JOURNAL OF TAZEEZ FOR PUBLIC HEALTH
AN OFFICIAL JOURNAL OF SAUDI HEALTH PROMOTION AND EDUCATION ASSOCIATION
Vol3; Issue2, Dec. 2026

Systematic Review

A Systematic Review of Ultrasonography for the Diagnosis of Soft Tissue and Skin Abscesses in Emergency Departments

Mazi mohammed Alanazi[1], Abdulrahman Masmali[2], Ali Abdulrahman Alahmari[2]

1. Saudi and Jordanian Board Emergency Medicine, Emergency Department, Head of Emergency Research Unit, First Health Cluster, Riyadh, Saudi Arabia ORCID: 0009-0003-5836-8086

2. Saudi Board Emergency Medicine Resident, Emergency Medicine Department, First Health Cluster, King Saud Medical City, Riyadh, Saudi Arabia

Abstract

Background: Skin and soft tissue infections are among the primary causes of ED visits for patients. We set out to determine the diagnostic accuracy of ultrasonography in the diagnosis of soft tissue and skin abscesses in emergency department. **Method**: Our study meets the PRISMA requirements and was conducted in accordance with best practice principles. We searched PubMed, Scopus, Google Scholar, and the Cochrane database of controlled trials to locate publications published between 2016 and 2023. We reviewed the available bibliographies for the studies and examined the articles to make sure nothing was missed. **Result and conclusion**: Five studies total, four in the ED and one in the clinic, were included in this systematic review. Four ultrasound investigations were conducted by emergency medicine experts, and one ultrasound investigation was conducted by family practice and internal medicine specialists. According to the included research, cellulitis abscesses may be reliably diagnosed by ultrasonography. Providers should consider using ultrasonography into their diagnostic examination of skin and soft tissue infections when there is a clinical question.

Keywords: ultrasound, skin abscess, soft tissue abscess, diagnosis

Published: February 14th 2026
https://doi.org/10.65759/spx5cc02

Introduction

Infections of the skin and soft tissues are frequently the main reason for patients to visit the ED. According to one study, throughout the course of ten years, the annual number of patients seeking care for an abscess in the ED rose from 1.2 million to 3.2 million (1). Including ED and outpatient visits, this figure rose to 14.2 million people (2).

Distinguishing between cellulitis and an abscess in the ED is crucial since their management differs greatly. Systemic antibiotics are often used to treat cellulitis, but an incision and drainage are necessary for additional source control in the case of an abscess (3). While misdiagnosis an abscess as cellulitis might result in delayed therapy and perhaps exacerbating the illness, misdiagnosis cellulitis as an abscess can lead to an unpleasant and needless operation.

In the past, doctors have mostly depended on the patient's history and physical examination to distinguish between cellulitis and abscesses. It might be challenging to base a diagnosis only on these characteristics, though, as physical examination results may overlap with other illnesses.3 Berger et al. discovered that clinical evaluation had an 83% specificity and only 76% sensitivity. On the other hand, Marin et al. (4) discovered that clinical examination was only 44% sensitive and 42% specific in instances with clinical ambiguity, but was moderately accurate in situations with a high degree of clinical certainty. Of the patients in their cohort, more than 40% belonged to the latter category. Furthermore, a number of studies have shown that the interrater reliability of diagnosis and the necessity for drainage are minimal (5).

The limits of clinical examination in identifying abscesses have led to a growing interest in ultrasonography as a potential adjunct technique to enhance abscess diagnosis (4,6). It may have high diagnostic accuracy for diagnosing abscesses, according to two earlier assessments (7,8). They were nonetheless constrained by somewhat modest sample sizes. Our goal was to find out how well ultrasound could diagnose skin and soft tissue abscesses.

Method

Our study was carried out in compliance with best practice guidelines and complies with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) criteria (9). To find articles from 2016 to 2023, we searched PubMed, Scopus, Google Scholar, and the Cochrane database of controlled trials. We looked over the studies' bibliographies that were found and checked the papers for any that could have been overlooked. Experts on the subject were also approached in order to find any other pertinent studies.

All prospective or randomized controlled trials evaluating the utility of ultrasonography for skin and soft tissue abscesses met the inclusion criteria. The proportion of management adjustments that were made correctly vs incorrectly, whether ultrasonography led to a change in care, and the variations in treatment failure rates between types of ultrasonography groups were among the secondary outcomes.

Each investigator evaluated each study separately for eligibility based on the previously established standards. Every abstract that satisfied the first set of requirements was examined in full. The final data analysis includes studies found to satisfy the eligibility requirements on full-text examination by both extractors. Any disagreements were settled by

consensus, with the contributing author added as necessary.

Results and discussion

We included 5 studies in this systematic review (Fig 1) with a total of 1730 patients. 4 were conducted in the ED and one in the clinic (Table 1). Emergency medicine specialist performed the ultrasound 4 investigations, while family practice and internal medicine specialists performed the ultrasound in one investigation. Main findings of the included studies were presented in Table 2.

Accurately determining if an abscess is present or absent in patients with skin and soft tissue infections allows for care that maximizes results without requiring needless intrusive procedures. Among 1,216 participants in a clinical trial with suspected cellulitis, wound infection, or abscess, Mower et al. examined the usefulness of bedside soft tissue ultrasonography. They found that, in general, ultrasonography rarely informed clinical decision making, but when it did, it generally improved appropriateness of management. Clinicians were confident in the presence or absence of an abscess in around 90% of instances; their clinical judgment was accurate, and ultrasonography seldom resulted in a change in treatment (10). Mower et al. findings are at odds with those of a related research that included 126 persons with cellulitis who did not have a visible abscess upon physical examination. In that investigation, the authors reported that in 56% of the cases, ultrasonography altered the planned course of treatment (4).

Compared to the Mower et al. research, a greater threshold for confidence regarding the presence or absence of an abscess was finally observed in 46% of these individuals. Additionally, a few single-site trials with a small number of doctors and studies with children have shown that bedside ultrasonography might help diagnose drainable abscesses more accurately and assist in the process (11,12). In comparison to Mower et al.'s findings, a recent meta-analysis found that ultrasonography had a similar sensitivity but a slightly lower specificity for the detection of abscesses. This could be due to a different range of patients with more advanced cellulitis and early fluid collections that do not prove to be true abscesses upon exploration (13).

Ultrasound has been evaluated in two prior systematic studies for its use in the diagnosis of abscesses (7,8). Six investigations with a 97% sensitivity and an 83% specificity were found by Subramaniam et al (7). Barbic et al. (8) showed that ultrasound had 96.2% sensitivity and 82.9% specificity after identifying 8 trials.

In pediatric, inflammatory or infectious etiology account for the great majority of soft tissue neck masses (14,15). The cervical lymphatic chain becomes inflamed as the lymphatic system removes infections from the head and neck, which enlarges the lymph nodes that are connected to it (16). Lymphadenitis develops when streptococcal or staphylococcal species—which are frequently the causing organisms—are injected into the swollen lymph nodes (16,17). Systemic signs including fever, erythema overlaying the neck, and unilateral neck swelling are common indicators that lymphadenitis differs from reactive lymph nodes (16). If the bacteria are not treated, they will suppurate and

destroy the lymph node's architecture, which will lead to the formation of an abscess.

Although the diagnosis of lymphadenitis is often made based on clinical grounds, ultrasonography has become the preferred imaging modality for investigating soft tissue neck masses when the diagnosis is equivocal (17,18). A normal lymph node is an ovoid, bean-shaped structure with a long axis greater than a short axis (14,15). Blood flows into the node through its central hilum. Lymphadenitis appears sonographically similar to an uninfected lymph node, although it occasionally displays increased peripheral vascular flow (17). A lymph node that has an abscess, on the other hand, loses its architectural integrity, frequently appearing more circular, occasionally displaying variable degrees of internal echoes, and lacking internal vascular flow (17).

In ED patients presenting with soft tissue or skin infection, the use of ultrasonography did not lead to a decreased treatment failure rate when compared with clinical evaluation alone, according to a research by Lam et al (11). Nonetheless, clinicians who using US said it was often helpful for creating and modifying patient care plans, especially when there was a lot of clinical ambiguity (11).

Point-of-care ultrasound was linked to a 73-minute decrease in the disposition time, according to research by Lin et al (19). To more accurately evaluate the impact of US on the time to diagnosis and disposition, further prospective trials are required. Future research should also identify the best training regimen and the frequency at which this test has to be administered in order to preserve provider competency. The role of color Doppler and compression varied throughout research, despite the fact that the majority of them employed imaging in two planes. Future studies should be conducted to ascertain how color Doppler and compression affect this technique's diagnostic accuracy.

Fig 1 PRISMA flow chart

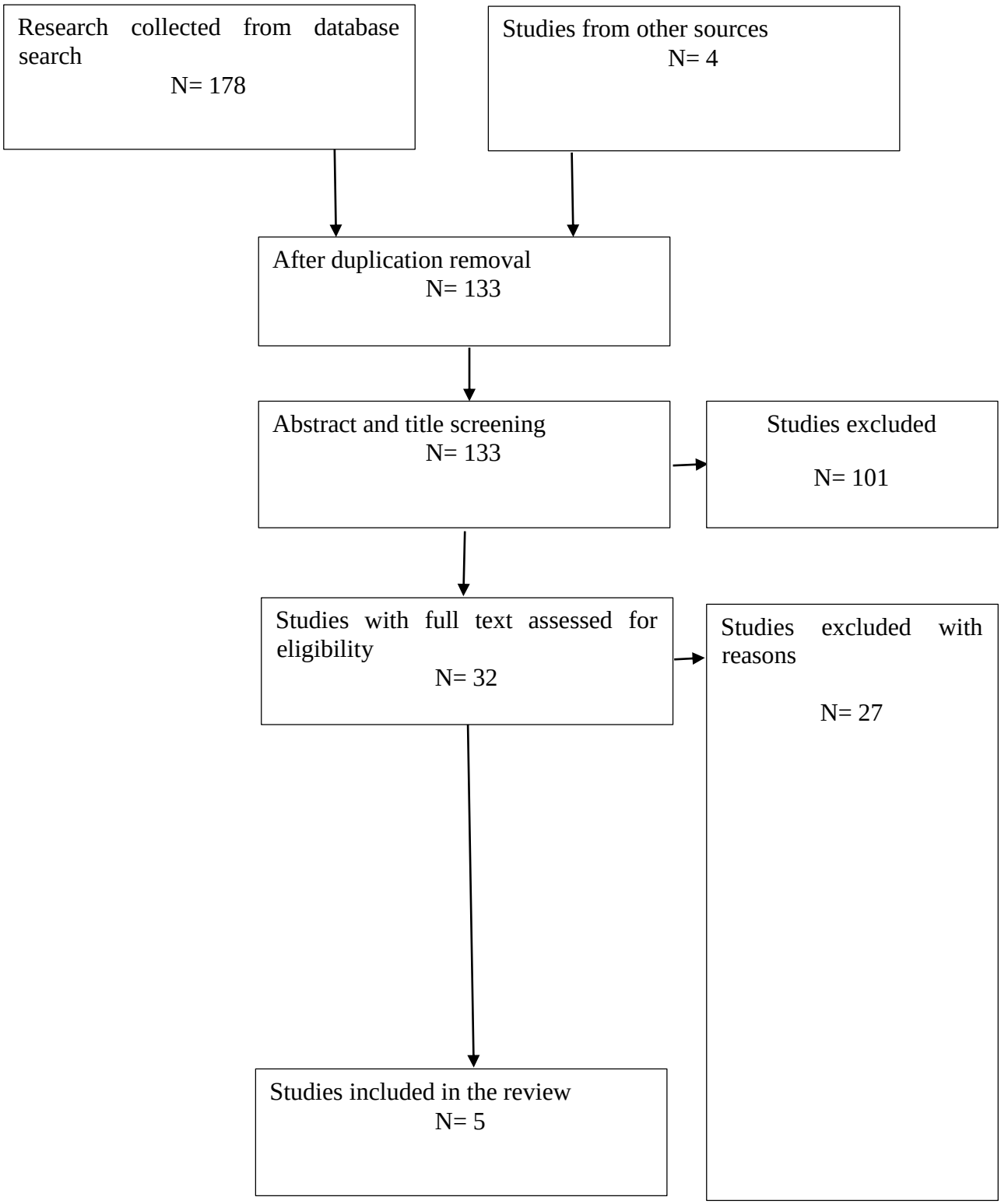

Table 1: characteristics of the studies included

Citation	Sample size	Study area	Percentage of abscesses	Specialist performed sonography	Standard
Mower et al., 2019 (10)	1216	ED	68	Emergency medicine specialist	Lust for incision and drainage at the first visit or the week-long follow-up. Every other instance was declared to have no abscess.
Lam et al., 2018 (11)	305	ED	41	Emergency medicine specialist	Purulence on incision and drainage at the first visit or at the 7 to 10 day follow-up. No abscess was seen in any of the other instances.
Greenlund et al., 2017 (20)	31	Clinic	Not available	Family practice and internal medicine	Not available
Levine et al., 2019 (21)	27	ED	31	Emergency medicine specialist	Radiology or CT ultrasound
Adams et al., 2016 (12)	151	ED	68	Emergency medicine specialist	Incision and drainage purulence on the first visit or throughout the two- to five-day follow-up. No abscess was found in any of the other instances.

Table 2: main findings of the studies included

Citation	Sample size
Mower et al., 2019 (10)	Based on surgical exploration and a week of follow-up, the clinical evaluation's sensitivity and specificity for abscess diagnosis were 90.3% and 97.7%, respectively, while the ultrasonography's results were 94.0% and 94.1%. The clinical evaluation's sensitivity and specificity among all instances for which the clinician was certain were 96.6% and 97.3%, respectively, whereas the ultrasonographic evaluation's sensitivity and specificity were 95.7% and 96.2%, respectively. Ultrasonography's sensitivity and specificity were 68.5% and 80.4%, respectively, out of 105 unclear instances. In 1.2% of instances, ultrasonography altered management, and in 23.1% of cases, it was not. Ultrasonography altered care in 23.8% of 105 unclear instances—appropriately in 84% and improperly in 16% of cases.
Lam et al., 2018 (11)	For all of the major or secondary outcomes, there was no statistically significant difference between the US and non-US groups. In 23% of the cases, the US group's management plan was altered. US was found to be more beneficial by clinicians in situations when clinical ambiguity was greater.
Greenlund et al., 2017 (20)	52% of patients had a clinical examination that was erroneous for size estimation by more than 0.5 cm. In 7 patients (23%) and 10 patients (32%), the ultrasound examination altered the physician's decision regarding whether or not to perform incision and drainage; in these cases, the management was changed in 55% of cases. In 16 cases (52%), the physician's confidence in carrying out the procedure was increased.
Levine et al., 2019 (21)	The research included twenty-seven patients. Three patients had CT, twenty-two received US, and two received both. In 78% of instances, US and radiology imaging diagnoses agreed with one another. As a result, there was generally high concordance between US and radiology imaging diagnoses; the kappa value between US and radiology imaging diagnoses was 0.69.

Adams et al., 2016 (12)	The sensitivity and specificity of ultrasonography for the presence of an abscess were 96% and 87%, respectively, out of 151 SSTIs studied among 148 patients. Physical examination has a sensitivity of 84% and specificity of 60% for the presence of abscess. For every four ultrasonography tests, one management adjustment was made correctly.

Conclusion

The included studies suggest that ultrasonography can accurately diagnose abscesses from cellulitis. When there is clinical doubt, providers should think about including ultrasonography into their diagnostic evaluation of infections of the skin and soft tissues.

List of abbreviations

US, ultrasound

CT, computed tomography

ED, emergency department

References

1. Taira BR, Singer AJ, Thode HC, Lee CC. National epidemiology of cutaneous abscesses: 1996 to 2005. Am J Emerg Med. 2009 Mar;27(3):289–92.

2. Hersh AL. National Trends in Ambulatory Visits and Antibiotic Prescribing for Skin and Soft-Tissue Infections. Arch Intern Med. 2008 Jul 28;168(14):1585. doi: 10.1001/archinte.168.14.1585

3. Singer AJ, Talan DA. Management of Skin Abscesses in the Era of Methicillin-Resistant Staphylococcus aureus. N Engl J Med. 2014 Mar 13;370(11):1039–47. doi: 10.1056/NEJMra1212788

4. Marin JR, Dean AJ, Bilker WB, Panebianco NL, Brown NJ, Alpern ER. Emergency Ultrasound-assisted Examination of Skin and Soft Tissue Infections in the Pediatric Emergency Department. Moore C, editor. Acad Emerg Med. 2013 Jun 12;20(6):545–53. doi: 10.1111/acem.12148

5. Marin JR, Bilker W, Lautenbach E, Alpern ER. Reliability of Clinical Examinations for Pediatric Skin and Soft-Tissue Infections. Pediatrics. 2010 Nov 1;126(5):925–30.

6. Berger T, Garrido F, Green J, Lema PC, Gupta J. Bedside ultrasound performed by novices for the detection of abscess in ED patients with soft tissue infections. Am J Emerg Med. 2012 Oct;30(8):1569–73.

7. Subramaniam S, Bober J, Chao J, Zehtabchi S. Point-of-care Ultrasound for Diagnosis of Abscess in Skin and Soft Tissue Infections. Carpenter CR, editor. Acad Emerg Med. 2016 Nov;23(11):1298–306. doi: 10.1111/acem.13049

8. Barbic D, Chenkin J, Cho DD, Jelic T, Scheuermeyer FX. In patients presenting to the emergency department with skin and soft tissue infections what is the diagnostic accuracy of point-of-care ultrasonography for the diagnosis of abscess compared to the current standard of care? A systematic review and meta-an. BMJ Open. 2017 Jan 10;7(1):e013688. doi: 10.1136/bmjopen-2016-013688

9. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ. 2021 Mar 29;n71. doi: 10.1136/bmj.n71

10. Mower WR, Crisp JG, Krishnadasan A, Moran GJ, Abrahamian FM, Lovecchio F, et al. Effect of Initial Bedside Ultrasonography on Emergency Department Skin and Soft Tissue Infection Management. Ann Emerg Med. 2019 Sep;74(3):372–80.

11. Lam SHF, Sivitz A, Alade K, Doniger SJ, Tessaro MO, Rabiner JE, et al. Comparison of Ultrasound Guidance vs. Clinical Assessment Alone for Management of Pediatric Skin and Soft Tissue Infections. J Emerg Med. 2018 Nov;55(5):693–701.

12. Adams CM, Neuman MI, Levy JA. Point-of-Care Ultrasonography for the Diagnosis of Pediatric Soft Tissue Infection. J Pediatr. 2016 Feb;169:122-127.e1.

13. Gottlieb M, Pandurangadu AV. What Is the Utility of Ultrasonography for the Identification of Skin and Soft Tissue Infections in the Emergency Department? Ann Emerg Med. 2017 Oct;70(4):580–2.

14. Rosenberg HK. Sonography of Pediatric Neck Masses. Ultrasound Q. 2009 Sep;25(3):111–27.

15. Papadopouli E, Michailidi E, Papadopoulou E, Paspalaki P, Vlahakis I, Kalmanti M. CERVICAL LYMPHADENOPATHY IN CHILDHOOD EPIDEMIOLOGY AND MANAGEMENT. Pediatr Hematol Oncol. 2009 Sep 21;26(6):454–60. doi: 10.3109/08880010903091848

16. Gosche JR, Vick L. Acute, subacute, and chronic cervical lymphadenitis in children.

Semin Pediatr Surg. 2006 May;15(2):99–106.

17. Friedman ER, John SD. Imaging of Pediatric Neck Masses. Radiol Clin North Am. 2011 Jul;49(4):617–32.

18. Kadom N, Lee EY. Neck Masses in Children: Current Imaging Guidelines and Imaging Findings. Semin Roentgenol. 2012 Jan;47(1):7–20.

19. Lin MJ, Neuman M, Rempell R, Monuteaux M, Levy J. Point-of-Care Ultrasound is Associated With Decreased Length of Stay in Children Presenting to the Emergency Department With Soft Tissue Infection. J Emerg Med. 2018 Jan;54(1):96–101.

20. Greenlund LJS, Merry SP, Thacher TD, Ward WJ. Primary Care Management of Skin Abscesses Guided by Ultrasound. Am J Med. 2017 May;130(5):e191–3.

21. Levine MC, Arroyo A, Likourezos A, Homel P, Dickman E. The use of point of care ultrasound in the evaluation of pediatric soft tissue neck masses. Am J Emerg Med. 2019 Aug;37(8):1466–9.