“G60” Geriatric Trauma Service 2013

John C Lincoln Health Network

Alicia Mangram, MD, FACS
Medical Director, Trauma Services
Medical Director, Trauma Critical Care
Trauma Quality Improvement Program (TQIP)
Annual Scientific Meeting and Training 2013

Honored by Experts. Honored to Serve.
Honored by Experts. Honored to Serve.
Trauma Volume

Honored by Experts. Honored to Serve.
Blunt vs Penetrating

Trauma

- Blunt
- Penetrating

Honored by Experts. Honored to Serve.
Mechanism of Injury

- MVC
- Falls
- MCC
- Ped/bike
- Assault
- Stab
- GSW

Life Expectancy is getting longer, so people are living longer.

Life Expectancy in 1900 was about 50 Years

Current life expectancy is 78 Years
### The Aging of America

Age > 65 is one of the fastest growing age groups

<table>
<thead>
<tr>
<th>Decade</th>
<th>Number (millions)</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-2010</td>
<td>35-40</td>
<td>14</td>
</tr>
<tr>
<td>2010-2020</td>
<td>40-55</td>
<td>38</td>
</tr>
<tr>
<td>2020-2030</td>
<td>55-72.1</td>
<td>31</td>
</tr>
</tbody>
</table>

*Administration on Aging: US DHHS, 2010*
Demographics: 85+years

- In 2009, people age > 85 years numbered 5.6 million
- In 2010, this subset increased to 5.8 million
- By 2020 this subset is expected to reach 6.6 million: 15% increase for the decade

Administration on Aging/ DHHS, 2010
Injury and violence are serious threats to the health and well-being of Americans ages 65 and older.

National Center for Injury Prevention and Control, 2007
An Increasing Elderly Population... Equals increasing Geriatric Trauma

Honored by Experts. Honored to Serve.
Geriatric Trauma

Multiple studies have shown that mortality/morbidity after trauma is strongly correlated with increasing age

- Trauma death rate per year [per 100,000]
  - All age groups = 56.0
  - Age >65 = 113.2
What’s Different About Geriatric Trauma?

Elderly trauma patients present a challenging clinical problem due to:
- Pre-existing health conditions
- Decreased physiologic reserve

- Prior operations
- Blood thinners
- Different patterns of injury
- Domestic abuse
- Self-inflicted injury

Elderly Trauma Patients

- Significant anatomic and physiologic changes
- Higher incidence of medical co-morbidities

Poly-pharmacy
- Antihypertensives 55%
- Antiarrhythmics 26%
- Hypoglycemics 22%
- Antiplatelet 22%
- Anticoagulation 7%

Pre-existing conditions

- Prevalence of pre-existing conditions
  - 4th decade—17%
  - 6th decade—40%
  - 7th decade—69%
  - 9th decade—80%

Pre-existing conditions make it difficult for patients to respond to the acute stress of trauma

Kauder et al., 2004
Should patients older than 60 years with poly-trauma and/or a significant mechanism of injury be considered as meeting the criteria for Trauma Team Activation (TTA)?

Why should patients age > 60 with minor injury severity scores (0-9) not be considered for TTA?

Would these patients benefit from a higher level of activation?
The National Trauma Data Bank (NTDB) was queried for the period of January 1, 1999 to December 31, 2008, for all trauma patients and associated injury severity score (ISS)

Data abstracted was based on patient’s age and ISS

For the period of review, the NTDB contained 802,211 trauma patients

Elderly patients (age >60 years) accounted for 21% of all patients.
## NTDB Comparison of Morbidity

<table>
<thead>
<tr>
<th>ISS Category</th>
<th>% Morbidity</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age 13-60</td>
<td>Age &gt; 60</td>
</tr>
<tr>
<td>Minor (0-9)</td>
<td>1.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Major (10-15)</td>
<td>4.8</td>
<td>10.4</td>
</tr>
<tr>
<td>Severe (16-24)</td>
<td>10.9</td>
<td>16.4</td>
</tr>
<tr>
<td>Critical (&gt; 24)</td>
<td>27.3</td>
<td>28.0</td>
</tr>
</tbody>
</table>
A relation exists between increased age, associated pre-existing medical conditions, and a poor physiologic reserve with resultant poorer outcomes.

It is essential to not under-triage the elderly patient with minor or major ISS.

A high index of suspicion is imperative with the elderly trauma patient.
Patient age > 60 is an independent predictor variable with interactions with pre-existing co-morbidities and poor physiologic reserve which together are determinants for increased morbidity and mortality among geriatric trauma patients.
Effects of Aging

The trauma care given to older trauma patients should be distinctive from care younger trauma patients require with the same injuries.
Treating patients with isolated injuries in a setting of chronic medical problems can lead to fragmentation of care delivery.

Who will assume responsibility for these patients?
We organized a geriatric trauma service, led by trauma surgeons, that was specifically designed to expedite the care of geriatric patients through a multidisciplinary approach.
“G-60” Trauma Unit Creation

Methods

– Discussion between trauma surgeons and hospital administration
  • Recognize the problem
  • Increase in morbidity and mortality when surgical intervention was done greater than 48 hours (in elderly)
Methods

Discussion between trauma surgeons and hospital administration

- Recognize and define key problem/SOLUTION
  - Increase in morbidity and mortality when surgical intervention was done greater than 48 hours (in elderly)
  - “something like G-60 should be done”
  - “how should G-60 be done?”
  - “who will take the lead among stakeholders for G-60?”
METHOD

» Dialogue between trauma surgeons and ER physicians
  – Effective triaging
  – Determining disposition
  – Admission criteria for G60 unit
METHOD

Identifying KEY players
  – Orthopedic Surgery
  – Internal Medicine
  – Cardiology
  – Anesthesiologist
METHOD

- Ortho – all patients to OR in 48hrs
- Multiple meetings w/ anesthesiologist and internal medicine
  - pre-op evaluation
  - role of cardiology consultation
  - role of ECHOs
**METHOD**

- **Multiple Meetings w/ variety of specialties:**
  - Physical/occupational therapy
  - Social worker
  - Case coordinator
  - Trauma coordinator
  - Respiratory therapy
  - Pharmacy
  - Nutritionist
  - Floor Nurse Supervisor
  - Emergency department liaison
  - Internal medicine hospitalist
  - Physical medicine and rehabilitation
METHOD

» An established area within our hospital was identified as our “G60” unit

» Telemetry capabilities
METHOD

A paging system for notifying all services of a G60 admission was designed and implemented.
G-60 Trauma Admission Orders

Note: These orders should be used for all patients 60 years of age or greater being admitted for traumatic injury, except those being admitted to the unit.

Admit to: “G-60” Geriatric Trauma Unit

Admitting Physician: ________________________________

Attending Physician: ________________________________

Consulting Surgeon

Diagnosis: __________________________________________

Condition: ____________________

Vital signs: _Every 4 hrs _Continuous pulse oximetry _Other_______________________

Activity: √ Telemetry _Bedrest _Other___________________________

Diet: _NPO now _NPO after midnight /or until ortho doctor sets surgery date and time if ok to give diet still consult surgery for NPO status
INCLUSION CRITERIA

» Age >60

» Traumatic injury requiring hospital admission

» Injury occurred within the previous 48 hours

» Above criteria met = G-60 Activation
G-60 ACTIVATION

» Seen first by ED physician to establish criteria

» G-60 activation paged to all relevant services
   - Trauma service, hospitalist, PT/OT, nutrition, RT, G60 nurse supervisor, social work, case manager, pharmacy

» Goal of activation-to-exam of 30 minutes
   - Seen by trauma service and hospitalist initially

» Appropriate sub-specialists notified

» Expedited pre-procedure medical clearance

» Admitted to SICU or G60 Service
GOALS

» 30 minutes – ED presentation to trauma service evaluation

» 4 hours – ED presentation to inpatient room

» 36 hours – ED presentation to operating room

» 5 days – ED to safe and appropriate disposition
Trauma Surgeon Leadership

» Multidisciplinary
» Continuous Total Quality Improvement
» Strong Leadership
» Effective communication

Honored by Experts. Honored to Serve.
Multidisciplinary rounds on floor

» Team Members
  - Trauma surgeon
  - Nurse Practitioner
  - RN
  - Respiratory therapist
  - Occupational therapist
  - Physical therapist
  - Chaplin
  - Trauma service manager

Honored by Experts. Honored to Serve.
Multidisciplinary rounds on floor

Honored by Experts. Honored to Serve.
The Creation of a Geriatric Trauma Unit “G-60”

Alicia J. Mangram, MD, Vanessa K. Shifflette, MD, Christopher D. Mitchell, MD, Van A Johnson M.D., Manuel Lorenzo, MD, Michael S. Truitt, MD, Anuj Goel, MD, Mark A. Lyons, MD, and Ernest L. Dunn, MD, Dallas, Texas

• The American Surgeon77: 1144-1146 (2011)
G-60

Our 1-Year Experience
Seniors At Risk For Injury: Falls

Honored by Experts. Honored to Serve.
Seniors At Risk For Injury: MVC
<table>
<thead>
<tr>
<th>OUTCOMES</th>
<th>Control (n = 280)</th>
<th>G 60 (n = 393)</th>
<th>P - value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average ED LOS (hours)</td>
<td>6.1</td>
<td>4.2</td>
<td>0.0001</td>
</tr>
<tr>
<td>Average ED to OR (hours)</td>
<td>52.9</td>
<td>37.6</td>
<td>0.0103</td>
</tr>
<tr>
<td>Average SICU LOS (days)</td>
<td>5.2</td>
<td>3.0</td>
<td>0.0002</td>
</tr>
<tr>
<td>Average Hospital LOS (days)</td>
<td>7.0</td>
<td>4.8</td>
<td>0.0002</td>
</tr>
<tr>
<td>MORBIDITY</td>
<td>Control (n=280)</td>
<td>G 60 (n=393)</td>
<td>P - value</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-----------------</td>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>UTI</td>
<td>3.9% (11)</td>
<td>1.5% (6)</td>
<td>0.05</td>
</tr>
<tr>
<td>Respiratory Failure</td>
<td>6.8% (19)</td>
<td>1.3% (5)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Congestive Heart Failure</td>
<td>1.4% (4)</td>
<td>0% (0)</td>
<td>0.05</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>1.4% (4)</td>
<td>0% (0)</td>
<td>0.017</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>1.7% (5)</td>
<td>0.2% (1)</td>
<td>0.0078</td>
</tr>
<tr>
<td>DVT</td>
<td>0% (0)</td>
<td>0.2% (1)</td>
<td>0.398</td>
</tr>
<tr>
<td>PE</td>
<td>0.07% (2)</td>
<td>0% (0)</td>
<td>0.0934</td>
</tr>
<tr>
<td>Decubitus Ulcer</td>
<td>0.03% (1)</td>
<td>0 (0%)</td>
<td>0.2358</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MORTALITY</th>
<th>Control</th>
<th>G 60</th>
<th>P - value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>5.7% (16)</td>
<td>3.8% (15)</td>
<td>0.2</td>
</tr>
</tbody>
</table>
Conclusion

A geriatric trauma service can lead to:

1. A more streamlined hospital visit
2. A reduction in morbidity
3. A trend towards decreased mortality
Geriatric trauma service: A one-year experience

Alicia J. Mangram, MD, Christopher D. Mitchell, MD, Vanessa K. Shifflette, MD, Manuel Lorenzo, MD, Michael S. Truitt, MD, Anuj Goel, MD, Mark A. Lyons, MD, Deborah J. Nichols, RN, and Ernest L. Dunn, MD, Dallas, Texas

G60 at JCL: Vision

» G60 was the solution to “too many medicine admits”

» Applauded “G60”
ACS Quality Improvement Program (TQIP)
TQIP Observations

- A high performing center might not be a high performing center for all types of patients
- Differences in performance based on patient
- Poor correlation across age groups
- Centers might be high performers for the young, yet not the elderly
- There are clinically relevant mortality differences across centers
TQIP: Elderly

- Poor correlation across age groups
- Centers might be high performers for the young, yet not the elderly
## Trauma Center Performance Status and Age.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>High</td>
<td>7</td>
<td>29%</td>
</tr>
<tr>
<td>Average</td>
<td>120</td>
<td>6%</td>
</tr>
<tr>
<td>Low</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

**Conclusion**: Centers might be high performers for the young, yet not the elderly (Nathens, 2012)
New “G-60” innovations at JCL

» Multidisciplinary rounds on floor
  – Monday, Wednesday, Friday

» Group sessions
  – Monday, Wednesday

» Vulnerable Elder Survey (VES)

» HgA1c in “G60”
VES-13
VES-13 and Our “G60” service

• Vulnerable Elders Survey (VES-13)
  • Functional status and age category based survey tool
  • Validated in uninjured older populations (age group: >=65 years)
  • Piloted VES-13 awards points based on age category (75-84 = 1 point, 85= 3 points)
    • Predicts complications and mortality in injured older adults
## Scoring VES-13

<table>
<thead>
<tr>
<th>Item</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0-3</td>
</tr>
<tr>
<td>Self-rated Health</td>
<td>0-1</td>
</tr>
<tr>
<td>Physical function</td>
<td>0-2</td>
</tr>
<tr>
<td>Functional disability</td>
<td>0-4</td>
</tr>
<tr>
<td>Maximum possible score</td>
<td>10</td>
</tr>
</tbody>
</table>

Wong (2012)
Total VES-Score vs. Age
Age-adjusted VES-Score vs. Age
Linear Regression

VES-13 Score = 0.245*(Age) - 14.86, p<.001
R-square = .53

Age-adjusted VES-13 Score = 0.136*(Age) - 7.64, p<.001
R-square = .24
VES-13 and Our “G60” service

Question: Is VES-13 an appropriate tool for use among G-60 population?

1. What is the nature of the relationship between age and VES-13 in G60 trauma patients?
2. Does preinjury VES-13 score (0-10 points, higher = greater risk) predict outcomes such as HLOS, medical complications, patient disposition or death?
# VES-Score and Endpoints

## PREDICTORS

<table>
<thead>
<tr>
<th>VES-Score</th>
<th>ISS score</th>
<th>Hospital length of stay (LOS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• VES&lt;3 (less vulnerable)</td>
<td>• ISS =&lt;9 (low)</td>
<td>• LOS&lt; Median LOS</td>
</tr>
<tr>
<td>• VES&gt;=3 (vulnerable)</td>
<td>• ISS&gt;9 (medium to high)</td>
<td>• LOS&gt;= Median LOS</td>
</tr>
</tbody>
</table>

## OUTCOMES

<table>
<thead>
<tr>
<th>Discharge destination</th>
<th>Hospital length of stay (LOS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Home (favorable)</td>
<td>• LOS&lt; Median LOS</td>
</tr>
<tr>
<td>• Elsewhere (unfavorable)</td>
<td>• LOS&gt;= Median LOS</td>
</tr>
</tbody>
</table>
# Associations: VES

<table>
<thead>
<tr>
<th>Discharge Disposition (Home vs. Elsewhere)</th>
<th>Home</th>
<th>Elsewhere</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>VES-Score &lt;3 %</td>
<td>19</td>
<td>18</td>
<td>37</td>
</tr>
<tr>
<td>%</td>
<td>51.4%</td>
<td>48.6%</td>
<td>100%</td>
</tr>
<tr>
<td>VES-Score &gt;=3 %</td>
<td>4</td>
<td>26</td>
<td>30</td>
</tr>
<tr>
<td>%</td>
<td>13.3%</td>
<td>86.7%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>44</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>34%</td>
<td>65.7%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Pearson’s Chi-Square =10.62 (df=1), p=.001
## Associations: ISS

<table>
<thead>
<tr>
<th>ISS</th>
<th>Home</th>
<th>Elsewhere</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=9%</td>
<td>16</td>
<td>32</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>33.3%</td>
<td>66.7%</td>
<td>100%</td>
</tr>
<tr>
<td>&gt;9%</td>
<td>6</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>37.5%</td>
<td>62.5%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>42</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>34.4%</td>
<td>65.7%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Pearson's Chi-Square = 0.92 (df=1), p=0.769
Binary Logistic Regression ISS

The ODDS prediction equation for patient discharge disposition to elsewhere when ISS>9

\[ = e^{(0.039 - 0.189 \times \text{ISS-binned (1)})} \]

Odds ratio = 0.828, \( p = 0.783 \), 95% CI, 0.215-3.189
Binary Logistic Regression VES-13

The ODDS prediction equation for patient discharge disposition to elsewhere when VES>=3

\[ \text{Odds ratio} = 6.350, \quad p = 0.004, \quad 95\% \text{ CI, } 1.803-22.367 \]
# ISS (>9) and Discharge

<table>
<thead>
<tr>
<th>ISS</th>
<th>Home</th>
<th>Elsewhere</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>17</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>19</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>6</strong></td>
<td><strong>10</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

N too small for valid stat
Future Directions

» VES-13

– Testing the ability to predict future important outcomes

  • Morbidity
  • Mortality
  • Patient stratification
Age > 65 is one of the fastest growing age groups

<table>
<thead>
<tr>
<th>Decade</th>
<th>Number (millions)</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-2010</td>
<td>35-40</td>
<td>14</td>
</tr>
<tr>
<td>2010-2020</td>
<td>40-55</td>
<td>38</td>
</tr>
<tr>
<td>2020-2030</td>
<td>55-72.1</td>
<td>31</td>
</tr>
</tbody>
</table>

By 2020, age > 85 is expected to reach 6.6 million: *15% increase for the decade*
An Increasing Elderly Population... Equals increasing Geriatric Trauma
Honored by Experts. Honored to Serve.
GERIATRIC TRAUMA AT John C Lincoln: 2013

THANK YOU!!!!!!!!!!