

Mini-CAT ASSIGNMENT WORKSHEET

Clinical Scenario

13-year-old female with no significant PMHx presents to the ED with 1 day of lower abdominal pain radiating to the periumbilical area. Pain is constant, sharp, rated 8/10, worsens with bending, and is temporarily relieved by Motrin. She reports associated nausea without vomiting or diarrhea. Bowel movements are normal, and she denies fever, chills, urinary symptoms, or GI bleeding. She had a similar episode 2 weeks ago, initially treated as a UTI but later thought to be viral. She denies sexual activity, vaginal symptoms, and is premenarchal. Because the ED did not have a pediatric ultrasound available, she was transferred to Cohen's children hospital for imaging due to concern for appendicitis.

Search question: Clearly state the question (including outcomes or criteria to be tracked)
In pediatric patients with suspected appendicitis, how does a staged imaging protocol (ultrasound followed by CT, if US findings are equivocal) compared to CT alone in terms of diagnostic accuracy?

PICO search terms:

P	I	C	O
Appendicitis	Staged imaging protocol	CT scan Alone	Diagnostic accuracy
Suspected appendicitis	Pediatric ultrasound	Computed tomography	Sensitivity /specificity
Pediatrics	Staged imaging	Immediate CT	Time to diagnosis
Children	US followed by CT		
	Referral US		

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Search Strategy:

Database	Search terms used	# of results	Filters applied
PubMed	("pediatric" OR "appendicitis") AND ("staged imaging" OR "US first" OR "referral US" OR "imaging protocol") AND ("CT" OR "CT alone") AND ("diagnostic accuracy" OR "specificity" OR "sensitivity" OR "time to surgery")	11	Last 10 years, full text, meta-analysis, randomized controlled trial, systematic review, Controlled clinical trial, Validation study, English, +/- Children: birth - 18
EBSCO	("pediatric" OR "appendicitis") AND ("staged imaging"	13	Past 10 years, English, Database: Medline, CINAHL,

	OR “US first” OR “referral US” OR “imaging protocol”) AND (“CT” OR “CT alone”) AND (“diagnostic accuracy” OR “specificity” OR “sensitivity” OR “time to surgery”)		Academic Search, Academic Journal, etc.
Google scholar	(“pediatric” OR “appendicitis”) AND (“staged imaging” OR “US first” OR “referral US” OR “imaging protocol”) AND (“CT” OR “CT alone”) AND (“diagnostic accuracy” OR “specificity” OR “sensitivity” OR “time to surgery”)	1311	Time range: 2021-2026, Review articles, sort by relevance

For this search question, I used PubMed, EBSCO, and Google Scholar. I focused on finding high levels of evidence, mainly systematic reviews and meta-analyses. If those weren’t available, I prioritized randomized controlled trials (RCTs), since they allow for direct comparison between interventions and help minimize bias through randomization. I also considered more recent RCTs, as they better reflect current clinical practice and guidelines. If RCTs were limited, I included cohort studies, since they follow pediatric patients over time and can provide insight into how these interventions perform in real-world settings. I avoided case reports and case series because they are more prone to bias and do not represent strong levels of evidence.

In PubMed, applying my search terms and filters yielded 11 articles. I first reviewed the titles to get a general sense of each study, then read the abstracts of those relevant to my question. From this, I selected three articles. In EBSCO, my search resulted in 13 articles. I used the same approach of reviewing titles and abstracts. In the end, I selected one article, which was a systematic review and meta-analysis. I followed a similar process in Google Scholar but ultimately did not select any articles from this database, as many were narrative reviews and did not meet the level of evidence I was looking for.

Articles Chosen

Article 1: Ultrasound and computed tomography in differentiating between simple and complicated appendicitis in pediatric patients

<https://link-springer-com.york.ezproxy.cuny.edu/article/10.1007/s00383-024-05880-0>

Citation:

Badlis, M., Amari, K., Alkheshi, M., Alolaby, K., & Alsaid, B. (2024). *Ultrasound and computed tomography in differentiating between simple and complicated appendicitis in pediatric patients: A systematic review and meta-analysis*. *Pediatric Surgery International*, 40:299. <https://doi.org/10.1007/s00383-024-05880-0>

Type of article: Systematic review and meta-analysis

Abstract:

Abstract

Objectives This study aims to measure the diagnostic accuracy and reliability of US and CT in diagnosing complicated appendicitis among pediatric patients and to find the performance of the imaging modalities in detecting complication signs.

Methods a systematic review and meta-analysis were done on 15 eligible studies from the Medline Database concerning pediatric appendicitis and its complications. Studies either provided an overall estimate of sensitivity and specificity of the imaging modality or addressed signs of complicated appendicitis. The reference standard employed was either surgical findings or histopathology reports.

Results The review included assessments of 4,497 pediatric patients, with 285 undergoing CT and 4,212 undergoing US imaging. CT demonstrated sensitivities of 62% and 68.4%, and specificities of 81% and 92.4%. US showed sensitivities of 33.9% to 51.5% and specificities ranging from 68.8% to 95%. The ultrasound's ability to detect appendiceal wall diameter > 5 mm showed the highest sensitivity (99.4%), while the conglomerate sign indicated the highest specificity (99.9%).

Conclusion The findings suggest that both US and CT exhibit higher specificity than sensitivity in diagnosing complicated appendicitis in pediatric patients. Given its favorable specificity, non-invasiveness, and lack of radiation exposure, US should be the first-line imaging modality in suspected cases of pediatric appendicitis. CT, offering robust specificity, should be reserved for ambiguous cases where US results are inconclusive. These insights underscore the critical role of precise imaging modalities in enhancing diagnostic accuracy, reducing unnecessary surgeries, and improving clinical outcomes in pediatric appendicitis management.

Why I chose this article: I chose this article because it directly evaluates the diagnostic accuracy of ultrasound and CT in pediatric appendicitis. As a systematic review and meta-analysis, it represents a high level of evidence and includes a large pediatric population, strengthening the reliability of its findings. The study clearly demonstrates the trade-off between ultrasound and CT, showing that while CT has higher sensitivity, ultrasound remains a strong initial test due to its safety profile. This directly supports a staged imaging approach (US first, followed by CT if equivocal).

Foreign study policy

Cultural context:

This study includes data from multiple countries, including regions such as the Middle East and Europe, where there is increasing awareness of radiation risks in pediatric populations but variability in how strictly ultrasound-first protocols is implemented. In some regions, CT may still be more commonly used due to its perceived diagnostic reliability, reflecting a more imaging-driven culture compared to settings that prioritize radiation reduction. This variation in clinical culture may influence the reported diagnostic performance of ultrasound and CT and how often CT is used as a follow-up modality.

Social context:

Differences in provider training and experience with pediatric ultrasound across countries play a major role in this study. In some healthcare systems, pediatric radiology expertise is more centralized, while in others, general radiologists or emergency physicians perform imaging, which may reduce ultrasound accuracy. Additionally, differences in patient populations, such as variations in BMI, age distribution, and disease presentation, may affect imaging quality and diagnostic performance. These factors can impact how generalizable the results are to U.S. pediatric populations.

Economic context:

The availability and cost of imaging modalities differ significantly across the countries included in this study. In lower-resource settings, ultrasound is often preferred due to its lower cost and accessibility, whereas CT may be limited or reserved for more severe or unclear cases. In contrast, higher-resource systems may rely more heavily on CT due to availability and efficiency. These economic differences may influence the observed preference for staged imaging protocols and should be considered when applying the findings to U.S. practice.

Article 2: Complementary computed tomography to inconclusive ultrasonography in children with suspected acute appendicitis: A systematic review and meta-analysis.

<https://research-ebSCO-com.york.ezproxy.cuny.edu/c/q3txcd/viewer/pdf/v4tmswzjmr>

Citation:

Araujo, V. D. C., Lopes, B. C., Petroianu, A., & Souza, I. K. F. (2026). *Complementary computed tomography to inconclusive ultrasonography in children with suspected acute appendicitis: A systematic review and meta-analysis*. *The American Surgeon*, 92(2), 576–589. <https://doi.org/10.1177/00031348251371186>

Type of article: Systematic review and meta-analysis

Abstract:

Abstract

Introduction: The optimal diagnostic pathway for pediatric acute appendicitis (AA) following an inconclusive or negative ultrasonography (US) is poorly defined, leading to debate over subsequent computed tomography (CT) use. This systematic review and meta-analysis compared negative appendectomy rates in children managed with a US-only pathway vs a pathway involving CT after a non-diagnostic initial US.

Methods: Following PRISMA guidelines (PROSPERO: CRD42024568560), we systematically searched 6 databases, including PubMed and Embase, through July 2024 for longitudinal studies comparing the 2 diagnostic pathways. Two reviewers independently selected studies and extracted data. Risk of bias in included studies was assessed using the ROBINS-I and Newcastle-Ottawa Scale, and the certainty of evidence was evaluated using the GRADE framework. A fixed-effects meta-analysis was performed to calculate pooled odds ratios (ORs) with 95% confidence intervals (CIs).

Results: The pooled analysis demonstrated that a US-only pathway was associated with significantly lower odds of negative appendectomy compared to the US-followed-by-CT pathway (OR 0.44; 95% CI 0.21-0.90; $P = 0.02$). This protective association was even more pronounced in the subgroup of patients with an initial inconclusive US (OR 0.22; 95% CI 0.05-0.89; $P = 0.03$).

Conclusion: In children with suspected AA after a non-diagnostic US, a US-only pathway is associated with a significantly lower rate of negative appendectomy. These findings support strategies that prioritize clinical re-evaluation and repeat US to reduce unnecessary surgeries and radiation exposure. However, given the low certainty of evidence, clinical judgment remains paramount.

Why I chose this article: I chose this article because it directly evaluates the role of CT after an inconclusive ultrasound, which closely aligns with my question on staged imaging (US followed by CT if equivocal). As a systematic review and meta-analysis, it is the highest level of evidence. Key findings from this study shows that the US-only group had significantly lower odds of negative appendectomy, which suggests that adding CT does not necessarily improve clinical outcomes and may even contribute to unnecessary interventions. I found this particularly important because CT is often used to increase diagnostic certainty, but this study shows that its routine use after an equivocal ultrasound may not always provide additional benefit. It also highlights the variability in clinical decision-making following inconclusive imaging, which is very relevant to real-world practice. Overall, this article helps answer whether a staged imaging approach truly improves diagnostic accuracy and outcomes, while also considering potential harms such as radiation exposure. Although the study population was not limited to pediatrics, I still think it is important to include because this clinical question is relevant across multiple settings, including emergency medicine, pediatrics, urgent care, and surgery, where patient populations are not exclusively pediatric.

Article 3: Repeat ultrasound in pediatric EDs improves appendicitis diagnosis after referral imaging

<https://pmc.ncbi.nlm.nih.gov/articles/PMC12602418/>

Citation:

Perpelitsa, V., Ames, J., Kaila, R., et al. (2025). *Repeat ultrasound in pediatric EDs improves appendicitis diagnosis after referral imaging*. *Frontiers in Pediatrics*, 13:1676690. <https://doi.org/10.3389/fped.2025.1676690>

Type of article: Retrospective cohort study

Abstract:

Background: Acute appendicitis is a leading cause of surgical emergencies in children, with ultrasound (US) emerging as a preferred diagnostic tool due to its lack of radiation and cost-effectiveness. However, the accuracy of US is highly operator-dependent and may vary between general referring emergency departments (EDs) and specialized pediatric EDs.

Objective: To compare the diagnostic sensitivity and specificity of US performed at referring EDs vs. a pediatric ED in identifying acute appendicitis.

Methods: A retrospective study analyzed pediatric patients aged <18 years who underwent US at referring EDs and were transferred to a pediatric ED for repeat imaging between July 2018 and July 2023. Data collected included US findings, surgical pathology, white blood cell count, and patient disposition. Sensitivities of the US were calculated and compared between settings.

Results: Among 64 children included, the US at the pediatric ED demonstrated higher sensitivity (85.2%) compared to referring EDs (51.9%) ($p = 0.018$). Pediatric ED US resulted in fewer non-visualized appendices (a 34.4% reduction) and equivocal findings (a 30.5% reduction). Patients with positive surgical pathology exhibited higher white blood cell counts (mean 17.1) and neutrophil percentages (mean 81.0%). False positive rates were low (6.9%), aligning with published benchmarks.

Conclusion: US performed at pediatric EDs exhibited superior diagnostic accuracy for appendicitis compared to referring EDs, likely due to operator expertise and enhanced imaging protocols. Efforts to standardize training and improve resources at referring EDs may reduce diagnostic disparities and unnecessary interventions.

Why I chose this article: I chose this article because it addresses an important secondary outcome in my question, which is the need for interfacility transfer and its impact on diagnostic accuracy. This study demonstrates that ultrasound accuracy varies significantly between referring emergency departments and specialized pediatric centers, often leading to repeat imaging and transfers. It highlights how limitations in initial imaging can delay diagnosis and affect clinical workflow, including time to surgical consultation. This is highly relevant because staged imaging protocols may increase reliance on ultrasound, and this study helps evaluate whether that approach is effective across different clinical settings.

Article 4: Diagnostic accuracy of non-radiologist-performed ultrasound for diagnosing acute appendicitis in pediatric patients: A systematic review and meta-analysis

<https://pmc.ncbi.nlm.nih.gov/articles/PMC12299215/>

Citation:

Oh, S. K. (2025). *Diagnostic accuracy of non-radiologist-performed ultrasound for diagnosing acute appendicitis in pediatric patients: A systematic review and meta-analysis*. *Medicina*, 61(7), 1308. <https://doi.org/10.3390/medicina61071308>

Type of article: Systematic review and meta-analysis

Abstract:

Abstract

Background and Objectives: Acute appendicitis is a common cause of abdominal pain requiring surgery in pediatric patients. Given concerns regarding radiation exposure from computed tomography (CT), ultrasound (US) has become the first-line diagnostic modality. In many emergency and resource-limited settings, non-radiologist physicians often perform these examinations. This study aimed to evaluate the diagnostic accuracy of a non-radiologist-performed ultrasound in detecting acute appendicitis in children. *Materials and Methods:* We conducted a systematic review and meta-analysis according to the PRISMA guidelines. The literature was searched across PubMed, Ovid MEDLINE, EMBASE, the Cochrane Library, and Google Scholar through June 2024. Studies reporting on the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of non-radiologist-performed ultrasounds in pediatric appendicitis were included. Study quality was assessed using the QUADAS-2 tool, and a bivariate random-effects model was used for statistical analysis. *Results:* Eight studies, with a total of 1006 pediatric patients, were included. The pooled sensitivity and specificity were 0.87 (95% CI, 0.83–0.90) and 0.93 (95% CI, 0.91–0.95), respectively. The area under the SROC curve was 0.783 (95% CI, 0.708–0.853), suggesting moderate-to-good diagnostic accuracy. Substantial heterogeneity was observed across studies, possibly due to differences in operator training and ultrasound techniques. *Conclusions:* Non-radiologist-performed ultrasound demonstrates moderate-to-good diagnostic accuracy in identifying pediatric appendicitis. These findings support its implementation in emergency or resource-constrained settings and suggest that incorporating structured ultrasound training for non-radiologists may improve timely diagnosis and optimize clinical decision-making in pediatric emergency care.

Why I chose this article: Since my question focuses on using ultrasound as the initial test before deciding on CT, it is important to understand how reliable ultrasound is on its own. This systematic review and meta-analysis found that ultrasound had a pooled sensitivity of 87% and specificity of 93%, demonstrating moderate-to-high diagnostic accuracy even when performed by non-radiologists. I found this particularly relevant because it supports the use of ultrasound as a first-line modality, which is the foundation of a staged imaging approach. The study also highlights that ultrasound accuracy is highly operator-dependent, which helps explain why some patients may still require CT or further evaluation. Although this article overlaps with other studies evaluating ultrasound accuracy, I chose to include it because it specifically focuses on non-radiologist-performed ultrasound, which better reflects real-world clinical settings such as emergency departments where immediate radiology support may not always be available. This adds an important perspective by addressing variability in provider skill and resource availability, which can directly impact the effectiveness of a staged imaging protocol and when CT is ultimately needed.

Foreign study policy

Cultural context:

This study was conducted in South Korea, where there is a strong emphasis on efficiency in emergency care and increasing use of point-of-care ultrasound by non-radiologist providers. There is a cultural acceptance of physician-performed ultrasound as part of routine clinical evaluation, which differs from the U.S., where imaging is more often performed by radiology departments. This may influence the reported effectiveness of ultrasound as a first-line modality.

Social context:

The study reflects a healthcare environment where non-radiologists, such as emergency physicians, are frequently responsible for performing and interpreting ultrasound. This differs from many U.S. settings, where radiologists play a larger role in imaging interpretation. Additionally, training systems and workflow structures may differ, impacting the consistency and accuracy of ultrasound findings. Patient flow in high-volume emergency departments may also influence reliance on rapid, bedside diagnostic tools.

Economic context:

South Korea has a national healthcare system that emphasizes cost-efficiency and rapid access to care. Ultrasound is a relatively low-cost and widely accessible imaging modality, making it a practical first-line option. This economic environment may encourage the use of ultrasound over CT, particularly in settings where reducing cost and improving throughput are priorities. These factors support the feasibility of ultrasound-first strategies but may differ from U.S. practice patterns, where CT is more readily utilized.

Summary of Evidence:

Author (Date)	Level of evidence	Sample/setting (# of subjects/studies/cohort/definition, etc)	Outcome(s) studied	Key findings	Limitations and Biases
Badlis et al. (2024)	Systematic review and meta-analysis	<ul style="list-style-type: none">- Included 15 studies (4 prospective, 11 retrospective) evaluating imaging in pediatric appendicitis- Total of 4,497 pediatric patients (ages 0–18 years)- 4,212 patients underwent ultrasound, while 285 underwent CT imaging- Studies conducted across multiple international centers with varying healthcare systems and imaging protocols- Included both simple and complicated appendicitis cases, defined based on surgical and histopathologic findings- Reference standard for diagnosis was surgical findings and/or histopathology	<ul style="list-style-type: none">-Diagnostic accuracy- Sensitivity and specificity- Ability to detect complicated appendicitis- Performance of specific radiologic findings	<ul style="list-style-type: none">- CT demonstrated higher sensitivity (62–68.4%) and specificity (81–92.4%)- US had lower sensitivity (33.9–51.5%) but comparable specificity (up to 95%)- Certain US findings showed very high sensitivity (~99%) or specificity (~99.9%)	<ul style="list-style-type: none">- The study had significant heterogeneity across studies, particularly in imaging protocols, definitions of appendicitis, and operator expertise.- A large proportion of included studies were retrospective, increasing the risk of selection bias and limiting control over confounding variables.- 11 out of 15 studies were

				<ul style="list-style-type: none"> - The study demonstrates that CT has higher sensitivity than ultrasound, which supports its role in improving diagnostic accuracy when ultrasound findings are equivocal. - These findings support a US-first strategy followed by CT when needed, aligning with the staged imaging protocol while considering diagnostic accuracy and radiation exposure. 	<p>noted as high risk of bias, and 12 had applicability concerns, which may affect the reliability and generalizability of the findings.</p> <ul style="list-style-type: none"> - There was variability in reference standards (surgical vs histopathology), which may introduce inconsistencies in outcome assessment. - Foreign studies and their differences in patient populations, such as variations in BMI, age distribution, and disease presentation, may affect imaging quality and diagnostic performance. These factors can impact how generalizable the results are to U.S. pediatric populations.
Araujo et al. (2026)	Systematic review and meta-analysis	<ul style="list-style-type: none"> - 5 studies (4 cohort, 1 non-randomized trial) - Total 1,250 pediatric patients 	- Primary outcome: Negative appendectomy rate	- The study found that a US-only	- The overall certainty of evidence was

with inconclusive or negative initial US findings
- 515 underwent CT, 735 managed with US-only pathway
- Conducted in U.S. and Canada
- Focused on decision-making after equivocal ultrasound findings

- Comparison of imaging pathways (US-only vs US followed by CT)
- Indirect assessment of diagnostic accuracy and clinical outcomes

pathway was associated with significantly lower odds of negative appendectomy compared to a pathway that included CT
- In patients with equivocal ultrasound findings, then primary outcome was even more pronounced
- The study suggest that adding CT does not necessarily improve diagnostic accuracy and may lead to unnecessary interventions. This challenges the assumption that CT should routinely follow equivocal ultrasound findings and instead supports a more conservative approach, such as repeat

low due to reliance on observational studies rather than randomized controlled trials.
- There was selection bias, as the decision to proceed with CT after inconclusive ultrasound was not standardized and likely influenced by provider judgment.
- The number of included studies was small (5 studies, 1,250 patients), which may limit statistical power and generalizability.
- There was notable clinical heterogeneity, such as differences in patient populations, imaging protocols, and definitions of “inconclusive” ultrasound.

				ultrasound or clinical reassessment.	
Perepelitsa et al. (2025)	Retrospective cohort study	<ul style="list-style-type: none"> -Retrospective cohort study including 64 pediatric patients (<18 years old) - Conducted within the U.S. healthcare system from 2018–2023 - Included patients who had an initial ultrasound at a referring (community) emergency department followed by a repeat ultrasound at a pediatric emergency department within 12 hours - Study population represents patients who required interfacility transfer for further evaluation - Compared imaging performance between general EDs vs specialized pediatric centers - Included patients with suspected appendicitis who had paired imaging studies for direct comparison 	<ul style="list-style-type: none"> - Diagnostic accuracy of US - Equivocal/non-visualized appendix rates - Impact of repeat imaging - Transfer implications 	<ul style="list-style-type: none"> - Pediatric ED ultrasound demonstrated significantly higher sensitivity (85.2% vs 51.9%, p = 0.018) compared to referring EDs. - Repeat ultrasound reduced non-visualized appendix rates by 34.4% and equivocal findings by 30.5%. - These findings highlight that the effectiveness of a staged imaging approach depends on provider expertise and imaging quality, which may influence diagnostic accuracy and contribute to increased need for CT or interfacility transfer. 	<ul style="list-style-type: none"> - The study had a small sample size (n=64) and was conducted within a single health system, which limits generalizability. - There is selection bias, as only patients who were transferred and underwent repeat ultrasound were included, excluding those managed at the initial site. - The retrospective design increases the risk of missing data and limits control over confounding variables. - The time interval between initial and repeat ultrasound may have influenced diagnostic accuracy due to disease progression. - Differences in operator experience and institutional

					protocols may limit applicability to other clinical settings.
Oh (2025)	Systematic review and meta-analysis	<ul style="list-style-type: none"> - Included 8 studies with a total of 1,006 pediatric patients - Studies evaluated non-radiologist-performed ultrasound (e.g., emergency physicians, surgeons) - Conducted across multiple countries and healthcare settings, including emergency departments and resource-limited environments - Included pediatric patients with suspected acute appendicitis undergoing ultrasound as the primary diagnostic modality 	<ul style="list-style-type: none"> - Diagnostic accuracy - Sensitivity/specificity - Point-of-care US performance 	<ul style="list-style-type: none"> - The study demonstrates that ultrasound has moderate-to-high diagnostic accuracy (sensitivity 87% & specificity 93%) even when performed by non-radiologists, supporting its reliability as a first-line imaging modality. - This reinforces the feasibility of a staged imaging approach by showing that ultrasound alone can often provide sufficient diagnostic information. - However, variability in operator skill may lead to equivocal results, which 	<ul style="list-style-type: none"> - There was heterogeneity across studies due to variability in operator skill, training, and ultrasound technique. - Some included studies had an unclear or high risk of bias, which may affect the validity of pooled results. - The study focused specifically on non-radiologist-performed ultrasound, which may limit generalizability to settings with radiologist-performed imaging. - Differences in clinical settings (emergency departments vs resource-limited environments) may impact applicability to U.S. practice.

				explains when CT may still be required in the staged imaging protocol	
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Conclusions

Badlis et al. (2024) concluded that CT shows better diagnostic performance compared to ultrasound in pediatric appendicitis, particularly in its ability to detect complicated cases and reduce missed diagnoses. CT showed higher sensitivity and specificity across studies, making it a more reliable modality when diagnostic certainty is required. However, the authors emphasized that ultrasound still plays a critical role as the initial imaging modality due to its high specificity, safety profile, and lack of ionizing radiation. They support a diagnostic approach in which ultrasound is used first, with CT reserved for cases where ultrasound findings are equivocal or nondiagnostic, thereby balancing diagnostic accuracy with patient safety.

Araujo et al. (2026) concluded that the addition of CT after an inconclusive ultrasound does not consistently improve clinical outcomes and may increase the likelihood of unnecessary surgical interventions, such as negative appendectomies. The study found that patients managed without immediate CT had lower odds of negative appendectomy, which suggests that routine escalation to CT may not always be beneficial. The authors highlight that decision-making after equivocal ultrasound should not be automatic, and that alternative strategies such as repeat ultrasound or clinical observation may be equally effective and beneficial. Overall, the study emphasizes a more selective and individualized approach to CT use rather than routine imaging following nondiagnostic ultrasound.

Perepelitsa et al. (2025) concluded that the diagnostic accuracy of ultrasound in pediatric appendicitis is highly dependent on the clinical setting and the level of provider expertise. Ultrasound performed at specialized pediatric emergency departments demonstrated significantly higher sensitivity and fewer equivocal results compared to ultrasound performed at referring community emergency departments. The authors found that repeat ultrasound at pediatric centers improved appendix visualization and reduced indeterminate findings, which can impact diagnostic accuracy and clinical decision-making. These findings underscore the importance of imaging quality, standardized protocols, and pediatric-specific expertise in achieving optimal diagnostic performance.

Oh (2025) concluded that non-radiologist-performed ultrasound can achieve moderate-to-high diagnostic accuracy in pediatric appendicitis, demonstrating that it is a viable first-line imaging modality. The study highlights that point-of-care ultrasound can be effectively integrated into clinical practice, particularly in emergency settings where rapid decision-making is required. However, the authors also emphasize that ultrasound remains highly operator-dependent, with variability in accuracy based on provider training, experience, and technique. As a result, while ultrasound is broadly useful, its reliability may vary across different clinical environments.

Overall conclusion:

Overall, the evidence supports a staged imaging approach (ultrasound first, followed by CT only if equivocal) for pediatric patients with suspected appendicitis. While CT consistently demonstrates higher sensitivity and overall diagnostic accuracy (Badlis et al.), it does not necessarily improve clinical outcomes when used routinely after an inconclusive ultrasound and may contribute to unnecessary interventions, such as negative appendectomies (Araujo et al.). Ultrasound, on the other hand, provides adequate diagnostic value as an initial test and avoids radiation exposure, especially when performed by trained providers (Oh). However, the effectiveness of this approach is highly dependent on operator skill, imaging quality, and clinical setting, as ultrasound accuracy significantly improves in pediatric-specific centers and may be limited in community settings (Perepelitsa et al.).

In relation to my question, this evidence suggests that a staged imaging protocol maintains diagnostic accuracy while reducing unnecessary CT use compared to a CT alone-first approach. In my patient's case, the need for interfacility transfer due to lack of pediatric ultrasound highlights a key limitation of this strategy: although ultrasound-first imaging is preferred, it is only effective when high-quality pediatric ultrasound is available. Without it, patients may experience delays in diagnosis or require transfer for appropriate imaging, which can impact clinical workflow and patient care.

Clinical bottom line

The weight of my studies is as follows: Araujo et al., Badlis et al., Oh et al., and Perepelitsa et al.

I weighed Araujo et al. (2026) highest because it most directly answered my question by evaluating whether CT should be used after an inconclusive ultrasound. As a systematic review and meta-analysis, it provides high-level evidence and specifically focuses on the decision point within a staged imaging protocol. The study found that a US-only pathway was associated with lower odds of negative appendectomy, which suggests that routine CT after equivocal ultrasound does not improve clinical outcomes and may lead to unnecessary interventions. This directly supports a more selective and conservative imaging approach.

I weighed Badlis et al. (2024) second because it is also a systematic review and meta-analysis with a large pediatric population. This study demonstrated that CT has higher sensitivity and specificity compared to ultrasound, which is important for diagnostic accuracy. However, it also supports the use of ultrasound as a first-line modality due to its safety and lack of radiation. While it does not directly compare staged imaging to CT alone, it provides strong evidence explaining why CT is useful when ultrasound is inconclusive. This supports a joint application of both image modalities rather than CT alone.

I weighed Oh et al. (2025) third because it is another systematic review and meta-analysis that focuses on the diagnostic accuracy of ultrasound, particularly when performed by non-radiologists. The study showed that ultrasound has a pooled sensitivity of 87% and specificity of 93%, which supports its role as a reliable first-line imaging modality. However, it is slightly less

directly applicable to my question because it does not compare imaging strategies and mainly focuses on ultrasound performance. That said, this study highly relevant to real-world practice, where ultrasound is often performed by non-radiologists, especially in emergency and pediatric settings.

I weighed Perepelitsa et al. (2025) last because it is a retrospective cohort study with a smaller sample size. However, I still found it valuable because it highlights real-clinical limitations of staged imaging. The study demonstrated that ultrasound accuracy is significantly higher in pediatric centers compared to community settings, and that repeat ultrasound improves diagnostic clarity. This is important because it shows that the effectiveness of a staged imaging approach depends on operator skill, imaging quality, and resource availability.

Clinical significance:

From a clinical standpoint, these findings suggest that a staged imaging approach is both safe and effective for evaluating pediatric appendicitis. Ultrasound provides adequate diagnostic information in many cases and avoids radiation exposure, which is especially important in pediatric populations. Although CT offers higher sensitivity, its routine use may not significantly improve outcomes and may increase unnecessary interventions. Therefore, ultrasound should be used as the initial imaging modality, with CT reserved for equivocal or inconclusive cases.

Other considerations:

A key consideration is that the success of a staged imaging protocol depends heavily on the availability of high-quality pediatric ultrasound and trained providers. In settings where pediatric ultrasound is limited, such as community emergency departments, patients may require interfacility transfer or CT imaging, which can delay diagnosis. Additionally, variability in ultrasound performance due to operator skill and patient factors (i.e., body habitus) must be considered.