

The Revised Field Triage Criteria: *How Will the New Changes Affect What You Do?*

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Background

- Injury is the leading killer for US citizens aged 1 to 44.
- Prehospital emergency medical services can have profound effects on the care of the injured and their outcome.
- At the injury scene, EMS providers must not only determine the severity of injury and initiate medical management, but also identify the most appropriate transport destination facility through a process called FIELD TRIAGE.
- The destination is important: severely injured patients have a 25% lower risk of death if they are treated at a Level 1 trauma center rather than a non-trauma center.

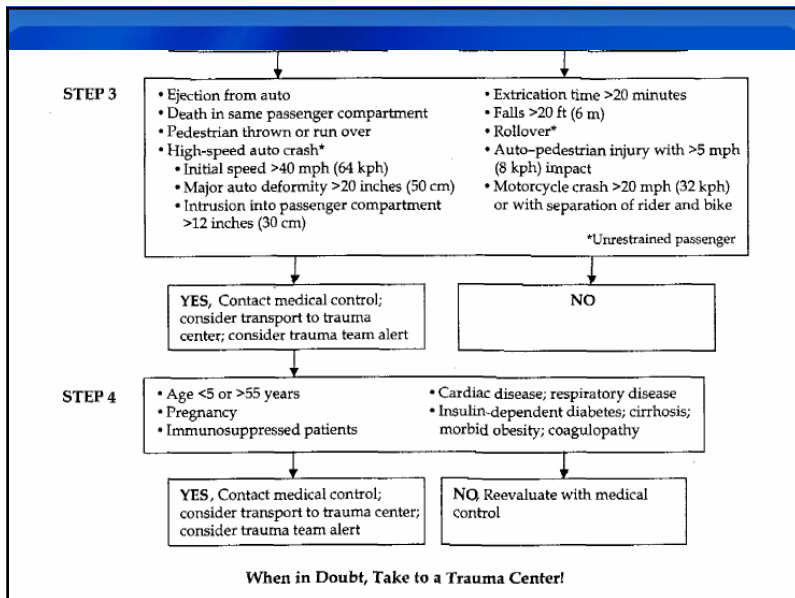
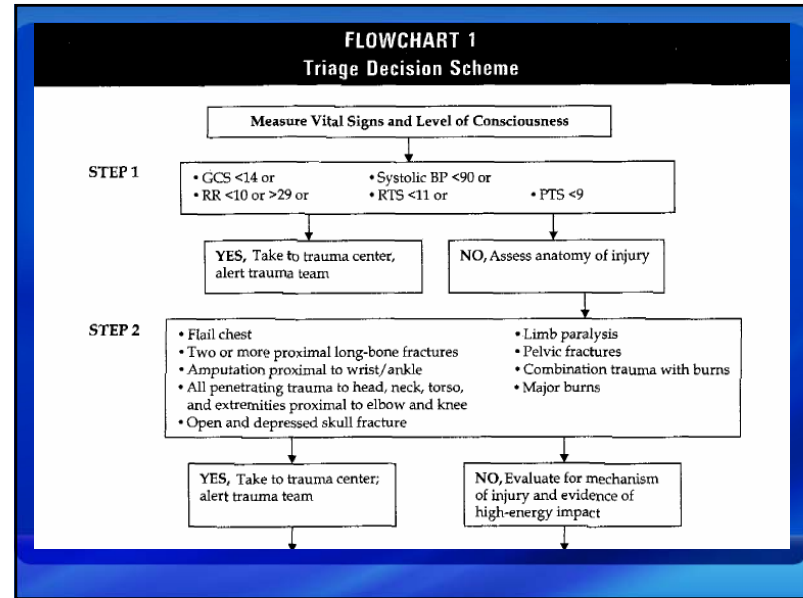
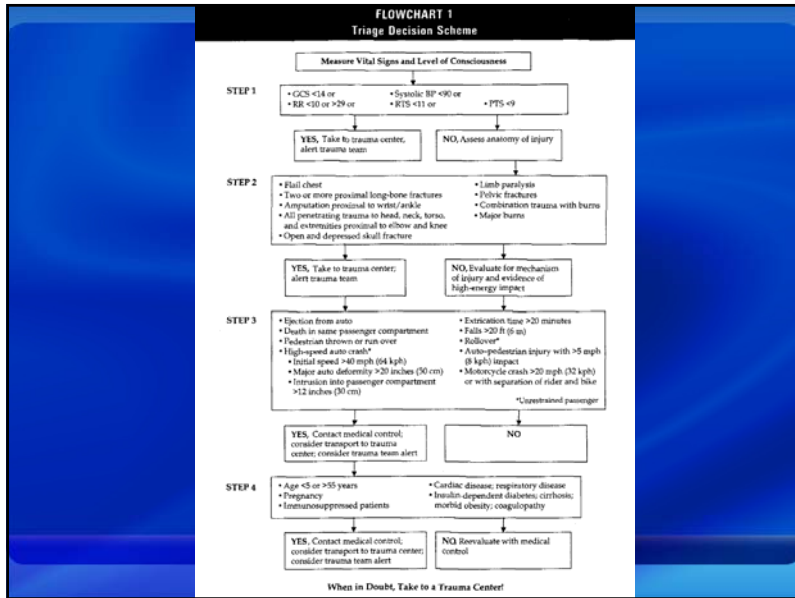
Prehospital Injury Care

- 15,000 EMS systems in US
- 800,000 EMS providers
- 16.6 million transport calls (6.5 million for injury)

TRIAGE: matches an injured patient with the appropriate facility for his or her injuries

Triage Protocols

- **1987** Field Triage Decision Scheme published by the American College of Surgeons in *Hospital and Prehospital Resources for Optimal Care of the Injured Patient*.
 - 4 Steps
 - Physiologic
 - Anatomic
 - Mechanism of Injury
 - Special Considerations
- **1990** Revised by ACS COT
- **1993** Revised by ACS COT
- **1999** Revised by ACS COT



Things change....

- Trauma systems have evolved
- Expansion of air medical coverage
- EMS training has expanded
- 1999 Field triage criteria have been field-tested
- Trauma patterns and mechanisms have shifted
- Technology has evolved (telemedicine, vehicles, etc)
- Laws and policies have changes (EMTALA, HIPAA) as have health care economics.

Background to 2006 Revision

- Trauma and EMS systems were less developed when the ACS-COT field triage criteria were last revised in 1999.
- There are increasing demands on EMS and medical centers to improve coordination and optimally utilize available resources.
- Need to balance needs of highly populated urban centers with advanced trauma systems with those of rural communities with limited capabilities and resources.
- Changes to the field triage criteria affects policy and many parties (therefore many local, state and federal agencies).
- Homeland security

Issues

- Big developed systems like increased central control at the cost of local autonomy (lots of expensive helicopters to pay for vs. too many patients)
- Transfer to trauma systems put a large burden on rural communities and rural EMS systems
- Some medical centers want to get out of taking care of trauma patients
- Centralized medical control vs. field judgment

These issues all depend on the locale

Process

- Gather representatives from involved governmental agencies, professional societies, practitioners and experts.
- Put them in a room and examine all their perspectives, issues and needs.
- May 2005 – full panel
- November 2006 – small working group

National Expert Panel on Field Triage

- CDC
 - Richard C. Hunt, MD, FACEP
 - Director, Division of Injury and Disability Outcomes and Programs (DIDOP)
 - Ileana Arias, Ph.D.
 - Acting Director, National Center for Injury Prevention and Control (NCIPC)
 - John Seggerson, Bob Bailey
- Health Resources and Services Administration (HRSA)
 - CDR Cheryl Anderson
 - Director, Trauma-EMS Program
- National Highway Traffic Safety Administration (NHTSA)
 - Drew E. Dawson,
 - Chief, EMS Division
- American College of Surgeons - Committee on Trauma
 - Gregory J. Jurkovich, MD, FACS
 - Professor of Surgery, Harborview Medical Center
 - ACS-Committee on Trauma, Vice Chair
 -

National Expert Panel on Field Triage

- **Robert C. Mackersie, MD, FACS**
 - Professor of Surgery, UCSF
 - ACS-COT
- **William Ball**
 - Vice President, Public Policy
 - OnStar
- **Robert R. Bass, MD, FACEP**
 - President NASEMSD
 - Executive Director, Maryland Institute for EMS Systems
- **Robert L. Gall, MD**
 - Chair of Emergency Medicine, Univ Mississippi
 - Executive Director of TelEmergency
- **Jerris R. Hedges, MD, MS**
 - Chair, Emergency Medicine
 - Orgeon Health & Science University
- **Mark C. Henry, MD**
 - Chair of Emergency Medicine, Stony Brook University
 - Former NY State Director of EMS
- **Troy Hogue**
 - Area Manager, Rural Metro
- **Robert O'Connor, MD, MPH, FACEP**
 - President NAMESP
 - Professor of Emergency Medicine, Thomas Jefferson Univ.
- **E. Brooke Lerner, PhD**
 - Assistant Professor of Emergency Medicine
- **Drexdal Pratt**
 - Chief, North Carolina Office of Emergency Medical Services
- **Gail Cooper**
 - Public Health Administrator (Retired)
 - Trauma Systems Consultation Committee
- **Mark Johnson**
 - Former state coordinator of EMS, Alaska
- **Jorie Klein, RN**
 - Trauma Coordinator, Parkland Hospital
- **Jane Ball, RN, DrPH**
 - Director, Emergency Medical Services for Children
 - National Resource Center
 - Children's National Medical Center
- **Daniel G. Hankins, MD**
 - Mayo Medical Transport, Emergency Medicine
- **Alasdair Conn, MD**
 - Massachusetts General Hospital Emergency Services
- **Jeffrey P. Salomone, MD FACS**
 - Trauma/Critical Care, Emory University, Grady Memorial
- **Roslyne D.W. Schulman**
 - Senior Associate Director for Policy Development
 - American Hospital Association
- **Rick Murray**
 - Manager, Emergency Medical Services
 - American College of Emergency Physicians (ACEP)
- **Stanley J. Kurek, DO, FACS**
 - MUSC Dept. of Surgery
- **Jon Krohmer, MD**
 - Kent County EMS, Grand Rapids, MI
- **Paul Taheri, MD**
 - University of Michigan Trauma Center
- **Stewart C. Wang, MD, PhD, FACS**
 - Director, Program for Injury Research and Education
 - University of Michigan Health Systems

Process

1. Discussed background for need to change field triage criteria
2. Reviewed existing data regarding utility of current criteria
3. Outlined proposed changes to field triage criteria
4. Obtained input regarding what support and materials are needed to facilitate EMS adoption of the new criteria

Evaluation of the ACS Criteria

- Norcross 1995 –patients transported by ground EMS directly to the trauma center
- EMS completed survey on ACS criteria
- Severe trauma defined as ISS>15

N=753	Sensitivity	PPV
Physiologic Criteria	65%	42%
Anatomic Criteria	45%	22%
Physiologic and Anatomic	83%	27%
Mechanism of injury	54%	16%
Physiologic, Anatomic, and Mechanism of injury	95%	18%

Positive Predictive Value (PPV)

- is the proportion of people with a positive test who have the condition.

Consensus target: 20% PPV

Panel Consensus re 1999 Triage Scheme

- Physiologic Criteria (Step 1): no changes needed
- Anatomic Criteria (Step 2): minor additions only
- Mechanisms Criteria (Step 3): major changes needed
- Age/Comorbidities (Step 4): much more information needed

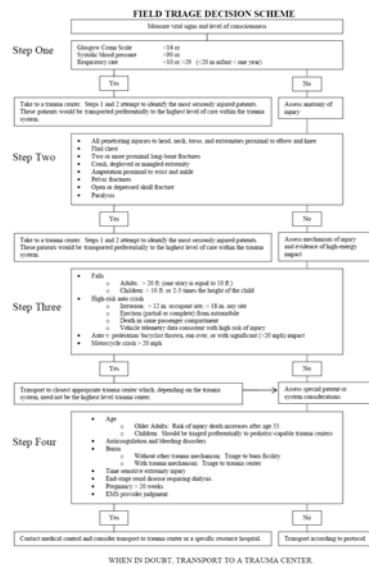
**No Consensus:
Recommended action if criteria met**

Data Review

~250 publications, trauma registries, NASS, CIREN, etc...



2006 Field Triage Decision Scheme



FIELD TRIAGE DECISION SCHEME

Measure vital signs and level of consciousness

Step One

Glasgow Coma Scale <14 or
Systolic blood pressure <90 or
Respiratory rate <10 or >29 (<20 in infant < one year)

Yes

No

Take to a trauma center. Steps 1 and 2 attempt to identify the most seriously injured patients. These patients would be transported preferentially to the highest level of care within the trauma system.

Assess anatomy of injury

Step 1 - Physiology

- **Measure vital signs and level of consciousness**
 - Glasgow Coma Scale <14
 - Systolic blood pressure <90
 - Respiratory rate <10 or >29 (<20 in infant < one year)
- If YES Take to a trauma center. Steps 1 and 2 attempt to identify the most seriously injured patients. These patients would be transported preferentially to the highest level of care within the trauma system.
- If NO Assess anatomy of injury

Step 2 - Anatomy

- All penetrating injuries to head, neck, torso, and extremities proximal to elbow and knee
 - Flail chest
 - Two or more proximal long-bone fractures
 - Crush, degloved or mangled extremity
 - Amputation proximal to wrist and ankle
 - Pelvic fractures
 - Open or depressed skull fracture
 - Paralysis
- If YES Take to a trauma center. Steps 1 and 2 attempt to identify the most seriously injured patients. These patients would be transported preferentially to the highest level of care within the trauma system.

Step 3 Mechanism of Injury

- Falls
 - Adults: > 20 ft. (one story is equal to 10 ft.)
 - Children: > 10 ft. or 2-3 times the height of the child
- High-risk auto crash
 - Intrusion: > 12 in. occupant site; > 18 in. any site
 - Ejection (partial or complete) from automobile
 - Death in same passenger compartment
 - Vehicle telemetry data consistent with high risk of injury
- Auto v. pedestrian/ bicyclist thrown, run over, or with significant (>20 mph) impact
- Motorcycle crash > 20 mph (*with or without separation*)

If YES Transport to closest appropriate trauma center which, depending on the trauma system, need not be the highest level trauma center.

Special Considerations

- Age
 - Older Adults: Risk of injury death increases after age 55
 - Children: Should be triaged preferentially to pediatric-capable trauma centers
- Anticoagulation and bleeding disorders
- Burns
 - Without other trauma mechanism: Triage to burn facility
 - With trauma mechanism: Triage to trauma center
- Time sensitive extremity injury
- End-stage renal disease requiring dialysis
- Pregnancy > 20 weeks
- EMS provider judgment

If YES Contact medical control and consider transport to trauma center or a specific resource hospital.

Bottom Line

WHEN IN DOUBT, TRANSPORT TO A TRAUMA CENTER.

Summary of 2006 Changes to Triage Scheme

- Minimal changes to Step 1 (Physiologic)
- Minimal changes to Step 2 (Anatomic)
- Substantial changes to Step 3 (Mechanism of Injury)
 - Change from High-speed to **High-risk** crash
 - Vehicle telemetry criterion added
 - Initial speed and major deformity removed
 - Intrusion criterion changed
 - Rollover criterion removed
 - Extrication time criterion removed
 - Fall height criterion decreased for kids
- Moderate changes to Step 4 (Special Considerations)
 - Burn criterion moved here from Step 2
 - Co-morbidities removed except anticoagulation/bleeding disorder
 - Dialysis, time sensitive injury, paramedic judgment added
 - Pregnancy criterion refined to > 20 weeks

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Mechanism Criterion

Initial Speed > 40 MPH



Mechanism Criterion

Major auto deformity > 20 inches



NEWER VEHICLES ARE DESIGNED TO CRUSH EXTERNALLY AND ABSORB ENERGY SO AS TO PROTECT PASSENGER COMPARTMENT INTEGRITY AND THE OCCUPANT.



Deformation *is* OUT - Intrusion *is* IN

•It is important to understand the difference between external vehicle DEFORMATION (or crush) and INTRUSION (displacement of components within the vehicle passenger compartment).

•Changes in vehicle design and construction (e.g. crush zones) have affected the association between observed vehicle deformity and risk of severe injury

•Newer vehicle are designed to crush externally and absorb energy so as to protect passenger compartment integrity and the

•Newer vehicles experience more crush but less intrusion in frontal crashes.

CRITERION: Intrusion > 12 in. occupant site; > 18 in. any site

IP intrusion = 25 in
TP intrusion = 16 in



IP intrusion = 12 in
TP intrusion = 24 in



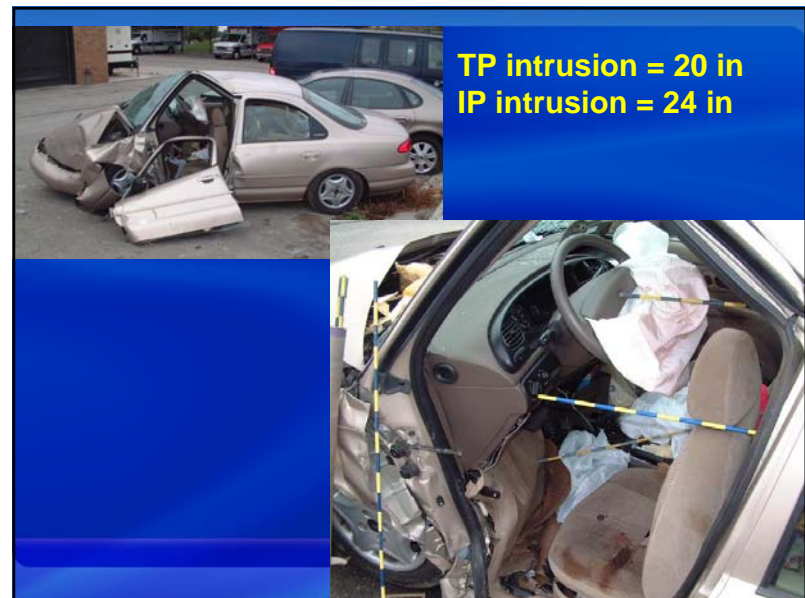
Stu's '2 FOOT' rule of thumb

- 2 ft -- seat width
- 2 ft -- SW to seatback
- 2 ft -- seat to toepan

A clipboard is approximately 1 foot long

IP intrusion = 15 in
TP intrusion = 22 in





TP intrusion = 26 in IP intrusion = 9 in



Toe pan intrusion = 19 in



Door intrusion = 16 in



Door intrusion = 19 in



Door intrusion = 18 in



Taken from above through sunroof

Door intrusion in LF = 44 cm (17 in)



Door intrusion in LF = 47 cm (19 in)



- Door intrusion in LF = 30 cm (12 in)



Roof intrusion in all 3 front seats = 50 cm (20 in)



Roof intrusion over DR = 35 cm (14 in)
Roof intrusion over LR cargo area = 53 cm (21 in)



Roof intrusion over DR = 34 cm (13 in)



Roof intrusion over LR = 31 cm (12 in)



Roof intrusion over DR = 37 cm (15 in)
Roof intrusion over RF= 33 cm (13 in)



Roof intrusion over entire 1st/2nd row = 58 cm (23in)



Rollovers: A very dangerous crash type



Full or partial ejection markedly increases injury risk in rollover crashes

CRITERION: Ejection (partial or complete) from automobile

**Full Ejection is best determined
in the field by EMS**

Partial Ejection is a new criterion

**Typical wounds in un-ejected occupants:
abrasions and contusions**



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Characteristic of partially ejected occupants: complex lacerations and "road rash"



**Characteristic of partially ejected occupants: complex lacerations
and "road rash"**

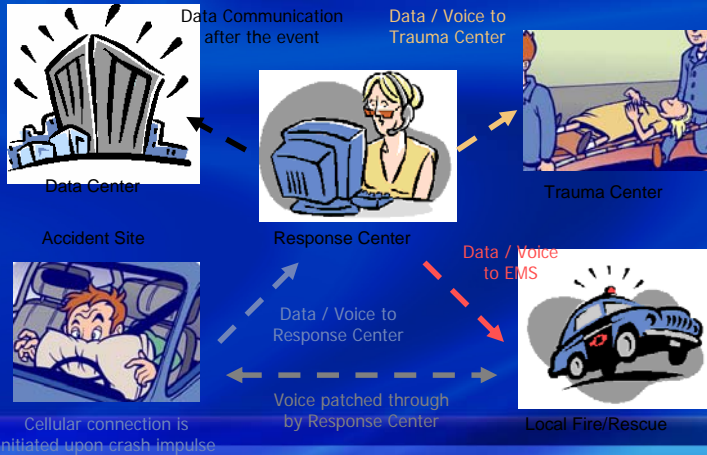


**Characteristic of partially ejected occupants: complex lacerations
and "road rash"**



Automatic Collision Notification (ACN)

System is based on cell phone coverage



Response Center – Screen I

Response Center – Screen I

Response Center – Screen II

NHTSA Injury Prediction Algorithm

Automatic Collision Notification

CURRENT

- Immediate notification
- Location
- Instant communication
 - Occupant condition (consciousness, distress)
- Crash conditions
 - Severity
 - Configuration (Side, Offset, Frontal, Rear)
 - Rollover
 - Vehicle type
- Restraint usage

FUTURE

- Occupant number
- Occupant characteristics (age, medical problems)
- Ejection

Advanced ACN is now standard in all GM vehicles.
Also on BMW, Mercedes

CRITERION: Vehicle telemetry consistent with high risk of injury

Summary

- The Field Triage Decision Scheme was revised with input from multiple federal agencies, professional organizations and experts.
- Great effort was made to preserve a local system's flexibility and ability to make maximal optimal use of available resources
 - Toolkit being produced with detailed risk charts to allow local calibration of EMS response and transport protocols
- The revision will require local protocol changes and training
 - Educational materials being prepared by CDC
 - Vehicle crash response educational materials at www.crashedu.org

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