

FROM THE SCANNER TO THE READING ROOM:

A NOVEL SYSTEM THAT AUTO-POPULATES
ACCURATE MUSCULOSKELETAL RADIOGRAPHIC
VIEWS IN REPORT TEMPLATES

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INTRODUCTION

- Musculoskeletal (MSK) radiologists face **large volumes** of radiographic studies, with each study featuring a **wide range** of possible techniques/views
- **Improper or incomplete** documentation of obtained MSK radiographic views obtained is not uncommon, and can lead to:
 - **Confusion** – Inaccurate reports can cause confusion for ordering providers, patients, and others accessing the reports
 - **Insufficient Reimbursement** – Medical billing coders use radiology reports to generate reimbursement claims
 - **Reduced Efficiency** – Manually entering the views acquired for each study can increase radiologist fatigue and time spent per study

- **Accurate** reporting of MSK radiographic views can improve clarity, reimbursement, and workflow efficiency

Aim:

- To develop and implement a **software design** within the electronic medical records (EMR) that allows for **automatic population of accurate radiographic views directly into report templates**
- Use only non-proprietary **"off-the-shelf"** software modules without custom coding for **easy reproducibility**

METHODS

New Workflow:

1. Technologist take appropriate radiographic views

2. Technologist marks views obtained into multiple-choice questionnaire (in EMR)

3. Data auto-transmits to dictation software

4. Obtained views are auto-populated into a special field in report templates

Views Scanned:

Answer	Comment
<input type="checkbox"/> AP, Lat	<input type="checkbox"/> Oblique
<input type="checkbox"/> AP	<input type="checkbox"/> PA
<input type="checkbox"/> Sunrise	<input type="checkbox"/> Lat Flex, Lat Ext
<input type="checkbox"/> Odontoid	
<input type="checkbox"/> Fuchs	<input type="checkbox"/> Swimmer's
<input type="checkbox"/> Coned L5-S1	<input type="checkbox"/> RPO, LPO
<input type="checkbox"/> Inlet, Outlet	<input type="checkbox"/> AP Int Rot
<input type="checkbox"/> AP Ext Rot	<input type="checkbox"/> Grashey
<input type="checkbox"/> Axillary	<input type="checkbox"/> Y
<input type="checkbox"/> AP Pelvis	<input type="checkbox"/> PA Chest
<input type="checkbox"/> Scaphoid	
<input type="checkbox"/> Harris	<input type="checkbox"/> Cephalic
<input type="checkbox"/> Lat	<input type="checkbox"/> False Profile
<input checked="" type="checkbox"/> Dunn	<input checked="" type="checkbox"/> AP right/left bending
AP right/left bending	
Dunn	

1) If view not listed, type in left box below 2) Leave right boxes empty 3) Ignore right/left/bilateral

Additional Views Scanned:

Simple pick-list survey, with an additional option to enter free-response for other views

METHODS

New Workflow:

1. Technologist take appropriate radiographic views
2. Technologist marks views obtained into multiple-choice questionnaire (in EMR)
3. Data auto-transmits to dictation software
4. Obtained views are auto-populated into a special field in report templates

Data from the EMR survey is transmitted to dictation software.

A special field can then be used to embed views into existing templates.

Properties

Attending: Attending...

Status: Draft

STAT: ☐

Custom Fields (70023307)

Body/Bone Scanned: H...

Laterality Scanned: R...

Views Scanned: A...

Custom Fields (70023308)

Body/Bone Scanned: Fl...

Laterality Scanned: L...

Views Scanned: A...

Insert Contributors...

Insert Custom Fields...

Properties

Fields (8)

Notes

Attachments

Quality Check

Report - PRIMORDIAL, OUTPATIENTONE - 70023307, 70023308

EXAM: ~~X-RAY HAND 2 VIEWS - RIGHT, X-RAY FINGER(S) MINIMUM 2 VIEWS - RIGHT~~

EXAM DATE: 8/15/2023 10:04 AM

X-RAY HAND 2 VIEWS - RIGHT, X-RAY FINGER(S) MINIMUM 2 VIEWS - RIGHT

AP/LAT, Oblique (accession 70023307), AP/LAT, Carpal Tunnel, Oblique, Pisiform View, Pisiform View, Scaphoid, Clenched with Ulnar Variation (accession 70023308)

HISTORY: [test; Pain]

COMPARISON: [None available at time of dictation]

TECHNIQUE: []

FINDINGS:

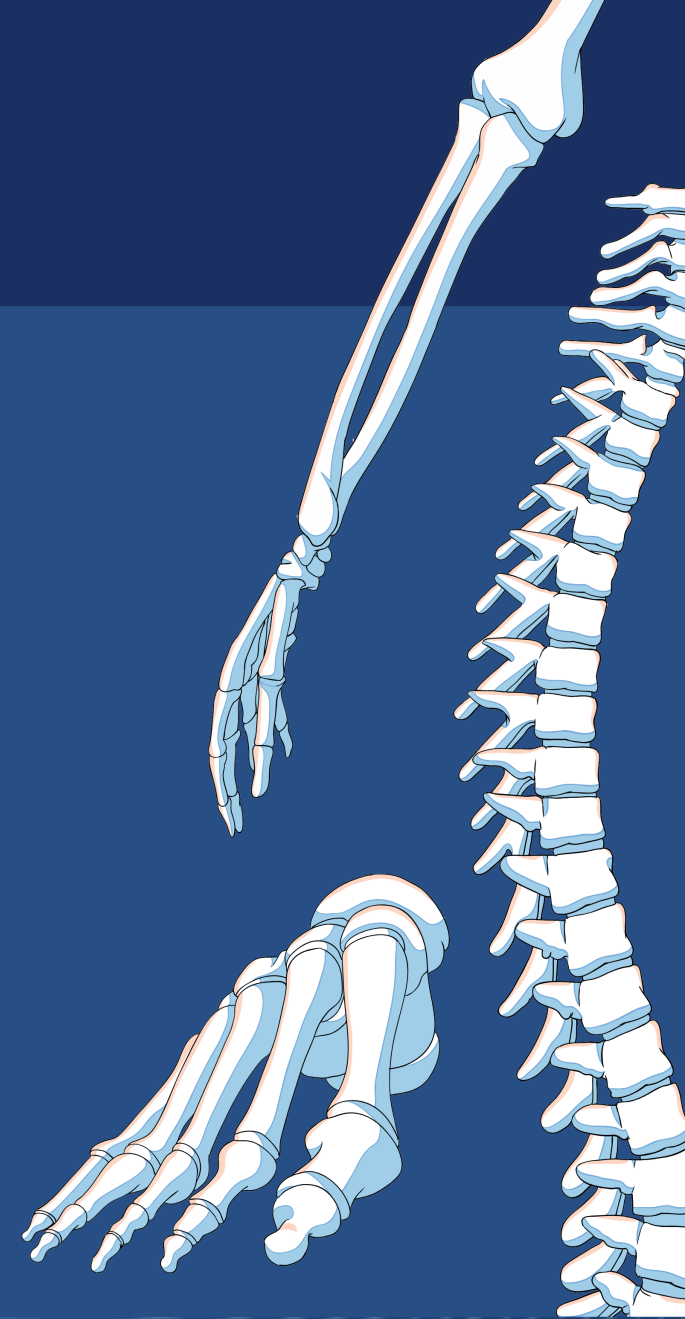
[There is no evidence for fracture or dislocation.][No definite soft tissue abnormalities are identified.][No definite radiopaque foreign bodies are identified.] There is [no significant] arthritis.

IMPRESSION:

METHODS

Data Collected:

- Obtain and compare 100 shoulder radiographs obtained during the pre-implementation (3/2024) and post-implementation (6/2024) periods
- Evaluate studies for completeness and accuracy of views reported in documentation
- Survey average time spent manually entering MSK radiographic views in the pre-implementation period
- Survey knowledge of accurate reporting and reimbursement
- Survey intent to utilize new workflow in daily practice



RESULTS

Metric	Pre	Post
Total Studies	100	100
Accurate, Complete Reports (Report that list specific views & # of views)	65	76
Accurate, Incomplete Reports (Reports that only lists # of views)	16	21
Inaccurate Reports	19	3

- 11% increased accuracy following implementation
- 5% increased incomplete reports
- 16% decreased inaccurate reports

Survey	Result
Time MSK radiologists spend manually documenting views per report	7 seconds
% radiologists aware that accurate reporting of MSK views dictate reimbursement	30%
% participants who intend to utilize new workflow in daily practice	100%

DISCUSSION

Implementation of this software into daily workflow can save radiologists over 44 hours a year!

Analysis of Time Saved

Per report	7 seconds
Average reports per workday	100
Average workdays per year	230
Time Saved	161,000 seconds = 44.7 hours = 5.6 workdays annually

Increased accuracy may prevent incorrect coding and save substantial costs in legal fees, manpower, and time

Analysis of Monetary Savings and Legal Implications

FCA Civil Damages	3 x Amount of Claim
FCA Civil Penalty per claim	\$13,946 - \$27,894
FCA Criminal Fine	\$250,000 - \$500,000
FCA Criminal Imprisonment	Up to 5 years
Exclusion Statute Salary Loss	Varies by physician

DISCUSSION

- Overall, 3 months after introducing the EMR survey and smartphrase to embed into templates, there was an **11% increase in correct documentation** of shoulder radiographic studies
- There remains a large number of exams reporting only number of views and a few inaccurate studies—Of note, none of these reports had utilized the smartphrase.
- This new semi-automated workflow can save MSK radiologists **44 hours per year** documenting accurate MSK views over the course of a year
- Improved accuracy ensures radiologists are **compensated appropriately** for their labor

Limitations:

- Time added to technologists' personal workflow
- Single-center experience
- Degree of workflow's benefit appears to be limited by full participation, at every step

Next Steps:

- Study effects of new workflow over a longer period of time with more participants

REFERENCES

- Chapter 9 - Radiology Services CPT Codes 70000-79999 (PDF). In: Medicare NCCI Policy Manual. U.S. Centers for Medicare & Medicaid Services. 2023. Accessed September 29, 2023. <https://www.cms.gov/files/document/medicare-ncci-policy-manual-2023-chapter-9.pdf>.
- Taylor-Phillips S, Stinton C. Fatigue in radiology: a fertile area for future research. Br J Radiol. 2019;92(1099):20190043. doi:10.1259/bjr.20190043.
- Centers for Medicare and Medicaid Services, MLN Booklet: Medicare Fraud & Abuse: Prevent, Detect, Report. ICN MLN4649244. January 2021. Accessed October 30, 2024. <https://www.cms.gov/outreach-and-education/medicare-learning-network-mln/mlnproducts/downloads/fraud-abuse-mln4649244.pdf>.
- Centers for Medicare and Medicaid Services, Factsheet: Laws Against Healthcare Fraud. July 2016. Accessed October 30, 2024, <https://www.cms.gov/files/document/overviewfwalawsagainstfactsheet072616.pdf>
- 28 CFR Part 85, Civil Monetary Penalties Inflation Adjustment. Accessed October 30, 2024, <https://www.ecfr.gov/current/title-28/chapter-I/part-85>.
- Sentence of Fine, 18 USC Sec. 3571. Accessed October 30, 2024, <https://www.govinfo.gov/content/pkg/USCODE-2023-title18/pdf/USCODE-2023-title18-partII-chap227-subchapC-sec3571.pdf>.

