Minimizing Ionizing Radiation in the Diagnosis of Acute Appendicitis in the Emergency Department.

THE CHILDREN'S HOSPITAL AT SAINT PETER'S UNIVERSITY HOSPITAL
A MEMBER OF SAINT PETER'S HEALTHCARE SYSTEM

Joseph Castellanos, M.D.[1], Jagdip Gill M.D.[2,3]

[1]Department of Pediatrics, The Children's Hospital at Saint Peter's University Hospital, New Jersey
[2]Division of Pediatric Emergency Medicine, Department of Pediatrics, The Children's Hospital at Saint Peter's University Hospital, New Brunswick, New Jersey
[3]Rutgers Robert Wood Johnson Medical School, New Brunswick, New Jersey

RUTGERS THE STATE UNIVERSITY OF NEW JERSEY

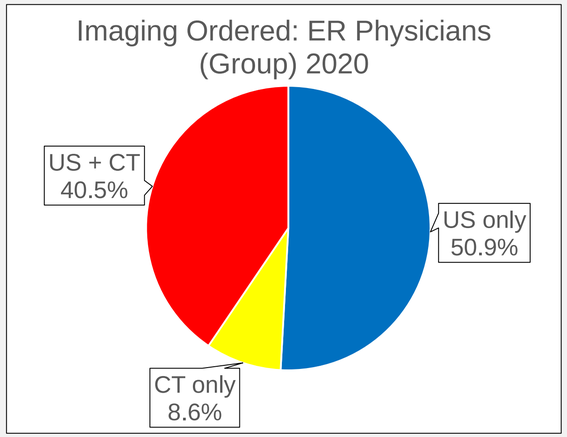
INTRODUCTION

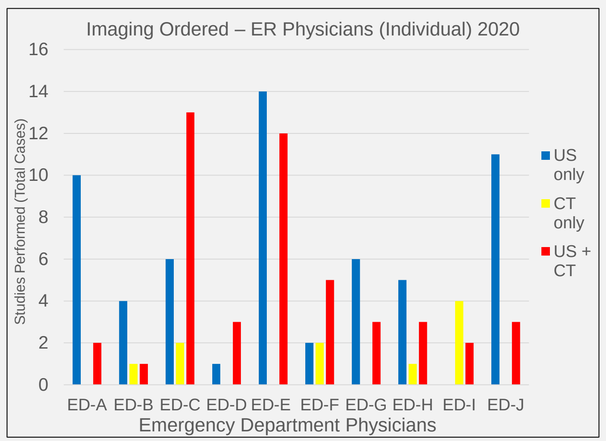
- **Appendicitis is the most common childhood surgical emergency.**
- **CT scans usage has continued to increase over the last 3 decades.[5]**
- **In the United States at least 600,000 abdominal and head CT are performed on children <15 years old.[1,5]**
  - Based on this lifetime risk, a rough estimate of 500 of those patients will die from cancer attributable to radiation from CTs.

STUDY DESIGN / METHODS

- **This was a quality improvement project to decrease ionizing radiation at Saint Peter's University Hospital by 20%.**
- **Retrospective chart review from January 2020 – December 2021.**
- **Inclusion Criteria:**
  - <18 years old admitted to SPUH.
  - Diagnosis of acute appendicitis.
- **Exclusion Criteria:**
  - None.
- **After 2020 data was collected, ER providers were shown the results and pathway was introduced to the ER providers.**
- **Providers were encouraged to always start with an ultrasound when evaluating appendicitis.**
- **If the appendix was not visualized or the ultrasound was not diagnostic, providers were encouraged to (prior to ordering a CT scan):**
  - Calculate pediatric appendicitis score.
  - Consult surgery
  - Re-examine the patient
  - Repeat US or discuss with radiology

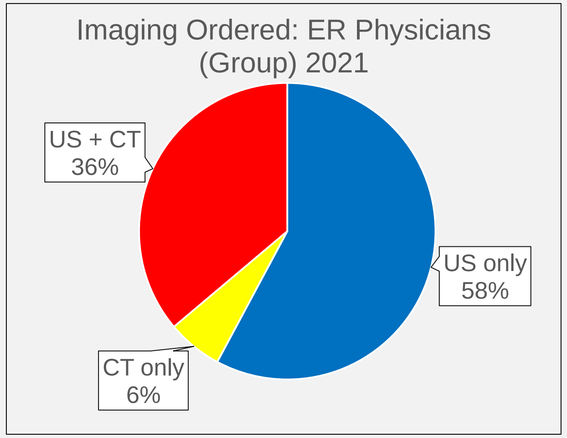
RESULTS (2020)

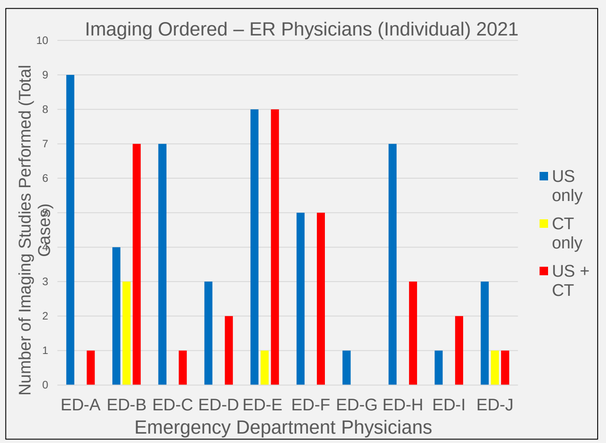




- **During the diagnostic work-up of appendicitis:**
  - 91.4% of patients had an US performed.
  - 49.1% of patients had a CT scan performed.
- **15 patients had a tubular structure visualized on US and went on to have a CT performed.**

RESULTS (2021)





- **During the diagnostic work-up of appendicitis:**
  - 95.2% of patients had an US performed.
  - 42.0% of patients had a CT scan performed.
- **10 patients had a tubular structure visualized on US and went on to have a CT performed.**

DISCUSSION

- **Overall, the number of patient receiving only an US when diagnosing acute appendicitis increased 7%, with a reflected decrease in CT usage by the same amount.**
- **Solely by focusing on the ER physicians there was an ionizing radiation reduction of 7% from 2020 to 2021.**
- **A study was done in the Seatlle metropolitan area developed a pathway model incorporating the pediatric appendicitis score (PAS) with US to optimize diagnostic accuracy while decreasing CT usage.[2]**
- **Overall, the usage of US increased significantly from 29% to 47%, although CT usage did not decrease (14% to 17%).[2]**
- **Moderate risk PAS patients who's providers had used the pathway had a much lower rate of CT. [2]**
  - 2.4% compared to 23%
- **Better incorporation of the PAS in the diagnosis pathway should lead to more significant decreases in ionizing radiation.[3,4]**

Table 1
Pediatric appendicitis score.

Feature	Point Value
Migration of pain	1
Anorexia	1
Nausea/vomiting	1
RLQ tenderness	2
Cough/hop/percussion pain	2
Fever	1
Leukocytosis	1
Left shift on WBC differential	1

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