

| Bibliographic Cite | PMID Link | Literature Type | Level of Evidence | Purpose | Population | Intervention and Outcome Measures | Results/ Recommendations | Study Limitations |
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| Moore CL, Carpenter CR, Heilbrun ME, et al. Imaging in suspected renal colic: Systematic review of the literature and multispecialty consensus. J Am Coll Radiol. 2019; 16(9 Pt A):1132-1143. | 31402228 | Systematic Review and Multispecialty Consensus | Low | To convene a multispecialty group with representation from national organizations including emergency medicine, urology, and radiology to perform a systematic literature review and seek consensus on imaging approaches in specific clinical scenarios in which renal colic was suspected, with an emphasis on situations in which CT may not be required. | For the literature review, of 6,337 publications screened, 232 were deemed relevant with acceptable methodology. Of key articles provided by authors blinded to the search results, 100% (95% confidence interval [CI] 93%-100%) were identified, indicating excellent capture of relevant articles. | In conjunction with the American College of Emergency Physicians (ACEP) eQual network, we formed a nine-member panel with three physician representatives each from ACEP, the ACR, and the American Urology Association. A systematic literature review was used as the basis for a three-step modified Delphi process to seek consensus on optimal imaging in 29 specific clinical scenarios. | At the completion of the Delphi process consensus, agreement was rated as perfect in 15 (52%), excellent in 8 (28%), good in 3 (10%), and moderate in 3 (10%) of the 29 scenarios. There were no scenarios where at least moderate consensus was not reached. CT was recommended in 7 scenarios (24%), with ultrasound in 9 (31%) and no further imaging needed in 12 (45%). The authors conclude that evidence and multispecialty consensus support ultrasound or no further imaging in specific clinical scenarios, with reduced radiation dose CT to be employed when CT is needed in patients with suspected renal colic. | There could be nearly unlimited permutations of the clinical presentation described in the vignettes. Twenty-nine questions were included because it was felt to be the best balance of major factors with the number of questions the group felt was within a reasonable scope to address. However, not all clinical scenarios were included. |
| Rob S, Bryant T, Wilson I, et al. Ultra-low-dose, low-dose, and standard-dose CT of the kidney, ureters, and bladder: Is there a difference? Results from a systematic review of the literature. Clin Radiol. 2017;72(1):11-15. | 27810168 | Systematic Review | Moderate | To investigate whether reducing the radiation dose of computed tomography (CT) of the kidney, ureters, and bladder (KUB) for acute renal colic impacts upon the specificity, sensitivity, and detection of urolithiasis. | Adults presenting with urolithiasis or flank pain imaged with standard dose (SD), low dose (LD), or ultra low dose (ULD) CT KUB. A total of 417 prospective studies were identified, and after screening, seven articles (1,104 patients) were included in the present study with a male:female ratio of 3:2. | All prospective studies in the English language reporting on adult patients who underwent CT KUB or non-contrast CT for renal colic or urolithiasis. Retrospective studies and those that included pregnant females, children, non-human test subjects, cadaveric use, and simulations were excluded. Data were collected using an Excel spreadsheet and ultra-low-dose (ULD CT) and low-dose CT KUB (LD CT) was defined as a radiation dose < 1.9 and < 3.5 mSv, respectively. | Of the four studies with ULD CT for both males and females, the prevalence of urolithiasis ranged from 36% and 73%, with additional pathologies found in 12-15%. The effective radiation dose of ULD CT ranged from 0.5-1.9 mSv. Overall, ULD CT and LD CT had a sensitivity of 90-100% and a specificity of 86-100% across all studies. ULD CT and LD CT are effective techniques and yield high sensitivity and specificity. Although they yield comparable results against standard-dose CT KUB in detecting alternative diagnoses, they may not be as effective in detecting stones < 3 mm in size or in patients with a body mass index of >30 kg/m ² however, this should be the first-line investigation for the majority of renal colic patients in the modern era. | High risk of bias; detection/selection bias; limited generalizability due to patient population |
| Rodger F, Roditi G, Aboumarzouk OM. Diagnostic accuracy of low and ultra-low dose CT for identification of urinary tract stones: A systematic review. Urol Int. 2018; 100(4):375-385. | 29549823 | Systematic Review | Low | To investigate the diagnostic accuracy of low dose (LD) and ultra-low dose (ULD) CT of the urinary tract for detection of urinary tract stones in patients with renal colic. | A total of 12 studies were included following screening. A total of 1,529 patients were included in the review (475 in the LD group and 1,054 in the ULD group). The study included all studies that compared LD or ULD CT for the detection of urinary tract stones compared to a reference standard. Reference standard was defined as either a standard dose CT KUB or physical stone finding (e.g., as seen in ureteroscopy). | The systematic review and meta-analysis was performed according to the Cochrane diagnostic accuracy review guidelines. A literature search was performed in August 2017 of several databases. No limitations were placed on language, region, or publication type. The following search terms were utilised: stones, calculi, urolithiasis, urinary calculi, renal colic, CT, CT KUB, LD, ULD, and radiation. These were combined with Boolean operators (AND, OR) to gain results. | Using standard dose CT KUB as the reference standard, the sensitivity of LD CT KUB ranged from 90 to 98% and specificity from 88 to 100%. The sensitivity of ULD CT KUB ranged from 72 to 99% and the specificity ranged from 86 to 100%. The diagnostic accuracy for LD CT was 94.3% and for ULD CT was 95.5%. The authors conclude that LD and ULD CT KUB provide effective methods of identifying urinary tract stones. High diagnostic accuracy, sensitivity, and specificity are maintained despite significant radiation dose reduction in comparison to standard dose CT. | Papers were grouped into LD and ULD CT groups on the basis of dosage in mSv. However, in each group, there was marked variation in the radiological protocol used across the studies. There is also methodological variation in the determination of dose as differing conversion factors used in several of the studies predating the most recent ICRP recommendations of 2008 in which the abdominal conversion factor remained the same, (0.015), but that for the pelvis decreased from 0.015 to 0.013, due to lower weighting factors for gonads and bladder. |