A Quality Improvement Program to Improve the Communication of Clinically Important Findings on CT and MR Enterography

Ryan Bailey MD*, Joseph Cernigliaro MD, Michael Picco MD, PhD, Candice Bolan MD, Francis A. Farraye MD, MSc

Radiologic Society of North America Annual Meeting
30 Nov 2021

Background

- Radiology reports are inherently variable in style and inclusion of information
- Specific radiologic criteria on CT and MR enterography are critical to guide management of patients with inflammatory bowel disease (IBD)
- Inconsistent inclusion of these criteria limits the benefit of these studies for referring clinicians and our patients
- We hypothesized that a standardized reporting template would improve consistency among reports and may improve provider satisfaction and patient care

MAYO CLINIC

Methods

- Developed a standardized reporting template to include all critical radiological elements needed in assessment of IBD
- Developed a scoring questionnaire including subjective and objective measures of report quality
- Identified 80 consecutive patients who underwent CT(50) or MR (30) enterography for IBD during 2/1/2020 - 3/15/2020
  - All were interpreted with free-text reports
- Two radiologists reinterpreted the same 80 exams with the standardized template
- Three referring gastroenterologists reviewed and scored the 80 cases, with free-text reports and then with standardized reports

MAYO CLINIC

Aim Statement

Improve the percent of radiology reports that include all clinically relevant radiological findings on CT and MR enterography of patients with inflammatory bowel disease

MAYO CLINIC

Report Scoring

- Eighty (50 CT/ 30 MR) exams were divided among 3 gastroenterologists who specialize in inflammatory bowel disease
- Original, free-text report was assessed and questionnaire answered
- Standardized report was assessed and questionnaire answered

1. Please read the old report and answer the following questions.
    a. How **clearly** did the report communicate the salient findings? (1-10 with 10 being the best)

    b. How **efficiently** were you able to extract the information pertinent to your evaluation? (1-10 with 10 being the best)

    c. Did this report omit pertinent information to your clinical practice?

        i. If yes, what pertinent information was missing in this report (select all that apply)?
            1. Disease location, length, and/or number of disease segments
            2. Enhancement pattern
            3. Bowel wall thickening
            4. Ulcerations
            5. Inflammatory changes
            6. Stricture
            7. Bowel dilation
            8. Penetrating disease (sinus tract, fistula, inflammatory mass, abscess)
            9. Perianal disease
            10. Mesenteric/perienteric findings (edema, fibrofatty proliferation, vasa recta distention)
            11. Extra-intestinal findings
            12. None

2. Please read the new report, and answer the following questions.
    a. How **clearly** did the report communicate the salient findings? (1-10 with 10 being the best)

    b. How **efficiently** were you able to extract the information pertinent to your evaluation? (1-10 with 10 being the best)

    c. Did this new report include any previously missing pertinent information you had listed in question 1c above?
        i. Yes, if so what?_____
        ii. No

    d. Would this new report have likely altered your previous course of clinical management?
        i. Yes, if so how? _____
        ii. No

MAYO CLINIC

Baseline Data

- Average subjective scores of clarity and efficiency were rated 7.7 and 7.2, respectively
- 40/80 (50%) reports were missing one or more important findings
- Most commonly omitted:
  - Disease location, length, # of segments
  - Perianal disease

Question		Original Report
How clearly were findings communicated?*		7.72
How efficiently was pertinent information extracte		7.28
*Results represent average score, scale 1-10, with 10 being h		
Number of Reports with Omitted Information		40
	Total Reports Missing Information	50%
	Total Reports with All Included Information (Goal: +40% from baseline, i.e. > 90%)	50%
Ommitted Information		
	Disease location, length, and/or # of segmen	18
	Enhancement pattern	2
	Bowel wall thickening	8
	Ulcerations	7
	Inflammatory changes	5
	Stricture	9
	Bowel dilatation	3
	Penetrating disease	3
	Perianal disease	18
	Mesenteric/perienteric findings	5
	Extra-intestinal findings	3
	Other	2

MAYO CLINIC

Intervention Data

- Subjective scores of clarity and efficiency improved to 9.9 each
- 77/80 (96%) reports included all important findings

Most importantly, 20 patients (25%) would have had a change in clinical management based on the new report

Question		Original Report	New Report	p value
How clearly were findings communicated?*		7.72	9.84	3.25E-14
How efficiently was pertinent information extracte		7.28	9.85	4.42E-18
*Results represent average score, scale 1-10, with 10 being highest				
Number of Reports with Omitted Information		40	3	
	Total Reports Missing Information	50%	4%	
	Total Reports with All Included Information (Goal: +40% from baseline, i.e. > 90%)	50%	96%	
Ommitted Information				
	Disease location, length, and/or # of segmen	18		
	Enhancement pattern	2		
	Bowel wall thickening	8		
	Ulcerations	7		
	Inflammatory changes	5		
	Stricture	9		
	Bowel dilatation	3		
	Penetrating disease	3		
	Perianal disease	18		
	Mesenteric/perienteric findings	5		
	Extra-intestinal findings	3		
	Other	2		
Among cases where information was omitted, would the new report alter clinical management?			**20**	

MAYO CLINIC

Original free-text report

Lower chest: Left lower lobe micronodule (2/27) is stable since 2013. No pleural or pericardial effusion.

Enterography: Prior proctocolectomy with ileoanal anastomosis. Hyperenhancement involving the afferent limb of the J-pouch consistent with active inflammation or pouchitis. Abnormal enhancement extends upstream, involving a long bowel segment to the level of the right lower quadrant small bowel anastomosis (2/125). Question stricturing disease just distal to the anastomosis given associated moderate upstream dilation (7/103). Question additional site of stricturing disease involving small bowel proximal to the anastomosis (7/110) with mild upstream dilation. Remainder of the small bowel is unremarkable without evidence of obstruction. No evidence of fistula or focal fluid collection.

Abdomen: Focal hepatic fatty infiltration about the falciform ligament. No suspicious focal liver lesion. No biliary ductal dilatation. Decompressed gallbladder. Normal spleen, pancreas, adrenals, and kidneys. Stable calcification anterior to the left kidney. Patent mesenteric and portal vasculature. Nonaneurysmal abdominal aorta.

Prominently enlarged lymph node in the central mesentery measuring up to 2.7 x 2.1 x 2.7 cm (2/153 and 6/56), previously 2.0 x 0.9 x 2.0 cm. Additional increased number of borderline enlarged mesenteric and pelvic lymph nodes (2/137 and 2/178) which are likely reactive. No free fluid.

Pelvis: Heterogeneous prostate. Normal bladder. No free pelvic fluid. Increased number of borderline enlarged lymph nodes in the central pelvic mesentery.

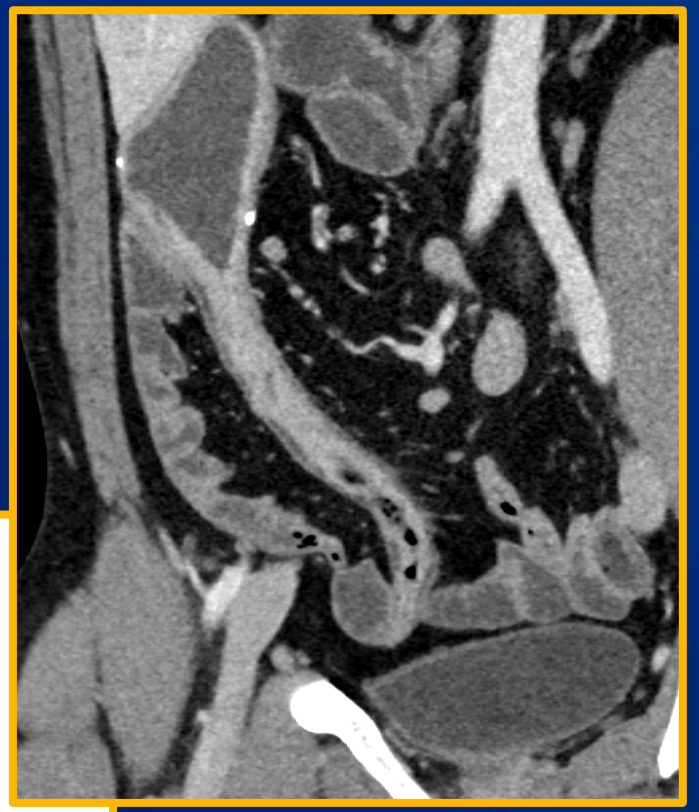
Musculoskeletal: Degenerative changes of the spine. No focal aggressive osseous lesions.

Image key: (Series #/image #)

IMPRESSION:
1. Evidence of active inflammation involving the ileal J-pouch and distal small bowel. Suspected stricturing disease at two sites proximal and distal to the right lower quadrant small bowel anastomosis.

2. Abdominopelvic adenopathy with largest central mesenteric node measuring up to 2.7 cm. While some of these nodes may be reactive, prominent size of the central mesenteric nodes merits continued follow-up versus tissue sampling.

Case example



Standardized report

Enterography:

- Disease location, length, and number of disease segments: 16 cm segment proximal to the J pouch
- Inflammatory changes:
  - Enhancement pattern: Hyperenhancement/
  - Bowel wall thickening: Mild (3-5 mm)
  - Ulcerations: None
  - Intramural edema: None
- Stricture +/- active inflammation: Yes with signs of active inflammation
  - If yes: Stricture
  - Upstream dilation: severe (> 9cm)
- Penetrating disease +/- active inflammation: None
- Perianal disease: None
- Mesenteric/perienteric findings: Enlarged nodes
- Extra-intestinal findings:None

IMPRESSION:

1. Inflammation statement: Active inflammatory small bowel Crohn's disease (+luminal narrowing)
2. Stricture statement: Stricture with signs of active inflammation over a 16 cm length proximal to the J pouch with > 9 cm proximal ileal dilatation)
3. Penetrating statement: No signs of penetrating disease.
4. Perianal disease, if present: None.

Lessons Learned

- Standardization of reports improved provider satisfaction
- Clinically pertinent data was more consistently included in the standardized report
- Standardized reports may improve patient care and, in this case, would have changed management for 25% of patients

MAYO CLINIC

Next Steps

- We plan to implement this template in our clinical workflow pending committee review
- Prospective analysis will be performed to evaluate referring clinician satisfaction in the “real world” setting
- Anticipated Benefits
  - Improved decision making for gastroenterologists
  - Improved clinical workflow with decreased need to contact the radiologist for clarification
  - Prompt appropriate therapeutic decisions

MAYO CLINIC

