

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

INCIDENT CASE

62 year-old man was referred for therapeutic fluoroscopic guided injection of the right ankle

Order: Joint Injection XR Request	
Dx: 1 --715.97 --Osteoarthritis of right ankle	
History / Findings Pertinent to Exam:	pain, osteoarthritis
Specify:	Right
Body Site:	ankle
Exam Priority:	Routine
Report Priority:	Routine Report
Requires Sedation by Radiology:	No
Height:	178 cm
Weight:	102.9 kg
Requested Timeframe:	First Available
Performing Location:	Penn State Hershey Radiology
Allergies: "Mycin" group, erythromycin	
Images obtained at one of Penn State Hershey's facilities are interpreted by Specialist Radiologists and are promptly available to your physician.	
To schedule, cancel or reschedule a Myelogram, Injection or Lumbar Puncture appointment with Penn State Hershey Radiology, call 717-531-1049 or fax 717-531-0607.	

Figure: Order requisition sent for injection and scanned into PACS for radiologist

INCIDENT CASE

- Patient consented to procedure
- Attending and fellow radiologist injected the right tibiotalar joint
- Patient experienced immediate pain relief



Figure: AP Fluoroscopic image confirms tibiotalar joint injection

INCIDENT CASE (continued)

- 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

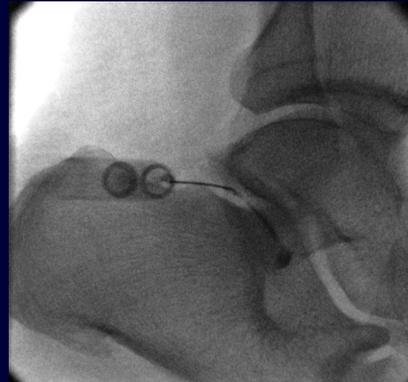


Figure A. Subtalar joint injection

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

INCIDENT CASE – FURTHER INVESTIGATION

Electronic order in the medical record system consisted of a generic selection of:

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

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

PURPOSE OF QUALITY PROJECT

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

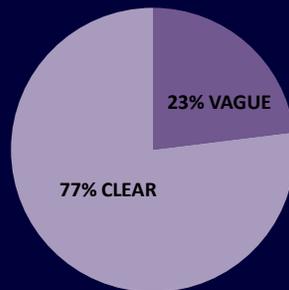
PREASSESSMENT METHODS

- 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

PREASSESSMENT RESULTS

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)



PREASSESSMENT RESULTS – SMALL JOINTS

Joint	# Vague Requests	Total # Requests	% Vague Requests
Ankle	9	57	15.8%
Elbow	0	6	0%
Foot	5	28	17.9%
Wrist	0	9	0%

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 – LARGE JOINTS

Joint	# Vague Requests	Total # Requests	% Vague Requests
Hip	26	46	56.5%
Knee	0	6	0%
Shoulder	6	48	12.5%

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

Ordering Provider	Vague Requests	Total Requests	Percent Vague Requests
UA	3	14	21.43%
CB	2	2	100%
JC	1	2	50%
CC	1	2	50%
NF	1	1	100%
JH	1	34	2.94%
MH	1	1	100%
HM	3	3	100%
MS	1	1	100%
EW	1	1	100%
RG	1	5	20%
BJ	1	2	50%
TM	4	8	50%
TM	1	2	50%
BO	1	1	100%
CD	7	7	100%
FN	1	1	100%
GR	7	7	100%
KM	1	1	100%
WT	1	1	100%
MK	3	9	33.30%
TW	1	1	100%
DC	1	7	14.30%
RB	1	1	100%

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**

INTERVENTION

- 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-subdeltoid 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

The screenshot displays an EMR interface for a 'Joint Injection XR' order. The order is for a STAT exam on 10/12/2015 at 08:20. The 'Body Site' dropdown menu is open, showing a list of specific injection sites: Navicular cuneiform - specify in sp instr, Other - specify in special instructions, Radiocarpal, Sternoacromial, Subacromial subdeltoid bursa, Subscapularis bursa, Subtalar, Talonavicular, Tarsometatarsal - specify in sp instr, Temporomandibular (TMJ), Tibiotalar, and Trigger point - specify in special instr. A yellow arrow points to this dropdown menu. Other fields include Exam Priority (STAT), Requested Date of Exam (10/12/2015 08:20), and various clinical details like weight (55 kg) and isolation precautions (Contact).

Order Name	Status	Start	Details
EMER 005#06725322	Admit: 08/15/2010 08:54:07 EDT		

Diagnostic Tests	Order	10/12/2015 08:20	STAT, Requested Dt: 10/12/2015 08:20
Joint Injection XR			

Details for Joint Injection XR

Exam Priority: STAT *Requested Date of Exa... 10/12/2015 0820 *Specify: [dropdown]

*Body Site: [dropdown menu open]

Special Instructions: [text box]

*Signs Symptoms: [dropdown]

Report Priority: Stat Report

Require Nurse Accompany: Yes No

Weight: 55 kg

Isolation Precautions: Contact

4 Missing Required Details Dx Table Sign

PROD: JTHOMASS October 12, 2015 08:21

NEW ORDER IN EMR – LATERALITY

Search: [Home] [Advanced Options] Type: Inpatient

Diagnoses for Signature

EMER: 005#-06725322 Admit: 08/15/2010 08:54:07 EDT

Diagnostic Tests

Joint Injection XR Order 10/12/2015 08:20 STAT, Requested Dt: 10/12/2015 08:20

Details for Joint Injection XR

Exam Priority: STAT *Requested Date of Exa... 10/12/2015 *Specify: [Bilateral, Left, Right]

*Body Site: [] Special Instructions: [] Symptoms: [Bilateral, Left, Right]

*History / Findings Pertin... [] Report Priority: []

Contact Name/Phone/Beep... [] Copy to: [] Require Nurse Accompany: []

Require Sedation by Radiology: [] Yes [] No Mode of Transport: [Bariatric Bed, Bariatric Wheelchair] Weight: []

Height: [] O2 Therapy: [Room air] Isolation Precautions: [Contact]

IRB#: [] Radiology Information: []

4 Missing Required Details [Dx Table] [Sign]

PROD: JTHOMASS October 12, 2015 08:21

COMMUNICATION

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

Changes to Joint Injection XR and Joint Aspiration XR order.

The Body site field in these orders has been changed from a free text to a drop down list. The option of 'Other' does exist and multiple joints can be selected. Some joints instruct the clinician to list the specific joint in the "Special Instructions" field.

Details for Joint Injection XR Request

Exam Priority: Routine *Specify: [] *Requested Timeframe: [] *Body Site: []

*History / Findings Pertinent to Exam: [] Report Priority: Routine Report Contact Name/Phone/Beep: []

Requires Sedation by Radiology: [] Yes [] No Copy to: []

Height: [] *Performing Location: [Penn State Hershey Radiology] Weight: []

Special Instructions: [] IRB#: [] Radiology Information: []

If this order is saved as a favorite you will need to delete the favorite and resave it with the Body Site field completed.

- Acromioclavicular
- Biceps tendon sheath
- Calcaneocuboid
- Carpal - specify in special instructions
- Carpometacarpal - specify in sp instr
- Distal radioulnar
- Elbow
- Glennohumeral
- Greater trochanteric bursa

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)

Order: Joint Injection XR Request
Dx: 1 -M12.811 -Other specific arthropathies, not elsewhere classified, right shoulder

Body Site:	Glenohumeral ←
Dx Code:	Rotator cuff tear arthropathy of both shoulders
History / Findings Pertinent to Exam:	Shoulder pain
Specify:	Bilateral
Exam Priority:	Routine
Report Priority:	Routine Report
Requires Sedation by Radiology:	No
Height:	152.40 cm
Weight:	56.25 kg
Requested Timeframe:	First Available
Performing Location:	Penn State Hershey Radiology
Special Instructions:	cuff tear arthropathy

Allergies: NKA
Images obtained at one of Penn State Hershey's facilities are interpreted by Specialist Radiologists and are promptly available to your physician.
To schedule, cancel or reschedule a Myelogram, Injection or Lumbar Puncture appointment with Penn State Hershey Radiology, call 717-531-1049 or fax 717-531-0607.

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