The Ability of the Physiologic Criteria of the Field Triage Guidelines to Identify Children Who Need the Resources of a Trauma Center

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Conflicts of Interest and Support

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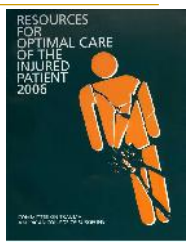
EMS and Children



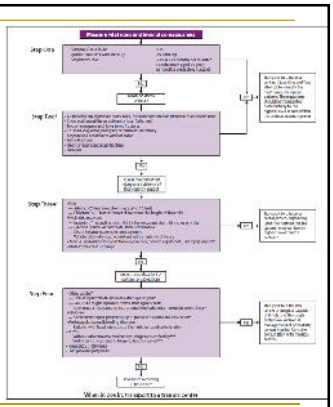
- Millions of injured children transported annually
- Severely injured
  - Minimize time to pediatric trauma center ➢ Maximize outcome
- EMS must identify the severely injured
  - Direct transport to trauma center
  - Tool: Field Triage Guidelines

Effect of Guidelines on Pediatric Destination Decisions

	Goal	2011 Field Triage Guidelines
Over-Triage	25-50%	**28%**
Under-Triage	<5%	**35%**

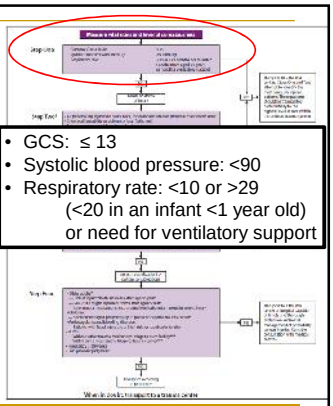
Field Triage Guidelines

- 4 steps



Field Triage Guidelines

- 4 steps
- 1st step physiologic status
  - Prior research found moderate predictor
    - Two possible causes:
      - Not age-appropriate
      - Missing documentation



- GCS: ≤ 13
- Systolic blood pressure: <90
- Respiratory rate: <10 or >29
  (<20 in an infant <1 year old)
  or need for ventilatory support

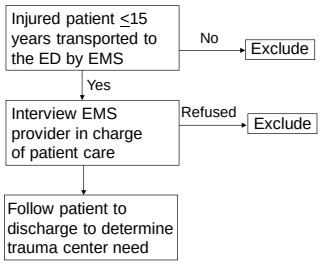
Objective

To determine the accuracy of the Field Triage Guideline's Physiologic Step when traditional cut points are compared to age-appropriate cut points for identifying children needing pediatric trauma center resources.

Methods

- 3 year prospective observational study
- 3 pediatric regional trauma centers
  - Dallas, TX
  - Milwaukee, WI
  - Rochester, NY

Process



Age Appropriate Vital Signs

Age	Respiration (Min-Max)	Systolic blood Pressure (Min)
6 month	24-40	65
1 year	20-40	72
3 year	20-30	78
6 year	18-25	80
8 year	18-25	84
12 year	14-20	94
15 year	12-20	100

*Adapted from Fuchs in EMS Clinical Practice and System Oversight

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Outcome – Trauma Center Need

Consensus-Based Criterion Standard Definition	Time (hours)
Advanced **airway management** - excludes intubation solely for surgical purposes.	4
More than 1 unit of a **blood product** - included any blood received from EMS and was based on orders regardless of supply or time to infuse	4
Admitted to the hospital for **spinal cord injury** - identified based on discharge codes and/or procedure notes.	-
Thoracotomy and did not meet NAEMSP/ACS-COT criteria for termination	48
Pericardiocentesis and did not meet NAEMSP/ACS-COT criteria for termination	24
Emergency **cesarean** delivery	24
Vascular, neurologic, abdominal, thoracic, pelvic, spine or limb-conserving **surgery**	24
Intra-cranial pressure monitoring	48
Interventional radiology	4
Died before discharge, but arrived not in cardiac arrest	-
Thoracostomy - added by investigators not in original criteria	2

Slide 12

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karim, 1/8/2018

Data Analysis

- Descriptive statistics
  - Over- and under-triage rates
  - Positive Likelihood Ratios (+LR)

Results

- 9,483 children included
- Average age 7.7 years (IQR: 9)
- 2% identified as needing pediatric trauma center

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Outcome – Trauma Center Need

Consensus-Based Criterion Standard Definition	Time (hours)	Met Outcome
Advanced **airway management** - excludes intubation solely for surgical purposes.	4	**146**
More than 1 unit of a **blood product** - included any blood received from EMS and was based on orders regardless of supply or time to infuse	4	**54**
Admitted to the hospital for **spinal cord injury** - identified based on discharge codes and/or procedure notes.	-	**15**
Thoracotomy and did not meet NAEMSP/ACS-COT criteria for termination	48	**1**
Pericardiocentesis and did not meet NAEMSP/ACS-COT criteria for termination	24	**0**
Emergency **cesarean** delivery	24	**0**
Vascular, neurologic, abdominal, thoracic, pelvic, spine or limb-conserving **surgery**	24	**84**
Intra-cranial pressure monitoring	48	**33**
Interventional radiology	4	**7**
Died before discharge but arrived not in cardiac arrest	-	**26**
Thoracostomy - added by investigators not in original criteria	2	**20**

Slide 15

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Physiologic Criteria

	Physiologic Step Met Step = 1,105 (12%)	Age-Adjusted Physiologic Step Met step =1,908 (20%)
Under-Triage	42%	43%
Over-Triage	10%	19%
+LR (95%CI)	5.5 (4.9-6.3)	3.0 (2.6-3.3)

Individual Criteria

	RR (<10 or >29) Met Criteria = 662 (7%)	Age-Adjusted RR Met Criteria =1,670(18%)	Systolic BP (<90mmhg) Met Criteria =174 (2%)	Age-Adjusted Systolic BP Met Criteria =63 (<1%)
Under-Triage	81%	66%	92%	94%
Over-Triage	7%	17%	2%	<1%
+LR (95%CI)	2.9 (2.2-3.7)	2.0 (1.6-2.4)	4.9 (3.1-7.8)	11.4 (6.4-20.4)

Vital Signs Not Obtained

- 14% GCS
- 29% SBP
- 16% RR
- 67% of cases had all three criteria reported

Physiologic Criteria Comparison Without Missing Data (n=6,327)

	No Missing Data Physiologic Step Met Step = 700 (11%)	Physiologic Step Met Step = 1,105 (12%)	No Missing Data Age-Adjusted Physiologic Met step = 1,568 (25%)	Age-Adjusted Physiologic Met step = 1,908 (20%)
Under-Triage	42%	42%	38%	43%
Over-Triage	10%	10%	24%	19%
+LR (95%CI)	5.9 (5.1-6.9)	5.5 (4.9-6.3)	2.6 (2.3-3.0)	3.0 (2.6-3.3)

Conclusion

- Confirmed Physiologic Step is a moderate predictor of trauma center need
  - Other criteria are needed to avoid under-triage
  - Over-triage is minimal
- Using age-adjusted criteria does not improve under- or over-triage rates
- Not obtaining vital signs is common
  - Unlikely to be the reason for our findings

Questions?

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