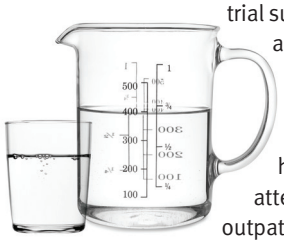
education

RESEARCH REVIEWS Fortnightly round up from the leading medical journals

Fluid restriction and heart failure

It wasn't long ago that we'd routinely advise people with heart failure and fluid overload to restrict their fluid intake. Nowadays, restriction advice is restricted to only a few, such as those with dilutional hyponatraemia. A new multicentre, open-label trial supports this approach. It randomised 504 people with chronic heart failure attending outpatient clinics to receive advice for liberal fluid intake or 1500 mL per day fluid restriction. No differences in health status or safety events were found between the two groups after three months.



Nat Med doi:10.1038/s41591-025-03628-4

If ya gettin' your risk factors down

We didn't realise it at the time, but in 1998 the boyband Five were mostly singing about the five main cardiovascular risk factors. *Five will make you get down* captures the collective peril of hypertension, hyperlipidaemia, unhealthy weight (underweight and overweight), diabetes, and smoking. Meanwhile *Five will make you feel alright* has a profound ambiguity that only the very best song lyrics capture. According to a new analysis of over two million people from 133 cohort studies, if you get to age 50 years without any of these risk factors you can expect to live an extra 13 years free of cardiovascular disease if you're a woman and 10 years if you're a man, compared with someone with all five. As Sean, Ritchie, Scott, Abz,

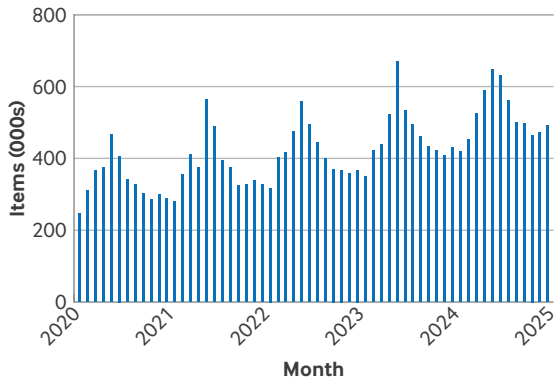


Fig 1 | Total fexofenadine prescriptions across general practices in England. From OpenPrescribing.net, Bennett Institute for Applied Data Science, University of Oxford, 2025

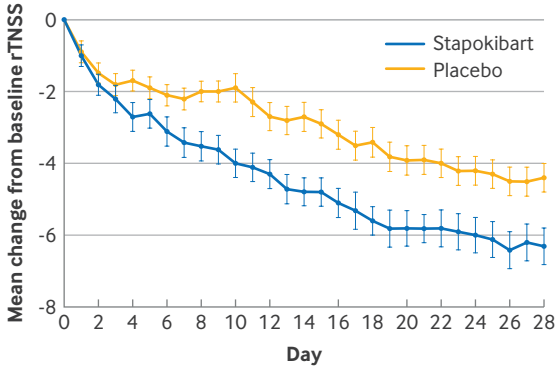
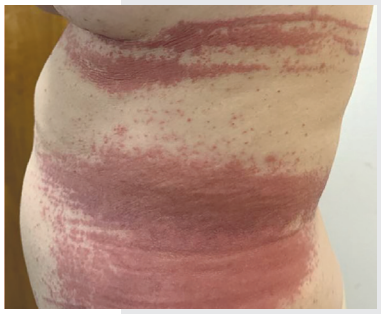


Fig 2 | Change in daily rTNSS during 4-week treatment period

Sneeze the day with antibody hayfever treatment

Prescribing of the antihistamine fexofenadine in England starts picking up in April each year, peaking in June (fig 1), yet for many people no amount of antihistamine and intra-nasal steroids will allow them to enjoy the outdoors in Spring. A phase 3 study of stapokibart, a humanised antibody targeting the alpha chain of the interleukin-4 receptor (IL-4Rα), found a clinically important improvement in total nasal symptom score (rTNSS) at two weeks compared with placebo (fig 2). Stapokibart or placebo was given as add-on therapy for people with moderate to severe seasonal allergic rhinitis and an eosinophil count of ›300 cells/µL.

Nat Med doi:10.1038/s41591-025-03651-5



CLINICAL PICTURE

Erythematous rash in the intertriginous areas

A woman in her early 60s presented with a three day history of a widespread, itchy rash. She had no relevant history and was not on any regular medications, but the rash occurred after she had worn new clothing. Examination showed symmetrical erythema, papules, and blisters to the neck, axillae, chest, groin, and abdomen (figure). A patch test for Disperse Red 17, a dye primarily used in the textile industry for colouring synthetic fibres, was positive.

She was diagnosed as having acute contact dermatitis. Although contact dermatitis is usually confined to the site of contact, when allergen exposure is sustained or substantial, the rash can spread beyond the area of direct contact. After changing clothing to avoid exposure to the allergen and applying topical glucocorticoid for two weeks,

and Jason would say, *Keep on movin'*.

N Engl J Med doi:10.1056/NEJMoa2415879

Cardiac arrests in marathon runners

For anyone training for a marathon this year, the risk of cardiac arrest probably isn't what you want to focus on, but findings from the Race Associated Cardiac Event Registry in the US should offer some reassurance. Among nearly 30 million marathon and half-marathon runners in the US between 2000 and 2023 there were 176 cardiac arrests: 1.12 per 100 000 in men and 0.19 per 100 000 in women. Mortality rates, for the unfortunate few who do have a cardiac arrest mid-race, have fallen from 71% before 2010 to 34% since 2010.

JAMA doi:10.1001/jama.2025.3026

Adding more evidence to the iron brew…

There are now six published major trials studying the safety and efficacy of intravenous iron in people with heart failure. The latest, FAIR-HF2, enrolled 1105 people with a left ventricular ejection fraction ≤45% and iron deficiency. It found no benefit from administration of ferric carboxymaltose versus placebo in time to cardiovascular death or first hospital admission for heart failure or total number of hospital admissions for heart failure.

JAMA doi:10.1001/jama.2025.3833

…but meta-analysis steels the headlines

Intravenous iron enthusiasts needn't be too downhearted, though. Hot on the heels of these findings, *Nature Medicine* published a systematic review and meta-analysis that included the results from FAIR-HF2 and the other five big trials—7175 patients in total. It found that people with heart failure with iron deficiency assigned to iron treatment had lower rates of hospital admissions for heart failure and cardiovascular mortality at 12 months compared with those assigned to placebo (relative risk 0.72 (95% confidence interval 0.55 to 0.89)).

Nat Med doi:10.1038/s41591-025-03671-1

Tom Nolan, clinical editor, *The BMJ*, London; sessional GP, Surrey

Cite this as: *BMJ* 2025;389:r691

this patient's rash improved substantially. Disperse dyes are the most common cause of textile related allergic contact dermatitis. The risk can be reduced by wearing loose fitting clothing made from natural fibres.

Patient consent obtained.

Cite this as: *BMJ* 2025;389:e082871

Shihui Zhou; Yifeng Guo (guoyifeng.yvonne2023@vip.163.com), Xinhua Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China

MINERVA From the wider world of research

Tranexamic acid

First developed in the 1960s, tranexamic acid, an inhibitor of plasminogen activation and fibrinolysis, found niche applications in treating hereditary bleeding disorders. The indications for drugs often narrow over time, but the uses of tranexamic acid have broadened. It's now commonly used to prevent blood loss in a variety of clinical conditions. The results of a recent trial suggest it should be used routinely in general surgery. Prophylactic treatment with tranexamic acid reduced the incidence of major bleeding without an increase in adverse effects (*JAMA Surg* doi:10.1001/jamasurg.2024.6048).

Adverse effects of a breast cancer screening programme

Follow-up of women who took part in the initial phase of a stepwise breast cancer screening programme in Denmark draws attention to the downsides of screening. Compared with women who hadn't been invited for screening, women who had been screened, particularly if they had received a false-positive result, used primary healthcare services more often and were prescribed more drugs (*J Epidemiol Community Health* doi:10.1136/jech-2024-222818).

Psoriasis and serious infections

Anxiety that systemic treatments for psoriasis increase the risk of serious infections, especially in older people, turns out to be misplaced. A large database study of adults aged over 65 years with psoriasis from Ontario, Canada, reports no associations between methotrexate or tumour necrosis factor inhibitors and risk of infection. Paradoxically, people using biologics that targeted interleukins experienced reduced rates of serious infection (*JAMA Dermatol* doi:10.1001/jamadermatol.2025.0144).

An anti-smoking pioneer

Long before Richard Doll and Austin Bradford Hill showed that cigarette smoking was a cause of lung cancer, Dr Lennox Johnston, a Merseyside general practitioner, became convinced that tobacco smoke was harmful and that nicotine was addictive. Frustrated by his inability to persuade the medical establishment that his findings should be taken seriously, he planned public protests including burning down BMA House and a stunt when he intended to pluck Winston Churchill's cigar from his mouth and stamp it out (*LRB blog* https://www.lrb.co.uk/blog/author/nicholas-hopkinson).

Vitamin D supplements

Four years ago, a meta-analysis concluded that vitamin D supplementation had a small benefit in preventing acute respiratory infections. It was probably the result of chance. An update, which includes the results of six recent trials, reports that, although the size of the protective effect hasn't changed, it's no longer statistically significant (*Lancet* doi:10.1016/S2213-8587(24)00348-6).

Warning labels

Legislation in Mexico in 2020 forced food and drinks manufacturers to put a warning label on their products if they contained high levels of salt, sugar, or saturated fat. It turned out to be unexpectedly effective—not because customers read the labels and chose to avoid these foods, but because manufacturers reformulated their products to circumvent the need for a label (*PLoS Med* doi:10.1371/journal.pmed.1004533).

Cite this as: *BMJ* 2025;389:r687

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

Farid Foroutan, Per Olav Vandvik, Lise M Helsingen, Mette Kalager, Matt Rutter, Kevin Selby, Nastazja Dagny Pilonis, Joseph C Anderson, Annette McKinnon, Jonathan M Fuchs, Casey Quinlan, Maaike Buskermolen, Carlo Senore, Pu Wang, Joseph J Y Sung, Ulrike Haug, Silje Bjerkelund, Konstantinos Triantafyllou, Dennis L Shung, Natalie Halvorsen, Thomas McGinn, Tandekile Lubelwana Hafver, Valerie Reinthaler, Gordon Guyatt, Thomas Agoritsas, Shahnaz Sultan

See full version on bmj.com for author details

Correspondence to: F Foroutan farid@magicevidence.org or S Sultan ssultan@umn.edu

CPD READING
0.5 HOURS

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.

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. 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] 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

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 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.

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]

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

BMJ Rapid Recommendations provide clinicians with trustworthy guidance in response to potentially practice-changing evidence.[19] The box overleaf provides linked resources that informed the panel members of this guideline. The infographic provides an overview of the impact of CADe-assisted colonoscopy.

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.

Understanding the recommendation

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.

The weak recommendation against routine use of CADe reflects that the panel placed a higher value on avoiding burdens than on uncertain benefits

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 was estimated from a modelling study. Many of the inputs to the modelling study were informed by data predominantly from a European population, although sensitivity analyses from a North American population did not result in major changes to estimates.
- *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.
- *Generalisability of CADe efficacy across endoscopists*—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.

Visual summary of recommendation

Population

People undergoing colonoscopy for any indication

- Screening
- Surveillance
- Follow up of positive faecal immunochemical testing

Recommendation applies to:

- ✔ Adult patients (18 years and older) who have agreed to undergo a colonoscopy

Recommendation does not apply to:

- ✖ Individuals undergoing colonoscopy for:
  - a history of inflammatory bowel disease
  - abnormal imaging findings
  - therapeutic interventions

See an interactive version of this graphic online

https://bit.ly/bmj-rr-aico

Recommendation

Routine colonoscopy		CADe colonoscopy
Endoscopic examination of the entire colon	or	Computer aided detection (CADe) colonoscopy - supplemented with use of artificial intelligence to increase adenoma detection rate
Strong / **Weak**		Weak / **Strong**

> We suggest against the routine use of CADe colonoscopy

Evidence profile potential benefits

Favours routine colonoscopy | No important difference | Favours CADe colonoscopy

Within 10 years	Events per 10 000 people			Evidence quality
Colorectal cancer incidence	82	No important difference	71	★☆☆☆ Very low
Colorectal cancer related deaths	15	No important difference	13	★★☆☆ Low
Colorectal cancer incidence	34	No important difference	23	★☆☆☆ Very low
Surveillance colonoscopy	2645	635 fewer	3280	★★☆☆ Low
Intraoperatively				
Adenoma detection rate	37	8 more	45	★★☆☆ Low

Values and preferences

Given uncertain benefits on critical outcomes and potential burdens (more frequent surveillance colonoscopies, increased health-related anxiety, overdiagnosis), most well-informed patients who have decided to undergo colonoscopy may not favour CADe assistance.

Patients may place more value on avoiding potential burdens than on currently uncertain benefits concerning critical outcomes such as colorectal cancer incidence, cancer-related mortality, and post-colonoscopy cancer incidence.

Limited evidence exists for patient values and preferences regarding CADe colonoscopy use. The weak recommendation against its use was informed by 60% of panel members (including patient partners) voting for a recommendation against CADe use and 40% voting in favour.

Population and system-level considerations

Decision analytic modelling shows that the implementation of CADe may result in a substantial increase in follow-up visits and procedures.

These, in turn, may result in a substantial increase in costs and a reduction in available resources.

The criteria for approval of CADe devices from regulatory agencies such as the US Food and Drug Administration remains unclear, making it difficult to integrate and compare different CADe systems in practice.

Rationale

Benefits of CADe colonoscopy on critical outcomes, such as colorectal cancer incidence and post-colonoscopy cancer incidence, are highly uncertain.

Low certainty evidence suggests little to no impact on colorectal cancer-related mortality, while the potential burdens—including more frequent surveillance colonoscopies, increased health-related anxiety, and overdiagnosis—are likely to affect many patients.

Given the trivial and uncertain benefits and the likelihood of burdens, the panel issued a weak recommendation against routine CADe colonoscopy use.

Key practical issues

- When used, CADe colonoscopy should not be a substitute for a careful and thorough examination
- Any potential benefit of CADe colonoscopy is contingent upon colonoscopy being performed by a trained endoscopist who ensures full mucosal visualisation of the colon
- Despite speculation that CADe colonoscopy is most beneficial for novice endoscopists, there is no evidence to support its efficacy being modified by the endoscopist's skill level

Additional areas of uncertainty

The impact of CADe colonoscopy on colorectal cancer incidence and related mortality is based on modelling work with low to very low certainty.

Most currently available randomised trials evaluating CADe colonoscopy are unblinded, raising concerns regarding provider bias and possibly influencing outcomes (overestimating benefits).

- *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 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, there is often leeway for the developer to update or modify its algorithms without necessarily reapplying for a full regulatory review.
- *Uncertainty in inferences on patients' values and preferences*—Due to the lack of relevant studies on values and preferences, the panel made inferences about what most patients would want. Given the uncertain evidence, all panel members agreed that the recommendation should be weak. 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. Thirteen panel members (60%) voted against, while nine (40%) voted for.
- *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 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.[25 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.
- *Age range in microsimulation study and generalisability*—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.

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 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 proved benefit for critical outcomes such as CRC incidence and mortality. In contrast, the AGA and ESGE panels placed a higher value on the potential—although 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.

Competing interests: See bmj.com.

Cite this as: *BMJ* 2025;388:e082656

Find the full version with references at doi: 10.1136/bmj-2024-082656

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 aids 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]

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.

EDITORIAL

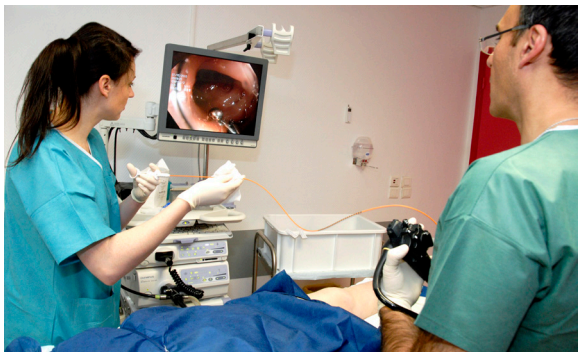
Limits of computer aided polyp detection

Role of artificial intelligence in identifying colorectal cancer is still evolving

Colorectal cancer (CRC) is the third most common cancer worldwide, often arising from precancerous adenomas.[1 2] Adenoma detection rate (ADR) is a key quality measure for colonoscopy, with higher ADRs associated with an improved survival benefit.[3 4] Advances in artificial intelligence (AI) have led to the development of computer aided polyp detection (CADe) systems aimed at improving ADR.

The *BMJ* Rapid Recommendations panel reviewed 44 trials on CADe for polyp detection, highlighting a pooled 8% increase in ADR compared with standard colonoscopy but noting no direct evidence on patient-important outcomes such as CRC incidence or mortality.[5] An accompanying microsimulation model by Halvorsen et al concluded that CADe significantly increased surveillance recommendations after screening colonoscopy (by 6.37%) and modestly increased recommendations for colonoscopy after a positive faecal immunochemical test (FIT) (by 0.82%).[6] The model predicted that implementation of CADe colonoscopy would prevent one additional CRC per 1000 individuals undergoing screening colonoscopy and five CRCs per 10 000 individuals with a positive FIT screening test followed by colonoscopy over 10 years. These studies underscore the limited evidence for a clinically important decrease in CRC incidence and mortality with CADe implementation.[6]

The *BMJ* Rapid Recommendation issued a weak recommendation against routine CADe use. In contrast, the European Society of Gastrointestinal Endoscopy (ESGE) and American Gastroenterology Association (AGA) issued a weak recommendation in favour of CADe[7] and no recommendation,[8] respectively, based on the same evidence. The AGA cited the delicate trade-off between the benefits, burdens, and harms as well as the lack of current evidence in support of their judgment.[8] This divergence in recommendations likely occurred because the *BMJ* Rapid Recommendations panel assigned greater value to the additional burdens associated with CADe. In contrast, the AGA and ESGE panels assigned more value to the potential benefits of CADe.



AJ PHOTO/SPL

These studies underscore the limited evidence for a clinically important decrease in CRC incidence and mortality with CADe implementation

Samantha M Linhares
samantha.linhares@yale.edu
Kurt S Schultz
Anne K Mongiu, Yale School of Medicine, New Haven, CT 06519, USA

The *BMJ* Rapid Recommendation and microsimulation study demonstrate that CADe systems are particularly effective at detecting small polyps, which may be less likely to develop into cancer than more advanced adenomas. This high sensitivity raises concerns around the potential for an increase in the surveillance burden with only minimal health benefits.[9 10] It should be noted that both the *BMJ* Rapid Recommendation and the AGA guidelines on CADe, produced in collaboration with shared methodological support, are living documents that will be updated as new evidence emerges.

There are several approved CADe devices. The BMJ Rapid Recommendation considered GI Genius and SKOUT only. The most widely approved is GI Genius in the US, Canada, UK, Switzerland, Israel, and Singapore.[5] Several others have been approved, including SKOUT in the US, ENDO-AID in Australia and New Zealand, and ENDOANGEL in China and Malaysia. Randomised studies with these devices found increases in ADR by 5-14%.[10-13] However, their clinical significance remains uncertain due to limited data on post-colonoscopy CRC incidence and mortality.

In addition, while cost-effectiveness analyses suggest potential benefits, they may overlook substantial overhead costs for integrating CADe into workflows, such as ensuring compatibility with video processors or integration into the electronic health record.[14 15]

Opportunities for computer aided polyp detection

Given these challenges, there is a need to demonstrate the effectiveness of CADe systems in identifying clinically important adenomas before recommending its widespread adoption in clinical practice.

CADe holds the potential for training endoscopists and in the screening of younger patients who are at increased risk for CRC (such as strong family history, genetic polyposis and non-polyposis syndromes, childhood history of radiation to the abdomen, pelvis, or spine).[10] Using neural networks, CADe can assess polyp features in real time, potentially reducing pathology costs.[18 19] Early-onset colorectal cancer (EOCRC) is associated with lower ADRs among affected patients and, with cases of EOCRC rising globally, CADe could improve detection.[20 21]

To gain trust, AI companies must ensure transparency in algorithm development and address concerns about data integrity and medical errors, especially as the evolving nature of these technologies has outpaced the legal framework of how these systems store patient data.[22] Health organisations must consider how CADe systems might affect patient safety and how they will address compromises in data integrity and CADe-related medical errors.

Cite this as: *BMJ* 2025;389:r732

Find the full version with references at http://dx.doi.org/10.1136/bmj.r732

STATE OF THE ART REVIEW

Evaluating patients with chest pain in the emergency department

Fernanda Bellolio,[1] Michael Gottlieb,[2] Richard Body,[3] Martin P Than,[4] Erik P Hess[5]

Full author details on bmj.com

Correspondence to: E P Hess erik.hess@vumc.org

This is a summary of Clinical Review Evaluating patients with chest pain in the emergency department. The full version can be read here: https://www.bmj.com/content/388/bmj.r136

0.5 HOURS

Chest pain is a common presenting symptom in both emergency and outpatient settings.[1 7] Of all patients who present with chest pain, only 5.1% will have ACS, and more than half will have a non-cardiac cause.[1]

The mean age at first myocardial infarction is 65.6 years for men and 72.0 years for women. Approximately 70% of these cases are non-ST-elevation myocardial infarction (NSTEMI) and unstable angina.

Clinical assessment and risk stratification

Initial evaluation

Obtain a detailed history and focused physical examination. This should include the history of the present illness, including pain characteristics, duration, risk factors, and associated symptoms. Chest pain should not be described as atypical, because this descriptor is not helpful in determining the cause.

Assess the patient's vital signs, perform a heart and lung examination, and note any signs of distress such as tachypnoea, diaphoresis, or mottled skin. Likelihood ratios are used to assess the value of a diagnostic test and to help determine how a test result will change the probability of having a disease. Prior abnormal stress test, peripheral artery disease, coronary artery disease, pain radiating to both arms, and pain similar to that from prior episodes of ischaemia are associated with ACS.[19-24]

Immediate evaluation

Electrocardiogram

The first step in the evaluation of patients with symptoms concerning for ACS is a 12 lead electrocardiogram (ECG). Guidelines recommend that the first ECG be obtained within 10 minutes of presentation.[1] Promptly assess the ECG for findings diagnostic of ST-segment elevation myocardial infarction (STEMI) (fig 1), non-ST-segment elevation ACS (NSTE-ACS), hyperacute T waves, pericarditis, or a cardiac dysrhythmia.[25] If the initial ECG is non-diagnostic but the patient continues to experience symptoms suggestive of ACS, repeat the ECG because ACS is a dynamic process. Also, assess the ECG for findings of alternate aetiologies.

The presence of ST-segment elevation, a new left bundle branch block, or dynamic ST-segment changes is suggestive of acute myocardial infarction (AMI). In a systematic review assessing the diagnostic accuracy of STEMI criteria, the criteria were 43.6% sensitive and 96.5% specific for occlusion myocardial infarction.[26] ST-segment elevation can also occur with diagnoses other than STEMI, such as pericarditis, early repolarisation, hyperkalaemia, hypercalcaemia, Takotsubo cardiomyopathy, and left ventricular aneurysm.[27]

Overall, less than half of patients with suspected ACS and left bundle branch block are ultimately diagnosed with AMI.[28] To increase the diagnostic accuracy for occlusion myocardial infarction in the setting of a left bundle branch block or a paced rhythm, additional ECG criteria have been developed.[29 30] The modified Sgarbossa criteria are the most accurate.[31]

High sensitivity cardiac troponins (hs-cTn)

Testing for cardiac troponin (cTn) is a cornerstone of the diagnostic approach.[1] Troponin is a protein contained within the myofibrillar apparatus that is found in both skeletal and cardiac muscle. It is possible to test for the cardiac isoforms of both troponin I (cTnI) and troponin T (cTnT) with high analytical specificity.

Consequences of the adoption of high sensitivity troponins

The ability to detect lower concentrations of troponin with greater precision has allowed for the development of modern clinical decision pathways with higher negative predictive value and earlier timeframes for troponin testing (often allowing serial troponins to be completed within 1-2 hours of arrival).[44-47] Additionally, most guidelines now advocate for the use of a single troponin risk stratification approach for certain low risk patient groups, who then might be suitable for early discharge from the emergency department.[35]

Falsely abnormal results can occur during analysis. Analytical causes of falsely abnormal results include rheumatoid factor, fibrin interference, haemolysis, autoantibodies, macro troponin, and heterophile

WHAT YOU NEED TO KNOW

- Identifying chest pain of cardiac origin is crucial because of the high mortality and morbidity of cardiovascular diseases
- High sensitivity cardiac troponins are the preferred biomarkers for diagnosing acute myocardial infarction, but these can be elevated from other causes
- Structured risk assessments should be used to estimate the risk of acute coronary syndrome and adverse events in patients with chest pain

antibodies.[49] Results can also be affected by high bilirubin and lipid levels and biotin.

Chest radiography

Although chest radiography is often obtained when evaluating patients with chest pain, findings infrequently lead to intervention, and its use should be guided by clinical suspicion.[56 57] In patients with chest pain and dyspnoea, a chest radiograph can identify signs of fluid overload such as pulmonary vascular congestion and oedema. A chest radiograph can also identify other acute cardiopulmonary causes of chest pain such as aortic dissection, pneumonia, or pneumothorax.

Point of care ultrasound

In a patient with acute chest pain and a non-diagnostic initial ECG, point of care ultrasound can identify regional wall motion abnormalities suggestive of ACS. However, accurate identification of regional wall motion abnormalities and differentiating acute from chronic abnormalities requires substantial expertise and should be assessed by more advanced users of echocardiography.[58] Point of care ultrasound can also help rapidly identify pulmonary oedema and has been shown to be helpful in the diagnosis of acute dyspnoea.[59]

Cardiac testing

There are two main types of non-invasive advanced cardiac testing: anatomical and functional. Anatomical testing directly visualises the coronary arteries and can estimate the degree of coronary stenosis. Though estimates of fractional flow reserve and thus functional cardiac information can be obtained from CT coronary angiogram, these estimates are not widely available in most centres.[61]

Other types of cardiac testing (exercise ECG, stress/rest single photon emission CT myocardial perfusion imaging, stress/rest stress echocardiography, and stress/rest positron emission tomography) provide information on cardiac function. Current guidelines recommend selective use of testing, reduced layered testing, and eliminating testing when the diagnostic yield is low. Resting imaging tests, including radionuclide myocardial perfusion imaging and echocardiography, could be of value in the evaluation of patients who have persistent chest pain suggestive of ACS, a non-ischaemic ECG, and initial or serially negative cardiac biomarkers.

Risk scores and risk stratification

Pathways and risk scores are integral to evaluation of chest pain, ensuring that patients receive appropriate care based on their risk level.[38 69 70]

Risk scores for possible ACS

Several risk scores have been evaluated. Some that were derived for prognostication in patients with established ACS were repurposed so that they could be used in the emergency department setting.

The thrombolysis in acute myocardial infarction score and HEART score have been applied both with a single hs-cTn test at the time of arrival in the emergency department and with serial hs-cTn testing over 1-3 hours.[3 74] The Emergency Department Assessment of Chest Pain Score (EDACS) score was designed to be used with serial troponin testing over 2 hours,[74] while the troponin-only Manchester Acute Coronary Syndromes score was designed for use with a single hs-cTn test at the time of arrival.[36 75 76]

Compared with an unstructured clinical assessment, risk scores have been shown to decrease unnecessary testing and reduce admissions while maintaining high sensitivity for the detection of acute myocardial injury and major adverse cardiac events.[1 23 77]

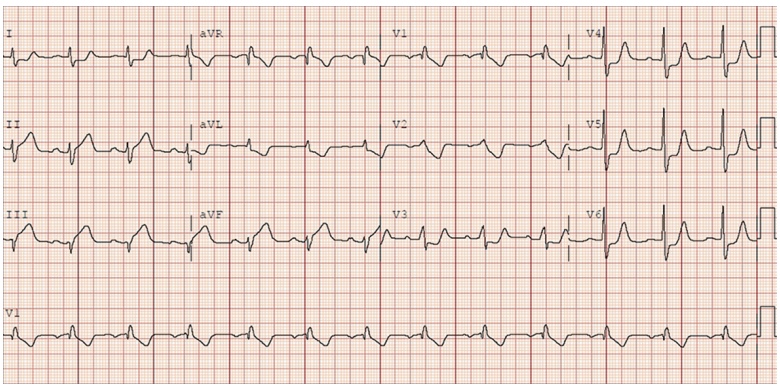


Fig 1 | ST-segment elevation myocardial infarction includes new ST-segment elevation at the J point in two contiguous leads ≥1 mm in all leads other than V2-V3, where the following cut-points apply: ≥2 mm in men ≥40 years; ≥2.5 mm in men <40 years, or ≥1.5 mm in women regardless of age

Clinical decision pathways

Whether used alone or with a risk score, hs-cTn testing must guide clinical decision making. This requires incorporating hs-cTn into a clinical decision pathway. Numerous pathways have been developed. As a general principle, decision pathways will specify criteria to rule out AMI after performing single hs-cTn test at arrival in the emergency department. After considering alternative diagnoses and other relevant factors, such patients might be eligible for early discharge. Patients with a hs-cTn level above a very high threshold have a high probability of AMI, and the diagnosis could be considered ruled in, allowing for early specialist referral and treatment. The remaining patients will undergo a second hs-cTn test one to three hours after the first test. This will stratify more patients to the rule-out and rule-in groups. The remaining patients could be in an observation group.

A key unanswered question is the optimum management of patients in the observation group. A reasonable initial approach is to repeat the hs-cTn test at six hours to confirm or refute the diagnosis with greater certainty. Imaging, such as CT coronary angiogram, could then be considered for the remaining patients who do not have AMI.

Optimal initial management

An approach to patients with acute chest pain suggestive of acute coronary syndrome (ACS) is shown in figure 2.

High risk patients

For patients with STEMI, clinicians should immediately activate the cardiac catheterisation laboratory for percutaneous coronary intervention[97] or transfer the patient to a centre that is capable of performing the test.[97]

HOW PATIENTS WERE INVOLVED IN CREATION OF THIS ARTICLE

We discussed this article with a patient who had presented to the emergency department several times as a patient and as a caregiver. They stressed the importance of clear coordination of care, where responsibilities between healthcare providers and patients are well defined, particularly regarding organising tests, reporting results, and follow-up. They highlighted the need to consider the impact of treatments on quality of life, including the practical and emotional effects of medications; the importance of addressing cost and time involved, ensuring patients are informed about financial and logistical aspects of their care; and the importance of clear dismissal instructions.

Also, three of the authors worked with patients with lived experiences of chest pain during the writing of a clinical guideline for management of low risk chest pain. Their voices are reflected in box 5 of the full article.

For patients with NSTEMI, aspirin 81-324 mg and a $P2Y_{12}$ receptor inhibitor (clopidogrel 300-600 mg or ticagrelor 180 mg) should be given.[101] Anticoagulation should be initiated with enoxaparin 1 mg/kg or unfractionated heparin 60-70 IU/kg.[102] As for patients with STEMI, oxygen should not be used routinely and pain should be treated with nitroglycerin and opioids as needed.

For patients with new ischaemic changes on ECG, elevated troponins, new-onset left ventricular dysfunction, or other high risk features, the American Heart Association recommends invasive coronary angiography to identify and manage any obstructive CAD. If invasive coronary angiography does not identify an obstructive stenosis that correlates with the clinical presentation and the patient remains troponin positive, cardiac magnetic resonance imaging can also be considered for determining alternative diagnoses.[103 104]

Intermediate risk patients

Current clinical decision pathways have two primary ways patients with possible ACS and a non-ischaemic ECG are classified as intermediate risk. First, the high sensitivity troponin concentration is in the range between the limit of detection and the 99th percentile. These patients have higher cardiac event and death rates in medium to long term follow-up and, as such, warrant further investigation.[55 105 106] Provided that there is not a relevant delta between serial high sensitivity troponin measurements, the patient is not experiencing acute myocardial injury, and can be safely discharged from the emergency department.[107]

Second, the high sensitivity troponin concentration is undetectable or in the range between the limit of detection and the 99th percentile with a negative delta. These patients are classified as intermediate risk using a risk score. For this group of patients, outpatient follow-up for further risk stratification is also reasonable.[96]

Low risk patients

Low risk patients can be discharged after initial risk stratification. For most low risk patients, urgent diagnostic testing for suspected coronary artery disease is not needed.[1]

Occlusion myocardial infarction is the anatomical and pathophysiological substrate of STEMI, but not all occlusion myocardial infarction manifests as STEMI

Special considerations

Occlusion myocardial infarction

Occlusion myocardial infarction refers to type 1 myocardial injury or infarction involving acute occlusion or near occlusion of a major epicardial coronary vessel with insufficient collateral circulation, resulting in imminent necrosis of downstream myocardium without emergent reperfusion. Occlusion myocardial infarction is the anatomical and pathophysiological substrate of STEMI, but not all occlusion myocardial infarction manifests as STEMI.[113] Patients with occlusion myocardial infarction and STEMI have similar angiographic findings, raised cTn levels, and a high risk of pre-catheterisation cardiac arrest and index visit mortality. Patients with occlusion myocardial infarction, but without STEMI, are less likely to receive emergency cardiac catheterisation compared with patients with STEMI (38% *v* 71%).[113]

Early identification of patients with occlusion myocardial infarction has the potential to lead to earlier intervention and to improve outcomes in patients with ACS. Further research on emergent reperfusion for NSTEMI occlusion myocardial infarction is needed.[26 113] In non-occlusion myocardial infarction, myocardial injury is due to ischaemia but without major coronary artery stenosis. The pathophysiology includes epicardial vasospasm, coronary microvascular dysfunction, spontaneous coronary artery dissection, and coronary thromboembolism. Management requires addressing the underlying cause (eg, antithrombotic therapy for thromboembolism or specific treatments for myocarditis or Takotsubo cardiomyopathy).[1 114]

Ischaemia with non-obstructive coronary arteries

One half of patients undergoing elective coronary angiography for possible ACS will have non-obstructive coronary heart disease. These patients are often discharged with a diagnosis of non-cardiac chest pain, and a percentage of them will have recurrent symptoms secondary to cardiac ischaemia. Ischaemia with non-obstructive coronary arteries can result from coronary microvascular dysfunction or coronary vasospasm, leading to inadequate blood flow to the myocardium. Patients often present with angina-like symptoms, making diagnosis challenging. Diagnosis requires coronary angiography, functional testing, and evaluations of coronary microvascular function and vasospasm. Management focuses on symptom relief through pharmacotherapy, lifestyle modifications, and psychosocial support. Ischaemia with non-obstructive coronary arteries and non-occlusion myocardial infarction involve ischaemia without large arterial blockages, but ischaemia with non-obstructive coronary arteries is focused on chronic ischaemia owing to microvascular disease, and non-occlusion myocardial infarction involves acute myocardial infarction owing to other causes such as oxygen supply/demand imbalance in conditions such as sepsis.

ACS presentation in women

Women with ACS experience worse outcomes than men, including higher patient and system delays and

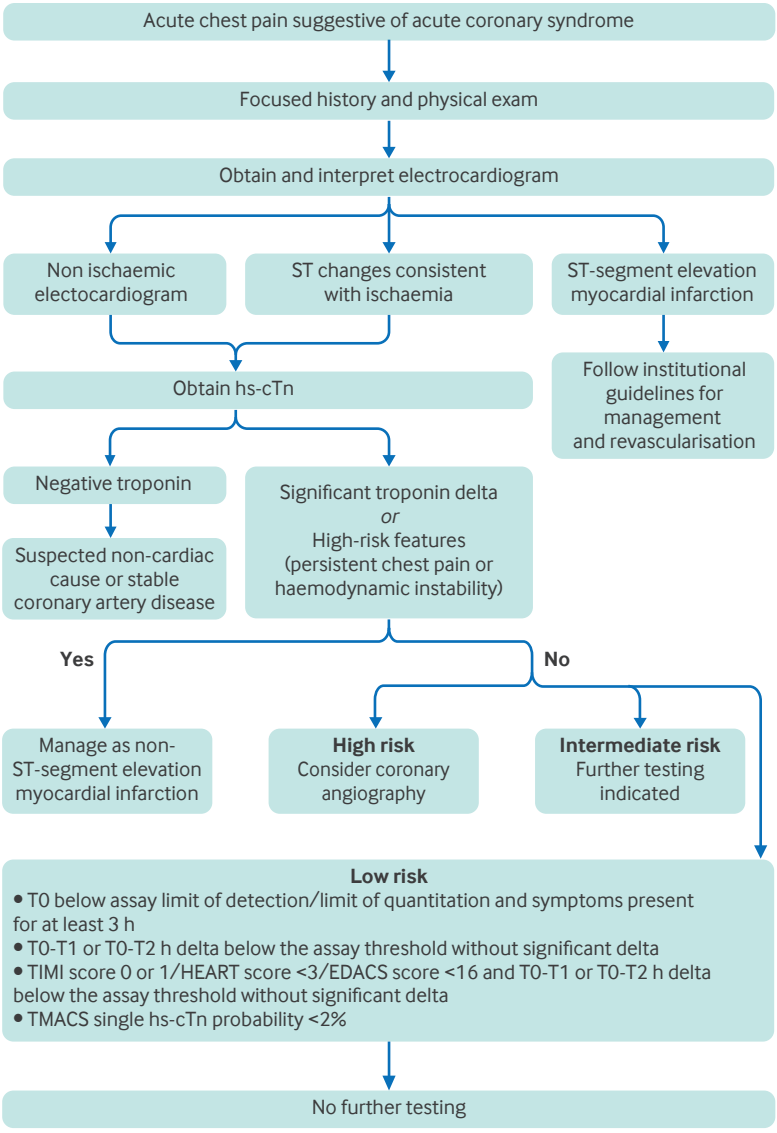


Fig 2 | Approach to patients with acute chest pain suggestive of acute coronary syndrome using risk scores for stratification. See full article for further details

less aggressive treatment.[118] Women have smaller coronary arteries and higher baseline myocardial blood flow, and have different coronary plaque characteristics (more diffuse, non-obstructive, and reduced overall plaque burden). Risk factors like hypertension, diabetes, and smoking, along with non-traditional factors such as psychosocial stress and socioeconomic status, impact women differently. Risks specific to women, including menopause, pregnancy, and hormonal changes, affect cardiovascular risk. Women are more likely to experience microvascular angina, spontaneous coronary artery dissection, and Takotsubo cardiomyopathy.[118] Sex-based troponin cut-offs reflect these physiological differences. Current guidelines and risk stratification tools, primarily based on men, could lead to under-treatment in women. Unconscious bias can affect clinical judgment. Women have worse outcomes after ACS and face higher risks of complications during revascularisation procedures.[118]

ACS presentation in older patients

Clinicians should have a low threshold for obtaining an ECG in older patients even in the absence of common cardiovascular symptoms.124 Presentations like falls, syncope, or nausea can be manifestations of ACS in older adults. Owing to the higher prevalence of comorbidities, a thorough assessment is necessary to differentiate between cardiac and non-cardiac causes of chest pain in older patients. The use of structured risk assessment tools ensures that diagnostic testing is targeted to those most likely to benefit.1

Guidelines

The most current guidelines are the European Society of Cardiology guidelines for the evaluation and management of acute chest pain.[87] These guidelines emphasise a structured approach incorporating diagnostic pathways, timing of serial troponin measurements, and risk stratification. Critiques to this algorithm include that it does not differentiate risk based on known CAD.[46] Supporters of the algorithm report that it is helpful even in patients presenting early (defined as within 3 hours of chest pain).[141] Changes in the 2023 version include the consideration of using coronary CT angiography or a non-invasive stress imaging test as part of the initial workup in patients with normal hs-cTn, no ECG changes, and no recurrence of pain.

Changes in the 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain include that patients with a low (<1%) risk of death or major cardiac events within 30 days do not require stress testing or cardiac imaging. Also, for those at intermediate risk and no known coronary artery disease, the decision to use anatomical or functional advanced cardiac imaging after a negative ACS workup should be guided by local availability, expertise, and patient preference.

Guidelines for Reasonable and Appropriate Care in the Emergency Department-1 guidelines are focused on patients with recurrent low risk chest pain and add that if a previous imaging or stress test is reassuring, a single troponin value below the validated threshold is enough to rule out ACS. Similarly to the European Society of Cardiology, these guidelines recommend screening for depression and anxiety among those with recurrent emergency department visits for chest pain and negative workup.[9]

Both the American Heart Association/American College of Cardiology guidelines and the European Society of Cardiology guidelines recommend a risk based approach to angiography with early invasive strategies for patients at high risk including those with ongoing chest pain, dynamic ECG changes, haemodynamic instability, or life threatening arrhythmias.

Competing interests: See bmj.com.

Cite this as: *BMJ* 2025;388:r136

Find the full version with references at https://doi.org/10.1136/bmj.r136

Please support families of those experiencing psychosis

CPD READING
0.5 HOURS

This author describes what it is like to experience a loved one going through a psychotic episode and what support health professionals could have given her and her family

PRIYA SUNDRAM

I was 10 when my sister first experienced psychosis. I remember her hearing voices, distressed and upset, shouting at someone we couldn't see. She was soon admitted to hospital for the first time and has since had many further admissions for psychosis. To me her condition seems to have an extreme on-off tendency. She will be well for long periods of time, and then within days she will be convinced she is dead, that the room is full of snakes, and the world is falling apart around her. Her recovery is often slow, and several times she has had to spend many, many months in hospital.

Visiting my sister was hard. At times she would be so unwell that she could barely speak, transported to some other world that she was unable to escape. At other times, she would be distressed, bursting into tears constantly or inconsolable with fear. Although visiting felt important, it was hard to know what to do on these visits. When she was better, we got into the habit of sitting and playing cards. But there were long periods when this was not possible. On the way home after my visits, I would almost always cry.

Conversations about communication

My family and I often wondered how best to communicate with my sister when she was in the grip of psychosis. Her hallucinations and delusions clearly terrified her. It felt natural to tell her they were not real, but to do this continually was to spend time constantly in opposition to her, contradicting her experiences. Nobody ever talked us through how to handle this.

One positive legacy of the pandemic was that we were sometimes given the opportunity to join my sister's ward reviews online. Then I was finally able to put the question about communication to a kind and patient consultant. He explained a way of recognising the emotional impact of my sister's hallucinations, and then, if possible, trying to dispel it by displacing it with trust. Something like, "That sounds really scary for you. Perhaps let's look under the bed together and see if there's anything there." I'm grateful to this consultant as this really helped. I just wish that conversation had happened sooner.

Role of families

Psychiatric wards are not always easy places on which to spend time. A visit might involve interactions with patients other than my sister, and knowing how to behave in those situations didn't necessarily come easily. When relatives visit patients in an intensive care unit, nurses and staff members are trained to support those visitors: to explain what the machines mean, to warn them of what might be hard, and to ensure their emotional needs are met. I don't ever remember such support for my family. The nurses and mental health support workers were generally kind and professional, but it wasn't part of the culture to check in on visitors.

In some ways my sister is lucky: she has a well resourced and educated family advocating for her, which so many do not. Yet despite that, we have often not found it easy. Perhaps family support needs to become part of the culture on mental health wards, and we should recognise the need for help in communicating. More proactive support is needed, in the emotional aspects of the visits as well as in how to best help our relatives.

Anonymous

Cite this as: *BMJ* 2025;389:r598

WHAT YOU NEED TO KNOW

- Psychosis can be very difficult to witness, especially when it is in a family member or loved one
- Giving families guidance on how best to communicate with someone during a psychotic episode can be helpful
- Family members need to be given more support when visiting a patient and to be seen as an important part of recovery

EDUCATION IN PRACTICE

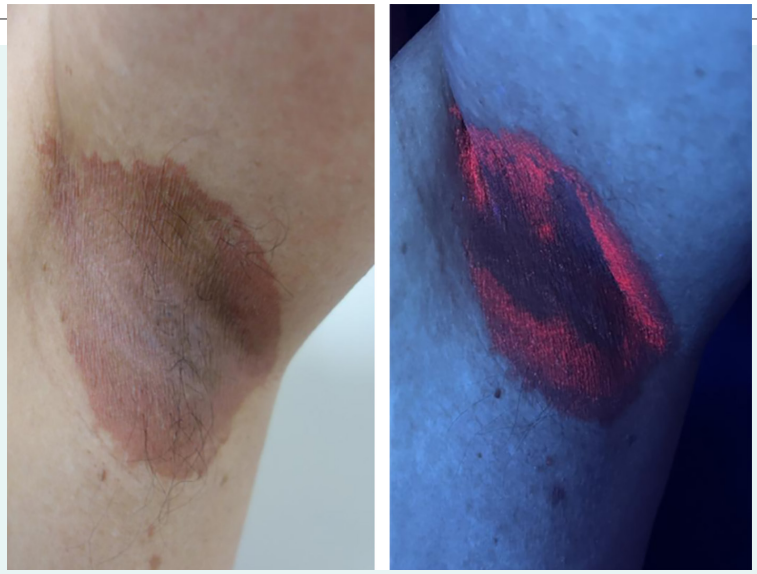
- What support or advice could you give to a family member when a patient is going through psychosis?
- How could you ensure you are working with a patient's family to help with recovery?

CASE REVIEW

Red-brown patches in the axillae

A man in his 50s presented to the dermatology department with a one month history of mildly itchy red-brown patches in both axillae. The lesions began as red-brown macules and gradually expanded, merging into larger patches. The patient used a topical antifungal treatment, but there had been no improvement. Physical examination revealed well defined, "cigarette paper"-like, wrinkled erythematous, brownish plaques with minimal scaling in both armpits (figure). No other lesions or lymphadenopathy were noted. His medical and family histories were unremarkable. Potassium hydroxide preparation of skin scrapings was negative for fungal organisms, but the lesions showed coral-red fluorescence under Wood's lamp examination (figure). *Corynebacterium minutissimum* was isolated from bacterial culture of the skin scrapings. Other laboratory tests were negative.

1 **What are the differential diagnoses?**
2 **What is the most likely diagnosis?**
3 **What is the management of this condition?**



Red-brown plaques in the left armpit (left) and coral-red fluorescence under a Wood's lamp (right)

Submitted by Hong-Hao Hu, Cheng-Cheng Liu, Qiao-Xi Li, and Jiu-Hong Li
Patient consent obtained.
Cite this as: *BMJ* 2025;388:e081933

answers

CASE REVIEW **Red-brown patches in the axillae**

1 What are the differential diagnoses?

Differential diagnoses include erythrasma, inverse psoriasis, acanthosis nigricans, and fungal infections. Fungal infections typically attributed to *Epidermophyton*, *Microsporum*, or *Trichophyton* species classically present as annular expanding plaques with central clearing and scales on the peripheral border. The diagnosis can be confirmed if skin scrapings using potassium hydroxide show hyphae or spores when examined with a microscope.

2 What is the most likely diagnosis?

Erythrasma, a superficial skin infection caused by the Gram positive bacterium *Corynebacterium minutissimum*.
Erythrasma typically presents as erythematous, scaly plaques or patches in intertriginous areas with a characteristic "cigarette paper"-like, wrinkled appearance. In darker skin, the appearance of erythrasma has minimal scaling and might present as darker brown or red-brown patches, with post-inflammatory pigmentation changes being more pronounced. Although extensive epidemiological studies on erythrasma are lacking, it is more commonly observed in individuals who are obese, are older, or have diabetes. The risk of erythrasma is increased by humid environments, excessive sweating, poor hygiene, advanced age, and underlying health conditions. *Corynebacterium minutissimum* produces coproporphyrin III, which fluoresces red under a Wood's lamp, making it a diagnostic tool for erythrasma. Recent bathing or showering could remove fluorescent substances, producing false-negative results. The diagnosis of erythrasma is primarily clinical, and the coral-red fluorescence observed by Wood's lamp examination provides confirmation. In the absence of a Wood's lamp, ultraviolet LED light from other sources could be used. Potassium hydroxide preparation, Gram staining, culture, and biopsy are all useful for differentiating this condition, but using a Wood's lamp is the fastest and most convenient method.

3 What is the management of this condition?

Treatment for erythrasma typically includes topical and oral antibiotics. Systemic treatment is reserved for cases with comorbidities, local antibiotic resistance, or widespread lesions. Topical antibiotics typically include clindamycin, fusidic acid, mupirocin, or benzoic acid with salicylic acid (Whitfield's ointment). Common oral antibiotics include erythromycin and tetracycline. Keeping the skin clean and dry can help reduce recurrence.

LEARNING POINTS

- Erythrasma is a superficial skin infection that presents with erythematous scaly plaques or patches and a "cigarette paper"-like, wrinkled appearance.
- The condition shows coral-red fluorescence under a Wood's lamp.
- Antibiotics are used for treatment.

PATIENT OUTCOME

See bmj.com.

CPD READING
0.5 HOURS

You can record CPD points for reading any article. We suggest half an hour to read and reflect on each.

LEARNING MODULE

Articles with a "learning module" logo have a linked BMJ Learning module at learning.bmj.com.