Clinical Safety & Effectiveness
Cohort # 18

Managing Cast Saw Safety within a busy Orthopaedic Surgical Practice

CENTER FOR PATIENT SAFETY & HEALTH POLICY
UT Health Science Center
SAN ANTONIO
The Team

Department of Orthopaedics

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The aim of this project is to improve cast saw maintenance through the creation of a protocol and create a safety log to monitor injuries by May 2016.
## Project Milestones

<table>
<thead>
<tr>
<th>Element</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team Established</td>
<td>January 2016</td>
</tr>
<tr>
<td>AIM Statement created/finalized</td>
<td>February 2016</td>
</tr>
<tr>
<td>Brainstorm Sessions, Workflow and Fishbone Analyses</td>
<td>March 2016</td>
</tr>
<tr>
<td>Clinic Surveyed</td>
<td>March – April 2016</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>April 2016</td>
</tr>
<tr>
<td>Intervention Implementation</td>
<td>April – May 2016</td>
</tr>
<tr>
<td>CS&amp;E Final Presentation</td>
<td>May 2016</td>
</tr>
</tbody>
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Background

• Oscillating saws are used to cut hard cast material while avoiding skin that is typically protected by padding beneath.
• In theory, there should never be an injury associated with cast removal; however, cast saw utilization by inexperienced residents and high volume medical clinic settings provide the opportunity for patient injury (e.g., burns or abrasions).
• Best estimate of cast saw injury is 7.2 per 1000 (Shore, 2014).
• Whether compensation sought by patients following cast saw injuries, malpractice claims or higher costs to insurers, the potential costs warrant improved safety practices.
• Challenged by a lack of data documented in the EMR, this project has focused on quantifying baseline cast saw injury rates within both Outpatient Orthopaedic Clinics (MARC and UHS Trauma).
Flow Chart A
Before Intervention

Cast Saw Use Workflow
UTHSCSA Department of Orthopaedics, MARC Clinic

1. patient arrives and checks in at front desk
2. was patient? (Yes/No)
   - Yes: provider consulted prior to existing cast removal
   - No: techs look up last note and determine plan for cast

3. does cast need to be removed? (Yes/No)
   - Yes: retrieve closest cast saw and inspect for dullness
   - No: provider proceeds with evaluation and treatment

4. did the saw cause a burn? (Yes/No)
   - Yes: alert provider
   - No: continue with appropriate treatment and documentation

5. did blade cutting smoothly? (Yes/No)
   - Yes: proceed with cut
   - No: change blade

6. is blade cutting smoothly? (Yes/No)
   - Yes: flip blade
   - No: replace blade

LEGEND
- Patient process
- Equipment
- Role of provider
Rationale for Survey

• Cast placement and removal are collapsed into a single CPT, making it impossible to specifically identify how many casts are removed within any given time period
• Cast saw technicians primarily place and remove all casts in the outpatient setting; often the first to note injury to patient
• Casts are placed and/or valved in the Emergency Department (done by Residents), which represents an additional clinical location from which injuries stem
• Multiple cast placements can occur in order to achieve clinical resolution* (see chart)
• No recently updated protocol available for cast saw safety maintenance (should include blade change recommendations and identify responsible person managing saw servicing reports)
• Limited training for PGY1 Residents:
  – Splinting and casting lectures (Drs. Faust and Wilkins)
  – 4 hours hands-on training in both ER and Outpatient Clinic settings
• Use of both plaster and fiberglass in casts placed yet each material responds differently to cast saw at the point of cut for removal (i.e., heat transfer difference)
Number of Times Cast Placed Before Final Removal

N = 195

Mar 14 - Apr 19, 2016
PLAN: Decision Making Tools

- **Blade dullness = Culprit**
- Implemented our Intervention
- **NO system to report/tract burns**
- Why these burns were happening?
- Our Data revealed very low frequency: <1.0% (N =2)
- **Survey**: most effective way to measure frequency
- Injury prone casts placed and/or valved in ED & OR are subsequently removed in outpatient clinic
- Discovered that **NO SINGLE CPT** code for Cast Removal. It is included in the fracture CPT code
- Planned to pull records and abstract data from medical chart
- What is frequency of Cast Saw Injury?

Decided to measure frequency of blade changes to improve this issue
DO: Pre-intervention Survey

Today’s DATE
__________________________________

1. Did you change the cast saw blade today?
   o Yes
   o No

2. If the blade was NOT changed today, do you know when it
   was changed?
   o Yes
   o No

3. If you know when the blade was last changed, please provide
   a date:
   ____________________________

Patient Information - Cast Removal

4. Date of Birth
   ____________________________

5. Gender
   o Male
   o Female

6. What is the clinic location where the patient’s cast was
   removed?
   o MARC
   o Trauma/UHS

7. Prior to removing the cast, was it valved?
   o Yes
   o No

8. Were there any complications associated with removing the
   patient’s cast?
   o Yes
   o No

9. If there were complications were observed, please select
   from the options below that describe the type of
   complication(s) noted:
   o Cut
   o Abrasion
   o Burn
   o Other
   Other complication (please describe):
   ____________________________

10. Was the complication due to cast saw use?
    o No
    o Yes

11. Please indicate by number how many times the patient
    required a cast be placed for this injury? (provide the number of
    casts patient had for complete resolution)
    o One
    o Twice
    o Three times
    o Four times
DO: Pre-Interventional Survey Results

- Data represents 1 month survey period 3/15/16 - 4/15/16
- Trauma clinic patients were adults; splits used preferentially to casts
- Injuries at the MARC were among children under 18 and elderly person over 65 years of age
- Compared to injury frequency documented in paper by Shore et al (11.5 per 1000), rate calculated from above data is 22 per 1000 (double the only documented rate)
- Considering multiple casts placed for individual patient clinical resolution, rate of injuries changes to 15 per 1000 (closer to Shore et al)

<table>
<thead>
<tr>
<th>Clinic</th>
<th># Patients Surveyed</th>
<th># Cast Saw Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trauma</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>MARC</td>
<td>121</td>
<td>3</td>
</tr>
</tbody>
</table>
DO: Intervention

Identified gaps:

1. No standardization of cast saw maintenance
   - Intervention: create logbook for each cast saw where techs record date that blades are flipped or changed
     • Creating this logbook helps everyone have the same information

2. No formal process for reporting and tracking cast saw burns
   - Intervention: designate one person as the cast saw burn tracker, have all providers send MRNs of patients with cast saw burns via secure email to this person for chart review
     • One person collecting MRNs of patients with cast saw burns allows the department to quantify injuries due to burns; a thorough chart review as follow up allows for identification of the contributory factors
Flow Chart B
After Intervention
DO: Implementing the Change

• **Log book for cast saw blade changes and flips***
  – Important to make all cast techs aware of the log book
  – Must be readily accessible and easy to use

• **Standardized process for reporting cast saw burns**
  – Must designate a faculty member committed to compiling and maintaining the list of patients and doing chart reviews (Champion)
  – Consider that there may be some resistance to reporting the burns, for fear of scrutiny and punishment
  – Email to be sent to trauma and MARC faculty and residents informing them of new process

• These interventions represent the first steps in improving cast saw safety.
• The log book provides standardization to a highly subjective process, thereby promoting consistency.
• Instituting reporting system for cast saw burns facilitates data collection on a low frequency problem that should be a “NEVER-event” and provides the basis for targeted improvement plans (re: teaching curriculum and staff accountability for technique/saw maintenance).
Process of implementation for saw blade log book:

- Met with 4 cast saw techs on two separate occasions to discuss:
  - Development of the log,
  - Feasibility of regular management
  - Necessity to number each cast saws,
  - Location of log for access by the entire department (esp. cast saw techs)

- Notified Clinic Manager of log book implementation
- Plans to present this presentation to the Department
- Designated a number to each cast saw, placed a visible number on each
DO: Implementing the Change

Cast saw blade log

Please check either flipped or changed, mark the date, and initial

<table>
<thead>
<tr>
<th>Cast saw #1</th>
<th>Cast saw #2</th>
<th>Cast saw #3</th>
<th>Cast saw #4</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>flipped</td>
<td>changed</td>
<td>date</td>
<td>flipped</td>
<td>changed</td>
</tr>
</tbody>
</table>
DO: Implementing the Change

• Process of implementation for formal reporting protocol:
  – Generated an email addressed to:
    • Residents
    • Pediatric Faculty
    • Trauma Faculty
  – Goal of communication:
    • State the goals of this QI project
    • Provide official notification of new reporting protocol (*highlighting the lack of systematic management and maintenance of cast saws in use at both the MARC and Trauma clinics*)
Results of Intervention

• **Cast saw blade log book:**
  – **Expectation:** given recorded frequency of blade changes in survey, expect at least one entry
  – **Reality:** One blade change recorded for one saw

• **Cast saw burn reporting protocol:**
  – **Expectation:** given infrequent incidence of burns, may or may not receive email communication (*i.e.*, *because there were no burns*)
  – **Reality:** Received no email reports of cast saw burns
CHECK: Results/Impact

• N= 0 Injuries (during Interventional Period of 1 month)

• Preferred approach:
  – Survey for baseline data (Phase 1) ✓
  – Implement QI process improvement (Phase 2) ✓
  – Re-check measurements of QI process (Phase 3) ✗
  – Analyze data (Phase 4) ✓

• Study intended to quantify cast saw injuries, however data were more revealing of efforts to improve residency program training

• Arbitrary method for cast saw blade replacement rather than systematic

• Cast saw blade log will address the saw maintenance issues along with systematic recommendation to use for no longer than 1 month

• Chief Resident will be responsible for reviewing injury cases on a quarterly basis
1. **Cast saw blade log book**
   - Lack of buy in from clinical staff
     - Perceived unimportance of keeping a log
     - Too busy
     - Didn’t remember to record the data
     - No reinforcement
     - Clinic managers have had limited involvement in current cast saw maintenance practices

2. **Standardized reporting protocol**
   - Lack of buy in from faculty and residents
     - No experienced faculty involved in project
     - Already inundated with e-mail, new information, new processes
     - Perceived unimportance
     - Hesitancy to report/fear of repercussions

3. **Systematic Change to Residency Training**
   - Complaint that current training is adequate; so many other training goals
Return on Investment

• **Improved Patient Safety**
  – #1 Priority
  – Injury of this type should be classified as “NEVER-EVENT” because 100% preventable

• **Reputation and Residency Education**
  – Injured patients share experiences, reducing public impression of UTHSCSA affiliated institutions
  – Residents should be able to demonstrate confidence in technique

• **Money**
  – Reduce incidence of litigation; estimated costs for closed fracture management cost approximate $100,000 per case (Halanski, 2008)
  – Hospital savings given the current costs per injured patient estimated $15,898 USD
ACT: Sustaining the Results

- Continue saw blade log book at the MARC; establish similar log for implementation at Trauma clinic
- Institute mandatory Cast Saw Safety Training for all Residents and clinical staff using cast saws
  - Improving education and training in cast saw use has shown to decrease the prevalence of cast saw injuries.
  - Team Based Approach
- Elicit support of senior faculty and present new protocol at faculty and resident meetings
- Implement chart review and root cause analysis on any reported burns
  - Case-specific education sessions for involved individuals
- Project confirmed cast saw burns as a problem at this institution and laid the groundwork for future QI endeavors targeting cast saw safety education and reinforcement of the new reporting protocol
Team Picture
Thank you!

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