

A System Approach to Elderly Falls: How Geriatric Protocols and Guidelines Improve Outcomes

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Respect your elders...

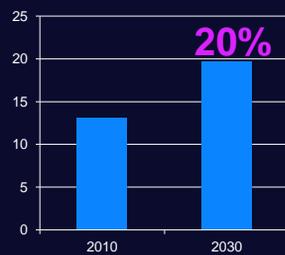
Objectives

- Prevalence of geriatric trauma
- Ground level falls as a major mechanism
 - Significant morbidity and mortality
- Strategies to optimize care of the elderly ground level fall patient

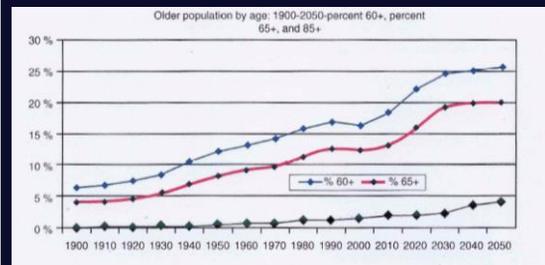
DEMOGRAPHICS OF TRAUMA

The population is aging

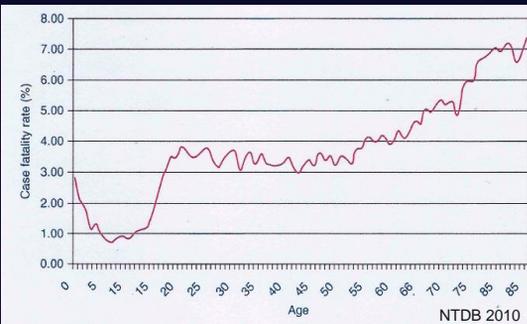
Percentage of US population over age 65



The population is aging

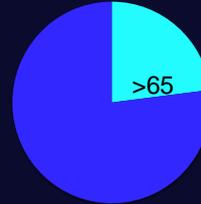


What's "elderly" for trauma?



Trauma Population

Age (years)



Trauma is the fifth leading cause of death in people over age 65.

The injured elderly: A rising tide

David J. Gesla, MD, FACS,^a Etienne E. Pracht, PhD,^b Joseph J. Tepas III, MD, FACS,^c John Y. Cha, MD, FACS,^a Barbara Langland-Orban, MD,^b and Lewis M. Flint, MD, FACS,^d Tampa and Jacksonville, FL, and Chicago, IL

- 15 year retrospective study of the demographics of trauma
 - The only segment of the trauma population to increase significantly?
- Patients >65 years of age**

The injured elderly: A rising tide

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Injury in the elderly population increased at a rate **7 times** that of adults

Mechanism of Injury



71%



20%

Ground Level Falls

- **#1** cause of injury-related death in elderly trauma patients
- \$35 billion spent 2008-2013 in the US alone

Ground Level Falls

- One third of all elderly people fall at least once per year
 - Annual incidence of falls increase with age
- 80% of these falls occur at home

Ground Level Falls

- Mortality 4.4%
- Morbidity significant
 - Longer hospital stays
 - Longer ICU stays
 - Less likely to be functionally independent at discharge (41% not independent)

Spaniolas et al, J Trauma 2010



GLF: Significant Injuries

- Closed Head Injuries
- Rib fractures

Closed Head Injuries

- Most common injury in the elderly patients who died
 - 77% of patients who died suffered a closed head injury
- Patients with anemia were two times more likely to die

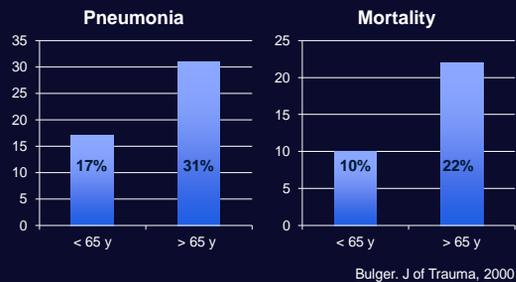
Cartagena et al, Aging Clin Exp Res 2016

Rib Fractures

- 9% of all trauma patients
- More common in elderly
- Loss of cortical bone mass with aging



Rib Fractures



PHYSIOLOGY OF AGING

and the lack of physiologic reserve

Changes with Aging

- Loss of visual acuity
- Hearing loss
- Balance & gait instability
- Slowed reaction times
- Baseline neurologic deficits
- Osteoporosis

Changes with Aging

- Underlying comorbidities
- Medications
- Decreased pulmonary reserve
- Increased risk of aspiration
- Baseline renal insufficiency – often with “normal” serum creatinine

Cardiovascular

- Even *healthy* individuals have age-related changes of their CV system
- Decreased response to adrenergic stimuli with age
- Elderly cannot compensate for hypovolemia or hemorrhage

Cardiovascular

- Normal vital signs are unreliable in the elderly
 - Baseline HTN
 - Beta-blockade
 - Many cannot mount a tachycardic response

Cardiovascular

- Normal vital signs are unreliable in the elderly

Is there a reliable indicator of shock in our elderly trauma patients?

Cardiovascular

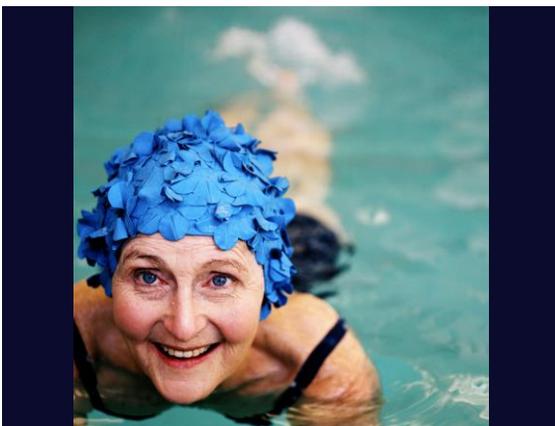
- Normal vital signs are unreliable in the elderly

Base Deficit can be used as a marker of occult shock

Cardiovascular

- Normal vital signs are unreliable in the elderly

Base Deficit worse than -6 associated with increased mortality



Do we need



Should the elderly go to a trauma center?



Development of Statewide Geriatric Patients Trauma Triage Criteria

Howard A. Werman, MD;¹ Timothy Erskine, EMT-P;² Jeffrey Caterino, MD;¹ Jane F. Riebe, MPH, CSTR;³ Tricia Valasek, MPH;⁴ Members of the Trauma Committee of the State of Ohio EMS Board⁵

- Literature review to identify possible geriatric triage criteria
- Ohio Trauma Registry Reviewed
- Evaluated if criteria impacted mortality
- Criteria developed are as follows...

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- ≥ 70 years of age with one or more:
 - GCS ≤ 14 & known or suspected trauma
 - SBP < 100
 - Proximal long bone fracture after MVC
 - Pedestrian struck by a motor vehicle
 - Any fall with evidence of brain injury

Injured patients with advanced age (≥ 65 years) and preexisting medical conditions should lower the threshold for field triage directly to a designated/verified trauma center.

Evaluation & Management of Geriatric Trauma, EAST Guideline. J Trauma, 2012.

Injured patients with advanced age (≥ 65 years) and preexisting medical conditions should lower the threshold for **field triage** directly to a designated/verified trauma center.

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Old Age as a Criterion for Trauma Team Activation

Demetrios Demetriades, MD, Jack Sava, MD, Kathleen Alo, RN, E. Newton, MD, George C. Velthaus, MD, James A. Murray, MD, Howard Belzberg, MD, Juan A. Asensio, MD, and Thomas V. Berne, MD

- Retrospective review of 882 patients over age 70 admitted to USC
- Many did not meet activation criteria:
 - 63% of the severely injured (ISS>15)
 - 25% of the critically injured (ISS>30)
- Age 70+ should be a trauma activation

Journal of Trauma, 2001.



High-risk geriatric protocol: Improving mortality in the elderly

Eric Bradburn, DO, MS, Frederick B. Rogers, MD, MS, Margaret Krasne, BS, Amelia Rogers, BS, Michael A. Horst, PhD, MPH, MS, Matthew J. Belan, MD, and Jo Ann Miller, BSN, RN, CCRN, Lancaster, Pennsylvania

- Patients >65 with a high risk finding were placed on the protocol
 - High-risk injury
 - Comorbidity
 - Physiologic parameters

Bradburn. J Trauma, 2012.

TABLE 1. High-Risk Geriatric Patient Indicators

High-Risk Injuries	Medical History Indicators	Assessment Indicators
TBI*	Anticoagulation: Coumadin/Plavix	Admission Glasgow Coma Scale score ≤14
≥2 Rib fractures	Cardiac history: CHF/HTN/Arrhythmias	Need for blood products
Pulmonary contusion	Chronic liver failure: Cirrhosis	PRBC/FFP
Pneumothorax	Chronic renal failure: Cr ≥1.8 and/or GFR ≤60	Surgical Intervention
Hemothorax	Pulmonary disease: chronic obstructive pulmonary disease	Base deficit >-6 mmol/L
Blunt cardiac Injury		• Systolic blood pressure <90 mm Hg
Hemoperitoneum		• Lactic acid ≥2.4 mmol/L
Pelvic fractures		
Long bone fractures		
Open fractures		

Bradburn. J Trauma, 2012.

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- STAT ABG
 - Repeat ABG q 4h until BD clears
- STAT EKG
 - Echo if hemodynamic changes
- Geriatric Consultation
- ICU admission with q 1h neuro checks
- BMP, Mag, Phos in AM

Bradburn. J Trauma, 2012.

High-risk geriatric protocol: Improving mortality in the elderly

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- Geriatric protocol reduced mortality significantly
 - Odds ratio 0.63 (0.39-0.99, p=0.046)
- Effect was most pronounced in the most severely injured patients

Bradburn. J Trauma, 2012.

Advanced age is not an absolute predictor of poor outcomes and should NOT be used as the sole criterion for denying or limiting care.

An initial, aggressive approach should be pursued for the management of the elderly patient.

EAST Guidelines

ACS TQIP GERIATRIC TRAUMA MANAGEMENT GUIDELINES

TQIP Guidelines

Elderly patients may not readily exhibit signs of shock, leading to under-triage.

A lower threshold for trauma team activation should be used for elderly trauma patients.

TQIP Geriatric Trauma Guidelines.

TQIP Guidelines

Determine if the elderly trauma patient is on any medicines that may affect care:

- Antiplatelet agents
- Anticoagulants
- Beta blockers

TQIP Geriatric Trauma Guidelines.

TQIP Guidelines

Consider common, nontraumatic events that may precipitate or complicate care:

- Acute coronary syndrome
- Hypovolemia/Dehydration
- Sepsis
- Cerebrovascular event

TQIP Geriatric Trauma Guidelines.

TQIP Guidelines

Monitor patient's fluid status:

- Daily fluid inputs and outputs
- Daily weights
- Consider central venous pressure monitoring

TQIP Geriatric Trauma Guidelines.

TQIP Guidelines

A full set of labs, including base deficit, should be obtained in all elderly trauma patients.

TQIP Geriatric Trauma Guidelines.

TQIP Guidelines

Develop criteria for early geriatric consultation and geriatric expertise on the multidisciplinary trauma team.

TQIP Geriatric Trauma Guidelines.

TQIP Guidelines

Obtain past history including comorbidities, medications, and pre-injury functional status as soon as possible.

TQIP Geriatric Trauma Guidelines.

TQIP Guidelines

Limit polypharmacy. Use Beers Criteria to guide pharmacotherapy in the elderly.

TQIP Geriatric Trauma Guidelines.

Summary

- Geriatric trauma population is rapidly increasing.
- Physiologic reserve decreases as patients age.

Summary

- Traditional vital signs are not reliable in the elderly
 - Triage criteria
 - Base deficit

Summary

- Outcomes of trauma in the elderly are improved with an aggressive, multidisciplinary, protocol driven approach