

# Improving diagnostic confidence in pediatric intussusception

A multifaceted approach in a regional radiology  
practice

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# Purpose and background

## Purpose

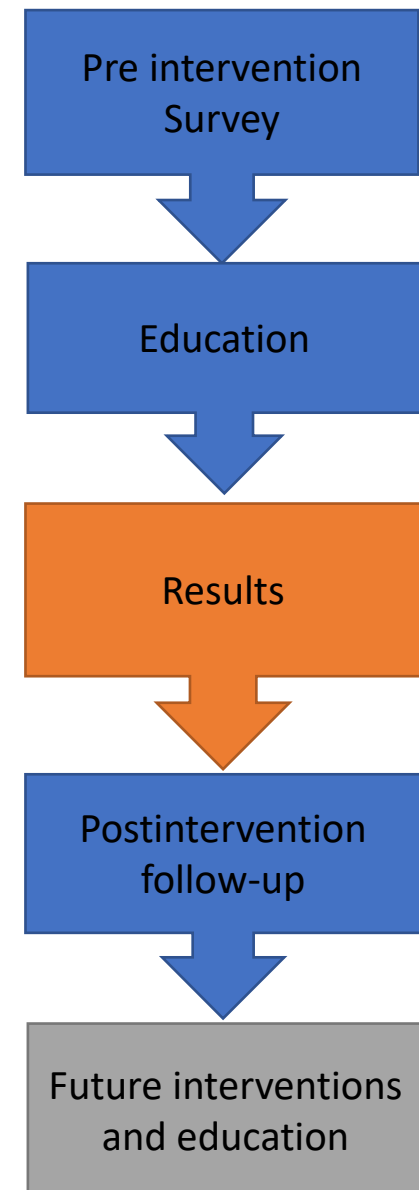
- Standardization of initial management of suspected intussusception
- Increase diagnostic confidence of sonographers and radiologists in pediatric exams, including intussusception

## Background

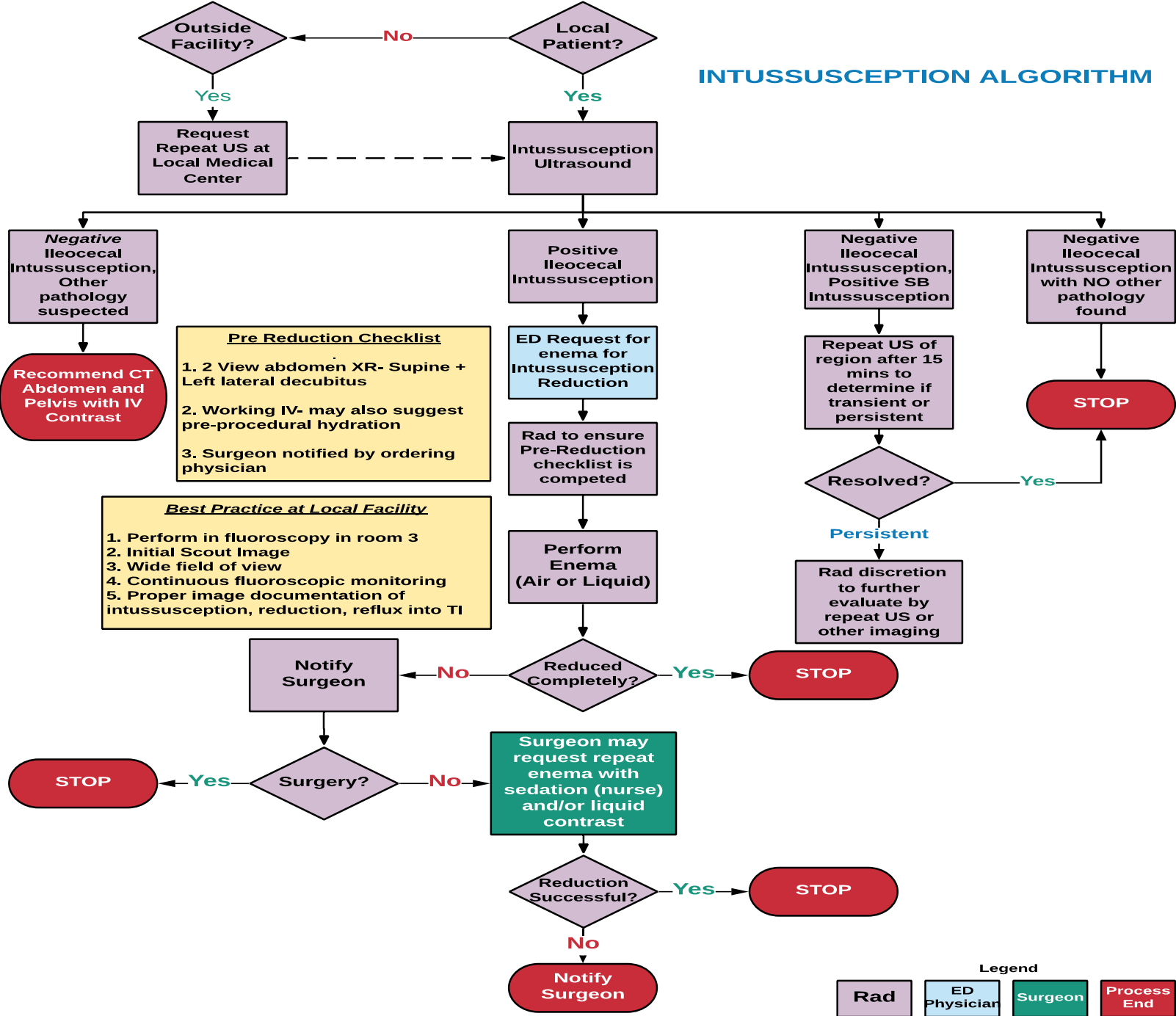
- Ileocolic intussusception is a common pediatric abdominal emergency typically diagnosed by ultrasound
- In our community practice, the exam is performed by a non-specialized sonographer and may be interpreted by a pediatric or non-pediatric radiologist, depending on availability

# Methods

- Pre intervention survey including both radiologists and sonographers regarding exposure, knowledge, and confidence in imaging pediatric patients, including intussusception
- Case-based CME presentation for sonographers and radiologists through didactic slides and videos summarizing imaging techniques, common findings, and the new reporting templates and management algorithm



# INTUSSUSCEPTION ALGORITHM



# Sonographer checklist

- In-house design for streamlined communication between sonographers and radiologists

JS History General (Rad)

Exam:

BMI:

Clinical Information:

Read Only Clinical Information:

Findings:

No	Yes	No	Yes	No	Yes	No	Yes
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nausea/Vomiting		Jaundice		Urinary Incontinence		Fever	
<input type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>	
Weight Loss/Gain		Bloody Stool		Kidney Stones		Hepatitis/Cirrhosis	
<input type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>	
Diarrhea		Hematuria		Painful Urination		Diabetes	
<input type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>	
Bloating		Urinary Frequency					
<input type="radio"/>		<input type="radio"/>					
Palpable Masses		<input type="text"/>					
<input type="radio"/>							
Pain (location, duration)		<input type="text"/>					
<input type="radio"/>							
Cancer (type, date, RX)		<input type="text"/>					
<input type="radio"/>							
Surgery (type, date)		<input type="text"/>					
<input type="radio"/>							
Medications		<input type="text"/>					
<input type="radio"/>							
Labs/Outside Studies		<input type="text"/>					
<input type="radio"/>							

**Abdomen/Aorta/Renal/Bladder:**

Liver/cm  Gallbladder  Murphy's Sign  Wall Thickness/mm

Bile Duct/mm  Pancreas  Rt. Kidney (cm)

Arteries / cm Rt Iliac  Lt Iliac  Lt. Kidney (cm)

Aorta/cm Prox  Mid  Distal

IVC  Spleen/cm  Urinary Bladder (Pre-Void) ml  (Post-Void) ml

Pylorus Is identified?  No  Yes **US Pylorus-**

Gastric distentions identified?   Channel Length (mm)

Passage of gastric contents in pylorus identified?   Single Wall Thickness

**Intussusception-**

Persistent intussusception identified  No  Yes Intussusception diameter (cm)  Intussusception length (cm)

Fatty core to intussusception present  No  Yes Intussusception location

Simple free fluid  Absent  Present  Unable to assess Small bowel appearance:

Complex free fluid  Absent  Present  Unable to assess Large bowel appearance:

Intussusception other comments:

# Radiologist template

- In-house design for streamlined communication between sonographers and radiologists

## EXAM DESCRIPTION:

ULTRASOUND ABDOMEN LIMITED FOR INTUSSUSCEPTION

## CLINICAL INFORMATION:

Abdominal pain.

## COMPARISON:

None.

## PROCEDURE:

Grayscale imaging of the periphery of the abdomen was performed assessing for intussusception. Solid organs not interrogated.

## FINDINGS:

Persistent intussusception [is/is not] identified.

Location:

Diameter:

Length:

Simple free fluid:

Complex free fluid:

Small bowel appearance:

Large bowel appearance:

Other findings:

## IMPRESSION:

No ileocolic intussusception.

Criteria for ileocolic intussusception: Bowel-in-bowel appearance with diameter of 2.0 cm or greater. A smaller diameter likely represents incidental transient small bowel intussusception or other pathology.

Presence of significant free fluid and small bowel thickening suggest process other than intussusception. Appendicitis or other pathology should be considered.

Colonic wall thickening and/or dilation suggests process other than intussusception. Colitis or other pathology should be considered.

# Sonographer education

- Detailed instructions for the entire imaging process, from techniques to image collection and pathologic features

## INTUSSUSCEPTION

*Exam Techniques*



# Radiologist education

- Narration of ileocolic and small bowel-small bowel intussusception with key findings

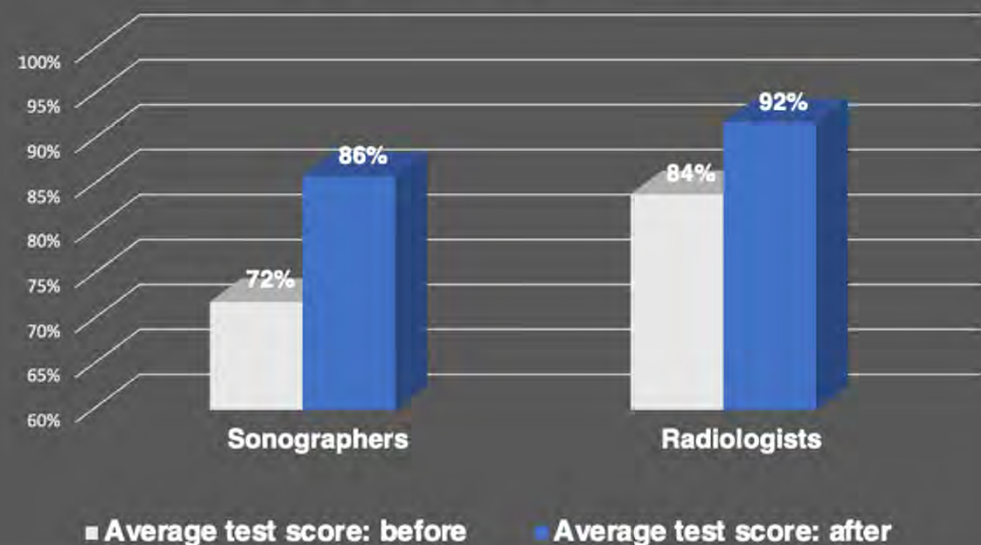




# Results

- Test scores improved following entire set of education materials (cranial, pylorus, intussusception, appendix)
- Radiologists reported significantly increased confidence in interpretation and felt training was adequate
- There was a lack of significant improvement in sonographers; this may be due to infrequent exposure to live cases and overall pediatric training
- Narrative feedback described an improved understanding of small-bowel-small bowel and ileocolic intussusception and common pitfalls

Effect of ultrasound education materials



Qualitative impact: differences in attitudes before and after intussusception education

Sonographers		Radiologists	
Somewhat or very confident performing intussusception ultrasound	6% increase ( $p = .29$ )	Somewhat or very confident interpreting intussusception ultrasound	15% increase ( $p = .008$ )*
Somewhat or very confident differentiating ileocolic intussusception from other pathologies including small bowel intussusception	15% increase ( $p = .07$ )	Somewhat or very confident differentiating ileocolic intussusception from other pathologies including small bowel intussusception	27% increase ( $p = .003$ )*
Described training in pediatric ultrasound as at least adequate	3% decrease ( $p = .37$ )	Described training in pediatric ultrasound as at least adequate	10% increase ( $p = .048$ )*

\* $p < 0.05$  is significant

# Conclusion

- Internal CME with didactic and video-based instruction is an effective method for practice improvement
- Practice-wide confidence in diagnosis and management of ileocolic intussusception has increased
- Sonographers formed a pediatric study group in response to the survey results and are seeking additional hands-on opportunities in pediatric imaging
- Future
  - Quantitative comparisons of cases before and after education
  - New education interventions for other pathologies