ICD map to AIS Severity

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AIS
ABBREVIATED INJURY SCALE

AAAM
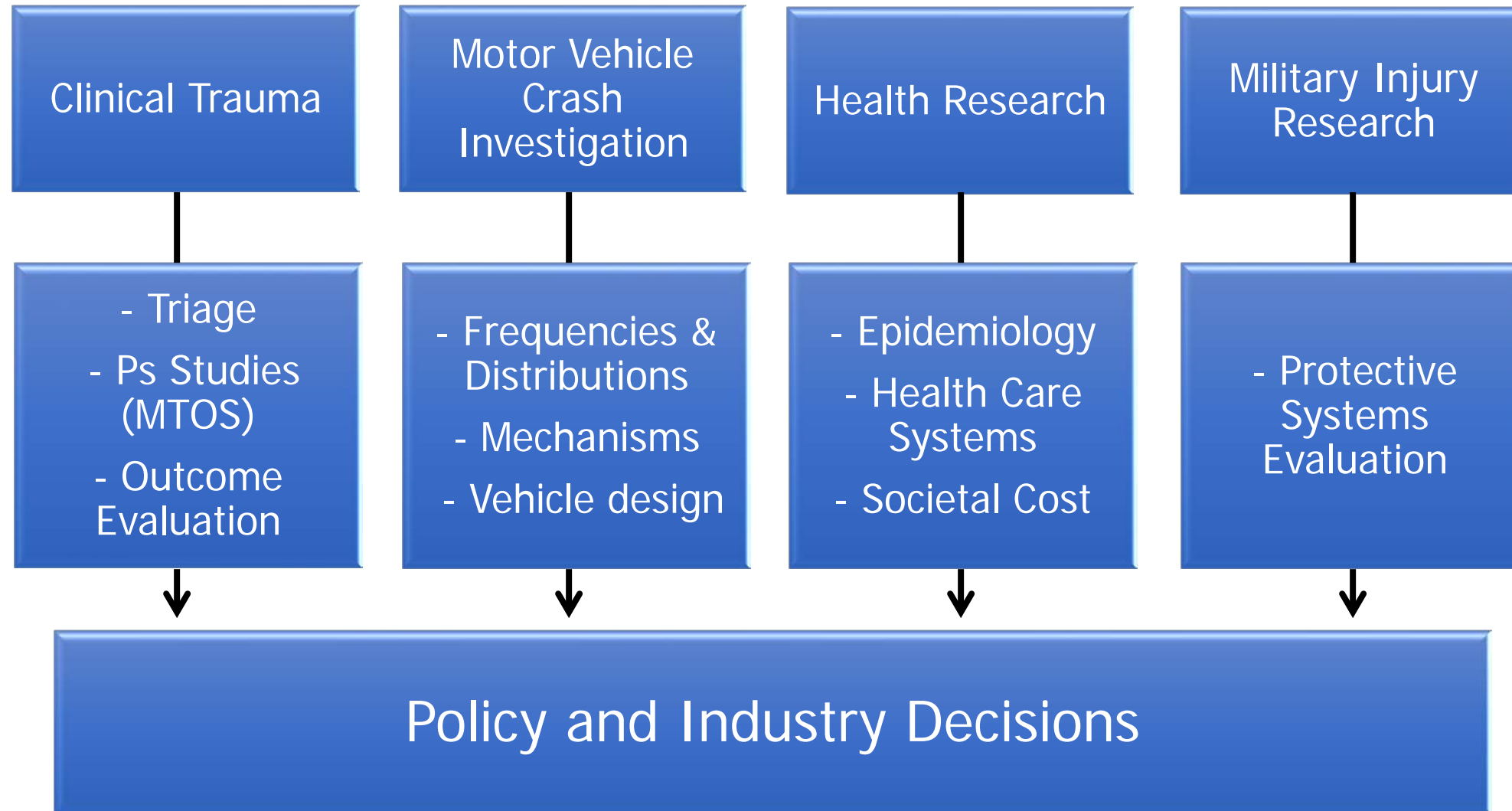Association for the Advancement of Automotive Medicine

AIS Definition

- 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.

CURRENT AIS USES

Clinical Trauma	Motor Vehicle Crash Investigation	Health Research	Military Injury Research
- Triage - Ps Studies (MTOS) - Outcome Evaluation	- Frequencies & Distributions - Mechanisms - Vehicle design	- Epidemiology - Health Care Systems - Societal Cost	- Protective Systems Evaluation

Policy and Industry Decisions

AIS Concepts and Purpose

- Rank injury by severity relative to importance to whole body
  - Severity unaffected by time, consequences or outcome
- Standardize terminology
- Usable for multiple injury causes
- Describe injury anatomically
- More than a threat to life scale

AIS Definition

- **AIS Descriptors identify damage to the anatomic structure from the transfer of energy and NOT physiologic response.**
  - **Example: Cerebral Contusion, Liver Laceration, Femur Fracture**

Sochor & Heltzel, 2015

Advantages of Anatomical Scale

- **Clinical training is not necessary**
  - Anatomic measurements are not variable as are physiological measurements which can be affected by:
    - *Time from injury to treatment*
    - *Pre-hospital care*
    - *Presence of alcohol/other drugs*
    - *Patient's age, ability to compensate for massive volume losses*

AIS Severity

- **Ordinal Scale**:

1	Minor
2	Moderate
3	Serious
4	Severe
5	Critical
6	**Maximal**

AIS Post-Dot "9" Injuries

- Definition = no severity can be determined because of inadequate information or documentation
  - Examples: Closed head injury (100099.9)
                      Blunt thoracic injury (400099.9)
- Useful for recording the frequency of injury
- Cannot use post-dot "9" in an ISS calculation
  - Incomplete and possibly inaccurate

AIS pre-dot identifier

Example – Femur fracture, NFS = *853000.3*

Pre-dot code = 853000	
8	Body Region *(AIS chapter)*
5	Structure type *(Skeletal)*
30	Specific structure *(Femur)*
00	Level of injury *(NFS = Not further specified)*
3	Severity number *(3 = serious)*

Patient Severity - Multiple Injuries

- *MAIS = maximum AIS severity for a patient with multiple injuries*
  - *Where AIS severity is severity of each single injury*
- *ISS = sum of the squares of the highest AIS severity in each of the three most severely injured, separate ISS body regions*

There are 2 Different Maps

- *Original EU request was for a map from ICD to AIS3+, so this map only indicates if the particular injury would be mappable to AIS2- or AIS3+, where possible to map.*

- *Additional map was created (which has now also been provided) which maps ICD to AIS severity, where possible to map.*
  - *This map has additional detail and can allow ISS to be calculated using the AIS mapped severities when linked with patient injury lists.*

ICD to AIS Potential Challenges

- ICD modifiers are different for each country or region and that may be where the conversion table is a challenge

- Data may not be robust such as police data and an incomplete hospital record

- Payment schemes – some health systems are not providing appropriate injury ICD codes due to coding guidelines for reimbursement

ICD to AIS/ISS Map Legend

Highest AIS Severity	Description
0	No Severity
1	Minor
2	Moderate
3	Serious
4	Severe
5	Critical
6	Maximal

ISS Body Region	Description
0	No Map
1	HeadNeck
2	Chest
3	Abdominal & Pelvic Content
4	Extremities & Pelvic Girdle
5	Face
6	External

AIS Chapter	AIS Chapters
-1	No Map
0	Other Trauma
1	Head
2	Face
3	Neck
4	Thorax
5	Abdomen
6	Spine
7	Upper Extremity
8	Lower Extremity
9	External

ICD to AIS3+ Map Legend

AIS 3+ Value	Meaning
0	Not a significiant injury (AIS 1, 2 or 9)
1	Significiant Injury (AIS 3, 4, 5, or 6)
9	Not mapped to a AIS severity level or unknown severity

Data Example

Blue information that would have come from your medical dataset.
Yellow is from the ICD9 to AIS08 ISS Map
Pink is from the ICD9 to AIS3+ Map

Patient Data			ICD to AIS/ISS Map			ICD to AIS3+
Patient	ICD-9	ICD Description	HIGHEST AIS SEVERITY	ISS BODY REGION	AIS CHAPTER	AIS3+ Map
A	861.21	Contusion of lung without mention of open wound into thorax	3	2	4	1
A	821	Fx of other and unspecified parts of femur	3	4	8	1
A	851.5	Cerebellar or brain stem contusion without mention of open intracranial wound	5	1	1	1
A	892	Open wound of foot except toe(s) alone	2	6	8	0
A	839.8	Closed dislocation; multiple and ill-defined sites	0	0	-1	9

Data Example Results

Patient Data			ICD to AIS/ISS Map			ICD to AIS3+
Patient	**ICD-9**	**ICD Description**	**HIGHEST AIS SEVERITY**	**ISS BODY REGION**	**AIS CHAPTER**	**AIS3+ Map**
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Using the ICD9 to AIS/ISS Map, you can estimate that Patient A had an MAIS of 5 and an ISS of 43.
Using the ICD9 to AIS3+ Map, you can estimate that Patient A had 3 injuries of AIS3+, meaning their overall MAIS was 3+.

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Thank You!

For ICD to AIS mapping questions, please send an email to:

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