Implementing a Structured Reporting Initiative Using a Collaborative and Iterative Approach and Phased Template Rollout

Quality Storyboard- Education Exhibit
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Purpose

- To describe the implementation of a structured reporting initiative at a large multi-site, academic medical center radiology department
- To provide a blueprint of how to successfully achieve structured reporting using a collaborative multistep approach

What is a Structured Radiology Report?

- Report with a consistent, standard format
- Expected data elements (such as patient name, medical record number, time study performed etc.) are present
- Normal exam reports for a given exam are always the same
  - My normal and your normal exam reports do not sound different→ referring physicians don't have to "interpret" your report
- May or may not include standard lexicon (standardized language)

Why should Structured Reporting be used?

- There is a growing body of evidence that structured reporting improves the quality and value of radiologists' major work product, the radiology report:
  - Radiologists can compare reports more easily
  - The report structure functions as a checklist, ensuring that images are interpreted in a consistent manner
  - Referring clinicians can find "what they are looking for" more easily
- Radiology leaders have called for optimization of reporting and the delivery of actionable information in radiology reports as a critical link in the imaging value chain

ACR CHAIR'S MEMO

Ellenbogen PH. J Am Coll Radiol. 2013 Sep;10(9):641.

Standardization in Radiology—Protocols, Procedures, and Reports: Best for Patients and Providers

- Structured reporting can break down sophisticated tasks into manageable and automated pieces
- A uniform lexicon helps diminish complexity
- Structured reporting makes it easier to concentrate on the images, and errors in both perception and interpretation would decrease
- Ordering physicians would also find the reports to be more readable

Radiology

Improving Communication of Diagnostic Radiology Findings through Structured Reporting[1]

Lawrence H. Schwartz, MD
David M. Panicek, MD
Alexandra R. Berk, MA
Yuelin Li, PhD
Hedvig Hricak, MD, PhD, Dr(hc)

Radiology. 2011 Jul;260(1):174-81.

- Compared content, clarity, and clinical usefulness of conventional (i.e., free-form) and structured radiology reports of body CT's
- Reports were evaluated by referring physicians, attending radiologists and radiology fellows
- Mean content and clarity satisfaction ratings were significantly better ($p < .0001$) for structured reports.
- Conclusion: Referring clinicians and radiologists found that structured reports had better content and greater clarity than conventional reports

Free text vs. Structured Reporting

- "Some radiologists believe their true value lies in crafting free-text reporting according to personal preferences. This idiosyncratic approach undermines actionable reporting because referring physicians are left having to navigate reports to find key actionable information, which inevitably varies from one radiologist to another"
- Structured reporting allows for a consistent and predictable report format, with easy navigation through the report to extract the necessary information
- May be disease-specific so that critical information will always be included in the report
- Promotes adherence to radiology practice guidelines

Boland G, Enzmann D, Duszak R, Actionable Reporting, JACR. 2014 Sep;11(9):844-5.

Setting

- Urban tertiary care medical center which performs 650,000 radiology exams/year
- Includes 3 hospitals and 5 outpatient imaging facilities
- Department includes 88 faculty, 36 residents, 13 fellows
- Powerscribe 360 (Nuance, Burlington, MA) is used as the voice recognition system
- A single PACS and RIS system (Centricity, GE healthcare, Chicago, IL) are used at all sites
- Prior to the Structured Reporting initiative, all attending and resident radiologists used a mix of free text and personally developed or cloned reporting templates, based on personal preference

The challenges

- Technical
- Organizational
- The human component
  - Balance the need for some uniformity, with the need to respect each radiologists expertise and opinion
  - Achieve systemic consistency while preserving physician autonomy

How can we motivate a large group of radiologists to agree on Structured Reporting?

- Consensus-building efforts are critical
- Implement structured reporting such that radiologists will prefer to use structured reports rather than creating, maintaining, and using their own macros or report templates

Outline of our process

- Planning
- Educate staff and trainees (8 weeks)
- Create multiple teams (2 weeks)
- Survey users (6 weeks)
- Template creation and multi-step refinement (5 steps, 8-44 weeks)
- Template Implementation
- Evaluation of our implementation and radiologists' compliance

Planning

- Three ground rules were decided upon in consultation with the department chairman
  1. The initiative would be limited to cross-sectional exams (CT, MRI, US), with the goal of having ≥ 90% of dictated studies having structured templates
  2. Structured reporting would be implemented using a consensus building process (rather than a top down) approach
  3. Reports would be structured but no restrictions would be made on the actual language used
- Two co-chairs were selected to lead the project
- No financial incentives or penalties would be linked to this initiative

Educate (8 weeks)

- Committee co-chairs formally presented concepts of structured reporting to staff radiologists and trainees, including relevant publications that examined both the benefits and challenges of structured reporting
- Defined goals of the structured reporting initiative were publicized
- Attempts made to directly address specific concerns from radiologists who were skeptical of the new initiative

Create multiple teams (2 weeks)

- The co-chairs formed subcommittees of subspecialist radiologists and additional stakeholder radiologists (off-site from main campus) to allow for focused input into template creation for both choosing content and appropriate language
- Subcommittees also included resident representatives for trainee input
- These radiologists were relied upon to integrate the concerns and needs of their referring clinician base into the process

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Create multiple teams (2 weeks)

- 6 subcommittees were formed:
  - Abdominal, Cardiothoracic, Musculoskeletal, Pediatric, Ultrasound, Neuroradiology
- Some subcommittees worked independently, others relied more heavily on the co-chairs
- For each template created, a formal template trial process allowed for feedback from all readers (both attendings and trainees)
- There were no administrators or administrative assistants involved in the process.

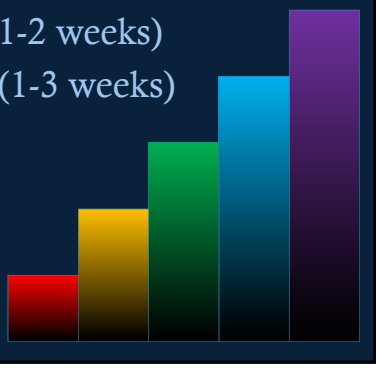
Survey users (6 weeks)

- A department-wide survey was distributed electronically to all staff and trainees to collect data on user navigation preferences

- Survey questions included
  - Preferred method of moving between fields in a template
  - Use of "pick lists"
  - Use of field names
  - Use of blank fields
- This was done to help inform global template structure and formatting decisions

Template creation and multi-step refinement

- Step 1: Template drafting (4-30 weeks)
- Step 2: Limited trial and voting (1-6 weeks)
- Step 3: Site-wide trial (1-3 weeks)
- Step 4: Template finalization (1-2 weeks)
- Step 5: Final technical checks (1-3 weeks)



Step 1: Template drafting (4-30 weeks)

- The creation of every structured reporting template was intentionally a multi-step process
- Template drafts were created, edited, trialed, and re-trialed until the greatest possible consensus was achieved
- After initial template drafting by sub-specialty physician champion(s), the committee co-chairs edited the draft to meet defined criteria, including a standard header with radiology information system (RIS) data merge fields for patient and exam information, contrast material information, and clear and grammatically correct language
- Pick-list options for common abnormalities and variants were crafted to allow for quick and typo-free report creation

Step 2: Limited trial and voting (1-6 weeks)

- A limited-user, two-week testing period for high-frequency readers of that exam type was first performed to test usability of the template and obtain focused feeedback
- We reasoned that the best way to determine whether a template was ready for use was to attempt to use it in clinical practice
- Draft templates were configured such that a normal workflow could be followed, with auto-population of the template with the launch of an exam for all trial radiologists
- A simple email-based mechanism for feedback was established, with all comments and suggestions sent to the committee co-chairs and/or subcommittee members
- These were compiled and distributed formally in a forum allowing for discussion or voting on details (when necessary)

Step 3: Site-wide trial (1-3 weeks)

- The revised template draft then entered a site-wide two-week trial, open to all radiologists responsible for reading that exam type
- This included rare readers (i.e. those reading that exam type only when on-call, a few days a month).
- All trainees were also invited to participate in this trial
- Again, all written template feedback was compiled by the committee co-chairs and formally distributed for discussion and voting (when necessary)

Step 4: Template finalization (1-2 weeks)

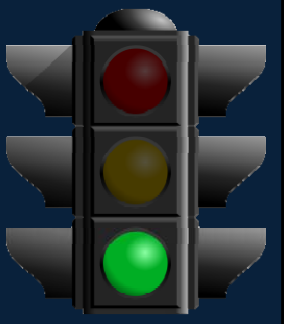
- The compiled feedback and voting results were shared again with stakeholders, together with a final template draft, revised by the committee co-chairs
- The co-chairs optimized and standardized the voice command fields, managed the naming of template pick-list options, and established standard language macros as required

Step 5: Final technical checks (1-3 weeks)

- Collaboration with radiology department coders was necessary to ensure matching of templates to proper exam codes
- This was essential for the correct exam template to auto-populate at the launch of each exam
- In some cases, the addition of new exam codes was required

Template implementation

- We required careful collaboration with the information technology department to ensure an uninterrupted exam interpretation workflow
- All finalized exam templates were initiated site-wide at a defined "go-live" time, which was publicized in advance
- User level accounts were then updated by the committee co-chairs, in order to avoid any conflicting personal templates from populating instead of the approved structured template



Template implementation

- Education of the technical staff was also required to ensure accurate coding of studies on exam completion, such that the correct template would properly auto-populate with exam launch
- For example, different exam codes and corresponding distinct templates were created for "CT Chest with Contrast" and "CT Chest for PE"

Methods: Evaluation of our initiative

- Our goal was to achieve >90% structured template availability by department exam volume within 2 years.
- In March 2016, the Montage™ search tool (Montage Healthcare Solutions, Philadelphia, PA) was used to conduct searches of monthly exam volume for all exams with finalized templates during that time period.
- Total monthly departmental cross-sectional (CT, MR, and US) imaging volume was also calculated for the 2-year period of template rollout, serving as the denominator.
- % of exams with available templates was thus calculated, to measure the success of structured reporting implementation

Methods: Evaluation of Radiologists' compliance in using the Structured Templates

- Following institutional IRB exemption, an audit of radiologist compliance with the use of the finalized standardized structured reporting templates was performed
- Twelve exam types representing a cross-section of subspecialty divisions, were selected for review
- A search was conducted for 100 consecutive cases beginning at least one month from the time the template was introduced, to allow for adequate dissemination and learning of the templates
- Reports from each exam type were reviewed manually to determine whether the standardized template was utilized
- Template compliance rates were calculated. Fisher's Exact test was used to determine if there was significant association between involvement of a trainee and template compliance among specific exam types

Results: Evaluation of our initiative

- Achieved 95% of all departmental cross-sectional exams having standardized templates, within 24 months of the project's start

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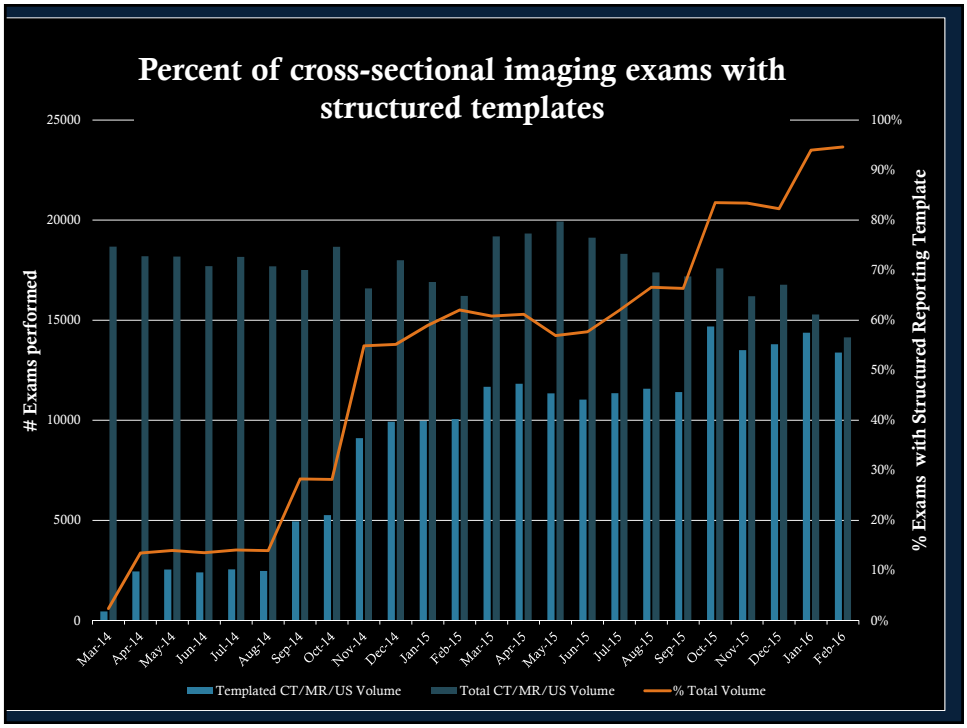

Results of template compliance audit

- Overall compliance rate of 94% among the 12 exam types audited
- 100% compliance among four exam types audited (knee MRI, non-contrast head CT, non-contrast chest CT, and PE protocol chest CT)
- ≥95% compliance among three additional exam types (shoulder MRI, abdomen/pelvis CT, and complete pediatric abdominal US).
- Lowest rate of compliance was seen with renal/bladder ultrasound (US) (83%)

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Results of template compliance audit

- Among the cases involving a trainee, 98% compliance to standardized structured templates was achieved
- For only two exams (abdomen MRI and lumbar spine MRI) was there a statistically significant association for improvement in template compliance with trainee involvement ($p<0.05$)
- No statistically significant association was found between template compliance and patient exam location (i.e. outpatient, inpatient or emergency department location) for any study type

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Exam Type*	Template Compliance (%)	Trainee Involvement (%)	Non-trainee Involved Compliance (%)	Trainee-Involved Compliance (%)
Shoulder MRI C-	97	49	96	98
Knee MRI C-	100	49	100	100
Lumbar Spine MRI C-	94	39	90	100 ($p < 0.05$)**
Head CT C-	100	23	100	100
Chest CT C-	100	31	100	100
Chest CT C+ (PE Protocol)	100	52	100	100
Abdominopelvic CT C+	96	48	92	100
Complete Abdomen US	85	6	80	100
Renal/Bladder US	83	12	82	92
Abdomen MRI C+/C-	88	44	79	100 ($p < 0.001$)**
Complete Pediatric Abdominal US	95	38	94	97
Pediatric Renal US	91	46	93	89
Mean (%)	94	36	92	98

Template compliance and trainee involvement among 12 audited exam types
*n=100 for each exam type.
**p-values calculated using Fisher's Exact test.

Additional results

- Introducing structured reporting also facilitated compliance with national reporting recommendations, with rollout of disease-specific templates:
  - Lung-RADS for lung cancer screening
  - Li-RADS for Hepatocellular carcinoma
  - PI-RADS for Prostate MRI staging
- Compliance with quality measures such as Physician Quality Reporting System (PQRS) measure for reporting carotid stenosis has also been facilitated by structured neck MRA and neck duplex Doppler ultrasound templates

Conclusions

- Implementing Structured Reporting at our large multi-site Radiology Department required consensus building, education, and technical optimization for success
- A collaborative and iterative approach achieved an overall compliance rate of 94%
- Our experiences will serve as a model to other institutions attempting to improve the quality of their reports by implementing structured reporting
- Further studies are required to determine whether our reports are indeed more actionable, and whether in turn patient care has improved

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