In part of their analysis, the authors chose to aggregate the positive predictive values (PPV) of the tests. While it may be tempting to aggregate the PPVs of primary studies when they only report on the positive test results, this is potentially misleading. The problem is that it tells you nothing about the accuracy of the test or whether the test adds anything to the diagnostic process. Since the PPV depends on both the prior probability and the likelihood ratio of the test, a high PPV could be the result of high prior probability for colorectal cancer. For instance, the reported pooled estimate of the PPV for rectal bleeding was 8.1%. Feasibly, this could result from a prior probability of 8.1% for colorectal cancer and a likelihood ratio of 1, in which case rectal bleeding as a diagnostic test for colorectal cancer is useless and clinicians should avoid using this test. Alternatively, with a prior probability of 0.81%, a PPV of 8.1% would mean the test has a positive likelihood ratio of around 11, making it a very good test for clinicians to use, and one that clearly adds to the diagnostic process.

The second shortcoming relates to whether the sensitivity and specificity should be aggregated using univariate methods when there is potential for the two to be associated, not least due to a changing diagnostic test threshold. For this reason the Cochrane Diagnostic Test Accuracy Working Group recommend a bivariate approach when aggregating diagnostic test data,[2] and it would have been interesting to see whether taking this more rigorous line had a material effect on the summary results.

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Authors' response

Thanks to both correspondents for their comments. Essentially, we agree with their points.

Bruce Arroll notices an apparent mismatch between the results for rectal bleeding combined with change in bowel habit (risk increased), and the results for rectal bleeding when combined with diarrhoea or constipation (risk unchanged — or lessened). This problem has arisen because 'change in bowel habit', which should mean constipation or diarrhoea, means something quite different when used by GPs. For GPs, it really means, 'constipation or diarrhoea, and I think colorectal cancer is a genuine possibility.' Presumably, the GP has summated other subtle clues to make this judgement. Studies comparing the risk with change in bowel habit consistently find much higher risks than for constipation and diarrhoea.[1] So, the clinical advice is simple: if your intuition tells you a patient with diarrhoea or constipation may have cancer, trust that intuition.

Brian Willis points out that our use of positive predictive values (PPVs) obscures the fact that these are dependent largely on two separate metrics: the prior probability, and the likelihood ratio of the test. One or other of these two may be the main source of variation, and you cannot tell from the PPV which component is providing the variation. We used cohort studies based in primary care settings to estimate PPVs that are, therefore, representative of the primary care population. However, the thrust of our article was to provide clinical advice (for which we believe PPVs are best), rather than advice on which 'test' to do (in which case meta-analysis of likelihood ratios would be better). We also reported positive likelihood ratios to enable comparisons between different symptoms (as 'tests').

In his second point, Willis recommends a bivariate approach. While we agree with this in principle, the bivariate method almost certainly would not have produced useful differences. We deliberately chose to omit analysis of negative predictive values, as no symptom, when absent, has a negative predictive value so high as to allow the clinician to be sure cancer was not present.

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