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RAPID RECOMMENDATIONS

Computer aided detection and diagnosis of polyps in adult patients undergoing colonoscopy: a living clinical practice guideline

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ABSTRACT

CLINICAL QUESTION

In adult patients undergoing colonoscopy for any indication (screening, surveillance, follow-up of positive faecal immunochemical testing, or gastrointestinal symptoms such as blood in the stools) what are the benefits and harms of computer-aided detection (CADe)?

CONTEXT AND CURRENT PRACTICE

Colorectal cancer (CRC), the third most common cancer and the second leading cause of cancer-related death globally, typically arises from adenomatous polyps. Detection and removal of polyps during colonoscopy can reduce the risk of cancer. CADe systems use artificial intelligence (AI) to assist endoscopists by analysing real-time colonoscopy images to detect potential polyps. Despite their increasing use in clinical practice, guideline recommendations that carefully balance all patient-important outcomes remain unavailable. In this first iteration of a living guideline, we address the use of CADe at the level of an individual patient.

EVIDENCE

Evidence for this recommendation is drawn from a living systematic review of 44 randomised controlled trials (RCTs) involving more than 30 000 participants and a companion microsimulation study simulating 10 year follow-up for 100 000 individuals aged 60-69 years to assess the impact of CADe on patient-important outcomes. While no direct evidence was found for critical outcomes of colorectal cancer incidence and post-colonoscopy cancer incidence, low certainty data from the trials indicate that CADe may increase positive endoscopy findings. The microsimulation modelling, however, suggests little to no effect on CRC incidence, CRC-related mortality, or colonoscopy-related complications (perforation and bleeding) over the 10 year follow-up period, although low certainty evidence indicates CADe may increase the number of colonoscopies performed per patient. A review of values and preferences identified that patients value mortality reduction and quality of care but worry about increased anxiety, overdiagnosis, and more frequent surveillance.

RECOMMENDATION

For adults who have agreed to undergo colonoscopy, we suggest against the routine use of CADe (weak recommendation).

HOW THIS GUIDELINE WAS CREATED

An international panel, including three patient partners, 11 healthcare providers, and seven methodologists, deemed by MAGIC and *The BMJ* to have no relevant competing interests, developed this recommendation. For this guideline the panel took an individual patient approach. The panel started by defining the clinical question in PICO format, and prioritised outcomes including CRC incidence and mortality. Based on the linked systematic review and microsimulation study, the panel sought to balance the benefits, harms, and burdens of CADe and assumed patient preferences when making this recommendation

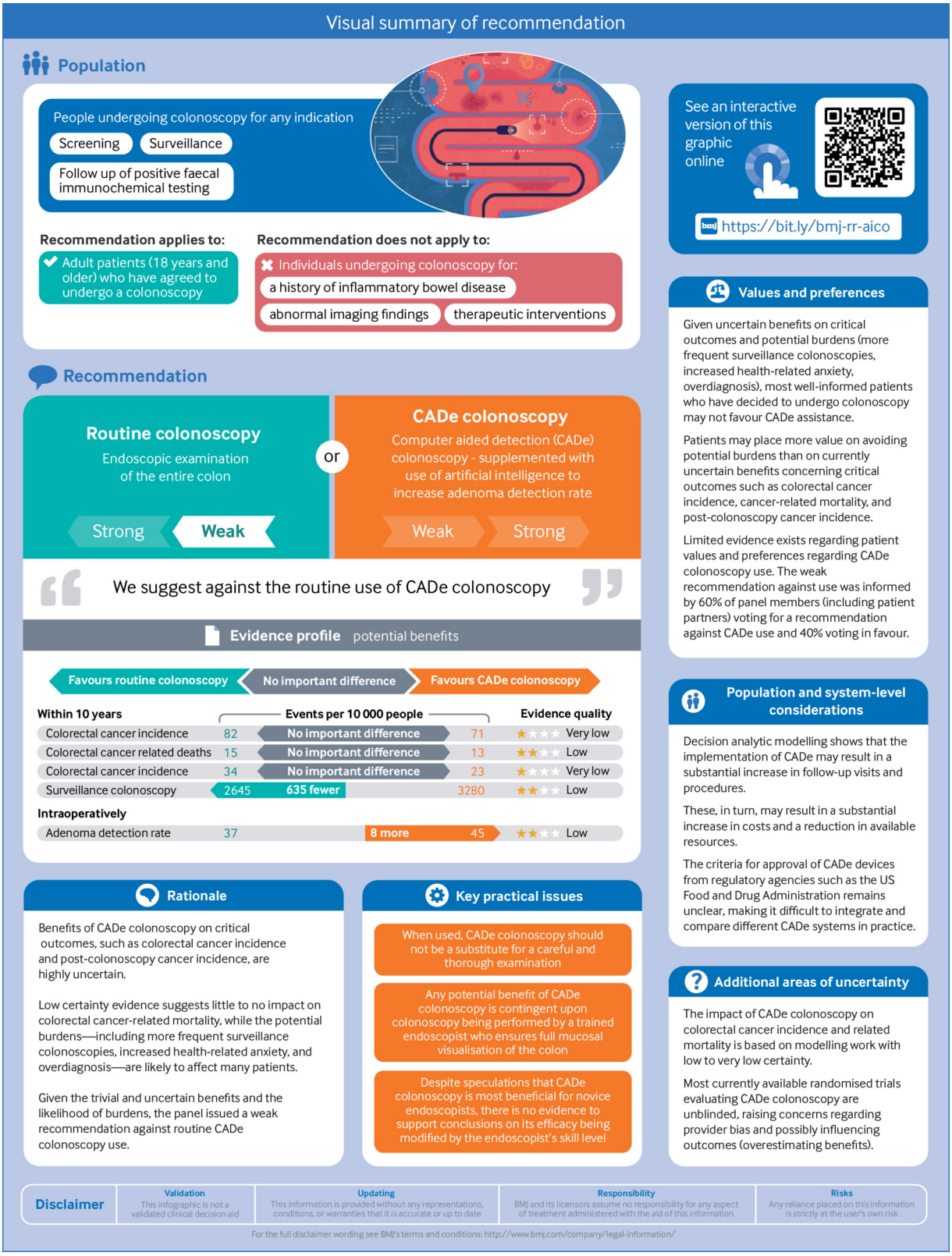
UNDERSTANDING THE RECOMMENDATION

The guideline panel found the benefits of CADe on critical outcomes, such as CRC incidence and post-colonoscopy cancer incidence, over a 10 year follow up period to be highly uncertain. Low certainty evidence suggests little to no impact on CRC-related mortality, while the potential burdens—including more frequent surveillance colonoscopies—are likely to affect many patients. Given the small and uncertain benefits and the likelihood of burdens, the panel issued a weak recommendation against routine CADe use.

The panel acknowledges the anticipated variability in values and preferences among patients and clinicians when considering these uncertain benefits and potential burdens. In healthcare settings where CADe is available, individual decision making may be appropriate.

UPDATES

This is the first iteration of a living practice guideline. The panel will update this living guideline if ongoing evidence surveillance identifies new CADe trial data that substantially alters our conclusions about CRC incidence, mortality, or burdens, or studies that increase our certainty in values and preferences of individual patients. Updates will provide recommendations on the use of CADe from a healthcare systems perspective (including resource use, acceptability, feasibility, and equity), as well as the combined use of CADe and computer aided diagnosis (CADx). Users can access the latest guideline version and supporting evidence on MAGICapp, with updates periodically published in *The BMJ*.



Why is the guideline needed?

Colorectal cancer (CRC) is the third most common cancer and the second leading cause of cancer related death worldwide.[1-3] Most colorectal cancers are adenocarcinomas and arise from precancerous polyps (adenomas or sessile lesions).[2] Adenomas are precancerous growths in the lining of the colon or rectum and affect up to 40% of adults by the age of 80 years.[4] Adenomas may become cancerous if left untreated, and up to 20% of individuals with a history of adenomas will develop CRC.[5] Serrated lesions or polyps can also be premalignant lesions, similar to adenomas. Identifying serrated lesions that can develop into cancer endoscopically or histologically

can be difficult. Colonoscopy, which allows for the detection and removal of these polyps (polypectomy), confers protection from the development of CRC.[6] However, long term reduction in colorectal cancer depends on the quality of the colonoscopy, including adequate visualisation of the colon, appropriate detection, and complete resection of any precancerous polyps.[7 8]

Computer aided detection (CADe) systems are advanced software algorithms designed to assist endoscopists by highlighting potential polyps (including flat or non-polypoid lesions) during colonoscopy.[9] These systems leverage artificial intelligence (AI) and machine learning (ML) technologies to analyse real-time video images from the colonoscopy, aiming to enhance the detection rate of polyps. CADe operates by identifying and marking areas of interest for closer examination by the endoscopist, thus acting as a second observer to potentially improve diagnostic accuracy and quality of colonoscopy. A commonly used measure to evaluate the performance of colonoscopy is the adenoma detection rate, which is endoscopist-dependent and varies based on indication, setting, and population.[10-13]

CADe is being increasingly used in clinical practice and is met with considerable enthusiasm and trepidation by gastroenterologists.[14] It also represents the most extensively researched application of AI in medicine, with evaluation through randomised controlled trials (RCTs).[15] In September 2023, an RCT addressing CADe use reported on 3213 patients undergoing colonoscopy for positive faecal immunochemical test (FIT+).[16] The authors concluded that CADe does not improve the identification of advanced colorectal adenomas that are associated with higher risk of colorectal cancer and mortality.

We performed a systematic review and meta-analysis of all RCTs, evaluating the impact of CADe-assisted colonoscopy for screening, surveillance, and follow-up of FIT+, on all reported outcomes.[15] The publication of the largest RCT,[16] along with the systematic review, triggered this guideline. Given the rapidly evolving field of AI, during guideline development, we commissioned an updated systematic review focused on trials assessing efficacy of CADe[17] and a separate review that examined patients' values and preferences (supplemental material). The review, together with a microsimulation study,[18] informed the recommendation.

About this guideline

This living guideline, to be dynamically updated with new evidence, contributes to the *BMJ* Rapid Recommendations series, a collaboration between the MAGIC Evidence Ecosystem Foundation and the BMJ. The recommendations provide clinicians with trustworthy guidance in response to potentially practice-changing evidence.[19] Box 1 provides linked resources that informed the panel members of this guideline.

Box 1: Linked resources in this *BMJ* Rapid Recommendation

- Foroutan F, Vandvik PO, Helsingen LM, et al. Computer aided detection and diagnosis of polyps in adult patients undergoing colonoscopy: a living clinical practice guideline. BMJ 2025;388:e082656, doi:10.1136/bmj-2024-082656
- MAGICapp [https://app.magicapp.org/#/guideline/jOKYGj] find an expanded version of the guideline with multi-layered recommendation, evidence summaries, and decision ais for use on all electronic devices
- Soleymanjahi S, Huebner J, Elmansy L, et al. Artificial intelligence-assisted colonoscopy for polyp detection: A systematic review and meta-analysis. *Ann Intern Med* 2024;177:1652-63 (updated systematic review on CADe and polyp outcomes)[17]
- Halvorsen N, Hassan C, Correale L, et al. Benefits, burden, and harms of computer aided polyp detection with artificial intelligence in colorectal cancer screening: microsimulation modelling study. *BMJ Med* 2025;3:e001446. doi:10.1136/bmjmed-2025-001446. (microsimulation study on CADe and patient important outcomes)[18]

An international panel, including three patients, 11 healthcare professionals, and seven methodologists (five of whom are healthcare providers), created these recommendations following the Institute of Medicine standards for trustworthy guidelines, using the GRADE approach for assessing the certainty of the evidence. The guideline development committee, together with the *BMJ*, judged that panel members were free from relevant intellectual and financial conflicts of interest. "How the guideline was made" (below) and the MAGICapp (https://app.magicapp.org/#/guideline/jOKYGj) present further details on how the team developed this guideline.

Understanding the recommendation

Key points to check before reading the recommendation

What is CADe and how does it affect colonoscopy?

CADe systems are software tools that use artificial intelligence and machine learning to assist endoscopists in identifying potential polyps during colonoscopy procedures.[9] While they may increase diagnostic yield, the effectiveness of these systems depends on the quality and diversity of the image datasets used in their development.[28]

As of March 2025, two CADe systems—GI-Genius and SKOUT—have received approval from the US Food and Drug Administration (FDA),[32 33] with an increasing number of these technologies likely to seek approval in the future (see practical considerations within MAGICapp (https://app.magicapp.org/#/guideline/jOKYGj). This underscores the importance of dynamic evidence synthesis and the development of living guidelines that can incorporate new data and technologies.

Decision to group colonoscopy indications

CADe systems are designed to enhance the detection of colorectal polyps and cancer during screening and surveillance colonoscopy or for evaluation of a positive faecal occult blood test (FOBT) or faecal immunochemical test (FIT). This guideline did not consider evidence for CADe use of CADe for patients with a history of inflammatory bowel disease, abnormal imaging findings, or therapeutic interventions (such as haemostasis for lower gastrointestinal bleed, stricture dilation, stent placement, or decompression), and therefore the recommendation may not be applicable for these indications.

Although each indication for colonoscopy—screening, surveillance, follow-up of a positive FIT/FOBT, or symptomatic evaluation—carries a different pre-test probability of underlying colorectal neoplasia, our systematic review found no credible evidence of effect modification by subgroup (CADe detection rates and patient-important outcomes did not vary by indication).[17] Additionally, the microsimulation modelling—which underpins the estimates of CRC incidence, mortality, and potential burdens such as surveillance intervals—did not show variation by indication.[18] Moreover, CADe's mechanism of action is uniform across these populations: it uses real-time image analysis to highlight suspicious lesions, regardless of a patient's baseline risk.

When formulating the recommendation, the panel concluded that the overall balance of benefits and harms was unlikely to differ meaningfully by indication. Nonetheless, the panel remains open to revisiting this approach. If credible subgroup findings emerge, later iterations of this living guideline may stratify recommendations by specific patient groups.

Evidence for the benefits and harms of CADe?

As of March 2025, 44 RCTs have assessed the efficacy of CADe-assisted colonoscopies, focusing on endoscopy-specific outcomes.[17] Pooled results from 40 of these trials (30 674 participants) suggest that CADe may improve adenoma detection rate (37% *v* 45%; relative risk (RR) 1.22 (95% CI 1.16 to 1.29)), and advanced colorectal neoplasia detection (12% *v* 14%; RR 1.16 (1.02 to 1.32)). CADe, however, may result in a higher

proportion of non-neoplastic lesions removed (29% *v* 32%; RR 1.11 (1.04 to 1.19)) and may increase withdrawal time (mean difference of 0.57 minutes). Critically, none of these trials reported on patient-important outcomes such as colorectal cancer incidence, colorectal cancer-related mortality, or post-colonoscopy cancer incidence.

Seeking to fill this evidence gap, a linked team of researchers performed a microsimulation study of 100 000 individuals aged 60-69 years to model CADe's impact on 10-year risks of colorectal cancer incidence, cancer-related mortality, post-colonoscopy cancer, perforation, bleeding, and the potential increase in surveillance colonoscopies arising from detecting small or diminutive lesions (≤5 mm in diameter).[18] The modelling results suggest that CADe may offer little to no change in colorectal cancer incidence (11 fewer per 10 000 patients followed), cancer-related mortality (2 fewer per 10 000 patients followed), or procedure-related complications (1 more per 10 000 patients followed). CADe, however, may lead to more frequent surveillance (635 more per 10 000 patients followed) (see infographic).

Who might benefit the most from CADe?

Our panel prioritised several subgroup hypotheses to explore with the synthesised evidence. The panel prioritised the impact of positive FOBT or FIT, older age, and sex on the expected benefits and harms/burdens of CADe. None of these subgroup analyses suggested variability in the expected benefits and harms of CADe (see MAGICapp for further details, including summary of findings tables for each subgroup: https://app.magicapp.org/#/guideline/jOKYGj). Therefore, this guideline applies to all individuals undergoing colonoscopy for all indications outlined above.

Recommendation: For adults who have agreed to undergo colonoscopy for any indication (symptoms, screening, or surveillance), we suggest against the routine use of CADe

Remarks: Readers should note that this recommendation does not apply to patients who are undergoing colonoscopy for a history of inflammatory bowel disease, abnormal imaging findings, or therapeutic interventions.

Understanding the recommendation: The benefits on critical outcomes of CRC incidence, and post-colonoscopy cancer incidence remain very uncertain. For colorectal cancer-related mortality, the evidence is of low certainty suggesting a trivial benefit (absolute reduction in colorectal cancer incidence below 10 cases per 10 000 patients (0.01%) and any absolute reduction in mortality below 5 deaths per 10 000 patients (0.005%)) or none. The evidence on harms, derived from the microsimulation study, suggests no difference in rates of perforation or bleeding with CADe. However, there is potential burden related to overdiagnosis, including more frequent surveillance colonoscopies (low certainty). Increased detection of adenomas that are small or diminutive in size (≤5 mm in diameter) will lead to more individuals being placed in a higher risk category that leads to increased surveillance. This may lead to increased health-related anxiety for many patients.

The uncertainty around benefits, and the high likelihood that patients may experience burdens with potentially small or no benefit led the panel to conclude that the majority (>50%) of well informed patients would not choose CADe assistance. The weak recommendation against routine use of CADe reflects that the panel placed a higher value on avoiding burdens than on uncertain benefits.

The evidence informing this recommendation comes from a living systematic review of 44 RCTs with >30 000 participants and a microsimulation study of CADe's impact. While the systematic review found no evidence on the critical outcomes, it provided low certainty evidence that CADe may enhance detection of polyps.[17] However, most of these polyps were diminutive or small and less likely to progress to advanced adenomas or cancer. Increased detection of such polyps may not provide any protection against the development of CRC but could instead increase the burden for these individuals.

The panel acknowledged that some clinicians and their patients may still decide to use CADe during colonoscopies. Our certainty about the values and preferences of patients who have agreed to undergo colonoscopy is low considering the lack of studies directly evaluating patients' preferences on the use of CADe (see supplemental material on bmj.com). Gastroenterologists also have different perspectives, with varying attitudes and trust, as identified in a separate systematic review.[20] We recognise that values and preferences may vary across settings and contexts. This variability further supports the decision to designate the strength of our recommendation as weak, recognising that, while the majority of individuals might not want CADe-assisted colonoscopy, a minority might and this would be an acceptable course of action.

A weak recommendation, using GRADE methodology, is most appropriate for circumstances in which there is a close balance between benefits and harms and/or uncertainty in the evidence. The weak recommendation indicates the panel's belief that some clinicians and patients are likely to place a lower value on the uncertain benefits and a higher value on avoiding the burdens associated with CADe and thus choose against a CADe-assisted colonoscopy.

The implication of a weak recommendation is that individual patients' values and preferences are likely to play a substantial role in deciding on diagnosis or treatment, ideally through shared decision-making with their healthcare provider. In the context of CADe, its use may depend more on whether the device is available in the endoscopy clinic that the patient attends. If available, it is unlikely that the gastroenterologist will consult the patient on whether the device should be turned on.

A decision for the patient to make, therefore, might be to consider whether they attend a clinic where CADe is available. However, this information might not be publicly available and, in healthcare systems where patients pay out of pocket, this could also be a consideration.

The next iteration of this guideline will consider evidence relating to healthcare systems and society, seeking to address whether the use of CADe represents effective use of health resources as well as potential issues related to feasibility, acceptability and equity.

Uncertainties

- *Impact of CADe on CRC incidence and CRC-related mortality*—In the absence of RCTs addressing CRC incidence and CRC-related mortality directly, the evidence on effects on these critical outcomes were estimated from a modelling study (for details see "How the guideline was made" below and the MAGICapp). Many of the inputs to the modelling study were informed by data predominantly from a European population, though sensitivity analyses from a North American population did not result in major changes to estimates. Direct evidence to support these outcomes may come from an ongoing long term European Union funded RCT evaluating the impact of CADe on patient-important outcomes.[21]This trial is slated to complete its follow-up by 2036.
- *Unblinded RCTs of CADe systems using adenoma detection rate as the primary outcome*—The lack of blinding in almost all trials and the use of outcomes judged by endoscopists raises concerns regarding potential bias. Knowing which group they belong to (CADe-assisted or routine colonoscopy) could influence the

endoscopists' performance and, consequently, the outcomes of the trials. The absence of blinding introduces the possibility that belief in the efficacy of CADe might lead to overreliance on the tool.[22]

- *Generalisability of CADe efficacy across endoscopists*—CADe should not be a substitute for careful and thorough examination. Any benefit of CADe is contingent upon the mucosa that is visualised during colonoscopy.[22 23] The technology requires colonoscopy to be performed by a trained endoscopist who ensures full mucosal visualisation of the colon. It is uncertain if trial findings are generalisable to endoscopists with varying expertise levels. However, to date, we have found no credible evidence to suggest that CADe's efficacy may be influenced by the endoscopist's skill set.
- *Lack of transparency in approval of CADe devices for use in practice*—Many CADe tools are developed by private companies, and the specific algorithms they use to flag or classify medical images are often proprietary. Because they are proprietary, there's limited public information about how these algorithms work or how they are trained. In addition, once a product has initial regulatory clearance (for example, through the FDA in the United States), there is often leeway for the developer to update or modify its algorithms without necessarily reapplying for a full regulatory review. This means that over time, the product's performance could change—potentially for better, but also possibly for worse—without formal regulatory reassessment or transparent reporting of the new clinical evidence.
- *Uncertainty in inferences on patients' values and preferences*—Due to the lack of relevant studies on values and preferences (see supplemental material), the panel made inferences about what most patients would want, as outlined in "How the guideline was made." Future research is needed to better understand the values and preferences of patients undergoing colonoscopy. Given the uncertain evidence, all panel members agreed that the recommendation should be weak. To inform the final recommendation, we asked the panel members to vote on whether to suggest against or for the routine use of CADe for adults undergoing colonoscopy for any indication (symptoms, screening, or surveillance), with one of the following statements to encapsulate the rationale and values and preferences informing the recommendation:
  - "Recommendation against." The benefits on the critical outcomes of CRC incidence, and post-colonoscopy cancer incidence remain very uncertain. For colorectal cancer-related mortality, the evidence is of low certainty suggesting a trivial or no benefit. The potential burdens—including more frequent surveillance colonoscopies, increased health-related anxiety, and overdiagnosis—are likely to exist for many patients. The uncertainty of any benefits, and the high likelihood that many patients would experience the burdens, led the panel to conclude that majority of well informed patients would not favour CADe assistance. In concluding with a weak recommendation against the routine use of CADe, the panel placed higher value on avoiding the burdens than on the uncertain benefits.
  - "Recommendation for." Given the uncertain benefits on critical outcomes, the panel believes that majority of well informed patients who have already decided to undergo colonoscopy would favour CADe assistance. This is due to the potential benefits of reduction in colorectal cancer incidence and mortality. The weak recommendation for CADe places greater value on the potential of avoiding colorectal cancer and death, rather than avoiding the potential burden of more frequent surveillance colonoscopies, increased health-related anxiety, and overdiagnosis.
  - Thirteen panel members (60%) voted against, while nine (40%) voted for.
  - Acknowledging the panel's deliberations—which ultimately yielded a 60%/40% split vote—we arrived at a weak recommendation against CADe. Recommendations must be both actionable and transparent about their rationale, even when evidence is low or very low certainty. The *BMJ* Rapid Recommendations approach therefore necessitates clarifying how the panel weighed anticipated benefits, harms, burdens, and uncertainties in patient values and preferences. On balance, these considerations led to a weak recommendation against CADe-assisted colonoscopy. We recognise that this may not fully capture the true values and preferences of all patients undergoing colonoscopy, and we will update our guidance as more robust evidence becomes available.
- *Microsimulation model using a 10 year follow-up period*—We selected a 10 year horizon for our modelling study for three main reasons. First, it reflects the longest and most robust randomised trial data currently available for colonoscopy screening (for example, the NordICC trial[6]) and aligns with emerging evidence on the relationship between adenoma detection rate and post-colonoscopy colorectal cancer.[24] Second, it matches the standard interval recommended by several CRC screening guidelines for average risk individuals (including those from the US Preventive Services Task Force[25] and the US Multi-Society Task Force[26]). Third, follow-up periods shorter than 10 years would likely underestimate the long term impact of colonoscopy on CRC incidence and mortality, whereas extending beyond a decade would require more speculative assumptions about disease progression and adherence of patients to recommended screening or follow-up schedule. We recognise that CRC can have a prolonged latency period, and some panel members expressed concern that 10 years might still be relatively short. Nonetheless, our modelling inputs reflect the best available evidence and common screening intervals for average risk adults. Additionally, the average patient age in our simulations is approximately 60 years, so a 10 year follow-up extends into the early 70s—a period when CRC incidence starts to markedly increase.[27] As a living guideline, we plan to update our recommendation if new evidence on longer term outcomes emerges that might alter our understanding of CADe's impact beyond 10 years.
- *Age range in microsimulation study and generalisability*—We acknowledge that the microsimulation model informing our estimates of CRC incidence, mortality, and potential harms was based on individuals aged 60 69, while our recommendation applies to all adults ≥18 years. This discrepancy may introduce uncertainty because of population indirectness. However, we did not downgrade our certainty in the conclusions drawn from the microsimulation study for indirectness, as we have no compelling evidence that CADe's relative efficacy varies by age. Younger adults face an even lower baseline risk of CRC and mortality, suggesting that the absolute effect of CADe would be smaller—further underscoring minimal or no net benefit. Therefore, the panel concluded that the recommendation remains valid for the broader adult population, while acknowledging this as an area of uncertainty that we will revisit if new data emerge.

Implementation and adaptation of the guideline

While the performance of a CADe system is dependent on how it was developed and validated, the actual application and utility of the intervention is reliant on how end users (endoscopists) ultimately engage with it.[22 23 28] According to one study, when given a choice, endoscopists "turned on" the CADe system in only 52% of procedures with varying amounts of time spent on repeat mucosal inspection in response to a visual indicator (or bounding box).[29] Provider attitude and trust is an important factor in how much and how often CADe is used.

This is a living guideline, and we will continuously monitor for new CADe trials or major updates to existing data. If a new trial indicates a substantially different effect on patient-important outcomes or if technological changes alter CADe's performance, the microsimulation model will be revised, and the panel will reassess the recommendation. This ensures that our living guideline remains current as evidence evolves. Additional evidence may increase our understanding of individual values and preferences, provider trust and adoption, and cost effectiveness or budget impact. While this guideline focuses on the individual patient level, future updates will take a societal and system level approach and consider formal cost-effectiveness analysis studies accounting for the upfront costs associated with buying (or subscribing) to CADe systems, and the increased burden of colonoscopies at a population level.

This guideline is the result of a collaborative approach to guideline development with MAGIC, the American Gastroenterological Association (AGA),[30] and the European Society of Gastroenterology (ESGE) (doi:10.1055/a-2543-0370). By leveraging a shared methodological framework (GRADE) and adhering to Institute of Medicine's strict standards for trustworthy recommendations,[31] we synthesised the most up-to-date evidence to streamline the guideline development process. This collaboration increased efficiency, allowed the sharing of evidence profiles and evidence-to-decision tables, and promoted transparency in panel judgments, with adaptations for the North American and European context.

While our panel used the same evidence base as the AGA and the ESGE, we reached a different conclusion—namely, a weak recommendation against routine CADe. All three guidelines made weak recommendations, with panel members agreeing that the net benefit is uncertain. The key distinction lay in how each panel judged patient values and preferences. Our panel placed a relatively higher weight on avoiding the potential burdens of additional surveillance, overdiagnosis, and anxiety for patients, given minimal or no proven benefit for critical outcomes such as CRC incidence and mortality. In contrast, the AGA and ESGE panels placed a higher value on the potential—though uncertain—benefits of CADe. Although we diverge in our final recommendations, we share a recognition that individual decisions may differ based on how patients and clinicians weigh uncertain benefits versus likely burdens. As a living guideline, we acknowledge that new data—especially from large RCTs addressing CRC incidence, mortality, and overdiagnosis—may lead to revisions in our recommendation, which we will update and refine as more evidence becomes available.

How patients were involved in the creation of this article

The panel included three patients with lived experience of undergoing colonoscopy for colorectal cancer screening. Their perspectives informed the values and preferences associated with decision-making related to the use of CADe.

How the guideline was made

Standards, methods, and process for trustworthy guidance

This *BMJ* Rapid Recommendation was developed in accordance with standards for trustworthy guidance from the Institute of Medicine,[34] and strives to meet criteria for methodological rigor as per AGREE-II.[35]

Who was involved?

For this guideline, we recruited an international panel including patient partners (individuals with lived experience of CRC screening), general practitioners, general internists, gastroenterologists, and health research methodologists. In selecting the panel members, we strived for geographic diversity, balance in sex and experience. Through iterative discussions, the panel collectively determined the scope of this guideline and formulated their recommendations. The methods and clinical co-chairs were selected by the MAGIC Evidence Ecosystem Foundation to lead the panel deliberations. Both the methods and clinical chair had expertise in GRADE methodology.[36] All panel members were screened for financial conflicts of interest. Intellectual conflicts of interest were minimised and managed.

What research did the guideline panel request and review?

To define the scope of this guideline, we deliberated the clinical question through discussing the population, intervention, outcomes, and subgroups of interest. Upon confirming the scope of our guideline recommendation, independent teams of health research methodologists, clinical experts, and biostatisticians conducted: 1) a pairwise systematic review to examine the benefits and harms of CADe, 2) a microsimulation study to address the outcomes prioritised but not evaluated by the RCTs on CADe, 3) a systematic search of any evidence evaluating the values and preferences of patients undergoing colonoscopy, 4) a systematic review of studies evaluating healthcare providers trust in AI technology in gastroenterology care.

What outcomes did the guideline panel request and review?

As an initial step in the guideline development process, we surveyed our panel for all the outcomes that they would like to know about prior to concluding on the balance between benefits and harms of CADe. After obtaining a list of all outcomes, panel members independently scored the importance of each potential outcome using a 1-9 point ordinal scale, with 1 indicating the least importance and 9 indicating that the outcome was considered critical to decision making. We then calculated the median rating for each outcome. Those with median ratings of 7-9 were deemed critical while those with lower scores (ratings of 4-6) were considered important but not critical. The panel ultimately weighed critical outcomes most heavily when determining the direction of the recommendation.

The panel deemed the following outcomes as being of critical importance (rated 7-9 on a 9-point ordinal scale): colorectal cancer-related mortality, colorectal cancer incidence, post-colonoscopy colorectal cancer incidence. The panel deemed the following outcomes as being of importance (rated as 4 to 6 on a 9-point ordinal scale): adenoma detection rate, advanced adenomas per colonoscopy, serrated polyps per colonoscopy, adenomas per colonoscopy, adenoma miss rate, polypectomies of non-adenomatous polyps per colonoscopy, withdrawal time (inspection time), number of colonoscopies per lifetime, perforations, and bleeding events.

The panel considered that the detection of adenomas, especially diminutive or small adenomas, may contribute to overdiagnosis (additional ineffective or unnecessary medical consequences of the diagnosis, such as intensive surveillance and follow-up that may not be clinically beneficial).[37] As detection rates increase, the likelihood of both screening effectiveness and overdiagnosis (detection of polyps that would not have progressed to clinical CRC during lifetime) increases. A higher proportion of patients being referred to surveillance colonoscopy owing to higher adenoma detection rates further increases the risk of overdiagnosis. Thus, the current focus on improving colonoscopy quality by increasing adenoma detection rate will likely increase the proportion and magnitude of overdiagnosis, leading to increased unnecessary costs, resources and burden associated with surveillance colonoscopy.

How did the panel formulate the recommendation?

In prior guideline publications, the MAGIC Evidence Ecosystem Foundation has presented the pre-established standards, methods, and processes for the *BMJ* Rapid Recommendations for developing trustworthy guidelines.[38] As with previous guidelines, our current *BMJ* Rapid Recommendation used the GRADE approach's framework for evaluating certainty in conclusions drawn from the available evidence and determining the strength and direction of recommendations. With GRADE, recommendations can either be strong or weak, for or against a course of action.

Over five meetings, the method and clinical co-chair facilitated the panel deliberations via web conferences. During the first two meetings, the panel defined the scope of the guideline, selected outcomes of interest, and reviewed the survey results regarding outcome prioritisation. We dedicated the third panel meeting to reviewing the evidence synthesised from the systematic review of RCTs on CADe and the findings from the microsimulation study. During the fourth and fifth panel meeting, we reviewed the evidence on benefits and harms, presented findings from our systematic search for studies on values and preferences, and the systematic review on provider trust.

Upon the presentation of all evidence synthesised, during the fourth and fifth meeting, through a consensus-based approach, the panel considered several factors when deciding upon the recommendation, reflecting an individual patient level approach. These factors included the balance between benefits and harms, overall certainty in the conclusions drawn from the evidence, and values and preferences of individuals undergoing colonoscopies.

The methods and clinical co-chair drafted the recommendation and circulated it to the panel for their review. All feedback was incorporated, and the panel approved the final version of the guidance for publication.

What did the panel consider as the minimal important difference in absolute risk of colorectal cancer incidence and mortality?

In judging the clinical significance of the potential impact of CADe on colorectal cancer incidence and mortality, we established explicit minimal important differences (MIDs) for 10-year outcomes. We determined that any absolute reduction in colorectal cancer incidence below 10 cases per 10 000 patients (0.01%) and any absolute reduction in mortality below 5 deaths per 10 000 patients (0.005%) would be regarded as "trivial to no benefit." These MIDs reflect our consensus about what most well informed patients might consider meaningful, based on both patient partner input and clinical experience.

How did the panel incorporate the values and preferences of patients?

In addressing patient values and preferences for CADe-assisted colonoscopy, we recognised a paucity of direct evidence. We conducted a broad systematic review (supplementary material) that encompassed CADe-specific research and studies on patients' values and preferences toward colonoscopy and general AI-driven healthcare. This search identified one study specifically examining AI in a gastrointestinal setting—though not CADe—and a systematic review on studies evaluating preferences on colorectal cancer screening tests.[39 40] The studies identified in this review highlighted the importance of mortality reduction and improvements in care quality as critical factors influencing preferences for specific screening tests. Patients also expressed concern about potential burdens, including increased health-related anxiety, overdiagnosis, and the possibility of requiring more frequent surveillance colonoscopies.

Given the lack of direct evidence for values and preferences on the use of CADe, we supplemented the indirect evidence from the systematic review with the inferences drawn by our panel on the values and preferences of patients. However, we acknowledge that the current evidence on CADe-specific patient values and preferences is limited. This uncertainty contributed to our issuing a weak recommendation, as we cannot definitively conclude how the general population of individuals undergoing colonoscopy would weigh CADe's uncertain benefits against its potential burdens. We will update our guidance as additional evidence becomes available, including any new research directly addressing patient experiences and preferences regarding CADe.

Our panel agreed on the following values and preferences statement:

- Given the uncertain benefits on critical outcomes, the panel believes that a majority of well informed patients who have already decided to undergo colonoscopy would not favour CADe assistance. This is due to potential burdens such as more frequent surveillance colonoscopies, increased health-related anxiety, and overdiagnosis. The weak recommendation against CADe places greater value on avoiding these potential burdens rather than on the currently uncertain benefits concerning critical outcomes like colorectal cancer incidence, cancer-related mortality, and post-colonoscopy cancer incidence.

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Patient involvement: At every stage of the guideline development process, from conception to finalisation, we have actively engaged with the three patient panel members who brought the essential perspective of lived experience to the table. Their insights, concerns, and preferences have shaped the recommendation within this document, ensuring that it reflects the principles of patient-centred care. Our patient partners have contributed in various ways, including but not limited to: (1) collaborating in the identification of priority areas, drawing from their own experiences and those of the broader patient community; (2) participating in guideline development meetings, where their perspectives were integral in crafting a recommendation that resonates with the needs and preferences of patients; (3) reviewing draft versions of the guideline, offering feedback from a patient's viewpoint to enhance clarity, accessibility, and relevance; (4) validating the final recommendations to ensure they are truly reflective of patient values, preferences, and experiences.

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Supplemental material: Details of systematic review of patient values and preferences for computer-aided detection (CADe) in colonoscopy

Main infographic: Summary of recommendation and evidence