

### Importance of Autopsy Data to Trauma Programs

Iowa Association of County Medical Examiners  
November 1, 2019  
West Des Moines, IA

- Gregory A. Schmunk, MD
- Chief Medical Examiner
- Polk County Medical Examiner
- Des Moines, IA

• With thanks to Susan Schmunk, CAISS, CSTR

• MedPartners, Tampa, FL

1

---

---

---

---

---

---

---

---

### Disclosures

- None

2

---

---

---

---

---

---

---

---

### Trauma Systems and MEs

- Many counties have trauma systems.
- These may be ACS level 1-4, with the level 3 and 4 hospitals in smaller counties
- A level I Trauma Center is a comprehensive regional resource that is a tertiary care facility central to the trauma system.
  - Iowa Methodist Medical Center, Des Moines (level II peds)
  - University of Iowa Hospitals & Clinics/University of Iowa Children's Hospital (adult and peds)
- A Level II Trauma Center can initiate definitive care for all injured patients.
  - Mercy Medical Center - Des Moines (adult and peds)
  - MercyOne Siouxland Medical Center
- A Level III Trauma Center has demonstrated an ability to provide prompt assessment, resuscitation, surgery, intensive care and stabilization of injured patients and emergency operations.
  - CHI Health Mercy Council Bluffs

3

---

---

---

---

---

---

---

---

### Trauma Registries

- The trauma registry is a complex database which includes information on the demographics, injuries, care and outcomes of trauma patients
- The registry itself is used to identify opportunities for system improvement or refinement as well as to facilitate performance improvement activities, trend reports, and research while protecting confidentiality
- Level I-III ACS verified hospitals must benchmark their data against national trauma data for validation purposes

4

---

---

---

---

---

---

---

---

### Trauma Registrars

- Receive specialized training in abstracting medical records in order to find all the data elements in a complex record and enter them into the registry for use by others
- Utilize an "abbreviated injury scale" (AIS), published by the American Academy of Automotive Medicine (AAAM) to take each injury and translate them into specific 7-digit codes
- Codes are then utilized to generate an injury severity score (ISS) ranging from 1-6 for any of the injured six body regions
- Scores from the three most severely injured regions of the body are then combined to generate a total injury severity score (ISS) which ranges from 1 to 75 (the maximum possible, which equates to un-survivable injury)
- The ISS can then be translated into a Probability of Survival (Ps)

5

---

---

---

---

---

---

---

---

### Coding

- According to the AAAM, the autopsy is the most reliable source of data, trumping any other diagnostic modality including radiology or even the observations of the trauma surgeon.
- Registrars are taught to code conservatively.
- Thus, if the number and type of rib fractures is not properly documented in an autopsy, a flail segment (3 adjacent rib fractures which are fractured in more than one spot, which has a worse prognosis for survival than three separate single rib fractures) would we coded with a less severe ISS score.
- Similarly, since the coding manual assigns a higher ISS to liver lacerations greater than 3 cm deep, if the autopsy report does not contain this level of detail, the ISS for that injury will be lower and the potential survivability of the patient will be greater.

6

---

---

---

---

---

---

---

---

### ACS Verification Reviews

- A team of physician and Trauma Program Manager peers comes for a site visit and reviews the registry data, inspects the facility and reviews selected medical charts.
- They are then able to determine whether the hospital meets national standards for accreditation as a trauma center.

7

---

---

---

---

---

---

---

---

### National Association of Medical Examiners Past Presidents Committee Trauma Survey 2018

In 2017, the committee recognized that NAME members can make a major contribution to the trauma system in the United States, and so conducted a baseline survey.

- Determine the current status of the collaboration between the Medical Examiner's office and Trauma Centers.
- Target audience:
  - Survey specifically sent to Medical Examiner or Coroner's office where trauma center is registered.
  - There are about 500 trauma centers (Level I and II).
- Asked how many ME or Coroner's offices are aware of existing trauma center in their jurisdiction.
- Assess level of collaboration.

8

---

---

---

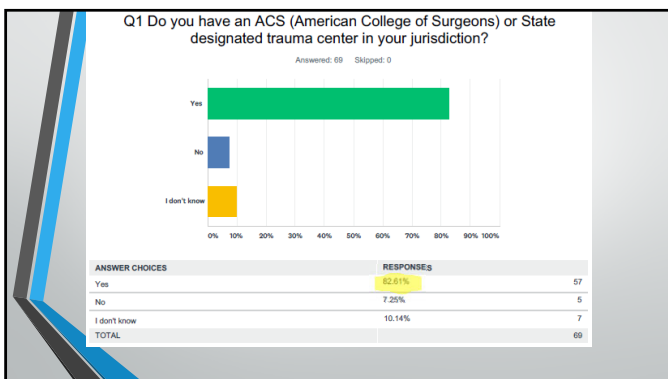
---

---

---

---

---



9

---

---

---

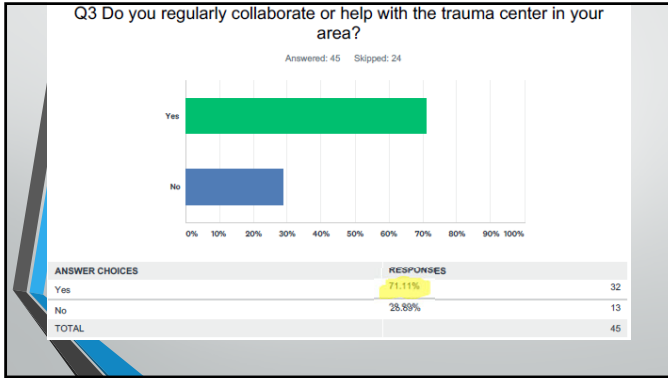
---

---

---

---

---



10

---

---

---

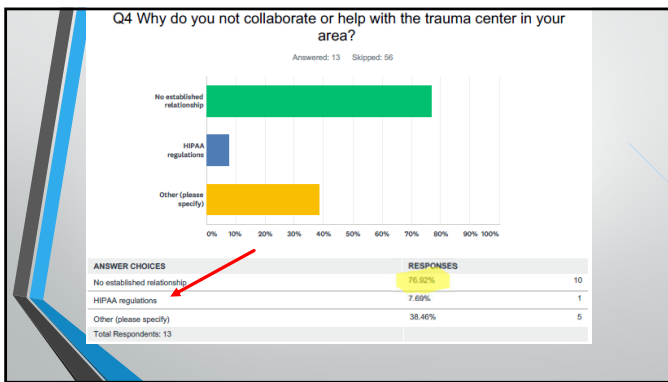
---

---

---

---

---



11

---

---

---

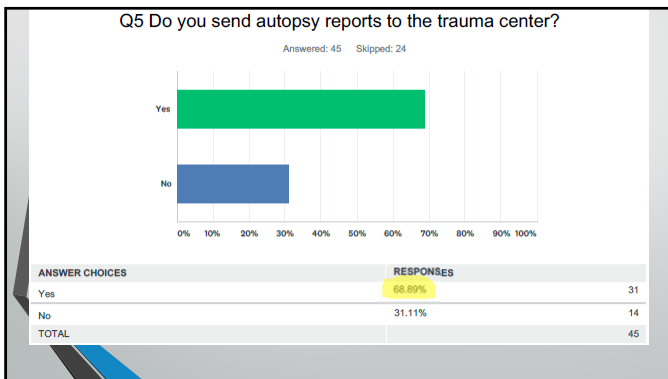
---

---

---

---

---



12

---

---

---

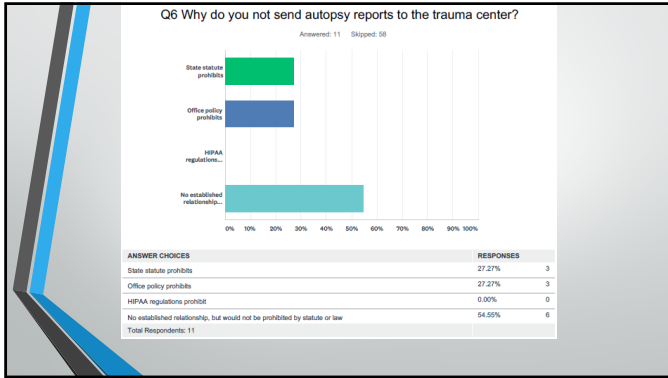
---

---

---

---

---



13

---

---

---

---

---

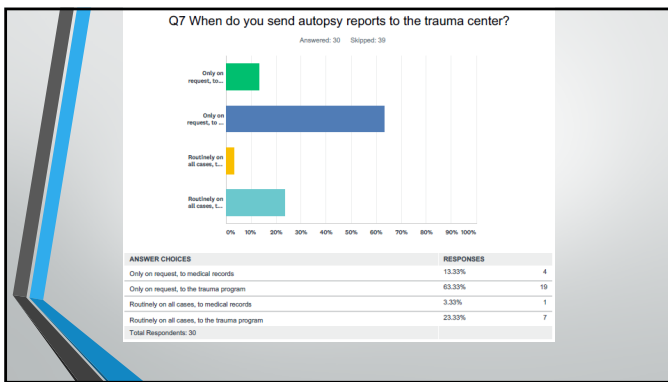
---

---

---

---

---



14

---

---

---

---

---

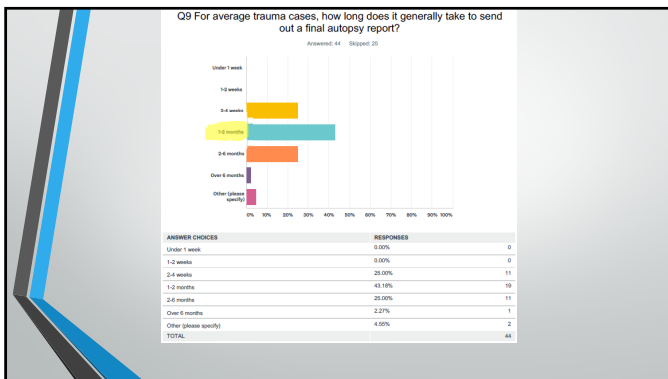
---

---

---

---

---



15

---

---

---

---

---

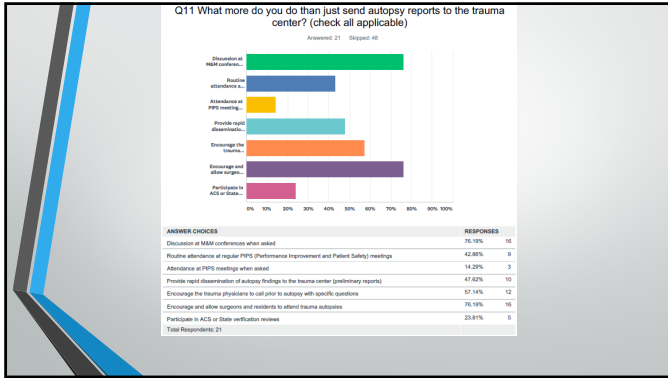
---

---

---

---

---



16

---

---

---

---

---

---

---

---

---

---



17

---

---

---

---

---

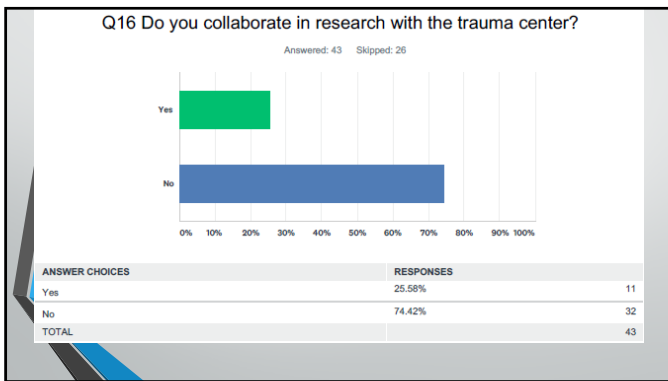
---

---

---

---

---



18

---

---

---

---

---

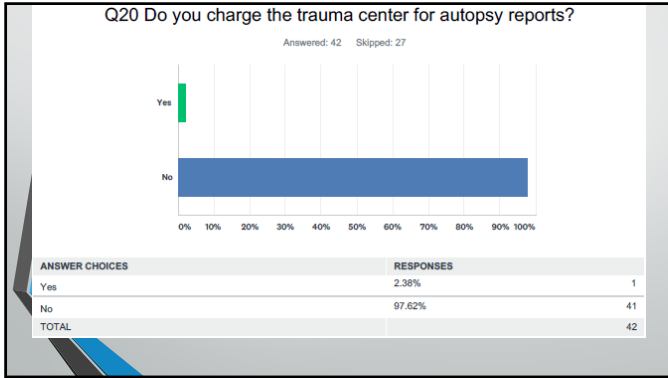
---

---

---

---

---



19

---

---

---

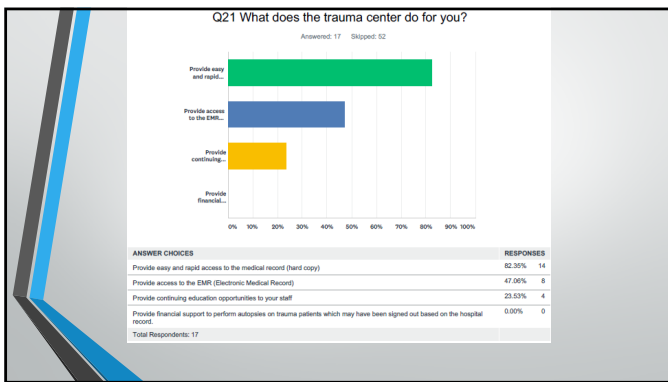
---

---

---

---

---



20

---

---

---

---

---

---

---

---

Baseline of where we are in collaboration

- Survey showed how many ME or Coroner's offices are aware of existing trauma centers in their jurisdiction.
- Mostly provide autopsy reports; request for autopsy sent if asked.
- A few ME offices participate in their M&M conferences.
- Some do not share reports due to "HIPAA regulations"

21

---

---

---

---

---

---

---

---

### Baseline Results

- Majority do not have collaborative research or publications together.
- Notable offices: LA County; San Diego County; Harris County, TX; Polk County, IA
  - Trauma program in San Diego provides funding to ME in order to do autopsies on cases which would otherwise be certified on the medical record only
- So far, very little effort is made to collaborate. A successful collaborative project requires regular contact. Mutual willing cooperation is required.

22

---

---

---

---

---

---

---

---

### Autopsy and AIS Coding

- According to the AAAM:
  - "Autopsy or medical examiner reports will be more detailed and complete than ED records"
  - Trauma registrars rely on the most reliable source of information (vide supra)
  - Taught to code conservatively, "probable", "possible", "rule-out" are not coded.
  - Cannot code without proper verification (autopsy or imaging studies).
  - Faced with contradictory information, use most reliable source (vide supra).
- Code g injury
  - Trauma has occurred but no information as to specific organ or region
    - "Injuries to the head" 8000g g
    - Cannot get AIS code

Association for the Advancement of Automotive Medicine. The Abbreviated Injury Scale - 2005 - Update 2008. Course Training Manual 2012

23

---

---

---

---

---

---

---

---

**AIS 2015**  
Abbreviated Injury Scale  
Dictionary

AAAM

24

---

---

---

---

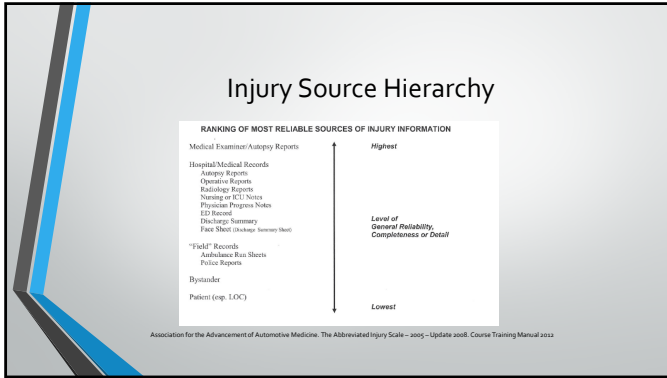
---

---

---

---





25

---

---

---

---

---

---

---

---

---

---

SOURCE	ADVANTAGES	DISADVANTAGES
Medical examiner's reports	<ul style="list-style-type: none"> <li>very detailed</li> <li>complete listing of injuries</li> <li>very important if well done</li> </ul>	<ul style="list-style-type: none"> <li>not always available</li> <li>requires extra steps to obtain</li> <li>bruise exams may be skipped because time consuming, therefore some injuries may be missed</li> <li>can be deceiving if not well done</li> <li>not available for all deaths</li> </ul>
Autopsy reports		
Operative reports	<ul style="list-style-type: none"> <li>very precise if well done</li> <li>external resources usually described</li> <li>frequently typed</li> </ul>	<ul style="list-style-type: none"> <li>not available for all injuries</li> </ul>
Radiology reports/imaging studies	<ul style="list-style-type: none"> <li>usually good source of injury detail</li> <li>complete descriptions</li> <li>especially good for fractures</li> </ul>	<ul style="list-style-type: none"> <li>misdiagnosis possible or sometimes not conclusive (e.g., rib fractures)</li> </ul>
Nursing or ICU notes	<ul style="list-style-type: none"> <li>good for description and location of external injuries</li> <li>sometimes contains graphics of external injuries</li> <li>often best source of duration of LOC</li> </ul>	<ul style="list-style-type: none"> <li>sometimes illegible</li> </ul>
Physician progress notes	<ul style="list-style-type: none"> <li>precise and useful, but only within specialty</li> <li>good descriptions of external injuries esp. mental notes</li> </ul>	<ul style="list-style-type: none"> <li>detail sometimes lacking</li> <li>often illegible</li> </ul>
ED record	<ul style="list-style-type: none"> <li>good descriptions of external injuries esp. mental notes</li> <li>highly high level "overview" of case</li> </ul>	<ul style="list-style-type: none"> <li>many non-verified diagnoses</li> </ul>
Discharge summary		<ul style="list-style-type: none"> <li>variability in completeness of injury details</li> <li>often skips or misdiagnoses injuries depending on who is dictating</li> </ul>
Face sheet (discharge summary)	<ul style="list-style-type: none"> <li>contains list of diagnoses</li> <li>contains ICD codes</li> </ul>	<ul style="list-style-type: none"> <li>not complete</li> <li>insufficient detail</li> </ul>
"Field" records	<ul style="list-style-type: none"> <li>contains information about condition at scene, LOC, blood tests</li> </ul>	<ul style="list-style-type: none"> <li>may be incomplete</li> <li>not always available</li> </ul>
Ambulance run sheets		
Police reports	<ul style="list-style-type: none"> <li>may have witnessed injury event</li> </ul>	<ul style="list-style-type: none"> <li>may be unreliable</li> </ul>
Bystander	<ul style="list-style-type: none"> <li>may report useful information about injury event or associated factors</li> </ul>	<ul style="list-style-type: none"> <li>may be unreliable</li> </ul>
Patient (self-reported)		

26

---

---

---

---

---

---

---

---

---

---

### Examples

- No autopsy or incompletely documented autopsy
  - Liver laceration – 541820.2
    - ISS 4
- Well documented autopsy
  - Multiple liver lacerations >3cm deep or "rupture" – 541826.4
    - ISS 16
  - Liver lacerations with disruption of >75% of a lobe or involving retrohepatic cava – 541828.5
    - ISS 25

27

---

---

---

---

---

---

---

---

---

---

### Examples

<ul style="list-style-type: none"> <li>• No autopsy or incompletely documented autopsy                     <ul style="list-style-type: none"> <li>• Multiple rib fractures – 450210.2                             <ul style="list-style-type: none"> <li>• <b>ISS 4</b></li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Well documented autopsy                     <ul style="list-style-type: none"> <li>• Bilateral flail chest – 450214.5                             <ul style="list-style-type: none"> <li>• <b>ISS 25</b></li> </ul> </li> <li>• Note – flail chest is <u>three or more</u> ribs fractured in <u>more than one location</u></li> </ul> </li> </ul>
--	--

28

---

---

---

---

---

---

---

---

### Examples

<ul style="list-style-type: none"> <li>• No autopsy or incompletely documented autopsy                     <ul style="list-style-type: none"> <li>• Multiple head injuries – 100099.9                             <ul style="list-style-type: none"> <li>• <b>ISS 8</b></li> </ul> </li> <li>• Subdural hematoma – 140650.3                             <ul style="list-style-type: none"> <li>• <b>ISS 9</b></li> </ul> </li> <li>• Cerebellar contusion – 140402.3                             <ul style="list-style-type: none"> <li>• <b>ISS 9</b></li> </ul> </li> <li>• Internal carotid injury – 121099.3                             <ul style="list-style-type: none"> <li>• <b>ISS 9</b></li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Well documented autopsy                     <ul style="list-style-type: none"> <li>• Cerebral contusion (extensive, massive or &gt;50cc) – 140618.5                             <ul style="list-style-type: none"> <li>• <b>ISS 25</b></li> </ul> </li> <li>• Subdural hematoma &gt;50cc (25cc if &lt;=10) – 140655.5                             <ul style="list-style-type: none"> <li>• <b>ISS 25</b></li> </ul> </li> <li>• Cerebellar contusion &gt;30cc – 140405.5                             <ul style="list-style-type: none"> <li>• <b>ISS 25</b></li> </ul> </li> <li>• Bilateral internal carotid artery lacerations – 121003.6                             <ul style="list-style-type: none"> <li>• <b>ISS 16</b></li> </ul> </li> </ul> </li> </ul>
---	--

29

---

---

---

---

---

---

---

---

### Examples

<ul style="list-style-type: none"> <li>• No autopsy or incompletely documented autopsy                     <ul style="list-style-type: none"> <li>• Subdural hematoma – 140650.3                             <ul style="list-style-type: none"> <li>• <b>ISS 9</b></li> </ul> </li> <li>• Liver laceration – 541820.2                             <ul style="list-style-type: none"> <li>• <b>ISS 4</b></li> </ul> </li> <li>• Multiple rib fractures – 450210.2                             <ul style="list-style-type: none"> <li>• <b>ISS 4</b></li> </ul> </li> <li>• <b>Total ISS = 17</b></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Well documented autopsy                     <ul style="list-style-type: none"> <li>• Subdural hematoma &gt;50cc (25cc if &lt;=10) – 140655.5                             <ul style="list-style-type: none"> <li>• <b>ISS 25</b></li> </ul> </li> <li>• Liver lacerations involving retrohepatic cava – 541828.5                             <ul style="list-style-type: none"> <li>• <b>ISS 25</b></li> </ul> </li> <li>• Bilateral flail chest – 450214.5                             <ul style="list-style-type: none"> <li>• <b>ISS 25</b></li> </ul> </li> <li>• <b>Total ISS = 75 (maximum possible)</b></li> </ul> </li> </ul>
--	---

30

---

---

---

---

---

---

---

---

### Polk County, IA Developments and Efforts

- Hired second BC-FP/Assistant ME to allow us to perform most autopsies
  - Previously did not autopsy many cases which had been hospitalized
- Monthly participation at PIPS at level I and level II trauma centers – for years
- Rapid dissemination of autopsy reports to medical records and trauma program – for years
- New program where registrars feed back to pathologists on missing data points in the autopsy reports
- New initiative to review all pre-hospital deaths in a PIPS format
  - Data to be added to state trauma database
- Resurrection of Metro Trauma Committee
  - Case specific review with attendance by State trauma program, both hospital trauma programs, ME and pre-hospital providers
  - Will review both hospital (ME, hospital and EMS data) and pre-hospital deaths (ME data)

31

---

---

---

---

---

---

---

---

---

---

### Summary PUBLIC HEALTH

- No reasons for ME/C and trauma programs to not cooperate.
  - HIPAA is an excuse, not a valid reason
- Collaboration is helpful to both sides
- NAME is actively supporting this collaboration
- Collaboration with trauma systems fulfills a major role of the ME/C

32

---

---

---

---

---

---

---

---

---

---

### References

- Association for the Advancement of Automotive Medicine. The Abbreviated Injury Scale – 2005 – Update 2008. Course Training Manual 2012
- Association for the Advancement of Automotive Medicine. The Abbreviated Injury Scale – 2005 – Update 2008
- <https://www.thecalculator.com/ahh/Revised-Trauma-Score-Calculator-713.html>
- <http://trauma.org/archives/index.html>
- Trinkoff, G. et al. American Association for the Surgery of Trauma Organ Injury Scale I: Spleen, Liver, and Kidney, Validation Based on the National Trauma Data Bank. *Journal of the American College of Surgeons* 200; 144:925, 2005
- Moore, E. et al. Organ injury scaling - spleen and liver (1994 revision). *J Trauma* 35: 321-324, 1995
- Moore, E. et al. Organ injury scaling IV: Thoracic vascular, lung, cardiac, and diaphragm. *J Trauma* 35: 199-200, 1994
- Moore, E. et al. Organ injury scaling III: Chest wall, abdominal vascular, ureter, bladder, and urethra. *J Trauma* 33: 319-320, 1992
- Moore, E. et al. Organ injury scaling II: pancreas, duodenum, small bowel, colon and rectum. *J Trauma* 32: 1417-1429, 1990
- Moore, E. et al. Organ injury scaling - spleen, liver and kidney. *J Trauma* 23: 1664-1666, 1989
- De Munter, L. et al. Mortality prediction models in the general trauma population: A systematic review. *Injury* 42: 221-229, 2012
- Copes, W. et al. Progress in Characterizing Anatomic Injury. *J Trauma* 22: 1200-1203, 1990
- Champion, H. et al. A Revision Of The Trauma Score. *J Trauma* 23: 629, 1989
- Boyd, C. et al. Evaluating Trauma Care. *J Trauma* 22: 370-378, 1987
- Baker, C. et al. The injury severity score: a method for describing patients with multiple injuries and evaluating emergency care. *J Trauma* 14: 187-196, 1974
- Rogers, C. et al. The Forensic Pathology of Liver Trauma. *Academic Forensic Pathology* 2: 184-191, 2008

33

---

---

---

---

---

---

---

---

---

---