Musculoskeletal Joint Injection Order Improvement

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BACKGROUND

• Fluoroscopic image guided therapeutic joint injections are performed daily by musculoskeletal radiologists at our institution

• Injection sites range from large joints, such as the hip and shoulder, to smaller joints such as the hands, ankle, and feet

• Procedure related risks include infection, bleeding, and contrast allergy
62 year-old man was referred for therapeutic fluoroscopic guided injection of the right ankle

- Patient consented to procedure
- Attending and fellow radiologist injected the right tibiotalar joint
- Patient experienced immediate pain relief
Referring surgeon contacted attending radiologist 1 day later stating the intended injection site was the subtalar joint, not the tibiotalar joint.

Patient returns for subtalar joint injection.

Patient experiences pain relief with no complication.

**INCIDENT CASE (continued)**

**PROBLEM IDENTIFIED: UNCLEAR SITE**

When performing the procedure, the radiologists assumed that ankle referred to “tibiotalar” joint.

However, “ankle” could also represent subtalar, calcaneocuboid, or talonavicular joint.
Electronic order in the medical record system consisted of a generic selection of:

- Hip
- Shoulder
- Ankle
- Knee
- Elbow
- Foot

**INCIDENT CASE – FURTHER INVESTIGATION**

**PROBLEM IDENTIFIED: UNCLEAR SITE**

- Similar problems exist with the generic terms “shoulder” and “hip”
  - Hip could represent:
    - Femoroacetabular joint
    - Greater trochanteric bursa
    - Iliopsoas bursa
  - Shoulder could represent:
    - Glenohumeral joint
    - Acromioclavicular joint
    - Subacromial-subdeltoid bursa
    - Biceps tendon sheath
EXISTING WORK AROUND

• For clarification, the radiologist
  – Could review the medical record notes to
determine exact site of intended injection
  – Could telephone/page the referring provider to
confirm intended injection site

• Occasionally the provider cannot be reached and the
radiologist either assumes site or cancels injection

QUALITY ISSUES IDENTIFIED

• Work around of looking through EMR or calling
referring provider is time consuming and inefficient
for the radiologist
• The process delays patient through-put
• Potential patient cancellations
• Possible wrong site injections
  – Injections have minor patient safety risks of
infection, bleeding, and contrast reaction
1. Determine the percentage of unclear orders by site and provider over the past quarter
2. Determine the number of wrong site injections over the past quarter
3. If a problem exists, develop a solution of electronic order workflow/orders
4. Implement the new workflow/orders
5. Post implementation, reevaluate percentage of unclear orders and number of wrong site injections

Purpose of Quality Project

• List of accession numbers from the past 200 fluoroscopic guided joint injections was obtained from the radiology information system (RIS)
• All cases reviewed to determine:
  1. Joint and body side requested
  2. Vagueness of request – did it state shoulder or glenohumeral joint
  3. Actual site and body side injected
  4. Any incorrect sites or body sides injected
  5. Referring provider
23% (46/200) of joint requests were vague
– 14/100 small joint (ankle, foot, elbow, or wrist)
– 32/100 large joint (hip, knee, or shoulder)

Vagueness included:
“ankle” for talonavicular, subtalar, or tibiotalar joint
“foot” for tarsometatarsal, talonavicular or navicular-cuneiform joint
“tarsometatarsal” without specifying which tarsometatarsal joint(s)

PREASSESSMENT RESULTS

<table>
<thead>
<tr>
<th>Joint</th>
<th># Vague Requests</th>
<th>Total # Requests</th>
<th>% Vague Requests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ankle</td>
<td>9</td>
<td>57</td>
<td>15.8%</td>
</tr>
<tr>
<td>Elbow</td>
<td>0</td>
<td>6</td>
<td>0%</td>
</tr>
<tr>
<td>Foot</td>
<td>5</td>
<td>28</td>
<td>17.9%</td>
</tr>
<tr>
<td>Wrist</td>
<td>0</td>
<td>9</td>
<td>0%</td>
</tr>
</tbody>
</table>

PREASSESSMENT RESULTS – SMALL JOINTS
PREASSESSMENT RESULTS – LARGE JOINTS

<table>
<thead>
<tr>
<th>Joint #</th>
<th>Vague Requests</th>
<th>Total # Requests</th>
<th>% Vague Requests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip</td>
<td>26</td>
<td>46</td>
<td>56.5%</td>
</tr>
<tr>
<td>Knee</td>
<td>0</td>
<td>6</td>
<td>0%</td>
</tr>
<tr>
<td>Shoulder</td>
<td>6</td>
<td>48</td>
<td>12.5%</td>
</tr>
</tbody>
</table>

Vagueness included:
“hip” for hip joint or trochanteric bursa
“intraarticular” for glenohumeral joint or hip joint
“shoulder” for glenohumeral or acromioclavicular joint or subacromial-subdeltoid bursa

PREASSESSMENT RESULTS – PROVIDERS

50% (24/48) providers sent vague orders

<table>
<thead>
<tr>
<th>Ordering Provider</th>
<th>Vague Requests</th>
<th>Total Requests</th>
<th>Percent Vague Requests</th>
</tr>
</thead>
<tbody>
<tr>
<td>UA</td>
<td>3</td>
<td>14</td>
<td>21.4%</td>
</tr>
<tr>
<td>CB</td>
<td>2</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>JC</td>
<td>1</td>
<td>2</td>
<td>50%</td>
</tr>
<tr>
<td>CC</td>
<td>1</td>
<td>2</td>
<td>50%</td>
</tr>
<tr>
<td>NF</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>JH</td>
<td>1</td>
<td>14</td>
<td>7.14%</td>
</tr>
<tr>
<td>HM</td>
<td>3</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>MS</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>EW</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>RG</td>
<td>1</td>
<td>5</td>
<td>20%</td>
</tr>
<tr>
<td>BJ</td>
<td>1</td>
<td>2</td>
<td>50%</td>
</tr>
<tr>
<td>TM</td>
<td>4</td>
<td>8</td>
<td>50%</td>
</tr>
<tr>
<td>TM</td>
<td>1</td>
<td>2</td>
<td>50%</td>
</tr>
<tr>
<td>BD</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>CD</td>
<td>7</td>
<td>7</td>
<td>100%</td>
</tr>
<tr>
<td>FN</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>GR</td>
<td>7</td>
<td>7</td>
<td>100%</td>
</tr>
<tr>
<td>KNF</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>WT</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>MEX</td>
<td>3</td>
<td>9</td>
<td>33.33%</td>
</tr>
<tr>
<td>TW</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>DC</td>
<td>1</td>
<td>7</td>
<td>14.29%</td>
</tr>
<tr>
<td>RB</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table shows providers with vague requests and percentage of their requests which were graded as vague.
PREASSESSMENT RESULTS

• 2 of 200 wrong site injections
  • 1 tibiotalar joint instead of subtalar joint
  • 1 hip joint instead of trochanteric bursa
  • No left/right errors
  • No complications of the 2 wrong site injections

PREASSESSMENT CONCLUSIONS

1. It is a SYSTEM Problem:
   • Order vagueness is not limited to one specific joint
   • Order vagueness is not limited to a few select providers

2. 23% vagueness is not acceptable
   • Inefficient for physicians and patients and technologists

3. Having 2 wrong site injections in only 3 months is a major quality and safety risk issue
• Generic injection sites of hip, foot, ankle, and shoulder were removed from electronic order system
• A dropdown menu was created for more specific site location
  – Shoulder: glenohumeral joint, AC joint, subacromial-subdeltoide bursa, subscapularis bursa
  – Ankle: tibiotalar, subtalar, talonavicular, other
  – Hip: hip Joint, trochanteric bursa, iliopsoas bursa
  – Foot: metatarsophalangeal, navicular-cuneiform, calcaneocuboid, intercuneiform, other

NEW ORDER IN EMR – SITE SPECIFIC
NEW ORDER IN EMR – LATERALITY

COMMUNICATION

Screenshot of tips and tricks that was sent to referring providers regarding the ordering methodology change.
NEW ORDER REQUISITION

Image shows the new order requisition that is scanned into the PACS system for viewing by the radiologist and schedulers with more specific body site listed (arrow)

POST-INTERVENTION METHODS

• List of 200 accession numbers of fluoroscopic guided joint injections performed 3 months after the intervention was obtained from the radiology information system (RIS)

• All cases reviewed to determine:
  1. Joint and body side requested
  2. Vagueness of request – i.e. did it state shoulder or glenohumeral joint
  3. Actual site and body side injected
  4. Any incorrect sites or body sides injected
POST-INTERVENTION RESULTS

- 1% (2/200) requests were rated as vague
  - Unclear which tarsometatarsal joint
- No wrong-site or wrong-side injections were found
- No negative feedback from referring providers on the new order drop-down menu

ORDER VAGUENESS
PRE- AND POST INTERVENTION

Control Chart shows pre and post order change request vagueness outcomes by month
OTHER INTERVENTION

- A PowerPoint presentation reiterating the importance of time-out procedures was created by the attending radiologist in the incident case
- All radiologists were required to read it and answer associated questions
- Time out procedure importance stressed to technologists in all procedure rooms

CONCLUSION

- Simple informatics change improved both patient safety and quality of care
- Workflow efficiency improved
- Fewer patient cancellations
CONCLUSION

- The change should be applied to all joint related procedures, including aspirations and ultrasound guided procedures
- Only risk is the referring provider selects the wrong drop-down in the EMR