PI In Motion: Nelson Non Surgical Admission Tool and Need For Trauma Intervention (NFTI) Tool

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Disclosures

- No relevant financial disclosures to present
- Sharing other’s ideas and how to put into practice

Thank you for allowing me to present!
My Background...
UCHealth University of Colorado Hospital (Aurora, CO)

- ACS Verified Level One Trauma Center
- ABA Verified Burn Center 2000 trauma admissions from 9 states and over 107 hospitals
  - 81% increase in trauma volume since 2014
- Part of a health system with:
  - 2 Level One Trauma Centers
  - 1 Level Two Trauma Center
  - 6 Level Three Trauma Centers
  - 1 Level Four Trauma Center
- Participate in a UCHealth System TQIP Collaborative
- Very active PIPS program
Objectives

1. Describe the significance of non-surgical admissions on patient safety and trauma program performance
2. Describe how the use of the Nelson Non-Surgical Admission tool can assist with performance improvement workflows and event classification
3. Identify the key steps to implement the Nelson Non-Surgical Admission Tool at your trauma center
4. Describe the significance of the NFTI tool on patient safety and trauma program performance
5. Describe how the use of the NFTI tool can assist with performance improvement workflows and event classification
6. Identify the key steps to implement the NFTI tool at your trauma center
THEN VS. NOW

[Image of an old-fashioned operating room]

[Image of a modern operating room]

School of Medicine
UNIVERSITY OF COLORADO ANHEIMER MEDICAL CAMPUS

uchealth
Performance Improvement - Why Do We Do This?

- Eliminate and Mitigate “Harm”
- Improve Patient Experience
- Decrease Variability
- Increase Efficiency
- Satisfy Regulatory Standards
- Decrease Cost
Two Big Problems

Non Surgical Admissions
• 10% threshold
• Right patient, right service, right time
• MUST review those that “fall out”

Undertriage
• 5% threshold
• Right patient, right level of care, right time
• MUST review those that “fall out”
Two Great, EVIDENCE BASED Answers

Nelson Scoring Tool
- Retrospective review tool
- Helps determine what is appropriate
- Easy to use

NFTI Tool
- Retrospective review tool
- Helps determine what is appropriate
- Easy to use
Nelson Non-Surgical Admission Tool
Nelson Scoring Tool

Nonsurgical Admissions With Traumatic Injury: Medical Patients Are Trauma Patients Too
Laura Nelson1, Sally Kuzniewski, Michael Grossman, Jay A Yelon, Lisa Szydziak
Affiliations
• PMID: 29742633
• DOI: 10.1097/JTN.0000000000000367

• 2 year analysis of tool
  • 28% to 4% non-trauma service admission rate
  • NO difference in outcome or mortality
• As an alternative to case-based reviews for all such patients, a scoring system or algorithm was developed that defined a group of patients considered as reasonable or appropriate for admission to NTS.
• Mortality and complication rates did not differ though length of stay was shorter for the TS group.
## Nelson Scoring Tool

### Scoring Criteria:

<table>
<thead>
<tr>
<th>Algorithm/Criteria</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;65 years</td>
<td>1</td>
</tr>
<tr>
<td>3 or more comorbidities</td>
<td>1</td>
</tr>
<tr>
<td>ISS &lt; 10</td>
<td>1</td>
</tr>
<tr>
<td>MOI GLF</td>
<td>1</td>
</tr>
<tr>
<td>No ICU admission</td>
<td>1</td>
</tr>
<tr>
<td>No need for surgical intervention</td>
<td>1</td>
</tr>
<tr>
<td>No blood products</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note: MOI GLF = mechanism of injury, ground level fall; ICU = intensive care unit; ISS = Injury Severity score.*

<4 points= inappropriate non-surg admit
4-5 points= further review
6-7 points= appropriate non-surg admit
Case #1

- 76 y/o female admitted to the ICU medicine service with 5 rib fractures and pulmonary contusions and a right radius fracture after a ground level fall. The patient did not require blood transfusion or operative intervention. PMHx- Hypertension, Type II Diabetes, and Peripheral Vascular Disease. No trauma consultation was obtained.

- Is this an appropriate non-surgical admission?
### Case #1

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;65</td>
<td>1</td>
</tr>
<tr>
<td>3 or more co-morbidities</td>
<td>1</td>
</tr>
<tr>
<td>ISS&lt;10</td>
<td>0</td>
</tr>
<tr>
<td>MOI Ground Level Fall</td>
<td>1</td>
</tr>
<tr>
<td>NO ICU Admission</td>
<td>0</td>
</tr>
<tr>
<td>NO Need for Surgical Intervention</td>
<td>1</td>
</tr>
<tr>
<td>NO Blood Products</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL SCORE</strong></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>

- What do you do with this information?
- What Level of Review?
- Proposed action items?
Case #2

- 70 y/o female admitted to the medicine service on the med surg floor with a hip fracture after a ground level fall. No other injuries were identified. The patient did not require blood transfusion during her hip fracture repair. PMHx- Hypertension, Type II Diabetes, and Peripheral Vascular Disease. No trauma consultation was obtained.

- Is this an appropriate non-surgical admission?
**Case #2**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;65</td>
<td>1</td>
</tr>
<tr>
<td>3 or more co-morbidities</td>
<td>1</td>
</tr>
<tr>
<td>ISS&lt;10</td>
<td>1</td>
</tr>
<tr>
<td>MOI Ground Level Fall</td>
<td>1</td>
</tr>
<tr>
<td>NO ICU Admission</td>
<td>1</td>
</tr>
<tr>
<td>NO Need for Surgical Intervention</td>
<td>0</td>
</tr>
<tr>
<td>NO Blood Products</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL SCORE</strong></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>

- What do you do with this information?
- What Level of Review?
- Proposed action items?
Case #3

• 72 y/o male admitted to the med surg medicine service with a large hemothorax and superior and inferior pubic rami fractures after falling 2 stories off of his house while installing holiday decorations. The patient required 2 units of PRBC’s on arrival and did not require operative intervention for pelvic fractures. PMHx- Hypertension. No trauma consultation was obtained.

• Is this an appropriate non-surgical admission?
**Case #3**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;65</td>
<td>1</td>
</tr>
<tr>
<td>3 or more co-morbidities</td>
<td>0</td>
</tr>
<tr>
<td>ISS&lt;10</td>
<td>0</td>
</tr>
<tr>
<td>MOI Ground Level Fall</td>
<td>0</td>
</tr>
<tr>
<td>NO ICU Admission</td>
<td>1</td>
</tr>
<tr>
<td>NO Need for Surgical Intervention</td>
<td>1</td>
</tr>
<tr>
<td>NO Blood Products</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL SCORE</strong></td>
<td><strong>3</strong></td>
</tr>
</tbody>
</table>

- **What do you do with this information?**
- **What Level of Review?**
- **Proposed action items?**
Case #4

- 52 y/o male admitted to the cardiology medicine service on tele with an open forearm fracture and open tib fib fracture after a motorcycle crash. The patient required operative intervention for his open fractures. PMHx- Hypertension, Myocardial Infarction, Congestive Heart Failure, Type 2 Diabetes, currently has an LVAD. Orthopaedics managed the fractures as a consulting service. No blood products were required during hospitalization.

- Is this an appropriate non-surgical admission?
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;65</td>
<td>0</td>
</tr>
<tr>
<td>3 or more co-morbidities</td>
<td>1</td>
</tr>
<tr>
<td>ISS&lt;10</td>
<td>1*</td>
</tr>
<tr>
<td>MOI Ground Level Fall</td>
<td>0</td>
</tr>
<tr>
<td>NO ICU Admission</td>
<td>1</td>
</tr>
<tr>
<td>NO Need for Surgical Intervention</td>
<td>0</td>
</tr>
<tr>
<td>NO Blood Products</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL SCORE</td>
<td>3</td>
</tr>
</tbody>
</table>

- What do you do with this information?
- What Level of Review?
- Proposed action items?
Always more to the story…

• After further PI review and consultation with the cardiology service, it is noted that the trauma service was called for consultation and the PGY 4 resident covering the trauma service refused to see the patient and informed the Emergency physician to call cardiology and ortho to manage the patient…
How do I do this at my center?

1. INTEGRATE this process into the PI review of all Non-Surgical Admissions
2. INTEGRATE the scoring tool into the registry
3. Allows you to run reports for site surveys and ensure you have completed a full review of cases

Note: some centers are implementing a PROSPECTIVE process for the NELSON score
Use of the Nelson Score Key Points

- Nelson Score should be used as a TOOL to guide the performance improvement and patient safety process
- Provides an objective scoring system for discussions that can be subjective
- A “positive” Nelson Score does not always imply that a non-surgical admission is inappropriate
- Ultimately, the care provided to the patient should be the focus of the review
  - Were established evidence based clinical practice guidelines followed?
  - If there is not currently a guideline in place, do we need one?
  - What was the ultimate outcome for the patient?
  - Was there harm caused by not admitting the patient to the appropriate service?
- Action planning should consider continued monitoring of compliance to assure loop closure
- Non-Surgical Admission REVIEW is more important than Non-Surgical Admission RATE
Need For Trauma Intervention Tool (NFTI)
Undertriage

Undertriage in trauma: Does an organized trauma network capture the major trauma victim? A statewide analysis
Michael A Horst1, Shreya Jammula, Brian W Gross, Alan D Cook, Eric H Bradburn, Juliet Altenburg, Danielle Von Nieda, Madison Morgan, Frederick B Rogers
Affiliations
• PMID: 29283966
• DOI: 10.1097/TA.0000000000001781

• 255,000 cases (2003-2015)
• Despite the existence of a statewide trauma framework for over 30 years, approximately, a third of severely injured trauma patients are managed at hospitals outside of the trauma system in PA.
  • For ISS > 15, UTR was determined to be 33.6%
Effectiveness of prehospital trauma triage systems in selecting severely injured patients: Is comparative analysis possible?
Eveline A J van Rein¹, Rogier van der Sluijs², R Marijn Houwert³, Amy C Gunning³, Rob A Lichtveld³, Luke P H Leenen³, Mark van Heijl³
Affiliations
• PMID: 29395772
• DOI: 10.1016/j.ajem.2018.01.055

• 33 studies included
• In most of the evaluated trauma systems, a substantial part of the severely injured patients is not transported to the appropriate level trauma center.
Undertriage

The magic number: Are improved outcomes observed at trauma centers with undertriage rates below 5%?
Shreya Jammula, Eric H Bradburn, Brian W Gross, Alan D Cook, Michael J Reihart, Frederick B Rogers

Affiliations
• PMID: 29901541
• DOI: 10.1097/TA.0000000000002002

• 404,000+ patients, 27 trauma centers
• Achieving ACSCOT less than 5% undertriage standards appears to have limited impact on institutional mortality.
• Undertriage= ISS>15, no trauma activation
## Traditional Matrix (Cribari) Method

**Figure 2**

<table>
<thead>
<tr>
<th></th>
<th>Not Major Trauma</th>
<th>Major Trauma</th>
<th>Total</th>
<th>Overtriage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Highest Level TTA</strong></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>A/C x 100</td>
</tr>
<tr>
<td><strong>Midlevel TTA</strong></td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>Undertriage = (E+H) / (F+I) x 100</td>
</tr>
<tr>
<td><strong>No TTA</strong></td>
<td>G</td>
<td>H</td>
<td>I</td>
<td></td>
</tr>
</tbody>
</table>

Major Trauma = ISS > 15
Need for Trauma Intervention (NFTI) Method

Complete the Matrix Method as a screening tool (ISS of 15 as the “cutoff”)

Apply the NFTI Criteria

Calculate “Adjusted” Over and Under Triage Rates
NFTI Criteria

- Receiving packed red blood cells (PRBC) within the first 4 hr of arrival;
- Being discharged from the ED to the operating room (OR) within 90 min of arrival;
- Being discharged from the ED to interventional radiology (IR);
- Being discharged from the ED to the intensive care unit (ICU) and having a total ICU length of stay (LOS) of 3 or more calendar days;
- Receiving mechanical ventilation for reasons other than procedural anesthesia within the first 3 days
- Death within 60 hrs. of hospital arrival.
Matrix vs. Need for Trauma Intervention (NFTI) Method

<table>
<thead>
<tr>
<th></th>
<th>Full TTAs</th>
<th>Limited/No TTA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Matrix Method</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matrix</td>
<td>AT 35</td>
<td>OT 48</td>
</tr>
<tr>
<td>Matrix Over Triage</td>
<td>58%</td>
<td></td>
</tr>
<tr>
<td><strong>NFTI Method</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NFTI</td>
<td>POS 7</td>
<td>NEG 41</td>
</tr>
<tr>
<td>NFTI Over Triage</td>
<td>49%</td>
<td></td>
</tr>
</tbody>
</table>

|               | AT 437    | UT 59         |
| Matrix        |           |                |
| Matrix Under Triage | 11.8%   |                |

|               | POS 25    | NEG 34        |
| NFTI          |           |                |
| NFTI Under Triage |         | 5%            |
### Retrospective NFTI Triage Review

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Under Triage</th>
<th>Over Triage</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY19Q3</td>
<td>5%</td>
<td>47%</td>
</tr>
<tr>
<td>FY19Q4</td>
<td>3%</td>
<td>36%</td>
</tr>
<tr>
<td>FY20Q1</td>
<td>5%</td>
<td>39%</td>
</tr>
<tr>
<td>FY20Q2</td>
<td>5%</td>
<td>49%</td>
</tr>
<tr>
<td>FY20Q3</td>
<td>5%</td>
<td>43%</td>
</tr>
</tbody>
</table>

- Over Triage
- Under Triage

Source: uchealth
Triage Compliance

- Average 98% Compliance with triage protocol
- Goal = >95%
How do I do this at my center?

1. CREATE A REPORT with variables that would be associated with undertriage
   - Use Matrix (Cribari) to identify those patients who are “at risk” for under and over triage
2. Review for + or – NFTI
3. Determine your “adjusted” under and over triage rates based upon NFTI

Report variables: Name, MRN, ISS, Hospital Arrival Date, Trauma Team Level, Hospital Specific Triage Criteria that was met, Trauma Type (Blunt/ Penetrating), ED Disposition, ED LOS (Time in ED), Patient Flow (patient flow through hospital stay), First ICU LOS, Total ICU Days, Blood Products (first 4 hours), Whole Blood (first 4 hours), Blood Products (first 24 hours), Whole Blood (first 24 hours), Hospital, Procedures (filter for “intubation), Intubation Date/ Time. Hospital Discharge Date, Outcome (Dead/ Alive), Time to Death, Admit Service
Use of the NFTI Tool Key Points

• NFTI should be used as a TOOL to guide the performance improvement and patient safety process
• Provides a more detailed analysis of POTENTIAL over and under-triage
• A “positive” NFTI does not always imply that triage is inappropriate
• Ultimately, the care provided to the patient should be the focus of the review
  • Were established evidence based clinical practice guidelines followed?
  • If What was the ultimate outcome for the patient?
  • Was there harm caused by not triaging the patient appropriately?
• Action planning should consider continued monitoring of compliance to assure loop closure
• Triage REVIEW is more important than RATES
Thank you!!!!

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(402) 213-8823
References