Clinical Safety & Effectiveness
Cohort # 13

Preventing Missed Fractures in Intubated Trauma Patients at UHS

CENTER FOR PATIENT SAFETY & HEALTH POLICY
UT Health Science Center
SAN ANTONIO
Educating for Quality Improvement & Patient Safety
The Team

* **Division**
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  * Florence Wall – BS, MS,PA-C; Dept. of Orthopaedics, UTHSCSA
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  * Hope Nora – CS&E Team Facilitator

* **Sponsor Department**
  * John Toohey, MD – Associate Professor; Dept. of Orthopaedics, UTHSCSA
The Team!
What Are We Trying to Accomplish?

OUR AIM STATEMENT

To improve initial assessment of intubated trauma patients with orthopedic consultation so that 100% of orthopedic diagnoses at 48 hours are the same as final diagnoses at discharge by January 7, 2014
Project Milestones

- Team Created 9/2013
- AIM statement created 9/2013
- Twice a Month Team Meetings 9/9 – present
- Background Data, Brainstorm Sessions, Workflow and Fishbone Analyses 9/9 – 10/7/13
- Interventions Implemented 10/23 – present
- Data Analysis 9/2013 – 1/2014
- CS&E Presentation 1/17/14
Why Do We Want to Do This?

38yo M s/p bicycle versus car

- GCS 5 on scene, intubated
- SDH, SAH, facial fractures
- L radius fracture, R scapula fracture
- Tracheostomy on HD 9
- ORIF on HD 14
Why Do We Want to Do This?

- Discharge to rehab anticipated for HD 21
- XRs of both wrists HD 20
- R radius fx missed
- ORIF on HD 21
- Subsequently discharged to rehab on HD 28
Plan: How Did We Approach Problem?

- Compile multidisciplinary team of experts
- Perform literature analysis
- Flowchart trauma assessment process
- Create cause effect diagram
- Chart review to assess current missed fracture rate
- Utilize IT resources
- Analyze and maximize current clinical technology, particularly CT scanner
Overlooked/missed injuries and delayed diagnoses are common problems in polytrauma patients.

Undiagnosed musculoskeletal injuries can lead to unsatisfactory fracture healing or malalignment (Buduhan G. et. al.).

Head injuries & GCS of 8 or lower more likely to have missed injuries/delayed diagnoses (Pfeifer R, et. al.).
Diagnosing injuries improves with better patient communication (Houshian S., et. al.)

Reported incidence of 6%-38% for all injuries, depending on definition and type of missed injury

True incidence difficult to determine due to use of retrospective studies (Houshian S, et. al.)

Prospective studies show higher incidence compared with retrospective (Enderson et. al.)
What Does the Literature Say?

Types of missed injuries

- Buduhan et al showed an 8.1% missed injury rate
- 54% of those were musculoskeletal
- 49% were fractures
- Limbs/extremities most common fracture sites
What Does the Literature Say?

Anatomic sites of missed injuries

- 33% missed injuries involve limbs
- 25% of those are fractures
- Buduhan G, et.al.
Where should we intervene?

1. Person is Injured
   - EMS assesses patient
     - EMS does not intubate
     - EMS/GE assesses for type of service needed
   - EMS intubates

2. Trauma
   - ABC Exam/May decide to intubate
     - Chest X-ray and labs
     - Initial CAT scan with scout/surview (not a diagnostic image)
     - Trauma reassesses and decides on consults needed
       - OR to stabilize
       - Not intubated
       - Intubated
Where should we intervene?
Multiple Injuries

Location of Fracture

Limited Exams

Delay of X-rays

Radiation Exposure
What Does Our Pre-Intervention Data Show?

* 9 month period prior to planned intervention

* Incidence:
  * 210 intubated patients evaluated by ortho from 1/1/13 to 9/30/13
  * 8 missed injuries identified in 210 patients
  * Incidence is 3.8% during this time period
  * Shortest time between misses: 3 days; longest: 91 days

* Incidence in our population likely higher than literature due to exclusive look at intubated trauma patients versus all trauma patients
What Does Our Pre-Intervention Data Show?

Pre-Intervention Data: Ortho Missed Fractures

Days between Events

Baseline: January thru September 2013

Days between Events


21  24  4  91  3  14  5

23.14
What Are We Going To Do?

* Factors listed as causes of missed injuries from literature:
  * clinical error in patient assessment
  * misinterpretation of the radiologic findings
  * lack of appropriate radiographic studies (Pfeifer et. al)
* We chose to focus on improving initial radiographic survey to decrease missed orthopedic injuries
* A scout image is a preliminary scan taken of a body region before a definitive imaging study and serves to establish a baseline
* We hope to use the scout to improve initial radiographic assessment of intubated trauma patients
Do: How Do We Make This Happen?

* Modify current protocol for CT scanning intubated trauma patients
  * Reposition arms across abdomen during CT scout acquisition
    * Every patient is unique; different techniques employed to assure as much of the body is within the scan field of view
  
* Contact those who would be affected by this change in protocol
  * Body radiologists, CT technologists & supervisor, trauma surgery team, orthopedic trauma team

* Signage added to CT scanner room to remind technologists of protocol and reason of importance
Do: How Do We Make This Happen?

- Project presented to Radiology Department Clinical Management Team
- Analyze rate of intervention implementation
- Collect anecdotal information about barriers to implementation
- Repeat data analysis of post-intervention period
Study: How Will We Know That a Change is an Improvement?

- Measuring the effect of the intervention was difficult because of the low event incidence
  - Proving the negative
  - Who would benefit from our intervention?
    - # of patients where intervention could be applied/total of patients in population
- Compile data from Sunrise for based on ortho consult with ventilator use
- Identified dates of orthopedic diagnoses to compare diagnoses at 48 hours and discharge
- Calculate rate of implementation in eligible patients
Post-Intervention Data

Post Intervention Data: Ortho Missed Fractures

Days between Events

Days between Events

Post Intervention: Oct thru December 2013
### Post-Intervention Data

**Implementation Rate:**

<table>
<thead>
<tr>
<th>Month</th>
<th>Attempted</th>
<th>Successful</th>
</tr>
</thead>
<tbody>
<tr>
<td>October</td>
<td>5/17</td>
<td>2/17</td>
</tr>
<tr>
<td>November</td>
<td>5/16</td>
<td>3/16</td>
</tr>
<tr>
<td>December</td>
<td>4/7</td>
<td>0/7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>14/40</td>
<td>5/40</td>
</tr>
</tbody>
</table>

2 patients in pre-intervention and 0 in intervention period had upper extremity injuries that could be identified with position change.
Return on Investment

- Difficult to establish ROI for this project
- Value related to improved quality of care and decreased malfeasance by delayed care
- Extrapolation of Trigger case
  - Extra surgery & hospitalization: 4/10-17/13
  
- $29,350
- Minimal investment involved with project
- Not a ‘Cure All’ but effective addition to the initial assessment process
Act: Expansion of Our Implementation

- Address the limitations to implementation
  - Improve ‘buy-in’ with trauma, orthopedic, radiology and CT teams
  - Re-think methods of positioning to optimize image versus body habitus limitations
- Closer monitoring of intervention implementation going forward
- Continue data collection to assess impact with analysis of missed injury type/location
- Increase length of scout run to maximize lower extremity surveillance
- Positioning part of training of CT technicians
Travis Haynes – Director of Coding & Reimbursement, UHS
Rachel Lyons – Coding Associate, UHS
For their crucial assistance in both brain power and grunt work to give us the data that we needed when we needed it!


Thank you!