Diagnostic utility of alarm features for colorectal cancer: systematic review and meta-analysis

CRD summary
This generally well-conducted review concluded that most symptoms that may predict the presence of colorectal cancer had poor sensitivity and specificity. Although there is some uncertainty surrounding the reliability of the individual pooled estimates, the overall conclusion is likely to be reliable.

Authors' objectives
To assess the diagnostic accuracy of alarm features in predicting colorectal cancer.

Searching
MEDLINE, EMBASE, and CINAHL were searched without language restrictions from inception to October 2007. Search terms were reported. Bibliographies of identified studies were also scanned.

Study selection
Prospective cohort studies of adults (over 16 years) undergoing lower gastrointestinal investigation (colonoscopy, barium enema or computed tomography colography) that recorded pre-test symptoms were eligible for inclusion. Included studies were required to compare the accuracy of alarm features (symptoms potentially indicative of colorectal cancer) with the results of the lower gastrointestinal tests. Only studies that recruited at least 100 unselected adults were eligible. Studies using flexible sigmoidoscopy were only included if the patients were followed up for at least one year or data were collected on all potentially missed cancers at the end of the study.

Most included studies were conducted in secondary care settings and used either colonoscopy or a combination of lower gastrointestinal investigations. The prevalence of colorectal cancer in studies ranged from 3% to 14.6%.

Three reviewers independently applied the inclusion criteria; disagreements were resolved by consensus.

Assessment of study quality
Studies were assessed in terms of blinding, the recruitment of a consecutive sample and sample size. Studies were classified as level 1 (highest quality) to level 5 (lowest quality). The authors did not state how many reviewers performed the quality assessment.

Data extraction
Data to construct a 2x2 table were extracted, from which sensitivity, specificity and positive/negative likelihood ratios and their corresponding 95% confidence intervals (CI) were calculated. Study authors were contacted where clarification was required.

Data were extracted independently by three reviewers. Differences were resolved by consensus.

Methods of synthesis
Pooled estimates of sensitivity, specificity, positive likelihood ratio and negative likelihood ratio, and 95% CI were calculated using a random-effects model. Heterogeneity was assessed using the I^2 and χ^2 statistics. Summary receiver operating characteristic curves were plotted. Subgroup analyses were used to explore a number of pre-specified potential sources of heterogeneity; p<0.01 was considered significant when likelihood ratios were the focus of these analyses.

Results of the review
Fifteen studies met the inclusion criteria (n=19,443 patients; study size range 130 to 8,529). One study was considered
level 1 quality, three level 2 quality and 12 were level 4 quality. Nine studies reported recruiting consecutive patients, but only one specifically reported blinding the interpreters of tests.

The most commonly evaluated symptoms as predictors of colorectal cancer were rectal bleeding (14 studies; n=19,189 patients) and change in bowel habit (11 studies; n=17,581). For rectal bleeding, the pooled estimate of sensitivity was 64% (95% CI: 55, 73), specificity was 52% (95% CI: 42, 63), with a positive likelihood ratio of 1.32% (95% CI: 1.19, 1.47) and a negative likelihood ratio of 0.76% (95% CI: 0.66, 0.87). For change in bowel habit, the pooled estimate of sensitivity was 41% (95% CI: 23, 60), specificity was 69% (95% CI: 58, 78), with a positive likelihood ratio of 1.29% (95% CI: 1.05, 1.59) and a negative likelihood ratio of 0.82% (95% CI: 0.66, 1.01). Statistically significant heterogeneity was found for the analyses of likelihood ratios.

Other symptoms assessed included anaemia (seven studies, n=4,404 patients), weight loss (five studies, n=7,418 patients), diarrhoea (five studies, n=3,904 patients), abdominal mass (two studies, n=2,465 patients), iron deficiency anaemia (four studies) and dark red rectal bleeding (two studies). For these symptoms, all summary estimates of sensitivity were below 25% and specificity over 80%. Summary estimates of positive likelihood ratios ranged from 0.74% (diarrhoea) to 3.83% (dark red rectal bleeding) and negative likelihood ratios ranged from 0.88% (iron deficiency and dark red rectal bleeding) to 0.99% (abdominal mass). Results of subgroup analyses were presented.

Authors' conclusions
Most alarm features had poor sensitivity and specificity for the diagnosis of colorectal cancer.

CRD commentary
The authors addressed a clear review question that was supported by appropriate inclusion criteria. Three databases were searched without language restrictions. There was no search for unpublished studies, so publication bias can not be ruled out. Study selection and data extraction were conducted in duplicate, reducing the risk of error and bias. Study quality was assessed using appropriate quality criteria and the results were provided for each study. Heterogeneity was assessed statistically but the results of these tests were not presented, so the reliability of the pooled estimates is uncertain. However, this was a generally well-conducted review and the conclusions are likely to be reliable.

Implications of the review for practice and research
Practice: The authors stated that a palpable abdominal mass and dark red rectal bleeding could have value in identifying patients who need urgent colonoscopy. Data were limited to secondary care settings and patients were not representative of clinical practice. The authors also stated that there was little evidence to support the current NICE (National Institute of Clinical Excellence) guidelines on rapid referral for suspected colorectal cancer.

Research: The authors stated that future studies should examine the utility of dark red rectal bleeding and abdominal mass. They also stated that there is a need to develop models that assess combinations of features that focus on specificity rather than sensitivity.

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