Original Paper

Radiology-to-Surgical Consultation Timing for Suspected Appendicitis in the Emergency Department: Retrospective Observational Study

Phillip Jenkins[1,2], MD, MS; Obert Xu[3], MBBS, MBA, BSN; Shelby Willis, MD; Ethan Kimball[3], DO; Ruchi Thanawala[1,2,4], MD, MS; Beech Burns[3], MD, MCR; Julie Doberne[1,2,4], MD, PhD

[1]Surgical Data and Decision Sciences Lab, Department of Surgery, Oregon Health & Science University, Portland, OR, United States
[2]Division of Informatics and Clinical Epidemiology, Department of Medicine, Oregon Health & Science University, Portland, OR, United States
[3]Department of Emergency Medicine, Oregon Health & Science University, Portland, OR, United States
[4]Division of Cardiothoracic Surgery, Department of Surgery, Oregon Health & Science University, Portland, United States

Corresponding Author:

Julie Doberne, MD, PhD
Surgical Data and Decision Sciences Lab, Department of Surgery
Oregon Health & Science University
3181 Sam Jackson Park Road
Portland, OR
United States
Phone: 1 503-494-4636
Email: doberne@ohsu.edu

Abstract

Background: Acute appendicitis is a common condition that typically requires surgery, yet the workflow linking diagnostic imaging to surgical consultation varies substantially across emergency departments (EDs). Delays between imaging completion and consultation ordering may prolong care and contribute to avoidable clinical and operational inefficiencies.

Objective: This study aimed to quantify real-world consultation delays among patients with radiology-confirmed appendicitis, identify factors associated with prolonged delays, and establish a manually adjudicated dataset linking radiology impression language to consultation behavior as an empirical foundation for future workflow automation. This study did not develop or evaluate a natural language processing (NLP) system; rather, the NLP and automation applications discussed represent potential areas for future work.

Methods: We performed a retrospective observational study of ED encounters at a single academic medical center from January 1, 2020, to December 31, 2025, during which abdominal imaging was obtained to evaluate possible appendicitis (N=1422). All radiology impressions were manually adjudicated and classified as positive, indeterminate, or negative. The primary timing measure was the interval from imaging completion to the placement of a surgical consultation order, which was analyzed within a predefined plausible window of −60 to +360 minutes. Mann-Whitney *U* tests were used to compare delays across imaging modalities and age groups. Logistic regression was used to assess predictors of prolonged delay (>30 minutes).

Results: Among 1422 encounters, radiology findings were classified as positive for appendicitis in 566 (39.8%), indeterminate in 675 (47.5%), and negative in 181 (12.7%). Surgical teams evaluated 99.8% (565/566) of patients with radiology-positive findings. Among 524 radiology-positive encounters with complete time stamps within the plausible window, the median time from imaging completion to consultation order was 30.8 (IQR 17.8-48.5) minutes, and 268 (51.1%) encounters exceeded 30 minutes. Delays were longer for computed tomography (CT) than for ultrasound (median 34.9 [IQR 21.7-53.0] vs 21.2 [IQR 10.9-36.4] minutes; *P*<.001). In adjusted analysis, CT was associated with prolonged delay (odds ratio [OR] 2.29, 95% CI 1.08-4.86; *P*=.03), whereas adult age group was not (OR 1.09, 95% CI 0.52-2.28; *P*=.81). Across a typical year, cumulative imaging-to-consultation waiting time totaled approximately 58 patient-hours.

Conclusions: Radiology-confirmed appendicitis reliably triggered surgical evaluation, yet meaningful delays remained. This foundational timing analysis and the accompanying adjudicated dataset quantify the opportunity for future workflow improvements and can inform the development and evaluation of NLP-driven tools to automate consultation activation following clear radiologic diagnoses. Prospective studies are needed to develop and validate such systems.

JMIR Perioper Med 2026;9:e91385; doi: 10.2196/91385

Keywords: appendicitis; emergency department; surgical consultation; workflow; radiology reporting

Introduction

Background

Acute appendicitis remains one of the most common conditions requiring urgent surgical intervention in both children and adults, and timely evaluation is essential to reducing the risk of perforation and postoperative complications [1,2]. Contemporary practice relies heavily on imaging, with computed tomography (CT) and ultrasound now central to diagnostic pathways [3]. Although imaging improves diagnostic confidence, it also introduces delays in the emergency department (ED) [1-4]. Recent workflow studies confirm that imaging remains a major contributor to ED length of stay: CT-related actions account for approximately 30% of total ED time for abdominal pain evaluations, and radiology report turnaround represents approximately one-third of the CT-related time interval [5]. These findings highlight how imaging-driven diagnostic workflows can prolong the time to definitive surgical consultation and management.

Variability in Consultation Workflows

Clinical pathways differ widely in the degree and timing of surgical team involvement, and imaging modality selection is itself shaped by patient factors such as age and concerns about radiation exposure [6,7]. In many pediatric and adult pathways, imaging is obtained before surgical evaluation, even when the pretest probability of appendicitis is high. Consequently, surgical consultation depends on ED clinicians initiating communication after reviewing radiology results, with 1 study demonstrating a median interval of more than 2 hours between ED physician evaluation and surgical consultation, even under structured protocols [8]. Imaging modality choice can further prolong evaluation; for example, abdominal magnetic resonance imaging (MRI) in children or pregnant patients increases the time to surgical involvement because of the need for specialized radiology interpretation [6]. In contrast, several studies show that earlier surgical involvement can expedite definitive care. An electronic health record (EHR)–integrated decision support tool in 2 pediatric EDs prompted surgical consultation before CT in high-risk cases and decreased CT use by more than half without increasing the rates of missed appendicitis [9]. The FASTPASS direct-to-surgery protocol produced similar gains and halved ED-to-operation times for appendicitis by simplifying communication steps [10]. Together, these studies demonstrate that communication workflows among the ED, radiology, and surgery are variable, subject to delay, and potentially modifiable.

Radiology Reporting and Informatics Approaches

Communication challenges may also arise from variability in radiology reporting. Radiology impressions are largely unstructured, and free-text wording differs among radiologists [11,12]. Because ED clinicians rely on impression text to determine the urgency of surgical evaluation, inconsistent or ambiguous language may create avoidable delays [13].

Informatics approaches have been proposed to address this variability. Natural language processing (NLP) systems have demonstrated high accuracy in identifying appendicitis in radiology impressions, with reported accuracies of 0.97 to 0.99 and F_1-scores near 0.90 [14], and large language models (LLMs) can now enhance these information extraction capabilities [15]. Computerized consult systems and automated paging tools have shortened ED length of stay by improving the reliability of interservice communication [16], while automated closed-loop notification systems have improved the timeliness and overall documentation of critical imaging result communication [17,18]. Similarly, decision support interventions that modify consult timing have been shown to change workflow behavior and improve outcomes [19].

Study Objectives

Despite these promising developments, no published work has established a clinically adjudicated dataset that links radiology impression language to actual surgical consultation initiation for suspected appendicitis. A validated dataset and an understanding of existing variation in consultation timing are prerequisites for designing, implementing, or evaluating automated triggers or NLP-driven tools. The aims of this study were therefore to (1) manually classify radiology impressions obtained for suspected appendicitis, (2) quantify the real-world interval between imaging completion and surgical consultation, and (3) identify factors associated with prolonged delay. We emphasize that this study is foundational: it does not develop, validate, or benchmark an NLP model, and the automation applications discussed are prospective.

Methods

Study Design and Setting

We conducted a retrospective observational study of ED encounters at a single academic medical center in which abdominal imaging was performed to evaluate suspected appendicitis. All eligible encounters from January 1, 2020, to December 31, 2025, were extracted from the institution's clinical data warehouse.

Ethical Considerations

This study was reviewed by the Oregon Health & Science University Institutional Review Board (STUDY00029543) and was determined not to constitute human subjects research; therefore, informed consent was not required. Data were handled in accordance with institutional privacy and security policies.

Data Source and Cohort Construction

The dataset included demographic characteristics, encounter time stamps, imaging orders, radiology impressions, and surgical consultation orders. All primary imaging modalities capable of evaluating appendicitis were included, including CT of the abdomen and pelvis, ultrasound of the appendix, limited abdominal ultrasound, and pediatric ultrasound of the appendix. Encounters missing an imaging report, consultation order, or specific time stamps were retained in the dataset but were excluded from analyses that required those elements. Chart review was performed for patients with radiology impressions positive for appendicitis but no consultation order.

Manual Classification of Radiology Impressions

Each radiology impression was reviewed and assigned to 1 of 3 categories based on explicit language regarding appendicitis. Impressions were labeled positive when they described acute appendicitis or complications such as perforation; negative when they described a normal appendix, the absence of secondary signs, or a clear alternative diagnosis; and indeterminate when the appendix was not visualized, visualization was incomplete, or the impression stated that appendicitis could not be confirmed or excluded. A single reviewer, a surgical resident with 4 years of experience and graduate training in clinical informatics (PJ), adjudicated all impressions using these predefined rules; ambiguous cases were resolved by reviewing the full radiology report and encounter documentation. This adjudication established the reference dataset used to characterize real-world consultation behavior.

Identification of Surgical Consultation Events

Surgical consultation events were identified by reviewing all order names associated with general surgery and pediatric surgery. Because consultation naming conventions varied, a normalization process was used to map all relevant orders to a single binary variable. Only consultations placed during the ED encounter were included.

Timing Measures

Several time stamps were available to measure the interval between radiologic diagnosis and consultation, including the time the examination ended, the time the preliminary interpretation was entered, the time the final interpretation was signed, and the time the consultation order was placed for the surgical service.

Because clinical decision-making often occurs before the final radiologist signature, the primary timing measure was the interval between imaging completion (examination end) and the placement of the consultation order. We selected this interval, rather than total ED length of stay or time to operation, because it isolates the discrete interservice communication step that automated consult activation would directly target. These downstream measures may be influenced by many additional factors (eg, operating room availability, boarding, and disposition logistics) that would not be addressed by automation of consult activation.

For the primary analysis, intervals were restricted to a predefined plausible window of −60 to +360 minutes. We retained negative values as low as −60 minutes because consultation orders are sometimes placed shortly before the recorded end of imaging acquisition, for example, when clinicians respond to preliminary communication from radiology or act on clinical concerns while imaging is still in progress. The upper bound of 360 minutes was chosen because consultation orders placed more than 6 hours after imaging completion may reflect a change in the patient's clinical status or an indication unrelated to the index imaging study, rather than a response to its results. This upper bound also approximates the upper limit of typical total ED visit durations in our region [20]. We also performed a sensitivity analysis restricted to nonnegative intervals (0 to 360 minutes).

Timing Analysis Using Radiology Documentation Milestones

To quantify how consultation delays vary depending on the radiology milestone used, we calculated the time from each of 3 radiology documentation milestones to the surgical consultation order: end of examination (the moment the scan itself was completed), preliminary interpretation (the time the first documented radiologist interpretation was entered), and final interpretation (the time the final interpretation was signed). The analysis included only radiology-positive encounters with a documented surgical consultation. For each milestone, we included encounters only if the consultation order occurred at or after the corresponding radiology time stamp, because a consultation placed before that milestone would not reflect the normal ED workflow for appendicitis; we applied no upper time limit in this descriptive analysis. Because these inclusion rules differ from the plausibility window used in the primary analysis, the number of encounters included differs between the 2 analyses (n=513 for the examination-end milestone vs n=524 in the primary analysis).

Statistical Analysis

Descriptive statistics summarized classification frequencies, consultation rates, and time intervals. Continuous variables were nonnormally distributed and were compared using Mann-Whitney *U* tests. Comparison groups included CT vs ultrasound and adult vs pediatric patients.

To evaluate factors associated with delayed consultation, a logistic regression model was constructed with a binary dependent variable indicating whether the interval from examination end to consultation order exceeded 30 minutes. This threshold was prespecified because it approximates the cohort median, yielding a balanced outcome distribution for regression, and because 30 minutes is an established benchmark for timely surgical response in American College of Surgeons verification standards: emergency general surgery standards require a surgeon or surgical team member to be physically available within 30 minutes of request and reserve a 30-minute highest-level consultation response for

the most acute patients (Standards PSR.3 and PC.2) [21], whereas trauma center standards require trauma surgeon bedside response to the highest-level activation within 15 minutes (level I or II centers) or 30 minutes (level III centers; Standard 5.4) [22]. Predictor variables included age group (adult or pediatric) and imaging modality (CT or ultrasound). In an exploratory sensitivity model, indicator variables for overnight imaging completion (7 PM to 7 AM) and weekend imaging completion were added to assess confounding by the time of imaging. Odds ratios (ORs) with 95% CIs were calculated from model coefficients.

To estimate cumulative operational burden, we summed imaging-to-consultation intervals within the plausible window and divided the total by the 6-year study period to yield average patient-hours per year.

Software and Reproducibility

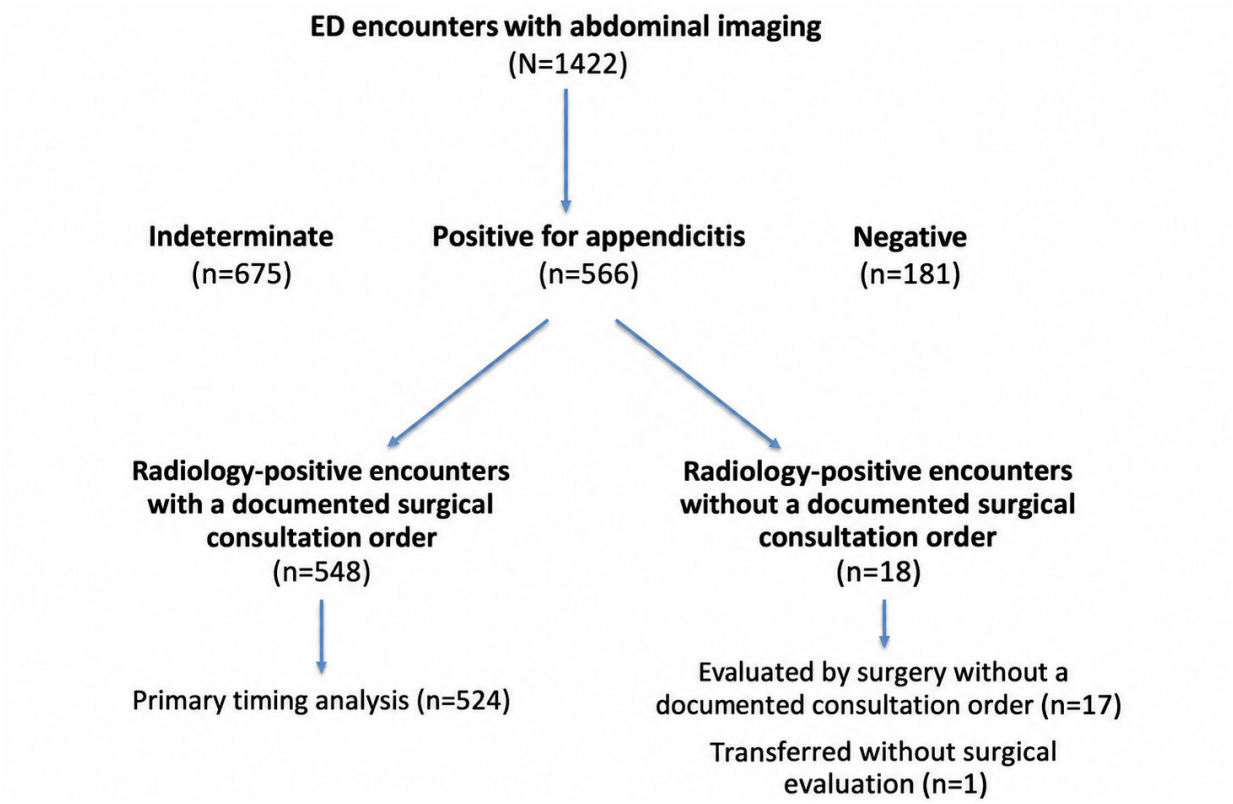
We conducted all data preprocessing, merging of manual classifications, and statistical analyses in Python (version 3.12; Python Software Foundation) using the *pandas*, *NumPy*, and *Matplotlib* packages, with *SciPy* for univariate testing and *statsmodels* for multivariable regression.

Results

Cohort and Classification of Radiology Impressions

A total of 1422 ED encounters involving abdominal imaging for suspected appendicitis were included. Imaging modalities consisted of CT and ultrasound examinations intended to assess the appendix. After manual review of all radiology impressions, 566 (39.8%) studies were classified as positive for appendicitis, 675 (47.5%) as indeterminate, and 181 (12.7%) as negative. Figure 1 summarizes cohort construction and final classification counts.

Figure 1. Cohort construction and manual classification of radiology impressions among emergency department (ED) encounters involving abdominal imaging for suspected appendicitis (N=1422).



Surgical Consultation After Positive Imaging

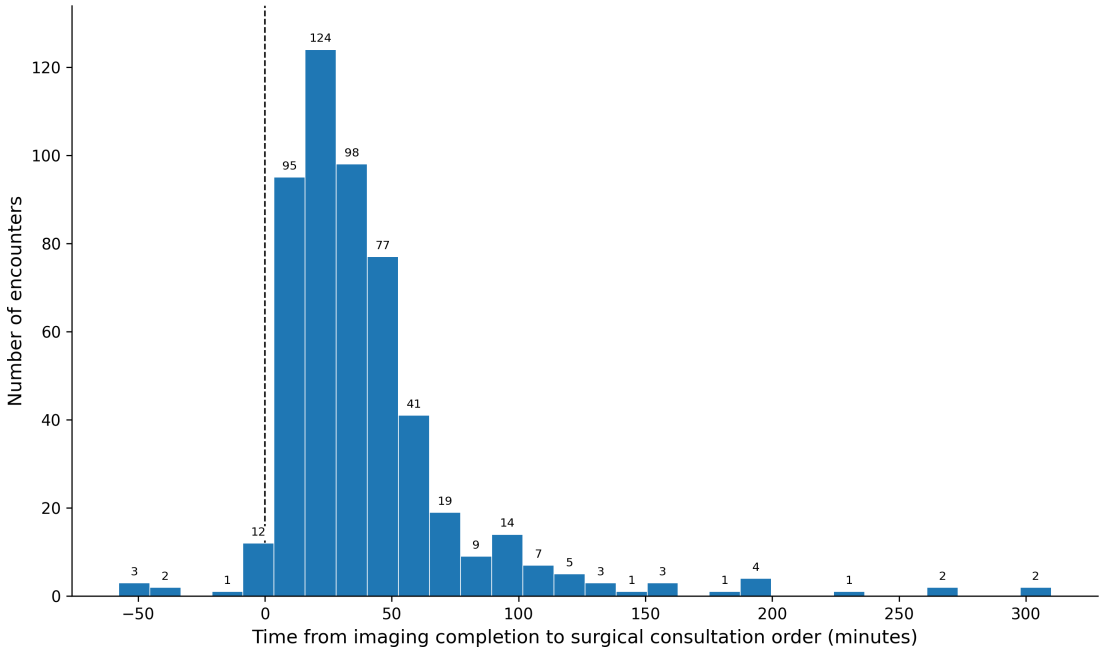
Among the 566 radiology-positive encounters, 548 (96.8%) had a formal surgical consultation order documented in the EHR. Of the 18 encounters without a recorded consultation order, chart review revealed that 17 patients were nevertheless evaluated by the surgical service without a discrete consultation order, most commonly through direct communication leading to admission, including 1 patient who was assessed by the surgical service in the ED before discharge without hospitalization. One patient was transferred to another facility without being seen by surgery at our institution. In total, 565 (99.8%) patients with radiology-confirmed appendicitis received surgical evaluation.

Time From Imaging Completion to Consultation

Of the 548 radiology-positive encounters with complete imaging and consultation time stamps, 24 fell outside the predefined plausible window (n=21 with intervals below –60

minutes and n=3 with intervals above +360 minutes), leaving 524 encounters for the primary analysis. The median interval from imaging completion to consultation order was 30.8 (IQR 17.8-48.5) minutes. A total of 14 (3%) encounters had negative intervals, representing situations in which consultation was initiated shortly before the end of imaging acquisition, typically when preliminary communication or another clinical concern prompted the consultation. In the sensitivity analysis restricted to nonnegative intervals (n=510), the median interval was 31.2 (IQR 18.5-49.4) minutes, which was nearly identical to that in the primary analysis. The overall distribution of consultation delays is shown in Figure 2.

Figure 2. Distribution of time from imaging completion to surgical consultation order among radiology-positive encounters within the plausible window (−60 to +360 minutes; N=524). The dashed line marks 0 minutes.



Consultation Delays by Radiology Documentation Milestone

The number of encounters available for analysis varied across the 3 radiology milestones because of differences in the consistency with which each time stamp was documented. The end of imaging acquisition was available for almost all radiology-positive encounters, whereas the preliminary interpretation time was available less frequently, and the final signature time was the least consistently documented. When a time stamp was unavailable, the corresponding interval could not be calculated, and the encounter was omitted from that comparison. Because examination completion, preliminary interpretation, and final interpretation are generally sequential, consultation delays differed depending on which time stamp was used. Delays calculated from the end of imaging acquisition were the most complete and operationally meaningful; delays calculated from the preliminary interpretation reflected earlier clinical review; and delays calculated from the final signature were heavily skewed by limited after-hours availability of attending radiologists. A full summary of delay distributions for each milestone is provided in Table 1.

Table 1. Consultation delays measured from 3 radiology documentation milestones among radiology-positive encounters (N=566).

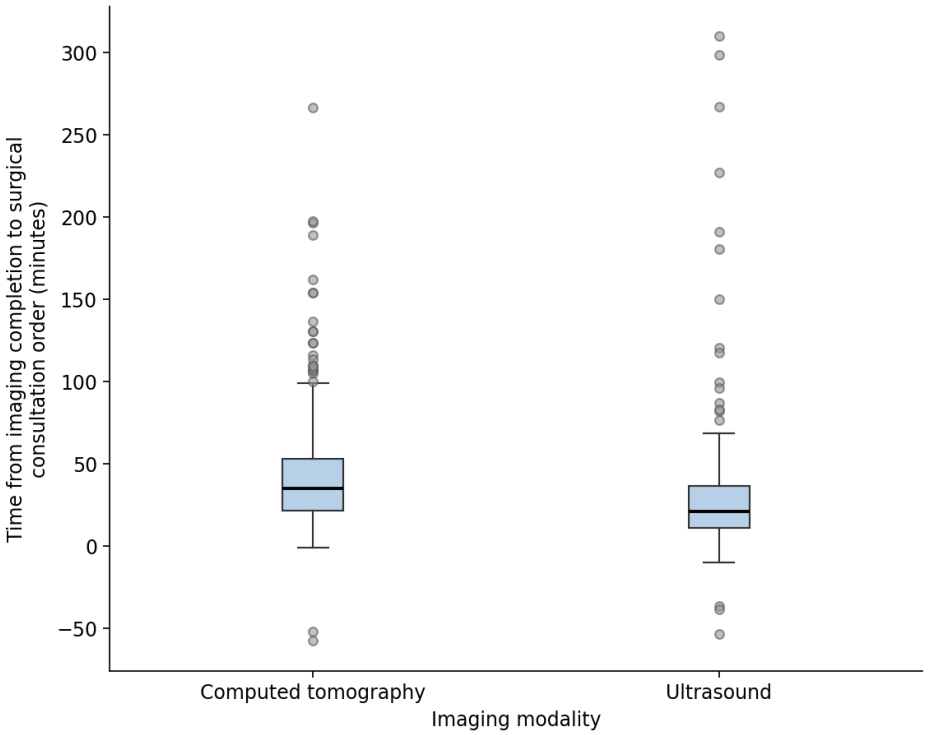
Metrics	Examination end to consultation	Preliminary interpretation to consultation	Final interpretation to consultation
Encounters included[a], n (%)	513 (90.1)	220 (38.9)	148 (26.1)
Delay (minutes), median (IQR)	31.4 (18.5-49.5)	10.2 (2.1-31.1)	10.2 (4.8-25.1)
Delay (minutes), mean (SD)	45.8 (79.2)	29.1 (61.1)	33.3 (119.0)

[a]Encounters were included in each column only if the consultation order occurred at or after the corresponding radiology time stamp; no upper time limit was applied in this descriptive analysis. Preliminary and final interpretation time stamps were documented less consistently than examination end times.

Comparisons by Imaging Modality and Age Group

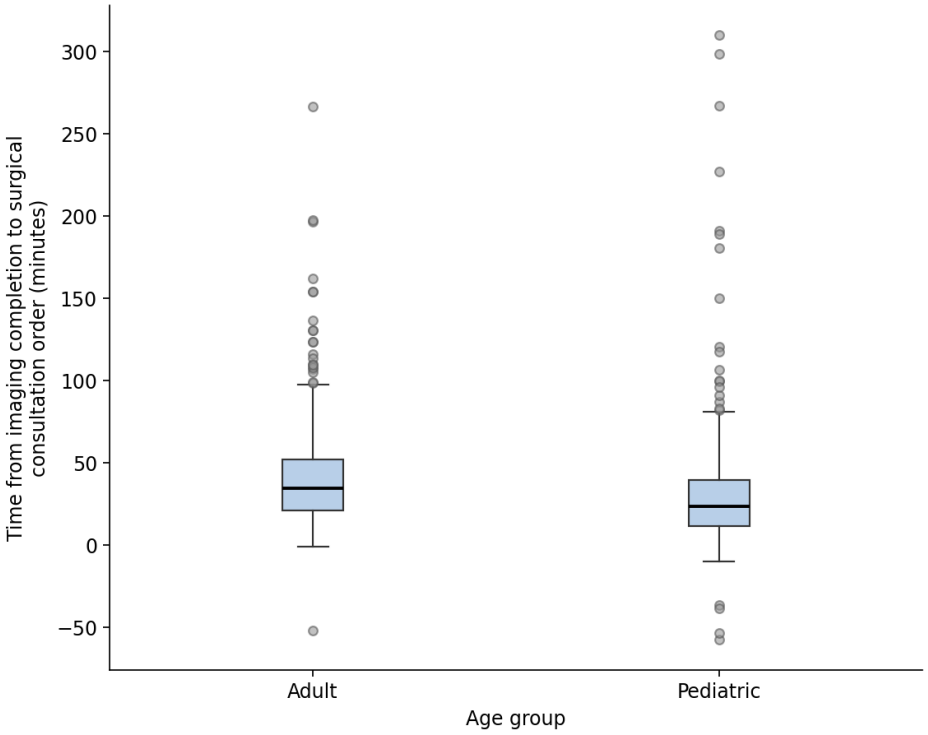
Consultation timing differed by imaging modality. For CT examinations, the median time from imaging completion to consultation order was 34.9 (IQR 21.7-53.0) minutes (n=348), compared with 21.2 (IQR 10.9-36.4) minutes for ultrasound (n=176). A Mann-Whitney *U* test demonstrated a statistically significant difference between modalities (U=41,204; P<.001). These modality-specific patterns are shown in Figure 3.

Figure 3. Distribution of time from imaging completion to surgical consultation order, stratified by imaging modality (computed tomography: n=348; ultrasound: n=176).



Timing also differed by age group in the unadjusted comparison. Adults had a median delay of 34.8 (IQR 21.3-51.9) minutes (n=335), while pediatric patients had a median delay of 23.6 (IQR 11.6-39.6) minutes (n=189). This difference was statistically significant (U=40,477; P<.001), as shown in Figure 4.

Figure 4. Distribution of time from imaging completion to surgical consultation order, stratified by age group (adult: n=335; pediatric: n=189).



Predictors of Prolonged Delay

Of the 524 encounters, 268 (51.1%) exceeded the 30-minute threshold. In the adjusted logistic regression analysis, adult age was not significantly associated with prolonged delay (OR 1.09, 95% CI 0.52-2.28; *P*=.81), whereas CT was associated with significantly higher odds of delay than ultrasound (OR 2.29, 95% CI 1.08-4.86; *P*=.03). The overall model was statistically significant (likelihood ratio *P*<.001), indicating that imaging modality contributed meaningfully to variation in consultation timing. In the exploratory model additionally adjusted for overnight imaging completion and weekend, the association with CT persisted (OR 2.32, 95% CI 1.09-4.94; *P*=.03), while neither overnight completion (OR 1.11, 95% CI 0.78-1.57; *P*=.58) nor weekend imaging (OR 0.84, 95% CI 0.57-1.25; *P*=.40) was associated with prolonged delay.

Cumulative Operational Burden

Across the 524 analyzable encounters, imaging-to-consultation waiting time totaled approximately 346 patient-hours over the 6-year study period, corresponding to approximately 58 patient-hours of additional ED occupancy per year attributable to this single diagnosis.

Discussion

Principal Findings

In this single-center retrospective study of 1422 ED encounters involving imaging for suspected appendicitis, 3 principal findings emerged. First, radiology-confirmed appendicitis was almost uniformly followed by surgical evaluation (565/566, 99.8%), indicating that the decision to involve surgery after a positive impression is effectively deterministic. Second, this reliable step was nonetheless delayed: the median interval from imaging completion to consultation order was 30.8 (IQR 17.8-48.5) minutes, 51.1% (268/524) of encounters exceeded 30 minutes, and delays were longer after CT than after ultrasound. Finally, these delays accumulated to approximately 58 patient-hours of additional ED occupancy annually. As health care systems move toward more intelligent and automated workflows, identifying processes that already occur reflexively but are performed slowly is a critical first step toward safely optimizing clinical care.

Comparison With Prior Work

Our findings extend prior work on imaging-driven ED workflow. Structured pediatric appendicitis pathways still exhibited median physician-to-consultation intervals exceeding 2 hours [8], and our data show that even the shorter imaging-to-consultation segment accounted for a median of half an hour. Interventions that restructure this communication step have consistently improved timeliness: a computerized consultation management system reduced ED length of stay [16], EHR-integrated decision support altered consultation and imaging behavior in pediatric appendicitis [9], the FASTPASS direct-to-surgery pathway halved ED-to-operation times [10], and automated closed-loop notification systems for critical imaging results improved the speed and completeness of documentation of radiologist-to-clinician communication [17,18]. Our study complements this literature by quantifying, at the encounter level, the specific interval that such systems would target for radiographically confirmed appendicitis and by contributing a manually adjudicated dataset that links impression language to consultation behavior.

Automation vs Standardized Protocols

A reasonable question is whether these delays would be better addressed by a standardized clinical protocol than by automation. We view the 2 approaches as complementary rather than competing. Protocolized pathways still depend on a clinician noticing the imaging result and manually initiating consultation; prior work shows that substantial delays persist even under structured protocols [8], and our own data demonstrate that a step that is already effectively obligatory (99.8% of positive studies led to surgical evaluation) still incurred a median delay of half an hour. Automation directly removes the dependence on human vigilance for a task with essentially no decision content, while protocols remain essential for defining who responds and how. Because more than half of encounters exceeded the 30-minute threshold, even modest reductions in activation latency would affect a large share of patients.

Toward Automated Consult Activation: Prospective Agenda

The broader significance of this work lies in its implications for future clinical systems, and we emphasize that these implications are prospective: the present study establishes the empirical foundation for automation but does not develop, validate, or benchmark an NLP model. Radiology impressions already function as triggers for action, even when documented as free text, and NLP systems, including modern LLMs, can extract actionable findings from such text with high accuracy [14,15]. Appendicitis is a favorable prototype condition because imaging has a high signal-to-noise ratio, treatment pathways are well defined, and downstream clinical actions are consistent; in such settings, automation does not replace clinical judgment but rather formalizes and accelerates decisions that are already being made reliably. Future work should develop and prospectively evaluate tools that use radiology-confirmed appendicitis findings to automatically initiate surgical consultation, trigger standardized order sets, and notify relevant care teams, with clinician oversight retained for radiology-negative or indeterminate cases that require more nuanced decision-making. The adjudicated dataset created here is designed to support the training and validation of such systems. Similar imaging-driven activation points exist across emergency and surgical care, each offering an opportunity to better align operational workflows with predictable clinical decisions.

Operational and Economic Implications

Although this analysis was not designed as a formal economic evaluation, the operational impact of these delays

is meaningful. At a single institution, the cumulative imaging-to-consultation delay for appendicitis accounted for approximately 58 patient-hours of additional ED occupancy annually. When considered alongside conservative estimates of ED cost per patient-hour, this translates to several thousand dollars per year attributable to a single common diagnosis [20,23]. More importantly, these delays consume limited ED capacity, contribute to crowding, and increase the cognitive burden on clinicians who must manually track and act on imaging results. When these delays are multiplied across institutions and other imaging-driven conditions, the system-level impact is likely substantial.

Limitations

Several limitations warrant consideration. First, this was a single-center study, and consultation workflows, staffing patterns, and radiology coverage differ across institutions; in particular, our findings partly reflect local factors such as after-hours attending radiologist availability and surgical service structure, which may limit their generalizability. Second, all impressions were classified by a single reviewer, a surgical resident with clinical informatics training; although predefined classification rules were applied and ambiguous cases were resolved by reviewing the full report, interrater reliability could not be assessed, and some subjectivity in classification is possible. Third, EHR time stamps are imperfect proxies for clinical events: they do not capture informal or verbal communication, documentation practices varied across milestones (with preliminary and final interpretation times recorded inconsistently), and consultation orders may be entered before or after the actual conversation with the surgical service, all of which may bias measured intervals in either direction. Fourth, although an exploratory model found no association between prolonged delay and overnight or weekend imaging completion, other potentially relevant variables, including ED workload and crowding, radiology turnaround time, individual clinician staffing, and patient complexity, were not reliably available in the dataset and could have confounded the observed associations. Fifth, the retrospective design limits our ability to assess downstream clinical outcomes such as time to operation, perforation, or complication rates. Finally, the cost estimate is a coarse extrapolation intended only to illustrate the order of magnitude.

Conclusions

This study demonstrates that radiographic identification of appendicitis is almost uniformly followed by surgical consultation but that the process incurs a consistent, measurable delay. By quantifying existing delays and establishing a manually adjudicated reference dataset, this work reframes workflow automation as an opportunity to better align clinical systems with decisions clinicians are already making. Future prospective studies should focus on developing and evaluating automated activation tools that leverage radiology impressions to improve timeliness, reduce operational inefficiency, and serve as scalable models for system-wide improvement in surgical care.

Generative AI Use

The authors declare that no generative AI tool was used in the study design, data collection, statistical analysis, interpretation, or preparation of the manuscript.

Funding

The authors declare that no financial support was received for this work.

Data Availability

The dataset generated and analyzed during this study contains protected health information and is not publicly available. Deidentified data may be made available from the corresponding author upon reasonable request and subject to institutional approval.

Authors' Contributions

Conceptualization: PJ, OX, SW, RT, BB, JD
Data curation: PJ, SW, BB, JD
Formal analysis: PJ, SW, EW, RT, JD
Investigation: PJ
Methodology: PJ
Project administration: OX
Resources: OX, EW, JD
Software: PJ
Supervision: RT, BB, JD
Validation: PJ, JD
Visualization: PJ
Writing—original draft: PJ, JD
Writing—review and editing: PJ, OX, SW, EW, RT, BB, JD

Conflicts of Interest

None declared.

References

1. Lotfollahzadeh S, Lopez RA, Deppen JG. Appendicitis. In: StatPearls. StatPearls Publishing; 2024. URL: https://www.ncbi.nlm.nih.gov/books/NBK493193/ [Accessed 2026-08-17]
2. Tang G, Zhang L, Xia L, Zhang J, Chen R, Zhou R. Preoperative in-hospital delay increases postoperative morbidity and mortality in patients with acute appendicitis: a meta-analysis. Int J Surg. Jan 1, 2025;111(1):1275-1284. [doi: 10.1097/JS9.0000000000001938] [Medline: 38990284]
3. Di Saverio S, Podda M, De Simone B, et al. Diagnosis and treatment of acute appendicitis: 2020 update of the WSES Jerusalem guidelines. World J Emerg Surg. Apr 15, 2020;15(1):27. [doi: 10.1186/s13017-020-00306-3] [Medline: 32295644]
4. Dhanik A, Stenson BA, Levenson RB, Antkowiak PS, Sanchez LD, Chiu DT. Root cause analysis of delayed emergency department computed tomography scans. West J Emerg Med. Mar 2024;25(2):226-229. [doi: 10.5811/westjem.17831] [Medline: 38596923]
5. Wang DC, Parry CR, Feldman M, Tomlinson G, Sarrazin J, Glanc P. Acute abdomen in the emergency department: is CT a time-limiting factor? AJR Am J Roentgenol. Dec 2015;205(6):1222-1229. [doi: 10.2214/AJR.14.14057] [Medline: 26587929]
6. Marin JR, Lyons TW, Claudius I, et al. Optimizing advanced imaging of the pediatric patient in the emergency department: technical report. Pediatrics. Jul 1, 2024;154(1):e2024066855. [doi: 10.1542/peds.2024-066855] [Medline: 38932719]
7. Durupt G, Ranzenberger LR, Tafti D, Carter KR. Appendix imaging. In: StatPearls. StatPearls Publishing; 2026. URL: https://www.ncbi.nlm.nih.gov/books/NBK549903/ [Accessed 2026-08-17]
8. Saucier A, Huang EY, Emeremni CA, Pershad J. Prospective evaluation of a clinical pathway for suspected appendicitis. Pediatrics. Jan 2014;133(1):e88-e95. [doi: 10.1542/peds.2013-2208] [Medline: 24379237]
9. Kharbanda AB, Madhok M, Krause E, et al. Implementation of electronic clinical decision support for pediatric appendicitis. Pediatrics. May 2016;137(5):e20151745. [doi: 10.1542/peds.2015-1745] [Medline: 27244781]
10. Kulvatunyou N, Zimmerman SA, Adhikhari S, et al. The impact of FASTPASS: a collaboration with emergency department to improve management of patients with gallbladder disease and acute appendicitis. J Surg Res. Apr 2021;260:293-299. [doi: 10.1016/j.jss.2020.11.018] [Medline: 33360754]
11. Pesapane F, Tantrige P, De Marco P, et al. Advancements in standardizing radiological reports: a comprehensive review. Medicina (Kaunas). Sep 17, 2023;59(9):1679. [doi: 10.3390/medicina59091679] [Medline: 37763797]
12. Schwartz LH, Panicek DM, Berk AR, Li Y, Hricak H. Improving communication of diagnostic radiology findings through structured reporting. Radiology. Jul 2011;260(1):174-181. [doi: 10.1148/radiol.11101913] [Medline: 21518775]
13. Choi K, Choi JY, Kim HJ, Kim HJ, Jang SK. Added value of structured reporting for US of the pediatric appendix: additional CT examinations and negative appendectomy. J Korean Soc Radiol. May 2023;84(3):653-662. [doi: 10.3348/jksr.2022.0027] [Medline: 37324982]
14. Li MD, Wood PA, Alkasab TK, Lev MH, Kalpathy-Cramer J, Succi MD. Automated tracking of emergency department abdominal CT findings during the COVID-19 pandemic using natural language processing. Am J Emerg Med. Nov 2021;49:52-57. [doi: 10.1016/j.ajem.2021.05.057] [Medline: 34062318]
15. Reichenpfader D, Müller H, Denecke K. A scoping review of large language model based approaches for information extraction from radiology reports. NPJ Digit Med. Aug 24, 2024;7(1):222. [doi: 10.1038/s41746-024-01219-0] [Medline: 39182008]
16. Cho SJ, Jeong J, Han S, et al. Decreased emergency department length of stay by application of a computerized consultation management system. Acad Emerg Med. Apr 2011;18(4):398-402. [doi: 10.1111/j.1553-2712.2011.01039.x] [Medline: 21496143]
17. Lacson R, O'Connor SD, Sahni VA, et al. Impact of an electronic alert notification system embedded in radiologists' workflow on closed-loop communication of critical results: a time series analysis. BMJ Qual Saf. Jul 2016;25(7):518-524. [doi: 10.1136/bmjqs-2015-004276] [Medline: 26374896]
18. Morris RW, Williams NM, Gordji RR, et al. Increasing utilization and improving documentation in a radiology critical alert system. Curr Probl Diagn Radiol. 2023;52(4):230-232. [doi: 10.1067/j.cpradiol.2023.03.013] [Medline: 37032290]
19. Rosen JE, Monsell SE, DePaoli SC, et al. The use and impact of a decision support tool for appendicitis treatment. Ann Surg. Oct 1, 2024;280(4):616-622. [doi: 10.1097/SLA.0000000000006412] [Medline: 38916104]
20. Average Oregon emergency department visit is 5.2 hours, dashboard shows. Oregon Health Authority. URL: https://www.oregon.gov/oha/erd/pages/average-oregon-emergency-department-visit-is-5.2-hours-dashboard-shows.aspx [Accessed 2026-08-17]
21. Optimal resources for emergency general surgery: 2022 standards. American College of Surgeons; 2022. URL: https://www.facs.org/media/evyh55dj/optimal-resources-for-emergency-general-surgery.pdf [Accessed 2026-08-17]

22. Resources for optimal care of the injured patient: 2022 standards. American College of Surgeons; 2025. URL: https://www.facs.org/quality-programs/acs-quality-program-standards-manuals/ [Accessed 2026-08-19]
23. Moore BJ, Stocks C, Owens PL. Trends in emergency department visits, 2006-2014. Agency for Healthcare Research and Quality; 2017. URL: https://hcup-us.ahrq.gov/reports/statbriefs/sb227-Emergency-Department-Visit-Trends.pdf [Accessed 2026-08-17]

Abbreviations

CT: computed tomography
ED: emergency department
EHR: electronic health record
LLM: large language model
MRI: magnetic resonance imaging
NLP: natural language processing
OR: odds ratio

Edited by Ivan Steenstra, Kenneth Cummings; peer-reviewed by Muhammed Ordu, Pratik Shingru; submitted 13.Jan.2026; final revised version received 23.Oct.2026; accepted 26.Oct.2026; published 16.Nov.2026

Please cite as:
Jenkins P, Xu O, Willis S, Kimball E, Thanawala R, Burns B, Doberne J
Radiology-to-Surgical Consultation Timing for Suspected Appendicitis in the Emergency Department: Retrospective Observational Study
JMIR Perioper Med 2026;9:e91385
URL: https://periop.jmir.org/2026/1/e91385
doi: 10.2196/91385

© Phillip Jenkins, Obert Xu, Shelby Willis, Ethan Kimball, Ruchi Thanawala, Beech Burns, Julie Doberne. Originally published in JMIR Perioperative Medicine (http://periop.jmir.org), 16.Nov.2026. This is an open-access article distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work, first published in JMIR Perioperative Medicine, is properly cited. The complete bibliographic information, a link to the original publication on http://periop.jmir.org, as well as this copyright and license information must be included.