UNDERTRIAGE and OVERTRIAGE

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TRIAGE

- 18th century French: Trier = to separate out
- Minimal use until 1970’s
- Assign degrees of urgency to wounds/illness to decide order of treatment in large group
- Rations treatment efficiently when resources are insufficient to treat all
- Sorting based on need or likely benefit
Over Triage and Under Triage

- Overestimating injuries
  - Goal: 25-30%
    - Discharge w/in 24/48 h
    - No Surgery
    - No ICU
    - No Blood
    - ISS less 15

- Underestimating degree or urgency of injuries
  - Goal: less 5%
    - Needed Resources but didn’t get them
For the TPMs

- Chap 16: “The ORANGE Book”
- Tracking and PI
- Variable Definitions
- Cribari Method
# CRIBARI METHOD

<table>
<thead>
<tr>
<th></th>
<th>ISS 1-15</th>
<th>ISS 16-75</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTTA</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>PTTA</td>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>No TTA</td>
<td>G</td>
<td>H</td>
<td>I</td>
</tr>
<tr>
<td>TOTAL TRAUMA</td>
<td></td>
<td></td>
<td>J</td>
</tr>
</tbody>
</table>

**Undertriage:** \((E + H) / (F + I) \times 100\)

**Overtriage:** \((A/C \times 100)\)
UNIFORM CRITERIA BETTER

• State wide adoption of uniform criteria
  • No change in mortality, but more pts. direct to higher level
    • Brice. PreHospital Emergency Care. 2017
  • WV
    • ↑ activations based on physiology (9.8% vs 14.5%, p<.0001)
    • Activations AFTER ED arrival: ↓ 20% (p<.0039)
    • transported from scene Level 1/2 vs ¾ ↑ (p<.0061)
    Statewide mortality decreased by 6% (p<.03)
SCORING SYSTEMS

- \( \text{GCSm} \leq 5 \) vs \( \text{GCS} \leq 13 \)
  - \( \text{GCSm} \leq 5 \) better assoc. w TC need (Odd ratio: 3.37)
    - Brown JB. J Trauma Acute Care Surg. 2014 Jul; 77:95-102

- \text{MGAP}: \text{Mechanism, GCS, Age, Art. Press}
  - Vs RTS, triage RTS
  - Point value to ranges for each criteria
  - More specific, accurate
  - Low risk (23-29 pts), intermediate (18-22 pts), high <18
  - Mortality 2.8%, 15%, 48%
SHOCK INDEX

- **What Is It?** HR/SBP
- **Bad:** > 1
- Compared to SBP < 90
- More sensitive, less specific for: ISS > 15, emergent operation, ICU >1d, ED death
- ↓ undertriage (5.9%)
- ↑ overtriage (1.3%)

LACTATE

- **ED Lactate vs. SBP (pre-hosp. or ED 90-110)**
  - Better predicting > 6 UpRBC (p<.0001)
  - Better predicting mortality (p<.0001)

- **Lactate ≥ 2.5 vs PH SBP <100**
  - Better predictor of: Bld transfusion > 5U, operation, IR, death
LACTATE

- ↑ Lactate + ACS criteria
  - Improved: PPV, NPV, accuracy
  - Over-triage decreased 7.2%
  - Under-triage increased 0.7%
    - Brown J Trauma Acute Care Surg 2016 81:445-52
KIDS ??

- **Standardized Criteria**

- **Pre-hospital Lactate**
  - For all - Requiring critical care
    - Median 2.1 mmol/L (CC) vs 1.7 mmol/L (p=.01)
  - Subgroup: NI VS + NI GCS
    - Median 2.6 mmol/L (CC) vs 1.7 mmol/L (p=.01)
      - Shah Pediatr Em Care. 2013. 29:715-9
KIDS

- **SIPA (Shock Index, Ped Age-adjusted)**
  - SI > 1.22 (4-6 yo), > 1.0 (7-12yo), >.9 (13-16)
  - SBP <90 (4-6 yo), SBP <100 (7-16 yo)
    - Emergency Operation
    - Need for ETT
    - Need for Transfusion
  - SIPA outperforms (p<.001)
  - Downside – More Math
GERIATRIC

- 65 yo +: 30-45% of Total Trauma admissions
  - Less likely to be transported to Trauma Center
  - Less likely to be transferred to TC
    - Kozar. J Trauma Acute Care Surg. 2015. 78:1197-1209

- More likely to be UNDER TRIAGED : 65+
  - 49.9% vs 17.8%, (p<.001)
GERIATRIC SPECIFIC CRITERIA

• Age alone: 70+ mandates FTTA
  • ↓ ED LOS, mortality
    • Hammer J Trauma Acute Care Surg. 2016.81:162-7

• Age alone: 70+ mandates EMS transport to TC
  • Overall – No ↓ mortality or DC to home
  • ISS less 10: ↓ mortality (2.5% vs 3.0%)
    • Caterino JAGS.2016.64: 1944-1951
GERIATRIC + PHYSIOLOGY

• **SBP 110 vs 90**
  • ↓ Undertriage by 4.4%
  • ↑ Sensitivity for need for intervention
    • Brown J Trauma Acute Care Surg 2015. 78:352-9

• **Shock Index**
  • SI > 1
    • Require Blood Transfusion (p=.0001)
    • Ex Lap (p=.01)
    • Complications (p=.02)
    • Predictor of Mortality (OR 3.1)
      • Pandit J Trauma Acute Care Surg. 2014; 76:1111-5
SECONDARY OVERTRIAGE

- Seen at 1 facility → Transfer to Trauma Center
  - Home from ED, w/in 24 hr
  - No Interventions
- 26% total - almost double if Peds
  - Head/neck injuries (56%)
  - Skin/soft tissue (41%)
    - Sorensen. JAMA. 2013; 148:763-8
- 24% total, Mean ISS 4
  - Ext Fx (31%); Head (23%); Soft tissue (13%)
SECONDARY OVERTRIAGE

- Rural Areas: Factors
  - Need for Consultants: Face, Ortho, Spine
  - Night Shift – hospital resources
    - Con JSR 2015 Mar 462-7
SECONDARY OVERTRIAGE - KIDS

- NTDB age 15 yrs or younger
  - 144,420 transfers evaluated
  - Secondary overtriage if ALL 4 criteria met:
    - ISS less 9, No surgical procedure needed, No CC admission, LOS less 24 hr
  - 22.4 % (32,318 kids) – met definition
  - 37.5% DISCHARGED directly from ED
    - Goldstein J Ped Surg. 2015.50:1028-31
SECONDARY OVERTRIAGE - KIDS

- Reasons:
  - Night shift
  - Scene GCS less 15
  - Need for consultation w Neurosurgeon
    - Followed by Spine, Face
  - Younger much higher rate of transfer (0-2 yrs)
    - Leung Am Surg 2016; 763-7
SUMMARY

- Stick to the Criteria
- Physiologic Additions
  - SHOCK INDEX, Lactate
  - Specific Geriatric
- Kids Overtriage, Old Folks Undertriage
- Secondary Overtriage – opportunity ???

How Breaking Your Hip Increases Your Death Risk
THANK YOU