Structured Reporting: Project Orientation

Curtis P. Langlotz, MD, PhD
Vice Chair for Informatics, Department of Radiology
Professor of Radiology and Informatics
(in Epidemiology and Biostatistics)
Medical Director, Information Services
University of Pennsylvania Health System

Outline

- Radiology reporting today
- Factors driving change
- Definition of structured reporting
- The RSNA reporting initiative
- Migration path to structured reporting

Knight & Reiner, Imaging Economics: November, 2004
Report from William James Morton, MD
May, 1896

The X ray plainly shows there is no stone of an appreciable size in the kidney. I only got the negative today and could not therefore report earlier. The picture is not so strong as I would like but it is strong enough to differentiate the parts.

Radiology Reporting Today

~80% ~19%
Breast Structured Reporting


Forces Driving Change

- Consistency of report format and content
- Compliance with accreditation requirements
- Compensation from pay for reporting incentives
- Continuous quality improvement programs
Tradeoffs of Radiology Reporting

Structured reporting is the optimal reporting method, provided that structured reporting tools do not impede radiologist productivity.

Reporting tools should enable a hybrid of speech recognition and structured reporting.

Radiology professional organizations should create a repository of exemplary reports based on RadLex and other standard terminologies.

The **RSNA** Reporting Initiative

- Goal: Create an on-line library of best-practices radiology report templates for key clinical scenarios
- Based on standard terminology, including RadLex
- Developed by consensus in collaboration with professional organizations and standards bodies
- Available as text report templates, speech recognition macros, and true structured reports
- Adapted by radiology practices based on local practice patterns

---

**Structured Reporting Attributes**

- Structured report format
  - Achieved today in most practices
- Consistent report content
  - Improved referring physician acceptance
- Standard report language
  - The essence of structured reporting

---

*Sistrom & Langlotz, J Am Coll Radiol 2: 159-167, 2005*

*Naik et al, AJR 176:591, 2001*
PA and Lateral Chest X-Ray

HISTORY:
Positive PPD

IMPRESSION:
No active cardiopulmonary disease

COMMENT:
PA and lateral views of the chest exposed at 13:45 hours on June 10th are reviewed without prior exams. The lungs are clear. The heart is normal in size. The mediastinal contours are normal. There is no evidence of tuberculosis.

Consistent Report Organization:
Macros and Templates

LIVER: [..]
GALLBLADDER: [..]
BILIARY: [..]
PANCREAS: [..]
SPLEEN: [..]
KIDNEYS: [..]
VASCULAR: [..]
OTHER FINDINGS: [..]
IMPRESSION: [..]

Sistrom & Langlotz, J Am Coll Radiol 2: 159-167, 2005
Consistent Report Organization

LIVER: Demonstrates diffuse increased echogenicity, likely due to fatty infiltration. There are no focal lesions.

GALLBLADDER: Normally distended with no gallstones. There is no pericholecystic fluid, wall thickening, or sonographic Murphy's sign.

BILIARY: No intrahepatic ductal dilatation is identified. The common duct measures 6 mm at the porta hepatitis.

PANCREAS: Limited visualization due to gas in the stomach and colon.

SPLEEN: Measures 9.9 cm in length and is normal.

KIDNEYS: The right kidney measures 11.9 cm. The there is an echogenic structure within the inferior pole of the right kidney with posterior shadowing, likely a renal stone. It measures 8 mm. There is no right hydronephrosis or hydroureter. The left kidney measures 12.3 cm. and is normal.

VASCULAR: The abdominal aorta is non aneurysmal.

OTHER FINDINGS: The bladder was empty and not evaluated.

IMPRESSION: No gallstones and no evidence of cholecystitis. There is an 8mm. stone within the inferior pole of the right kidney without evidence of hydronephrosis.

Sistrom & Langlotz, J Am Coll Radiol 2: 159-167, 2005

Standard Report Language

MRI Knee

Medial meniscus: [normal]

tear
intersubstance tear
flap tear
radial tear
meniscal cyst
degenerative change
The Radiology Report in 10 Years: Structured, Customized, and Interactive

OBSERVATIONS:
The lateral meniscus is unremarkable. The medial meniscus demonstrates some degenerative signals, which do not touch the inferior articular surface of knee. For example series 4, images 5-6. However, on images 7, a small, focal, articular focus about the inferior articular surface near the free edge, this is compatible with a tear.

Quadriceps tendon and patellar tendon are intact. Anterior cruciate ligament and posterior cruciate ligament are intact.

As far as can be seen, the articular cartilage is unremarkable.

Moderate amount of suprapatellar fluid is identified.

www.radlex.org
Disadvantages of Structured Reporting


RSNA Reporting Workshop
Consensus Section Headings

- Administrative Information
  - Facility, provider, date/time
- Patient Identification
  - Name, identifier, gender, date of birth
- Clinical History
  - Includes allergies and reason for exam
- Imaging Technique
  - Device, device settings, patient maneuvers, radiation dose, medications administered, including contrast
- Comparison
  - Date and type of previous exams reviewed
- Observations
  - Imaging findings, including measurements and annotations
- Summary or Impression
  - An itemized list of important findings, including recommendations
- Signature

University of Pennsylvania
Proposed Template Authoring Conventions (1)

- [The lungs are clear.] —square brackets signify a place for data entry, and can contain default text.
- [normal* | dilated] —vertical bars or "pipes" separate mutually exclusive options, e.g., menu items. Asterisk indicates default value.
- [chronic chest pain; atypical angina; pre-valve replacement] —semicolons separate multiple binary choices, e.g., check boxes.
- [# ml] — number sign signifies a number (often followed by units). Real numbers contain a decimal point.
- {If left or co-dominant: LPDA and LPL branches should be addressed.} — curly brackets signify a comment or help text, removed when finalized.
- [<date>] -- pointy brackets signify a pre-defined data type.
- All square brackets and all comments (in curly brackets) should be removed upon report finalization (or sooner).

Rules
- Certainty
- Criticality
- Comparisons/temporal change

Proposed Template Authoring Conventions (2)

- Headings and subheadings indicated by font and indentation. Heading on a separate line.
- Any portion of the report can be marked up with sets of terms from a controlled vocabulary, using the standard tuple to identify a term: (term name, term ID, vocabulary ID).
- Any structured information (except headings and subheadings) can be replaced by free text.
Sample Template From Library: Chest Radiography

Clinical History:
cough, fever, hemoptysis, post-op day #, oxygen requirement, change in respiratory status, check tube or line

Imaging Technique:
Portable AP chest radiograph* | PA and lateral chest radiograph

Comparison:
<Exam type>, <Date>

Observations:
Lungs: Clear
Heart: Normal* | mildly enlarged | moderately enlarged | markedly enlarged
Mediastinum: Normal | post-operative changes

Impression:
No active disease

Sample Template As Finalized: Chest Radiography

Clinical History:
cough, fever

Imaging Technique:
Portable AP chest radiograph

Comparison:
chest radiography, May 17, 2009

Observations:
Lungs: clear
Heart: mildly enlarged, but unchanged from prior
Mediastinum: post-operative changes

Impression:
1. Cardiomegaly
2. No pneumonia

Keywords:
Heart, mildly, enlarged
Mediastinum, post-operative changes
The End

Curtis P. Langlotz, MD, PhD
Chair, RSNA Structured Reporting Committee
Vice Chair for Informatics, Department of Radiology
Professor of Radiology and Informatics
(in Epidemiology and Biostatistics)
Medical Director, Information Services
University of Pennsylvania Health System