Discordance in diagnostic imaging interpretation between pediatric and community radiologist reads in suspected appendicitis

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Are routine overreads for patients transferred with acute appendicitis with diagnostic imaging a waste of radiologist time and resources?

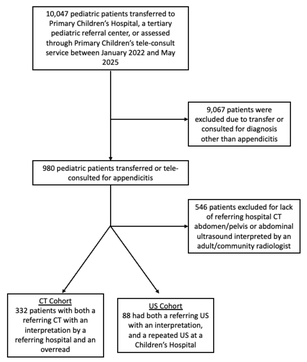
BACKGROUND

- Radiologists overread CT scans and we repeat ultrasounds after transfer
- CT is highly specific and sensitive as is an ultrasound-first diagnostic imaging approach

METHODS

Study Design	• Retrospective cohort study
Inclusion	• Children (<18) with suspected appendicitis evaluated through our center's telehealth service or transferred for appendicitis between 2022 and 2025 • Outside interpretation available • Pediatric radiologist overread a CT scan • US repeated at children's hospital
Outcomes	• Discordance between interpretations or findings
Covariates	• Demographic, clinical, and laboratory variables were analyzed, and outcomes, including surgery, perforation, and negative appendectomy rates
Statistics	• Positive predictive value using surgery with appendicitis confirmed on pathology as true positive. No surgery or negative appendectomy as false positive

CONSORT diagram



RESULTS

Characteristic	N = 332	N = 88
Concordance Rate	92%	57%
Agreement Type		
Negative Concordance	6 (1.8%)	2 (2.3%)
Negative Discordance	28 (8.4%)	36 (41%)
Positive Concordance	298 (90%)	48 (55%)
Positive Discordance	0 (0%)	2 (2.3%)

Characteristic	Discordant Scans, N = 28	Concordant Scans, N = 298	p-value	Discordant Scans, N = 37	Concordant Scans, N = 48	p-value
Age in years	10.8 (7.9, 14.1)	11.5 (8.3, 14.0)	>0.9	8.4 (5.0, 11.2)	10.6 (7.8, 12.1)	0.066
Female sex	16 (57%)	132 (44%)	0.2	14 (38%)	20 (42%)	0.7
Temperature > 38° C	5 (18%)	57 (19%)	0.9	10 (27%)	6 (13%)	0.089
Weight (Kg)	37 (29, 58)	41 (27, 58)	>0.9	27 (20, 40)	35 (25, 44)	0.10
Initial White Blood Cell Count (cells/μL)	9.3 (6.5, 12.3)	15.2 (11.9, 18.4)	<0.001	10.3 (7.6, 13.8)	15.7 (11.4, 18.5)	<0.001
Initial Absolute Neutrophil Count (cells/μL)	6.3 (4.0, 9.0)	12.2 (9.0, 15.1)	<0.001	7.1 (4.7, 9.9)	12.5 (7.9, 15.3)	<0.001
Initial Bands (%)	0.30 (0.20, 0.35)	0.40 (0.30, 0.50)	0.009	0.30 (0.20, 0.40)	0.30 (0.23, 0.40)	0.4
Surgery	4 (14%)	298 (100%)		1 (2.7%)	48 (100%)	
Referring read Correct	3 (11%)	100 (100%)		1 (2.7%)	100 (100%)	

RESULTS

Cohort	PPV of OSH CT (95% CI)	PPV of OSH US (95% CI)
Whole Cohort (N= 326, 85)	0.90 (0.86–0.92)	0.56 (0.46–0.67)
WBC (N= 321, 82)		
Leukocytosis (N = 241, 56)	0.99 (0.97–1.00)	0.66 (0.53–0.77)
No Leukocytosis (N = 59, 26)	0.87 (0.70–0.95)	0.35 (0.19–0.54)
ANC (N = 285, 72)		
Neutrophilia (N = 231, 48)	0.99 (0.97–1.00)	0.67 (0.53–0.78)
No Neutrophilia (N = 54, 24)	0.87 (0.71–0.95)	0.29 (0.15–0.49)
Bands (N = 229, 59)		
Bandemia (N = 174, 40)	0.93 (0.90–0.96)	0.65 (0.50–0.78)
No Bandemia (N = 55, 19)	0.64 (0.52–0.75)	0.42 (0.23–0.64)
Combined Markers (N=317, 82)		
Three (N = 137, 30)	0.98 (0.94–0.99)	0.73 (0.56–0.86)
Two (N = 90, 22)	0.93 (0.86–0.97)	0.50 (0.31–0.69)
One (N = 39, 10)	0.81 (0.68–0.90)	0.70 (0.40–0.89)
None (N = 34, 20)	0.62 (0.45–0.76)	0.30 (0.15–0.52)
PPV of Children's Hospital CT	0.97 (0.94–0.98)	0.98 (0.89–1.00)

CONCLUSIONS

- Community hospital CT are highly predictive of appendicitis
- CT overreads may not be warranted in the right clinical context
- Diagnostic performance of community hospital US was not as strong as CT
- Positive OSH US warrants repeat at a children's hospital

NEXT STEPS

- Design protocol for accelerated transfer to OR and evaluate for effect on negative appendectomy rate and improvement in efficiency

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