INSTITUTIONAL IMPLEMENTATION OF NON-CONTRAST RAPID MRI FOR PEDIATRIC APPENDICITIS: EFFECTS ON WORKFLOW AND DIAGNOSTIC PERFORMANCE.

MM Werner, (MD, SOM), [1]LP Browne, [1]WW Pryor III, Department of Radiology, Children's Hospital Colorado, Aurora, CO.

Background: In recent years, "rapid" magnetic resonance imaging (rMRI) for the assessment of acute appendicitis in pediatric patients has become an attractive option when compared to computed tomography (CT), due to the lack of ionizing radiation. While use of gadolinium contrast for these scans had previously been standard protocol in many institutions, recent recommendations for non-contrast MRI appendicitis offer the potential benefits of further reducing time required to obtain these studies and limiting unnecessary gadolinium administration.

Purpose: The purpose of this review is to determine the average time associated with individual steps when obtaining an rMRI, comparing these times between scans using contrast (pre-intervention) and those without contrast (post-intervention). This protocol change is hypothesized to reduce the length of time for the rMRI to be completed, overall reducing time between study order and report finalization, without consequent negative impacts on study sensitivity and specificity.

Methods: This study is a retrospective review of pediatric patients who underwent rMRI at a tertiary pediatric hospital that transitioned from using contrast-enhanced studies to unenhanced studies in 2022. Studies were identified using the Montage exam code X10474. Follow-up studies and studies using the wrong protocol were excluded. The contrast group consisted of patients who underwent the exam between December 2016 and December 2021; 55 studies were included for this group. The non-contrast group reviewed patients who underwent rMRI exams from November 2022 to October 2023; after exclusions, the non-contrast group had 101 studies. Order times were verified in the electronic medical record (EMR); study start and stop times were recorded from DICOM headers. Study report creation and report finalization times were provided through the Montage search function. These times were used to calculate order-to-exam start, exam start-to-exam completion, exam completion-to-report creation, interpretation time, and time from order-to-report finalization. After excluding patients who had an intermediate MRI interpretation and those who were given non-operative treatment, relative sensitivity and specificity were calculated for each of the two groups based on surgical and pathological reports in the EMR.

Results: For the contrast group, the mean age was 12 (range 5-17 y, SD 3.9); 69% were female. Nine of the patients in this group underwent surgery. The sensitivity was 85.7% and the specificity was 97.8% for this group.
The non-contrast group had a mean age of 12 (range 5-17, SD 3.6); 60% were female. Fourteen of these patients went to surgery, 13 of whom had rMRI reports indicating a high probability of appendicitis. For this group, sensitivity was 92.3% and specificity was 98.7%. The contrast group had an average total duration of 154 minutes from study order to report finalization, and the non-contrast group had an average time from study order to report finalization of 87 minutes ($p<0.01$).