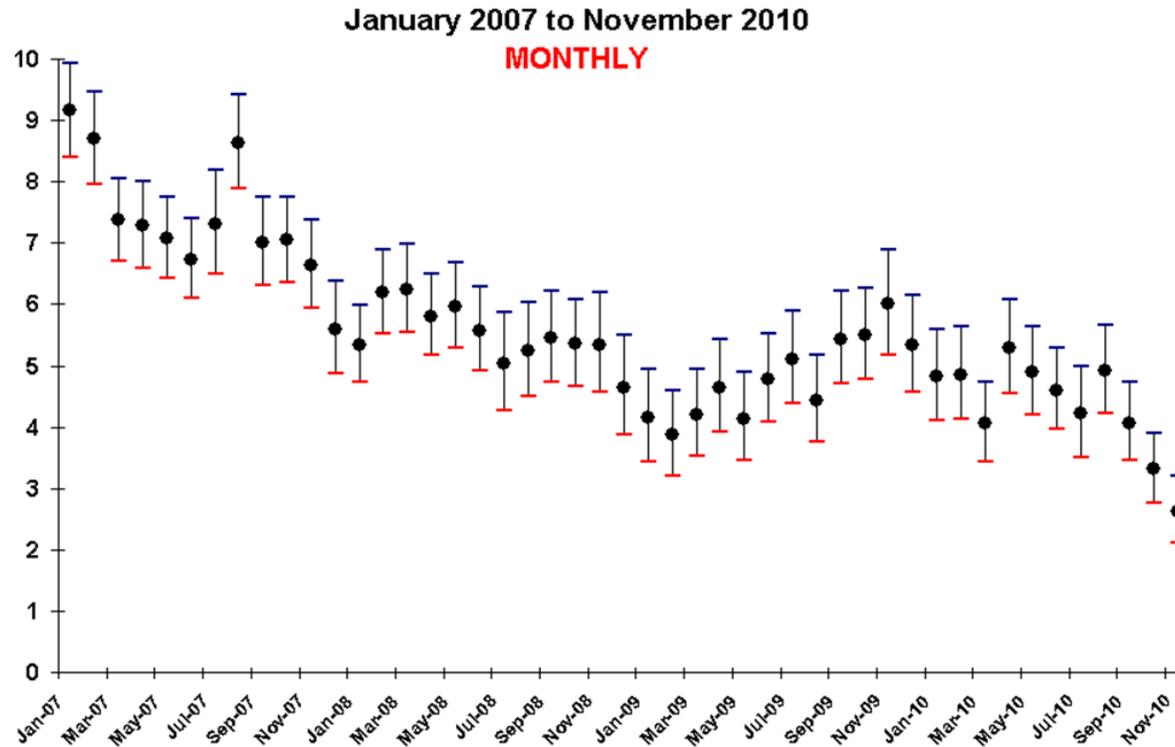
# Key Concepts in Statistical Inference

Significance/Smoothing/Time Unit/Secular Trend Example

Key Concepts in Statistical Inference
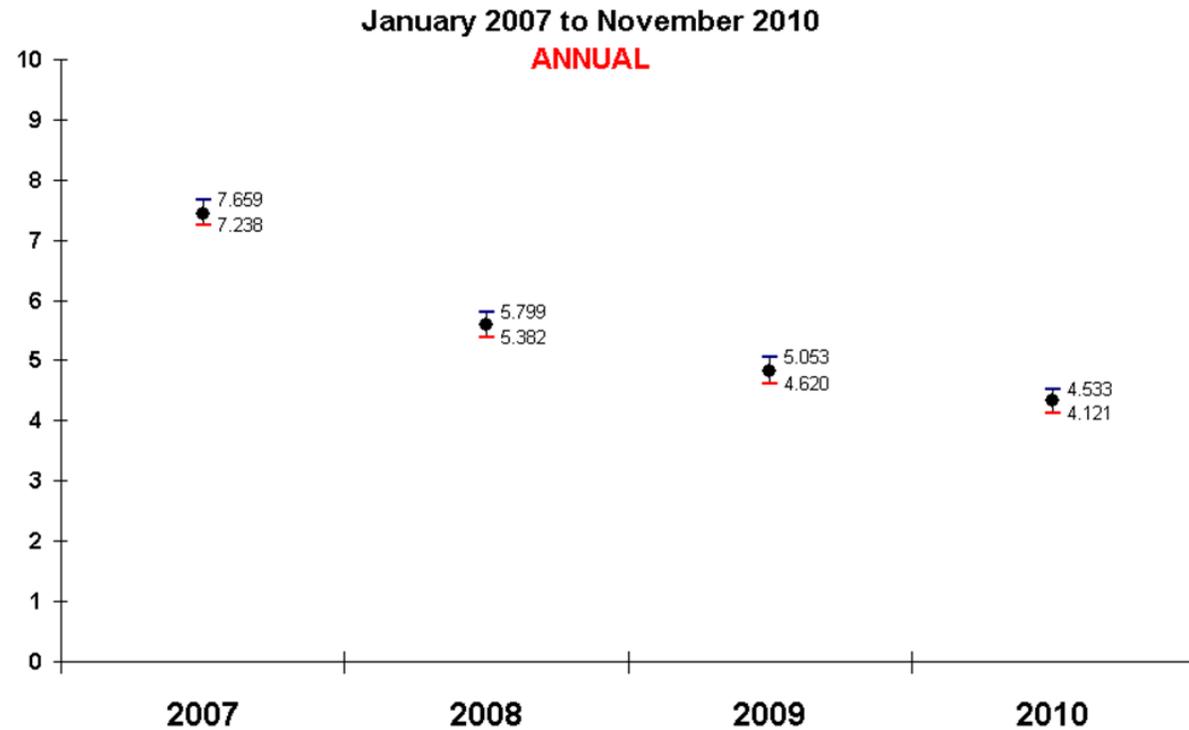
Strategies for reducing Type 1 & 2 errors due to Random Error/Variation and Bias (continued):

- Relevant comparisons (e.g. hospitals of same level)

- Presenting trend data without suitable interpretation is unwise – corollary: do not present data you do not understand (**data interpretation requires a well-reasoned argument and, typically, local hospital knowledge**)

Key Concepts in Statistical Inference

Strategies for reducing Type 1 & 2 errors due to Random Error/Variation and Bias (continued):

- **Provide explanations/hypotheses** for large differences

Note: Multicausality (i.e. many component causes) is a common feature in injuries and diseases

"All of the fruits of scientific work, in epidemiology or other disciplines, are at best only tentative formulations of a description of nature, even when the work itself is carried out without mistakes. "

- Rothman & Greenland

Key Concepts on Performance Metrics

*"Only when you know **why** you have hit the target can you truly say you have learned archery."*

- Chinese Proverb

"The single biggest mistake organizations make is to have too few performance measures. The second biggest is to have too many."

- Mark Graham Brown

Key Concepts on Performance Metrics

- Low negative outcome rates, even over a period of years, are no guarantee that risks are being controlled and will not lead to negative outcomes in the future; this is particularly true where there is a low probability of events but where major hazards are present

- Under-reporting can result from an emphasis on low failure rates as a performance measure, particularly when related to reward systems

- Whether a particular event results in a **failure it is often a matter of chance**, so it will not necessarily reflect whether or not a hazard is under control

Performance Improvement & Patient Safety

ACS Orange Book
Chapters 15 & 16
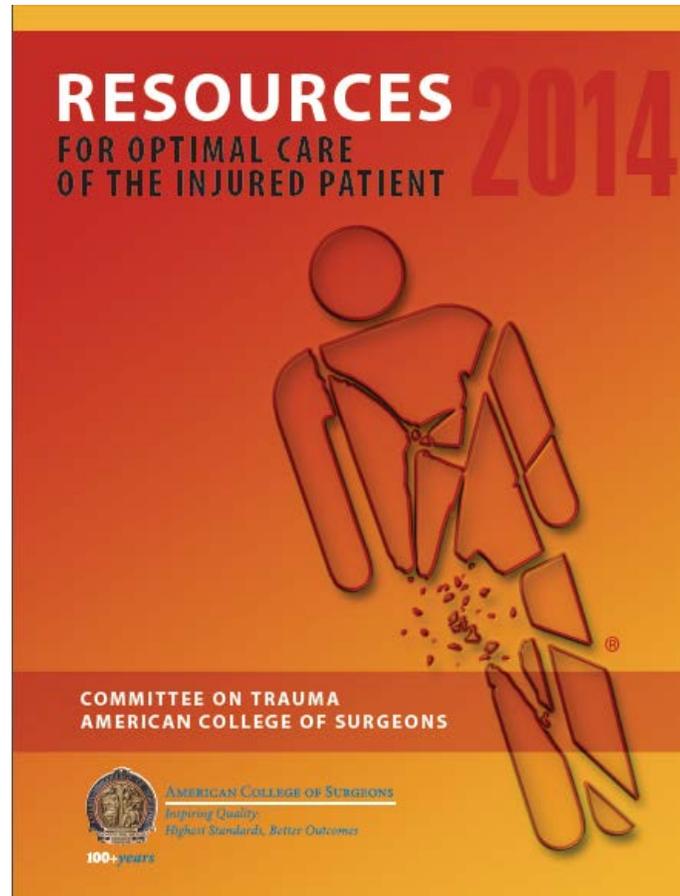
The Continuous Process of Performance Improvement

From *Resources For Optimal Care Of The Injured Patient* by ACS Committee on Trauma
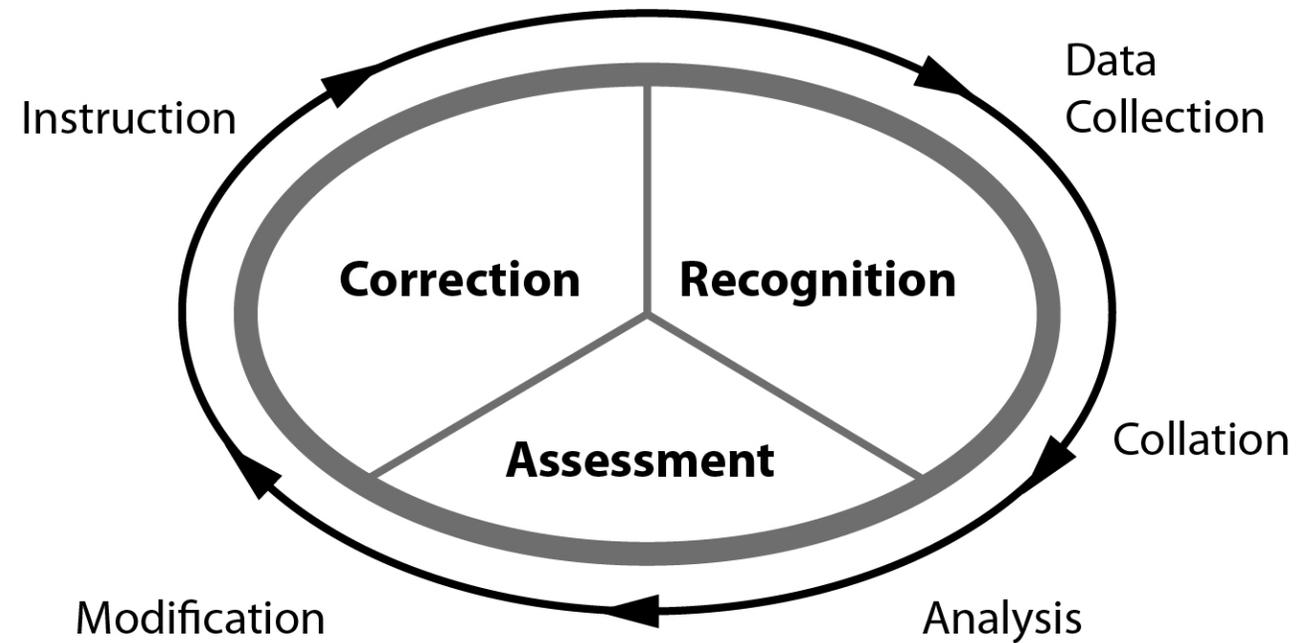
Performance Improvement and Patient Safety (PIPS)

▶ A trauma center should provide safe, efficient, and effective care to the injured patient

▶ Requires authority and accountability to continuously measure, evaluate, and improve care (performance improvement)

▶ Routinely reduce unnecessary variation in care and prevent adverse events (patient safety)

Performance Improvement and Patient Safety (PIPS)

▶ Includes a comprehensive written plan outlining the configuration and identifying both adequate personnel to implement that plan and an **operational data management system**

▶ Must be supported by a **reliable method of data collection** that **consistently** obtains the information necessary to identify opportunities for improvement

Performance Improvement and Patient Safety (PIPS)

▶ Integrate with local and regional trauma system performance improvement efforts

▶ A verification process should be present to validate that the trauma PIPS program can effectively assess the quality and safety of care

From *Resources For Optimal Care Of The Injured Patient* by ACS Committee on Trauma

Performance Improvement and Patient Safety (PIPS)

▶ The trauma center must demonstrate that **all trauma patients** can be identified for review – per **National Trauma Data Standard (NTDS)** definitions of the ACS-COT

▶ Must be supported by a registry and a reliable method of concurrent data collection that consistently obtains information necessary to identify opportunities for improvement

NTDB Inclusion Criteria
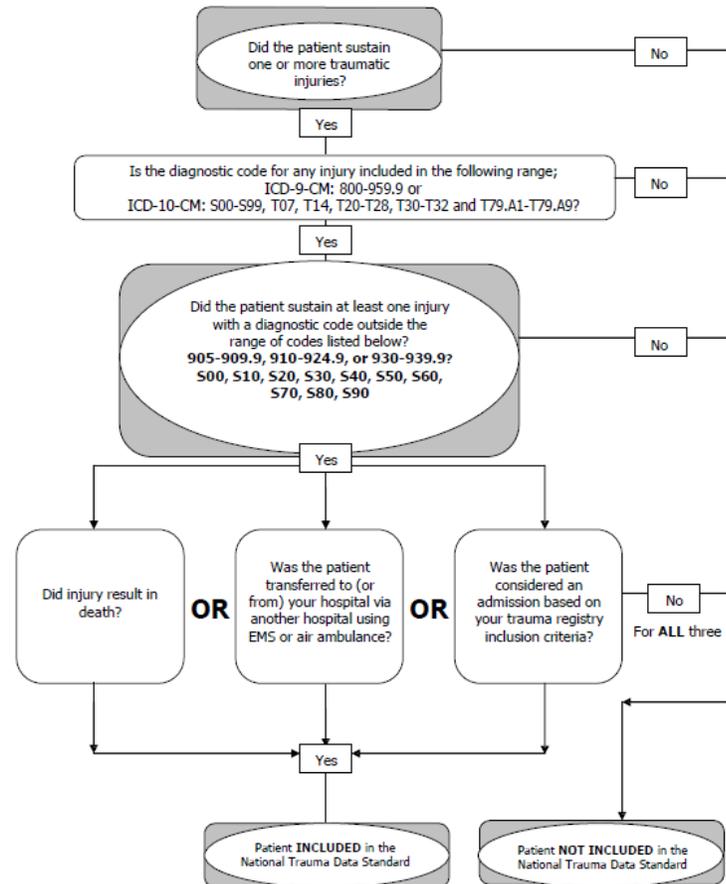
Performance Improvement and Patient Safety (PIPS)

▶ All Level I, II, and III trauma centers must use a risk-adjusted benchmarking system to measure performance and outcomes

▶ Development of a statewide risk-adjusted benchmarking system is in process

▶ Risk-adjusted benchmarking uses statistical modeling, to "adjust" for risk factors in specific patient populations, to allow for comparisons to other trauma centers and overall averages

Performance Improvement and Patient Safety (PIPS)

▶ The trauma program's scope of performance evaluation extends from institution-wide variables (process review) to measures of individual practitioner performance (peer review)

▶ The determinants of how well a trauma center performs include variables that can be influenced (such as efficacy, safety, or cost of care) and variables that cannot be influenced (such as the severity of injury or preexisting co-morbidities)

Performance Improvement and Patient Safety (PIPS)

▶ Fundamental to the performance improvement process is **monitoring and measurement** of the outcome of specific processes or procedures related to trauma care to improve efficiency, increase effectiveness, or reduce real or potential harm, as well as to improve future outcomes

▶ Process and outcomes measures, referred to as audit filters, require defined criteria and metrics

▶ Audit filter example: the percentage of completed registry records within 2 months of discharge should be determined (the threshold is 80 percent)

From *Resources For Optimal Care Of The Injured Patient* by ACS Committee on Trauma

Examples for PIPS Review

▶ Mortality reviews

▶ Trauma surgeon response times to activations

▶ Under and over activations

▶ Consult times for criteria specified "time-critical injuries" (i.e., neurosurg, ortho)

▶ Non-surgical admissions (should be <10%)

▶ Transfers for acute care from ED

Examples for PIPS Review

▶ Pediatric traumas (if not a peds trauma center / admit <100 peds pts per year)

▶ Times to OR for specified injury types (i.e., fixation of femur fxs / washout times for open fxs)

▶ Blood ratios with MTP (1:1:1)

▶ OR delays

▶ Changes in radiology interpretation (rates)

Performance Improvement and Patient Safety (PIPS)

▶ The primary responsibility of a trauma center's PIPS program is to monitor and continually improve structures, processes, and outcomes **within the institution**

▶ The PIPS program is also essential to provide leadership and participation in PIPS processes **beyond the walls of the institution**, including participation in external PIPS activities often associated with regional trauma advisory committees

▶ Trauma centers of all levels should be engaged in regional PIPS

From *Resources For Optimal Care Of The Injured Patient* by ACS Committee on Trauma

Performance Improvement and Patient Safety (PIPS)

Trauma PIPS Levels of Review
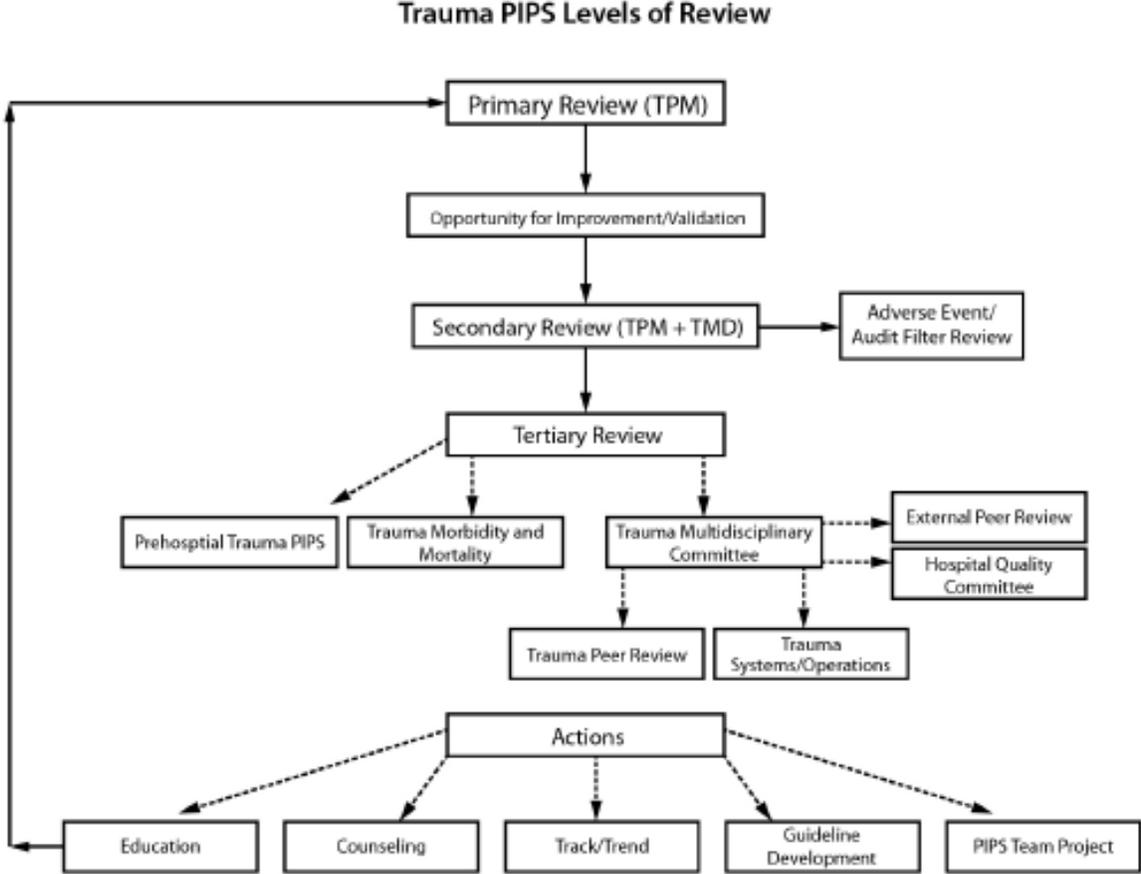
From *Resources For Optimal Care Of The Injured Patient*
ACS Committee on Trauma

Questions?