

# Performance of overnight on-call radiology residents in interpreting unenhanced abdominopelvic MRI studies performed for pediatric right lower quadrant abdominal pain.

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## Purpose

Acute appendicitis is an important cause of abdominal pain in pediatric patients. Although imaging plays an increasingly important role in rapid diagnosis [1], there is no universally accepted strategy. Ultrasound and computed tomography have been commonly used as the first line diagnostic test [2], but there is rising interest in the use of magnetic resonance imaging (MRI) due to its lack of ionizing radiation or need for intravenous contrast [3]. At our institution, pediatric abdominopelvic MRI for acute abdominal pain is supervised and interpreted by radiology residents (PGY-3 and above) outside of normal business hours. To determine the performance of MRI when interpreted by readers who have received targeted training but have limited experience, we performed a retrospective review of preliminary MRI interpretations rendered by radiology residents compared with final (attending radiologist) interpretations and operative findings.

## Materials and Methods

This retrospective chart review study was approved by our institutional review board, with a waiver of informed consent. A consecutive series of 377 pediatric patients (age < 19 years) who were imaged using abdominopelvic MRI for acute abdominal pain were included. The preliminary (resident) and final (attending) interpretations of each MRI examination were reviewed and coded as positive or negative for acute appendicitis. Reference standards were derived from the electronic medical record (surgical pathology results and clinical follow-up notes). Concordance (agreement) between preliminary and final reports were determined. Additionally, diagnostic performance (sensitivity, specificity, and positive/negative predictive value) of both residents and attending radiologists were determined by comparing to the reference standards.

## Results

The overall concordance rate was high (97.1%) and did not differ significantly with factors such as the post graduate level of the resident (Table 1) or the academic year. Analysis of diagnostic performance showed a trend toward lower sensitivity in resident interpretations (Table 2). Specificity was high for both groups. Positive predictive value trended lower in residents, while negative predictive value was high for both groups.

## Results

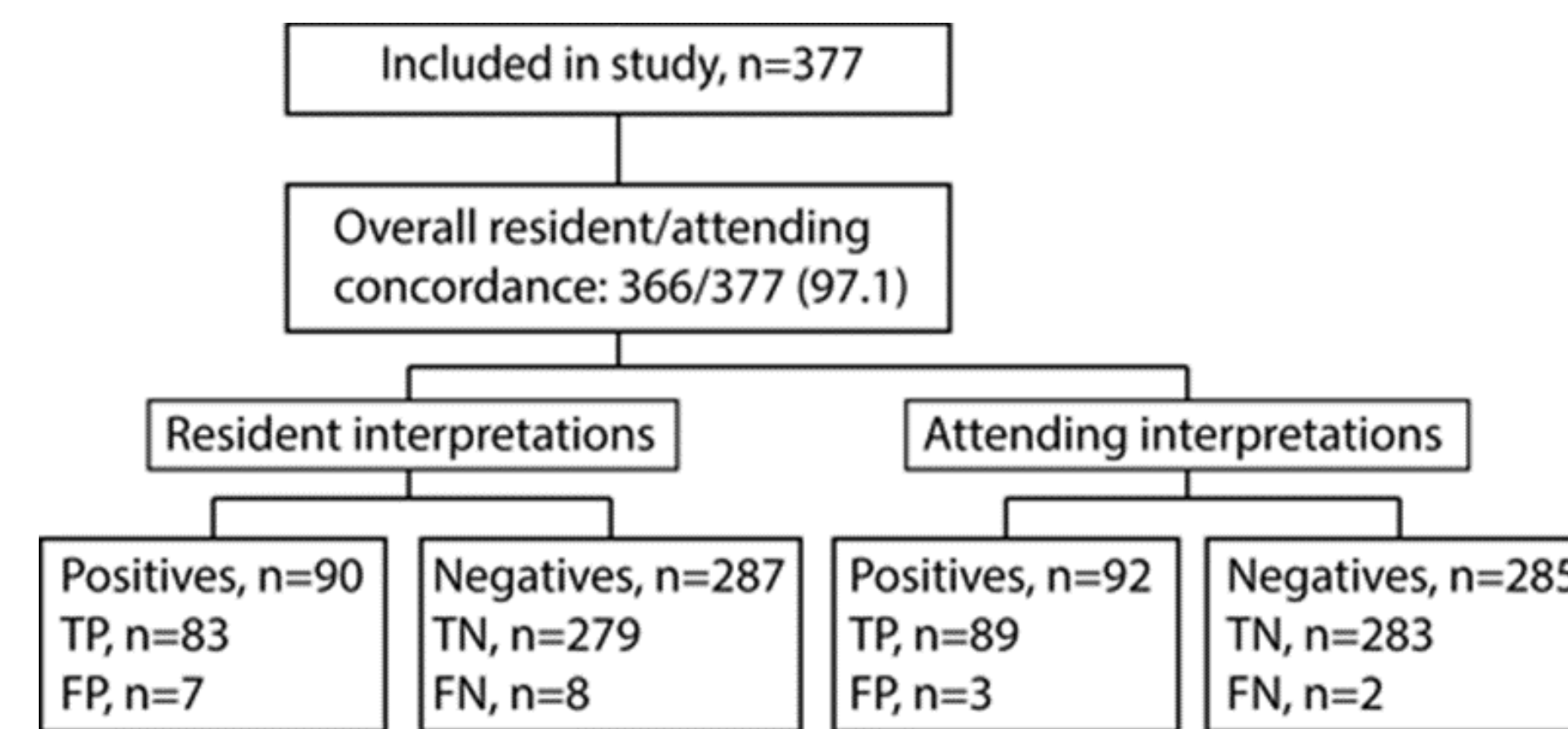


Chart 1. Flowchart summarizing the raw data collected.

PGY Level	Concordance
All PGY levels (3-5)	366/377, 97.1% (94.8% – 98.5%)
PGY-3	210/214, 98.1% (95.3% – 99.5%)
PGY-4	95/99, 96% (90% – 98.9%)
PGY-5	61/64, 95.3% (86.9% – 99.0%)

Table 1. Concordance rates between PGY3 to PGY5 resident interpretations and attending radiologist interpretations. 95% confidence intervals in parentheses.

## Results

Metric	Attending Radiologists	Residents
Sensitivity	89/91, 97.8% (92.3% – 99.7%)	83/91, 91.2% (83.4% – 96.1%)
Specificity	283/286, 98.9% (97% – 99.8%)	279/286, 97.6% (95% – 99%)
Positive Predictive Value	89/92, 96.7% (90.8% – 99.3%)	83/90, 92.2% (84.6% – 96.8%)
Negative Predictive Value	283/285, 99.3% (97.5% – 99.9%)	279/287, 97.2% (94.6% – 98.8%)
Accuracy	372/377, 98.7% (96.9% – 99.6%)	362/377, 96% (93.5% – 97.8%)

Table 2. Diagnostic performance of attending radiologists and residents. 95% confidence intervals in parentheses.

## Conclusions

Trainee residents with targeted training but limited experience demonstrated strong diagnostic performance in the interpretation of pediatric abdominopelvic MRI. These results suggest that the modality could be more widely adopted outside of specialized tertiary care centers, performed by general and emergency radiologists after receiving targeted training.

### References:

1. Bachur, Richard G., et al. "Diagnostic imaging and negative appendectomy rates in children: effects of age and gender." *Pediatrics* (2012): peds-2011.
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3. Mushtaq, R., Desoky, S. M., Morello, F., Gilbertson-Dahdal, D., Gopalakrishnan, G., Leetch, A., ... & Udayasankar, U. K. (2019). First-line diagnostic evaluation with MRI of children suspected of having acute appendicitis. *Radiology*, 291(1), 170-177.