

Prelim radiology report
discordances resulting
in patient management
changes

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Authors have nothing to disclose

Introduction

At our institution, after hour radiology studies are given preliminary report by radiologists-in-training and overread by attending radiologists the following morning. Depending on the degree of report change, attending radiologist attest without change, with addition, with minor changes, or with major changes. This study aims to evaluate reports that received major discordance and assess if it led to changes in patient management.

Types of diagnostic radiology errors

Perceptual error:

- 60-80% of diagnostic radiology errors
- Occur during the initial detection phase of image interpretation
- Finding is retrospectively present on image but not detected at the time of interpretation

Cognitive error:

- Abnormality is detected on the image, but improperly understood resulting in incorrect diagnosis

Classification of diagnostic radiology errors

Kim YW, Mansfield LT.
AJR Am
J Roentgenol
2014;202(3):465–470.

Bruno MA, Walker EA,
Abujudeh HH.
Radiographics. 2015
Oct;35(6):1668-76.

Classification Scheme for Errors in Diagnostic Radiology

Cause of Error	Explanation
Complacency	A finding is appreciated but attributed to the wrong cause (false-positive finding)
Faulty reasoning	A finding is appreciated and interpreted as abnormal but is attributed to the wrong cause (true-positive finding misclassified)
Lack of knowledge	A finding is seen but is attributed to the wrong cause because of a lack of knowledge on the part of the interpreter
Underreading (missed finding)	A finding is present on the image but is missed
Poor communication	An abnormality is identified and interpreted correctly but the message does not reach the clinician
Technique	A finding is missed because of the limitations of the examination or technique
Prior examination	A finding is missed because of failure to consult prior radiologic studies or reports
History	A finding is missed because of inaccurate or incomplete clinical history
Location	A finding is missed because of the location of a lesion outside the area of interest on an image
Satisfaction of search	A finding is missed because of failure to continue to search for additional abnormalities after the first abnormality was found
Complication	A complication from a procedure
Satisfaction of report	A finding was missed because of overreliance on the radiology report from a previous examination

Materials and methods

The study was approved by the institutional review board.

199 studies that received major discordance were retrospectively identified through the dictation search.

Imaging findings and ED/ admission notes were reviewed to determine if patient management changed once final report was rendered.

Period of March to June, 2017 was randomly selected.

Materials and methods

Discordance were classified based on the (1) outcome of the patient and (2) type of error

Outcome of the patient

- No change in management
- Change in management: change in medication, surgery (or no surgery), or follow up
- Outcome consistent with preliminary read: subsequent management showed outcomes more consistent with preliminary read, not the final read

Cognitive error: abnormality is detected but interpreted incorrectly

Perceptual error: abnormality is not detected on initial interpretation

Other

Cause of Error	Explanation
Complacency	A finding is appreciated but attributed to the wrong cause (false-positive finding)
Faulty reasoning	A finding is appreciated and interpreted as abnormal but is attributed to the wrong cause (true-positive finding misclassified)
Lack of knowledge	A finding is seen but is attributed to the wrong cause because of a lack of knowledge on the part of the interpreter
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Satisfaction of report	A finding was missed because of overreliance on the radiology report from a previous examination
Poor communication	An abnormality is identified and interpreted correctly but the message does not reach the clinician
Technique	A finding is missed because of the limitations of the examination or technique

Results

	No change	Change	Correct prelim
Wrong interpretation	42 (35.3%)	14 (26.9%)	8 (32%)
Miss	70 (58.8%)	38 (73.1%)	15 (60%)
Other	7 (5.9%)	0	2 (8%)
Total	119 (59.8%)	52 (26.1%)	25 (12.6%)

Results - reason for “no change”

5 cases: mis-identification of anatomy, not the conclusion of report e.g. occlusion of M3 branch, not M2 branch of MCA

2 caes: missed chronic finding e.g. chronic orbital wall fracture

24 cases: treatment is conservative e.g. rib fracture

47 cases: condition is already known to clinical team

- 24 cases: chronic condition e.g. CODP, CHF
- 10 cases: known oncology history
- 11 cases: transfer from outside hospital for the condition

Results - reason for “no change”

16 cases: clinically suspected and managed despite not being called on radiology report e.g. infection suspected and antibiotic given, fracture missed but seen by orthopedic on call

20 cases: more pressing clinical problem is present e.g. small pneumothorax in patient with large intracranial hemorrhage, ground glass lung nodule in patient on hospice for end stage dementia

5 cases: miscellaneous, including confusing language and image technical limitation

Results - “change”

13 cases were fracture misses e.g. minimally displaced tibial plateau fracture

8 were either overcall or miss of subsegmental pulmonary embolus

3 were either overcall or miss of appendicitis

3 were miss of brain infarct

3 were either overcall or miss of pneumonia

8 cases were lesion mischaracterization e.g. liver abscess, not hemangioma

14 miscellaneous cases

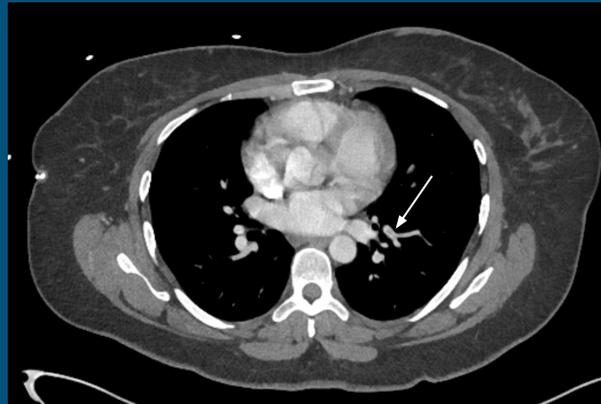
Results - “change” examples



Missed lisfranc fracture, better seen on follow up CT



Missed subsegmental PE



Overall subsegmental PE

Result - “prelim report” correct

Small subdural hematoma or possible infarct -> not present on follow up study

Lung nodule on chest radiograph -> not present on follow up CT

No appendicitis -> patient with continued pain and went to surgery, pathology show inflammation

Lack of history or interval history helped with correct diagnosis

Results

Three cases were lost to follow up. Two cases were subtle nondisplaced extremity fractures in young patients. One case was lymphadenopathy in young patient treated for mononucleosis that radiologist recommended follow up to rule out lymphoma or immunodeficiency.

One of the notes showed problem with over-read radiology report. Subsequent follow up suggests clinician understood prelim results as final report.

Results - severity of patient condition

	No change	Change	Prelim correct	Patients with prelim report	Patients without prelim report
Alive	86 (72.3%)	43 (82.7%)	21 (84%)	211,483 (88.3%)	280,757 (88.3%)
Deceased during the ED visit/admission	19 (16.0%)	3 (5.8%)	3 (12%)	28,076 (11.7%)	37,148 (11.7%)
Deceased within 2 years of ED visit	14 (11.7%)	6 (11.5%)	1 (4%)		
Total	119	52	25	239,559	317,905

Conclusion

There were 199 major change issues over 4 month period.

In 119 cases did not result in management change (59.8%).

In 52 cases resulted in management change (26.1%).

In 25 cases subsequent management favored correct prelim diagnosis (12.7%).

Lost of follow up was low at 3 cases (1.5%).

Conclusion

Severity of patient illness is higher for exams with major change as indicated by higher deceased rate at the time of analysis (23.1%) compared to overall deceased rate 11.7% for the same period.

Higher severity of illness suggests that patients were more likely to not follow breathing directions, move from pain, and sub optimally positioned, which can also contribute to misdiagnosis.

To err is human
To forgive, divine

Alexander Pope

References

Ruutiainen At, Scanlon MH, Itri JN: Identifying benchmarks for discrepancy rates in preliminary interpretations provided by radiology trainees at an academic institution. *Journal of the American College of Radiology* 8(9): 644-8, April 2011.

Bruno MA, Walker EA, Abujudeh HH. Understanding and Confronting Our Mistakes: The Epidemiology of Error in Radiology and Strategies for Error Reduction. *Radiographics*. 2015 Oct;35(6):1668-76.

Kim YW, Mansfield LT. Fool me twice: delayed diagnoses in radiology with emphasis on perpetuated errors. *AJR Am J Roentgenol*. 2014 Mar;202(3):465-70.