Bibliographic Cite	PMID Link	Literature Type	Level of Evidence	Purpose	Population	Intervention and Outcome Measures	Results/ Recommendations	Study Limitations
Ahmed O, Rodrigues DM, Nguyen GC. Magnetic Resonance Imaging of the Small Bowel in Crohn's Disease: A Systematic Review and Meta-Analysis. Can J Gastroenterol Hepatol. 2016;2016:7857352.	27446869	Systematic Review	Moderate level of evidence	To analyze the use of MR in detecting small bowel activity as well as extramural complications in Crohn's patients.	1020 Crohn's patients were included.	There were 27 included studies, of which 19 were included in the pooled analysis. Pooled analysis of the 19 studies (1020 patients) with raw data revealed a sensitivity of 0.88 (95% CI 0.86 to 0.91) and specificity was 0.88 (95% CI 0.84 to 0.91). In regard to detecting stenosis, pooled sensitivity was 0.65 (95% CI 0.53 to 0.76) and specificity was 0.93 (95% CI 0.89 to 0.96).	MR imaging provides a reliable alternative in detecting small bowel activity in patients with Crohn's disease. Its advantages include high diagnostic accuracy and no radiation exposure while its disadvantages include high cost and limited availability.	The analysis revealed fairly high specificity in detecting stenosis, but only moderate sensitivity. Some of the limitations of our study include the varied length of time between the reference standard and MR imaging. Similarly, due to the small number of studies, we were not able to determine whether more advanced MR (such as MR with 3.0 T magnetic field strength) had any additional benefit. Finally, the large heterogeneity amongst the studies, including reference standards, radiologists experience, and results, suggests that more definitive studies might still be required.
Kabir SA, Kabir SI, Sun R, et al. How to diagnose an acutely inflamed appendix; a systematic review of the latest evidence. Int J Surg. 2017;40:155-62.	28279749	Systematic Review	Moderate level of evidence	To systematically report and analyse the latest evidence on the different approaches used in diagnosing appendicitis.	The study included ultimate diagnoses of appendicitis. After applying inclusion and exclusion criteria, a total of 58 studies were selected for final review.	Two independent researchers screened title and abstracts, 3222 articles were considered irrelevant. A third independent reviewer reviewed equivocal cases. Selections were based on the PRISMA Flow methodology. Included studies comprised of randomized controlled trials, meta-analyses, systematic reviews, retrospective studies, case series and case reports.	In summary, in adults, raised Alvarado scores and laboratory markers (WCC, CRP) all contribute to the suspicion of appendicitis. When alone, none of them are able to predict the diagnosis in a valid or reliable way. Subsequent surgical intervention should therefore not be based on either of them alone. However, when used in combination they show greater promise. A precise algorithm for the diagnosis of appendicitis based on a combination of these variables will prove to be useful. We believe also that many novel markers will be adopted and utilised successfully in the future. Further research is warranted to determine the effectiveness of these markers, and to continue searching for undiscovered potential markers. CT remains the best radiological modality for diagnosing appendicitis but radiation exposure and long-term cancer risks are a major concern. The use of USS-CT pathways or even USS-MRI pathways increases diagnostic certainty without always having to expose unclear cases to radiation. The alternative use of repeat USS may reach a sensitivity of 100%. The precise sequence and threshold for imaging pathways remains are yet to be determined.	N/A
Kopylov U, Yung DE, Engel T, et al. Diagnostic yield of capsule endoscopy versus magnetic resonance enterography and small bowel contrast ultrasound in the evaluation of small bowel Crohn's disease: Systematic review and meta-analysis. Dig Liver Dis. 2017; 49(8):854-863.	28512034	Systematic Review and Meta-analysis	Low level of evidence	To compare the diagnostic yield (DY) of CE to MRE and SICUS in detection and monitoring of SB CD through meta-analysis of the available literature.	A total of 112 studies were retrieved; following selection, 13 studies were eligible for analysis. Allstudies were of European origin: (1- Denmark (n = 1), the Netherlands (n = 1), Israel (n = 1), Germany (n = 4), Italy (n = 6)). Three studies involved pediatric patients, while the rest evaluated adult patients only. Two studies included only patients with suspected CD, five studies established CD only; the rest included both suspected and established CD.	Authors performed a systematic literature search for trials comparing the accuracy of CE, MRE and SICUS for detection of active SB inflammation in patients with suspected and/or established CD. Only prospective studies comparing CE with another additional diagnostic modality were included in the final analysis. Pooled odds ratios (ORs) for the DY of the three modalities were calculated.	The DY of CE for detection of active SB CD was similar to that of MRE (10 studies, 400 patients, OR 1.17; 95% CI 0.83–1.67) and SICUS (5 studies, 142 patients, OR 0.88; 95% CI 0.51–1.53). The outcomes were similar for the subgroups of suspected versus established CD and adult versus pediatric patients. CE was superior to MRE for proximal SB CD (7 studies, 251 patients, OR 2.79; 95% CI 1.2–6.48); the difference vs SICUS was not significant. The authors conclude that CE, MRE and SICUS have similar DY for detection of SB CD in both suspected and established CD. CE is superior to MRE for detection of proximal SB disease, however the risk of capsule retention should be considered.	Most of the limitations of our study are inherent to all diagnosticmeta-analyses and include heterogeneity in diagnostic protocols, diagnostic criteria and patient selection. There was lack of a "gold-standard" modality for detection of SB CD, therefore most of the included studies compared the modalities against each other. Thus,a calculation of estimated sensitivity and specificity for the modalities was impossible due to a lack of gold-standard modality for which the results obtained by either modality could be compared. An additional limitation of the analysis is that authors limited it to studies using CE as a comparator.
Rud B, Vejborg TS, Rappeport ED, et al. Computed tomography for diagnosis of acute appendicitis in adults. Cochrane Database Syst Rev. 2019; Nov 19; 2019(11):CD009977.	31743429	Systematic Review	High level of evidence	To evaluate the accuracy of CT for diagnosing appendicitis in adults with suspected appendicitis. Secondary objectives were to compare the accuracy of contrast-enhanced versus non-contrast-enhanced CT, to compare the accuracy of low-dose versus standard-dose CT, and to explore the influence of CT-scanner generation, radiologist experience, degree of clinical suspicion of appendicitis, and aspects of methodological quality on diagnostic accuracy.	Authors included prospective studies that compared results of CT versus outcomes of a reference standard in adults (> 14 years of age) with suspected appendicitis. We excluded studies recruiting only pregnant women; studies in persons with abdominal pain at any location and with no particular suspicion of appendicitis; studies in which all participants had undergone ultrasonography (US) before CT and the decision to perform CT depended on the US outcome; studies using a case-control design; studies with fewer than 10 participants; and studies that did not report the numbers of true-positives, false-positives, false-negatives, and true-negatives. Authors identified 64 studies including 71 separate study populations with a total of 10,280 participants (4583 with and 5697 without acute appendicitis).	Two review authors independently screened and selected studies for inclusion. Two review authors then independently collected the data from each study and evaluated methodological quality according to the Quality Assessment of Studies of Diagnostic Accuracy - Revised (QUADAS-2) tool. A bivariate random-effects model was used to obtain summary estimates of sensitivity and specificity.	Estimates of sensitivity ranged from 0.72 to 1.0 and estimates of specificity ranged from 0.5 to 1.0 across the 71 study populations. Summary sensitivity was 0.95 (95% confidence interval (CI) 0.93 to 0.96), and summary specificity was 0.94 (95% CI 0.92 to 0.95). At the median prevalence of appendicitis (0.43), the probability of having appendicitis following a positive CT result was 0.92 (95% CI 0.90 to 0.94), and the probability of having appendicitis following a negative CT result was 0.04 (95% CI 0.03 to 0.05). In subgroup analyses according to contrast enhancement, summary sensitivity was higher for CT with intravenous contrast (0.96, 95% CI 0.92 to 0.98), CT with rectal contrast (0.97, 95% CI 0.93 to 0.99), and CT with intravenous and oral contrast enhancement (0.96, 95% CI 0.93 to 0.98) than for unenhanced CT (0.91, 95% CI 0.87 to 0.93). Summary sensitivity of CT with oral contrast enhancement (0.89, 95% CI 0.81 to 0.94) and unenhanced CT was similar. Results show practically no differences in summary specificity, which varied from 0.93 (95% CI 0.90 to 0.95) to 0.95 (95% CI 0.90 to 0.98) between subgroups. Summary sensitivity for low-dose CT (0.94, 95% 0.90 to 0.97) was similar to summary sensitivity for standard-dose or unspecified-dose CT (0.95, 95% 0.93 to 0.96); summary specificity did not differ between lowdose and standard-dose or unspecified-dose CT. No studies had high methodological quality as evaluated by the QUADAS-2 tool. Major methodological problems were poor reference standards and partial verification primarily due to inadequate and incomplete follow-up in persons who did not have surgery. The authors conclude that the sensitivity and specificity of CT for diagnosing appendicitis in adults are high. Unenhanced standard-dose CT appears to have lower sensitivity than standard-dose CT with intravenous, rectal, or oral and intravenous contrast enhancement.	In some study reports, the reporting quality made it difficult to assess whether data collection was conducted prospectively or retrospectively. In most of these situations, authors contacted the corresponding author and excluded the study if they received no reply. However, for some studies, judgments may have been too liberal. In general, they accepted studies as having prospective data collection if study authors used the term 'prospective' or 'consecutive' to characterise the data collection, and if they found no clear-cut evidence to suggest the contrary. Another limitation was that authors did not distinguish between uncomplicated and complicated acute appendicitis as separate target conditions.
Taylor MR, Lalani N. Adult small bowel obstruction. Acad Emerg Med. 2013;20(6):528-44.	23758299	Meta-Analysis; Review	Moderate level of evidence	The primary objective was to perform a systematic review and meta-analysis of the history, physical examination, and imaging modalities associated with the diagnosis of (small bowel obstruction)SBO. The secondary objectives were to identify the prevalence of SBO in prospective ED-based studies of adult abdominal pain and to apply Pauker and Kassirer's threshold approach to clinical decision-making to the diagnosis and management of SBO	To be included in this review, prospective studies were required to have 1) bedside US performed by EPs, 2) enrollment of adult patients with symptoms/signs suggestive of AAAs, and 3) comparison/confirmation of results. We searched MEDLINE and EMBASE with the PubMed interface for articles from 1965 through November 2011 (see Appendix A for complete MEDLINE and EMBASE search strategies). We also searched the Cochrane Central Register of Controlled Trials and the Cochrane Review addressing the topic of emergency bedside US in the diagnosis of AAA. The searches were conducted with the assistance of a medical librarian. Review of the titles and abstracts of the search results were conducted independently by two authors (ER and NM) and disagreements were adjudicated by a third author (RS). Bibliographies of the included articles were also reviewed.	METHODS: MEDLINE, EMBASE, major emergency medicine (EM) textbooks, and the bibliographies of selected articles were scanned for studies that assessed one or more components of the history, physical examination, or diagnostic imaging modalities used for the diagnosis of SBO. The selected articles underwent a quality assessment by two of the authors using the Quality Assessment of Diagnostic Accuracy Studies 2 (QUADAS-2) tool. Data used to compile sensitivities and specificities were obtained from these studies and a meta-analysis was performed on those that examined the same historical component, physical examination technique, or diagnostic test. Separate information on the prevalence and management of SBO was used in conjunction with the meta-analysis findings of computed tomography (CT) to determine the test and treatment threshold.	The prevalence of SBO in the ED was determined to be approximately 2% of all patients who present with abdominal pain. Having a previous history of abdominal surgery, constipation, abnormal bowel sounds, and/or abdominal distention on examination were the best history and physical examination predictors of SBO. X-ray was determined to be the least useful imaging modality for the diagnosis of SBO, with a pooled positive likelihood ratio (+LR) of 1.64 (95% confidence interval [CI] = 1.07 to 2.52). On the other hand, CT and magnetic resonance imaging (MRI) were both quite accurate in diagnosing SBO with +LRs of 3.6 (5- to 10-mm slices, 95% CI = 2.3 to 5.4) and 6.77 (95% CI = 2.13 to 21.55), respectively. Although limited to only a select number of studies, the use of ultrasound (US) was determined to be superior to all other imaging modalities, with a +LR of 14.1 (95% CI = 3.57 to 55.66) and a negative likelihood ratio (-LR) of 0.13 (95% CI = 0.08 to 0.20) for formal scans and a +LR of 9.55 (95% CI = 2.16 to 42.21) and a -LR of 0.04 (95% CI = 0.01 to 0.13) for beside scans. Using the CT results of the meta-analysis for the 5- to 10-mm slice subgroup as well as information on intravenous (IV) contrast reactions and nasogastric (NG) intubation management, the pretest probability threshold for further testing was determined to be 1.5%, and the pretest probability threshold for beginning treatment was determined to be 20.7%. The authors conclude that potentially useful aspects of the history and physical examination were limited to a history of abdominal surgery, constipation, and the clinical examination findings of abnormal bowel sounds and abdominal distention. CT, MRI, and US are all adequate imaging modalities to make the diagnosis of SBO. Bedside US, which can be performed by EPs, had very good diagnostic accuracy and has the potential to play a larger role in the ED diagnosis of SBO. More ED-focused research into this area will be necessary to bring about this change	There were several limitations of this meta-analysis. First, it is possible that some studies relating to SBO diagnostics were missed given the strategy of our search. Second, we limited our searches to generalized SBO in adults and therefore our meta-analysis. The quality of the studies in this meta-analysis was highly variable and was subject to several biases. Eventual clinical outcome is fraught with bias, however, as many variables could play into what ultimately happens to a patient in the hospital. One of the limitations to the pooled meta-analysis groups is the large heterogeneity seen in the studies. Some of this was controlled for by removing certain outliers, but was not always completely eliminated. The nature of diagnostic imaging studies, especially CT scans, lends itself to heterogeneity given the very wide range of machines and scanning techniques used, as well as the tools used for interpretation. Furthermore, the benefits and risks of NG placement did not take into account patient preference or pain relief and were derived from lower-quality, potentially biased primary studies. Risk of bias - one or more key results (state which ones in the comments section) were based on studies with a majority having a high risk of bias No test for heterogeneity was performed on all of the studies so it is impossible to know if it exists in this analysis. Since the studies included in this meta-analysis were cross-sectional or retrospective in nature the risk of bias is possible. The study population may be different in the detection and analysis of this analysis.

Wu LM, Xu JR, Gu HY, et al. Is magnetic resonance imaging a reliable diagnostic tool in the evaluation of active Crohn's disease in the small bowel? J Clin Gastroenterol. 2013;47(4):328-38.	23340059	Meta-Analysis; Review	Moderate level of evidence	To evaluate the overall diagnostic accuracy of magnetic resonance imaging (MRI) in assessing the activity of Crohn's disease (CD) in the small bowel.	An electronic search yielded 630 primary studies, of which 601 were excluded after reviewing the title and abstract. Twelve articles were excluded after reviewing the full article. Therefore, a total of 17 studies (19 populations) with 725 patients, who fulfilled all of the inclusion criteria, were considered for the analysis.	Two reviewers searched MEDLINE, EMBASE, and other electronic databases to identify studies in which MRI imaging was evaluated for assessing the activity of CD in the small bowel from January 2001 to September 2011. Bivariate random effects metaanalytic methods were used to estimate summary, sensitivity, specificity, and receiver operating characteristic curves.	MRI had a pooled sensitivity of 0.87 [95% confidence interval (CI): 0.77, 0.93] and a pooled specificity of 0.91 (95% CI: 0.81, 0.96). Overall, likelihood ratio (LR)+ was 9.5 (95% CI: 4.4, 20.6) and LR was 0.14 (95% CI: 0.08, 0.26). In patients with high pretest probabilities, MRI enabled confirmation of active CD; in patients with low pretest probabilities, MRI enabled exclusion of active CD. Worst-case-scenario (pretest probability, 50%) posttest probabilities were 90% and 13% for positive and negative MRI results, respectively. The authors conclude that a limited number of small studies suggest that MRI has high sensitivity and specificity for diagnosis of active CD in the small bowel; MRI will likely also prove to be suitable as the primary modality for active CD imaging surveillance.	The authors report several possible limitations. Authors attempted to examine publication bias using the Deeks funnel plot, and no publication bias was found. However, potential publication bias may still exist, because small studies with optimistic results may be published more easily than small studies with unfavorable results. Moreover, only included studies published in English, which might invoke the so-called "Tower of Babel" bias, which refers to the fact that investigators working in a language other than English could be sending only studies with positive results to international journals. Furthermore, the interpretation of MRI scans was performed qualitatively in the majority of the studies, and blinding in 4 studies was either unclear or absent. So there is a risk of subjective interpretation, but it is more likely to be in favor of MRI, and its diagnostic accuracy might be even lower.
Yoon HM, Suh CH, Cho YA, et al. The diagnostic performance of reduced-dose CT for suspected appendicitis in paediatric and adult patients: A systematic review and diagnostic meta-analysis. Eur Radiol. 2018; 28(6):2537-2548.	29327290	Systematic Review and Meta-analysis	Moderate level of evidence	To evaluate the diagnostic performance of reduced-dose CT for suspected appendicitis.	Fourteen original articles with a total of 3,262 patients were included. Studies or subsets of studies that investigated the diagnostic performance of reduced-dose CT for suspected appendicitis in paediatric and adult patients were eligible for inclusion in the analysis. Studies were excluded if any of following criteria were met: (1) case reports or case series that involved <10 patients; (2) conference abstracts, letters, editorials, reviews, meta-analyses, consensus statements and guidelines; (3) studies that focused on topics other than using reduced-dose CT for evaluating suspected appendicitis; (4) studies with insufficient data for evaluating the diagnostic performance of reduced-dose CT for suspected appendicitis; and (5) existence of studies with partially overlapping patient populations.	A systematic search of the MEDLINE and EMBASE databases was carried out through to 10 January 2017. Studies evaluating the diagnostic performance of reduced-dose CT for suspected appendicitis in paediatric and adult patients were selected. Pooled summary estimates of sensitivity and specificity were calculated using hierarchical logistic regression modelling. Meta-regression was performed.	For all studies using reduced-dose CT, the summary sensitivity was 96 % (95 % CI 93–98) with a summary specificity of 94 % (95 % CI 92–95). For the 11 studies providing a head-to-head comparison between reduced-dose CT and standard-dose CT, reduced-dose CT demonstrated a comparable summary sensitivity of 96 % (95 % CI 91–98) and specificity of 94 % (95 % CI 93–96) without any significant differences (p=.41). In meta-regression, there were no significant factors affecting the heterogeneity. The median effective radiation dose of the reduced-dose CT was 1.8 mSv (1.46–4.16 mSv), which was a 78 % reduction in effective radiation dose compared to the standard-dose CT. The authors conclude that reduced-dose CT shows excellent diagnostic performance for suspected appendicitis.	First, nine of 14 included studies were retrospective, resulting in a high risk of bias in patient selection. Second, the decision threshold of indeterminate cases was considered as positive in eight studies and negative in one study, and not reported in four studies.