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Title **Systematic Reviews of Clinical Decision Tools for Acute Abdominal Pain**

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Aim

To systematically examine the literature on paper- or computer-based decision tools (DTs) for patients with acute abdominal pain (AAP).

Conclusions and results

Making accurate decisions for patients with acute abdominal pain (AAP) is difficult, because many conditions cause it, and no single clinical finding or test is both specific and sensitive. To avoid missing seriously ill patients, many undergo unnecessary surgery, with negative laparotomy rates of 25%. Delays can lead to perforation rates of 20%. Many paper- or computer-based DTs, that combine two or more clinical or laboratory findings have been developed to help manage patients with AAP. No consensus exists on which of these DTs is most appropriate for clinical use.

Question 1, accuracy review: 32 studies were eligible whereof 13 reported false-positive and false-negative rates for both DTs and unaided doctors' diagnosis, enabling direct comparisons. In random effects meta-analyses of these 13 studies, DTs had significantly lower false-positive rates and may have higher false-negative rates than unaided doctors; significant heterogeneity was present. Two studies compared the diagnostic accuracies of doctors aided by DTs to unaided doctors' performance. Neither study demonstrated evidence of a difference in performance between aided and unaided doctors. Meta-regression of DTs from 32 studies showed association of diagnostic odds ratio with type of data set used ($p<0.001$), year of study ($p<0.001$), and whether study authors evaluated a tool they had themselves developed ($p=0.02$). There was no evidence of an association between disease prevalence and the accuracy of diagnostic DTs ($p=0.96$). None of the other quality indicators tested were significantly associated with the diagnostic odds ratio of DTs in the meta-regression. *Question 2, impact study review:* Only 1 of 15 potentially relevant papers was eligible, showing a clear need to improve the design and implementation of such studies. In the only eligible study, a 4-arm cluster randomized trial showed similar impacts of a structured paper checklist and the computer DT on hospital admission rates, perforation rates, and negative laparotomy rates. *Question 3, usability:* Usage rates of AAP DTs from studies retrieved for the accuracy and impact reviews ranged from 10%–77%. Possible determinants of usability include the reasoning method used, the number of data items to enter, and the output format. *Question 4, cost effectiveness:* A deterministic cost-effectiveness comparison demonstrated that a structured paper checklist is likely to be more cost effective than a computer-based DT, under stated assumptions.

Recommendations

With their significantly lower false-positive rates than doctors, DTs are potentially useful in confirming a diagnosis of acute appendicitis, but not in ruling it out. The clinical use of well-designed paper or computer-based structured checklists is a promising way to improve management of AAP patients, subject to further research.

Methods

See Executive Summary link above.

Further research/reviews required

- Better-designed studies are needed to evaluate the accuracy and impact of AAP decision tools on clinical decisions (eg diagnosis) and patient outcomes.
- Primary studies are needed to assess the usability of such DTs.
- Further research is needed to identify the most accurate AAP DT, whether it is computer-based or paper-based.

Research on decision tools in general should focus more on clinical problems and use accepted biometric methods, whatever the technology.

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