

2024 Clinical Practice Guideline Update by the Infectious Diseases Society of America on Complicated Intra-abdominal Infections: Diagnostic Imaging of Suspected Acute Diverticulitis in Adults and Pregnant People

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This paper is part of a clinical practice guideline update on the risk assessment, diagnostic imaging, and microbiological evaluation of complicated intra-abdominal infections in adults, children, and pregnant people, developed by the Infectious Diseases Society of America. In this paper, the panel provides recommendations for diagnostic imaging of suspected acute diverticulitis. The panel's recommendations are based on evidence derived from systematic literature reviews and adhere to a standardized methodology for rating the certainty of evidence and strength of recommendation according to the GRADE (Grading of Recommendations Assessment, Development, and Evaluation) approach.

Keywords. intra-abdominal infection; acute diverticulitis; guideline; diagnostic imaging; radiology.

In adults with suspected acute diverticulitis, should computed tomography, ultrasound, or magnetic resonance imaging be obtained as the initial imaging modality?

Recommendation: In non-pregnant adults with suspected acute diverticulitis, the panel suggests obtaining an abdominal computed tomography (CT) as the initial diagnostic modality (*conditional recommendation, very low certainty of evidence*).

Remarks:

- Intravenous (IV) contrast is usually appropriate whenever a CT is obtained and can be helpful to characterize and detect subtle bowel wall abnormalities and complications of diverticulitis; however, CT without IV contrast may be appropriate [1].

Recommendation: In non-pregnant adults with suspected acute diverticulitis, if CT is unavailable or contraindicated, the panel suggests obtaining an ultrasound (US) or magnetic resonance imaging (MRI) as the initial diagnostic modality (*conditional recommendation, very low certainty of evidence*).

In pregnant adults with suspected acute diverticulitis, should computed tomography, ultrasound, or magnetic resonance imaging be obtained as the initial imaging modality?

Recommendation: In pregnant adults with suspected acute diverticulitis, US or MRI can be considered for imaging; however, the panel is unable to recommend one imaging modality versus the other (*knowledge gap*).

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This paper is part of a clinical practice guideline update on the risk assessment, diagnostic imaging, and microbiological evaluation of complicated intra-abdominal infections in adults, children, and pregnant people, developed by the Infectious Diseases Society of America [2–8]. In this paper, the guideline panel provides recommendations for diagnostic imaging of suspected acute diverticulitis in adults, including pregnant adults. Recommendations are stratified by initial imaging and then subsequent imaging if initial imaging is inconclusive. These recommendations replace previous statements in the last iteration of this guideline [9].

A complicated intra-abdominal infection extends beyond the hollow viscus of origin into the peritoneal space and is associated with either abscess formation or peritonitis; this term is not meant to describe the infection's severity or anatomy. An uncomplicated intra-abdominal infection involves intramural inflammation of the gastrointestinal tract and has a substantial probability of progressing to complicated infection if not adequately treated.

These recommendations are intended for use by healthcare professionals who care for patients with suspected intra-abdominal infections.

METHODS

The panel's recommendations are based on evidence derived from systematic literature reviews and adhere to a standardized methodology for rating the certainty of evidence and strength of recommendation according to the GRADE (Grading of Recommendations Assessment, Development, and Evaluation) approach (Supplementary Figure 1) [10]. The recommendations have been endorsed by the European Society of Clinical Microbiology and Infectious Diseases (ESCMID). Strong recommendations are made when the recommended course of action would apply to most people with few exceptions. Conditional recommendations are made when the suggested course of action would apply to the majority of people with many exceptions and shared decision making is important.

A comprehensive literature search (through October 2022) was conducted as part of a systematic review. Key eligibility criteria at both the topic and clinical question levels guided the search and selection of studies. The search was limited to include any randomized controlled trials (no publication date limit) or observational studies published in 2010 or thereafter. Due to a lack of studies addressing MRI, the publication date limit was expanded to include studies published in 2005 or thereafter. Studies addressing children were excluded because diverticulitis is rare in children. Studies addressing appendiceal diverticulitis and colonic diverticular bleeding, along with those studying CT colonography, magnetic resonance cholangiopancreatography, unenhanced CT, and point-of-care US (POCUS) were also excluded.

Although POCUS is used frequently, only studies assessing ultrasounds performed in a controlled manner and interpreted by a radiologist were included, primarily due to the variability in interpretation of POCUS. Refer to the full list of eligibility criteria in the [Supplementary Material](#).

Sensitivities, specificities, and corresponding 2×2 tables were plotted in RevMan based on the population and imaging study [11]. Included studies underwent critical appraisal according to the GRADE approach, and then an assessment of benefits and harms of care options informed the recommendations [10, 12]. Details of the systematic review and guideline development processes are available in the [Supplementary Material](#).

SUMMARY OF EVIDENCE

A comprehensive search identified 7 observational studies meeting eligibility on whether to use CT, US, or MRI to diagnose diverticulitis [13–19] (Supplementary Table 1).

Three studies addressed the diagnostic accuracy of CT or MRI in the targeted patient population (ie, patients with suspected diverticulitis) [13, 15, 19]. Computed tomography yielded sensitivities of 92–99% and specificities of 97–100% (Supplementary Figure 2), whereas MRI yielded a sensitivity of 94% (95% CI: 82–99%) and a specificity of 88% (95% CI: 47–100%) (Supplementary Figure 3).

No studies addressing the diagnostic accuracy of US in patients with suspected diverticulitis were found; however, 4 studies addressing the diagnostic accuracy of US or CT in patients with abdominal pain were identified [14, 16–18]. No studies addressing the diagnostic accuracy of MRI were found for this broader patient population. As expected, studies that enrolled patients with abdominal pain versus patients with suspected diverticulitis, specifically, had a lower prevalence of diagnosed diverticulitis. Therefore, patients enrolled in these studies had a lower pre-test probability of diverticulitis. In these studies, US yielded sensitivities of 61–100% and specificities of 99–100% (Supplementary Figure 4), whereas CT yielded sensitivities of 81–95% and specificities of 93–99% (Supplementary Figure 5).

The evidence comparing CT with MRI is of low certainty due to indirect comparisons, ie, each study compared only 1 imaging modality to the clinical reference standard, and due to a small sample size in the study addressing MRI (Supplementary Tables 2 and 3). The evidence comparing CT with US is of very low certainty due to risk of bias as determined by applying the QUADAS-2 tool [20, 21], indirect comparisons as described above, indirect populations in that these studies included patients with abdominal pain, and wide CIs for the sensitivities of US (Supplementary Tables 2 and 4).

No studies addressing the diagnostic accuracy of imaging modalities for pregnant patients with suspected diverticulitis

were identified. However, the panel considered evidence from non-pregnant adults, along with the balance between benefits and harms (eg, radiation exposure) of each imaging modality.

Additional analyses were performed that were considered informative but not essential to formulating the recommendation (Supplementary Figure 6, Supplementary Table 5).

RATIONALE FOR RECOMMENDATIONS

Computed tomography is suggested as the initial imaging modality for non-pregnant adults with suspected diverticulitis due to its high diagnostic accuracy for diverticulitis. Additionally, CT can identify complications associated with diverticulitis (eg, perforation, abscess, pylephlebitis, bowel obstruction, bleeding, fistula) and can be used to rule out other causes of abdominal pain [1, 22–24]. Compared with MRI, CT is more readily available, often more feasible, less costly, and may cause less distress for patients with a sensitivity to noise or confined spaces. Compared with US, obtaining a CT as the initial imaging test may decrease the need for additional imaging, resulting in saved time and resources. These benefits outweigh the risks attributed to CT of radiation exposure [25, 26] and contrast-associated side effects (eg, contrast-induced nephropathy).

IMPLEMENTATION CONSIDERATIONS

If CT imaging is not readily available or is contraindicated, US or MRI are reasonable alternatives in terms of diagnostic accuracy. Ultrasound results may be limited by abdominal tenderness, leading to a more restricted evaluation, and patient obesity. Intravenous (IV) contrast is usually appropriate whenever a CT is obtained and can be helpful to characterize and detect subtle bowel wall abnormalities and complications of diverticulitis; however, CT without IV contrast may be appropriate [1]. At least one study found similar diagnostic performance in low-dose unenhanced CT as compared with contrast-enhanced, standard-dose CT in adults with suspected acute diverticulitis [27].

RESEARCH NEEDS

Future research on MRI as the initial diagnostic imaging modality in patients with suspected diverticulitis would be informative. Head-to-head comparisons of different imaging modalities in this patient population are also needed. Additional research on low-dose CT would also be helpful.

Supplementary Data

Supplementary Materials are available at *Clinical Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

Notes

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Dr. Robert Bonomo is chair of the panel. Drs. Pranita Tamma and Robert Bonomo served as clinical leads for the questions addressed in this manuscript. The remaining panelists assisted with the conception and design of the analysis, interpretation of data, drafting and revising the recommendations and manuscript, and final approval of the recommendations and manuscript to be published. Jennifer Loveless, lead methodologist, and Katelyn Donnelly, methodologist, were responsible for project management, designing and performing the data analyses, and leading the panel according to the GRADE process.

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Additional information. More detailed information on the analysis and development of recommendations is available in the [Supplementary Material](#).

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