"Near-Miss" Events in Abdominal CT Interpretation:

Evaluation Based on Report Addenda
Authors:

Neil K Bansal, MD
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Andrew B Rosenkrantz, MD
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Background

Diagnostic error in radiologic interpretation represents an important cause of patient harm.

Greater understanding of the most common errors as well as of the underlying causes for such errors is needed to help guide quality improvement efforts.

When placing an addendum, the radiologist acknowledges that an error is being corrected, which may signify a “near-miss” event.
Purpose

To use report addenda to characterize the nature of "near-miss" events in abdominal CT interpretation.
**Methods**

This retrospective study was HIPAA compliant and reviewed by our institutional review board, which waived the requirement for written informed consent.

A departmental database was searched to identify all abdominal CT reports performed between January 2009 and September 2015 with the word “addendum,” yielding 3,940 report addenda.

We identified those addenda reporting a misinterpretation due to perceptual or cognitive errors, representing so-called "near-miss" events.

Addenda were characterized by a spectrum of features, including the nature of the change, event prompting the addendum, and anatomic site.
Results

709 addenda (0.5% of reports)

785 misinterpretations

Distribution of the nature of the change

- 84.1% new finding
- 5.1% upgrade in severity of original finding
- 3.9% downgrade in severity of original finding
- 6.9% other report modification

Most common anatomic sites and most common finding per site

- 9.8% vasculature - atherosclerosis/thrombus
- 8.3% abdominal wall - ventral hernia
- 7.4% bone - osseous lesion (not clearly benign)
- 6.9% kidney - renal lesion (not clearly benign)
- 6.1% liver - steatosis
- 5.1% ureter - calculus

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Nature of Near-misses in Abdominal CT Reporting
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Results

209 addenda provided the **event** prompting a change

- 30.6% comparison with prior imaging
- 22.5% additional surgical history
- 13.4% referrer request for re-review
- 8.6% additional signs, symptoms, or lab abnormality
- 8.6% additional known diagnosis
- 5.7% attention to patient gender
- 5.3% multi-planar reconstructions
- 5.3% consultation with other radiologist
Results

Association with division of interpreting radiologist:

Upgrade in severity (p=0.015):

- 12.0% for emergency radiologists
- 3.9% for academic radiologists
- 4.3% for community radiologists

Prompted by additional signs, symptoms, or laboratory abnormality (p=0.004):

- 26.1% for emergency radiologists
- 7.3% for academic radiologists
- 2.8% for community radiologists
Case example 1

69 year-old female undergoing imaging for provided indication of Crohn’s disease.

Contrast-enhanced axial CT images showed cystic structure involving the pancreatic body (arrow).

Finding was initially interpreted as diffuse marked dilatation of the main pancreatic duct with soft tissue nodules, most likely representing main duct intraductal papillary mucinous neoplasm, possibly with associated carcinoma.

Subsequent additional history was provided of known diagnosis of pancreatitis with pancreatic pseudocyst, and addendum was placed that the lesion was most likely pseudocyst rather than neoplasm.

Subsequent MRI demonstrated hemorrhage and nonenhancing debris within the cystic structure, consistent with a benign pancreatic fluid collection.
Case example 2

60 year-old male with known diagnosis of lymphoma.

(A) Initial report from contrast-enhanced CT described increasing left para-aortic lymphadenopathy (arrow) and did not report other abnormalities related to known lymphoma diagnosis.

(B) It was subsequently brought to the attention of the radiologist that a prior 18F-FDG PET/CT had shown FDG-avid splenic mass (arrow).

(C) The CT report was then addended to note the additional presence of the mass on CT (arrow), as well as slight increase in size of the mass since the earlier PET/CT.
**Case example 3**

25 year-old male undergoing CT enterography for abdominal pain.

(A) Initial report from contrast-enhanced CT described possible ingested tablet within the terminal ileum (arrow), non-visualization of the appendix, and otherwise unremarkable enterography. It was then noted that the patient had previously been treated conservatively for acute appendicitis.

(B) On further review, separate decompressed terminal ileum was noted (arrow), and the original hyperdensity was alternatively interpreted as appendicolith within thickened appendix, raising suspicion for persistent appendicitis.
Discussion

• Missed findings rather than misinterpretations of detected abnormalities were the most common reason for abdominopelvic CT report addenda.
• Most common anatomic sites of near-miss events (vasculature, abdominal wall, and bone) did not involve visceral organs, thus potentially being outside the primary focus of the interpreting radiologist. Such awareness may help guide QA initiatives.
• Addenda had distinct characteristics in the ED setting, indicating a role for enhanced integration of referrers and radiologists in the ED to help facilitate communication of additional clinical information.
• Informatics and workflow optimization may facilitate radiologists’ access to patient-related data as well as communication with other physicians and thereby help reduce misinterpretations.