Association between clinical gestalt and diagnosis of appendicitis in children (age 5-19) in a community ED setting

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BACKGROUND

- Pediatric appendicitis is a common diagnostic challenge
- Clinical gestalt can be a useful tool for diagnosis, although its utility is not well characterized

OBJECTIVES

To describe the association between clinical gestalt and

1. ED diagnostic evaluation risk factors
2. Diagnosis of pediatric appendicitis in a community ED setting

METHODS

- **Study Design:** Prospective cohort study across 11 EDs within Kaiser Permanente Northern California
- **Inclusion Criteria:**
  - Index ED visit between 9/2/16 and 11/29/16
  - Age 5-19 years
  - < 5 days of right-sided or diffuse abdominal pain
- **Exclusion Criteria:**
  - Abdominal trauma
  - Pregnancy
  - Known history of appendectomy
- **Data Collection:**
  - Enrolled by treating ED physician using an EHR-embedded web application, RISTRA (Figure 1)
  - Clinical gestalt was recorded prior to ordering imaging
  - Additional characteristics identified from EHR data with manual chart review validation

FIGURE 1

Screenshots of RISTRA web application

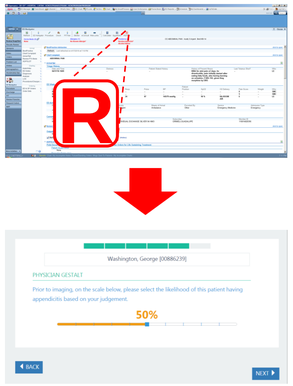


TABLE 1

Characteristics by clinical gestalt category (N=238)

Characteristic (% Yes)	Clinical Gestalt Category 0-10% (n=53)	11-49% (n=85)	50-89% (n=94)	90-100% (n=6)
Risk Factor (n=238)				
Male (n=108)	37.7	37.7	56.4	50.0
Temperature > 38°C	7.5	2.4	5.3	33.3
Nausea/Vomiting	62.3	66.9	66.0	66.7
Anorexia	35.8	49.4	67.0	66.7
Pain Migrating to RLQ	7.5	25.9	55.3	66.7
Pain with cough/hop	18.9	47.1	55.3	66.7
Max Abdominal Tenderness in RLQ*	17.0	43.5	84.0	83.3
Pain < 24 hours	64.2	62.4	64.9	50.0
WBC Done (n=192)	35.9	88.2	97.9	100.0
WBC > 10 · 10^9/L (n=100)	15.1	38.8	57.5	83.3
PMN > 7.5 · 10^9/L (n=86)	11.3	31.8	52.1	66.7
PAS Score Average	2.1	3.6	5.8	6.8

RLQ = right lower quadrant; PAS = Pediatric Appendicitis Score; WBC = white blood cell; PMN = polymorphonuclear neutrophil
*Significantly associated with ≥ 50% gestalt (p < 0.0001)

FIGURE 2

Distribution of clinical gestalt values

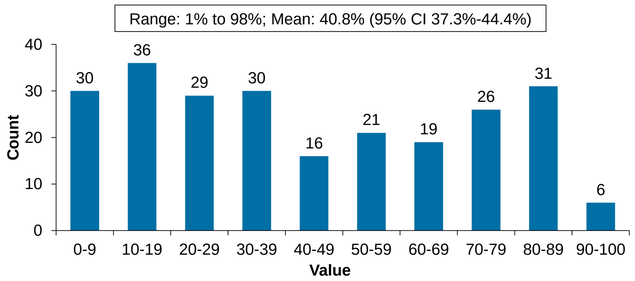


FIGURE 3

Diagnosis of appendicitis and any ED abdominal imaging by clinical gestalt category

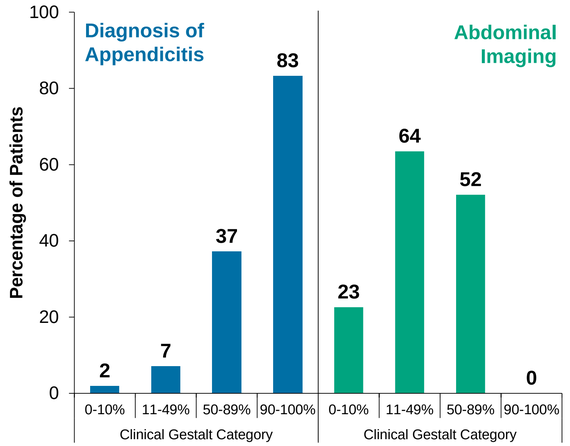


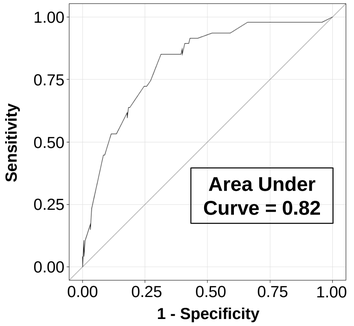
TABLE 2

Diagnosis of appendicitis and any ED abdominal imaging by clinical gestalt category

	Clinical Gestalt Category 0-10% (n=53)	11-49% (n=85)	50-89% (n=94)	90-100% (n=6)
Any ED Abdominal Imaging (n=115)	22.6	63.5	52.1	0
US Only (n=63)	17.0	37.6	23.4	0
CT Only (n=18)	1.9	10.6	8.5	0
Both (n=34)	3.8	15.3	20.2	0
Diagnosis of Appendicitis (n=47)	1.9	7.1	37.2	83.3

FIGURE 4

Receiver Operating Characteristic (ROC) curve of clinical gestalt as a predictor of diagnosed appendicitis



DISCUSSION

- Clinical gestalt appears to have excellent discrimination in predicting pediatric appendicitis diagnosis in a community ED setting
- Clinicians still often utilize abdominal imaging in patients anticipated to be low risk
- Further development of risk stratification tools that incorporate both structured data and gestalt may help target imaging use

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