

# education

## ART OF MEDICINE

### Is teaching rewarding?

My father was a teacher in a small school in Sri Lanka, and I too wanted to be a teacher. However, the fact that my father was always poor meant that I finally decided to study medicine.

After passing my primary fellowship exam of the Royal College of Surgeons, I worked as a surgical registrar under a famous surgeon. The surgeon was so busy that the teaching and training of medical students was left to the registrars. This gave me great pleasure, and from then on I always enjoyed teaching.

On my return to Sri Lanka, I joined the Faculty of Medicine at the University of Jaffna and again had the satisfaction of teaching medical students and junior doctors. During the civil war, I had to take refuge in the UK, but I continued my interest in teaching and received an honorary lecturer post from University College London and was given their “top tutor” award a few years ago.

With the war over, I regularly teach life support courses in northern Sri Lanka. Once, when I was lost in the new hospital, a doctor welcomed me, “Sir, you remember me, I was one of your students, and now [I’m] the head of the department of surgery.” More recently, a doctor approached me and said, “I was keen to meet you for the last 40 years but I did not know where you were. You remember teaching us as medical students when you were a registrar? I always wanted to meet and thank you. Today I have met you and thanked you after 40 years.”

The Tamil classic *Thirukkural* says: “The learned will long for more learning when they see that, while it gives pleasure to themselves, the world also derives pleasure from it.”

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Hindu temple, Jaffna

## PRACTICE UPDATES

### NICE recommends evolocumab for treating primary hypercholesterolaemia and mixed dyslipidaemia

Evolocumab is a monoclonal antibody administered via subcutaneous injection that inhibits proprotein convertase subtilisin/kexin type 9 (an enzyme involved in the down regulation of low density lipoprotein (LDL) receptors). NICE recommends evolocumab for treating primary hypercholesterolaemia or mixed dyslipidaemia at a dose of 140 mg every two weeks, and if LDL concentrations are persistently above specified levels despite maximal lipid lowering therapy. It is authorised as an adjunct to diet either in combination with other lipid lowering therapies or alone where other therapies are not tolerated or are contraindicated. Commonly reported side effects include nasopharyngitis, upper respiratory tract infection, influenza, back pain, arthralgia, and nausea. It costs about £4422 per patient per year with the recommended administration regime.

• <http://bit.ly/29jLL1Q>

### Oral health for adults in care homes

More attention needs to be paid to the oral health of adults in care homes, says new NICE guidance. Staff caring for residents or clinicians carrying out assessments should assess the mouth care needs of all residents as soon as they start living in a care home. Consider involving family and friends in the initial assessment and understand how residents usually manage their daily mouth care and if they need support. Assess if dentures are marked or unmarked and if residents would like them marked. Note contact with dental services and advise care staff to make an appointment if necessary.

• <http://bit.ly/29wrSIR>

## FAST FACT—RENAL CALCULI

Risk factors for renal calculi are numerous and include:

- Recurrent urinary tract infections with *Proteus* species
- Hypercalcaemia
- An oxalate-rich diet, such as from tea, strawberries, spinach, rhubarb, nuts
- Dehydration
- Hyperuricaemia (gout)
- Medications including diuretics, antacids, corticosteroids, aspirin, allopurinol, vitamin C and D supplements, acetazolamide, and antiretroviral drugs
- History of structural urinary tract abnormalities
- Family history

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**CPD/CME**

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# Colorectal adenocarcinoma: risks, prevention, and diagnosis

CPD/CME

1 CREDIT

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This is an edited version, full version on thebmj.com

**Colorectal cancer is the fourth most common cause of cancer related mortality globally, with 1.4 million new cases and 700 000 deaths annually.<sup>1</sup>**

## What is colorectal cancer?

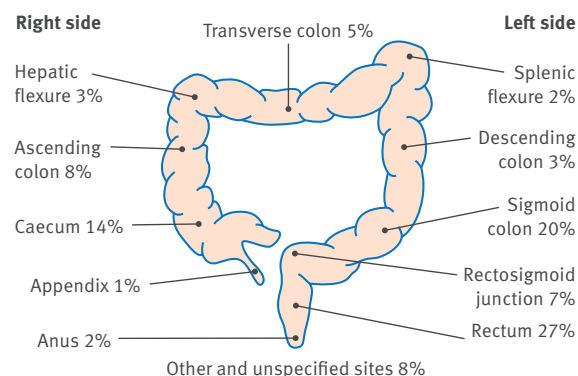
Colorectal cancer refers to tumours of the rectum or large bowel (including the appendix) that arise from the colorectal mucosa (fig 1). Adenocarcinoma is the most common form of colorectal cancer (>95%). Rarer subtypes include carcinoid tumour, sarcoma, and lymphoma; these present differently from adenocarcinoma<sup>1</sup> and will not be discussed in this review.

## How does colorectal adenocarcinoma develop?

Colorectal cancer typically develops from adenomatous polyps that undergo dysplastic changes to become cancerous (fig 2).<sup>2</sup> Tumours can occur sporadically, but there are some inherited colorectal cancer syndromes (see table 1). Several risk factors are also recognised (see box 1).

## Who gets colorectal cancer?

The incidence of colorectal cancer strongly increases after 50 years of age (fig 3), and median age at diagnosis



**Fig 1 | Distribution of bowel cancer by anatomical site, UK (2007-09)** (adapted from Cancer Research UK, bowel cancer incidence statistics, [www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/bowel-cancer/incidence](http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/bowel-cancer/incidence))

## HOW PATIENTS WERE INVOLVED IN THE CREATION OF THIS ARTICLE

No patients were involved in the creation of this article.

## WHAT YOU NEED TO KNOW

- Colorectal cancer is the third most common cancer in men and the second most common in women
- It is rare below 40 years of age
- Increasing age, male gender, and a family history of colorectal cancer are the greatest risk factors for the disease
- Refer patients presenting with suspicious symptoms and signs urgently to a specialised unit for investigation

is about 70 years in developed regions.<sup>23</sup> Previously low risk regions (such as Spain and several countries in Eastern Europe and East Asia) have seen rapid rises in incidence of colorectal cancer. This has been attributed to the adoption of high fat diets heavy in red and processed meats, physical inactivity, excessive alcohol consumption, and smoking. The US and other high income countries have seen a plateau or drop in disease incidence, possibly due to an increased use of diagnostic endoscopy and polypectomy.<sup>24 25</sup>

## What are the risk factors for colorectal cancer?

Most colorectal cancer cannot be attributed to any single risk factor, although increasing age and male sex have consistently shown strong associations with disease incidence in epidemiological studies<sup>23</sup> (box 1).

The key genetic syndromes associated with colorectal cancer are summarised in table 1; and the current UK recommendations for screening and surveillance of asymptomatic patients in moderate-risk family groups are summarised in table 2.<sup>26</sup>

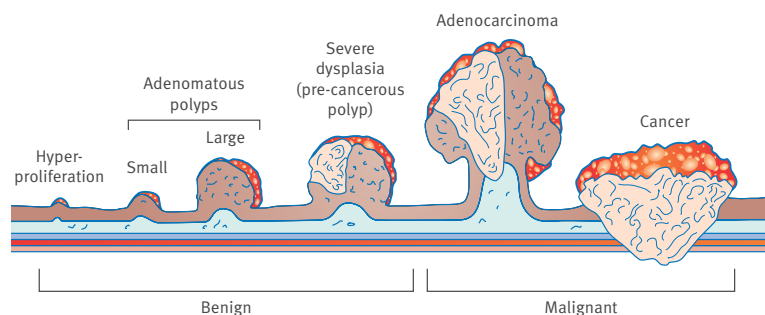
## How do patients present, and who should be referred?

The commonest presenting features of colorectal cancer are abdominal pain, change in bowel habit, rectal bleeding, and microcytic anaemia, although these commonly feature in other gastrointestinal diseases. Left sided colorectal tumours typically present with altered bowel habit (such as loose stools, increased frequency, and intestinal obstruction secondary to progressive luminal narrowing), rectal bleeding or mucus, or tenesmus. Right sided lesions may present more insidiously with weight loss, abdominal pain or mass, or iron deficiency anaemia.<sup>27</sup> Urgently investigate and refer men and non-menstruating women with iron deficiency anaemia, as 10% of such patients will have colorectal cancer.<sup>28 29</sup>

**Table 1 | Inherited syndromes predisposing to colorectal cancer**

| Syndrome   | Prevalence  | Genes                                       | Associated cancers  | Prognosis  |
|--|---|---|---|--|
| Hereditary non-polyposis colorectal cancer (HNPCC) or Lynch syndrome | HNPCC accounts for 1-4% of colon cancers <sup>3</sup> | MSH2, MLH1, MSH6, PMS2 (autosomal dominant) | <i>Most common</i> —colorectal cancer (often right sided), endometrial cancer<br><i>Less common</i> —stomach, ovary, urogenital tract, gallbladder, brain cancers | 90% of men and 70% of women with HNPCC develop bowel cancer by age 70 years <sup>4</sup> |
| Familial adenomatous polyposis (FAP)                                 | FAP accounts for <1% of bowel cancers <sup>3</sup>    | APC (autosomal dominant)                    | Colorectal cancer 100 polyps (adenomas) that start to develop in adolescence<br>May feature upper gastrointestinal tract polyps                                   | Almost all FAP patients develop bowel cancer by age 40 <sup>5</sup>                      |

It is estimated that another 20% of bowel cancer is linked to hereditary factors not associated with FAP and HNPCC.<sup>6</sup>



**Fig 2 | Progression from colorectal polyp to cancer (adapted from Johns Hopkins Colon Cancer Center. Polyps 101. [www.hopkinscoloncancercenter.org/CMS/CMS\\_Page.aspx?CurrentUDV=59&CMS\\_Page\\_ID=744568E4-291E-4276-97C4-FA7A4EE02235](http://www.hopkinscoloncancercenter.org/CMS/CMS_Page.aspx?CurrentUDV=59&CMS_Page_ID=744568E4-291E-4276-97C4-FA7A4EE02235))**

A UK population based case-control study of 2093 patients aimed to quantify the pre-diagnostic features of colorectal cancer (see table 3 for details).<sup>30</sup> The 2015 NICE guidelines for the urgent referral of suspected colorectal cancer are summarised in table 4.<sup>31</sup>

### How to investigate suspected colorectal cancer

Advise patients that more than one investigation may be necessary to confirm or exclude a diagnosis of colorectal cancer.<sup>32</sup>

Colonoscopy is the recommended first line imaging for suspected colon cancer in patients without major comorbidity.<sup>32</sup> Bowel preparation with oral laxatives improves the diagnostic yield of pan-colonic imaging. Biopsies are taken from any suspicious lesions unless contraindicated (for example, in coagulopathy) to confirm the diagnosis and degree of tumour differentiation (well, moderately, or poorly differentiated) to guide treatment. Patients who have undergone incomplete colonoscopy (due to

intra-procedural discomfort or poor bowel preparation) may be offered repeat colonoscopy, computed tomographic (CT) colonography, or barium enema. Patients with major comorbidity and frail or elderly patients with poor mobility and poor tolerance to bowel preparation may be offered alternative imaging such as CT colonography or flexible sigmoidoscopy in the first instance, followed by biopsy of suspicious lesions.<sup>32</sup>

### Colonoscopy

Colonoscopy is operator dependent and requires full bowel preparation. Completion rates (that is, passage of colonoscope to caecum) vary widely because of technical challenges, and experienced endoscopists typically achieve completion rates of 98%. A 90% rate is considered acceptable.<sup>33</sup> Histological confirmation of malignancy requires multiple biopsies. Overtly malignant lesions may be injected with dye contrast to mark the area and facilitate subsequent surgical resection. Procedural risks are mainly related to sedation and bowel perforation (table 5).<sup>34 35</sup> Prospective comparative studies have suggested that patients are as comfortable with conventional colonoscopy as CT colonography. Both of these investigations are preferred over barium enema.<sup>36 37</sup> Poor bowel preparation and incomplete colonoscopy are the two main variables contributing to false negative tumour detection.<sup>33</sup>

Box 2 lists advice for people referred for colonoscopy. If there is a clear contraindication or more than one relative contraindication to bowel preparation, offer admission on the day before colonoscopy for inpatient preparation.

### Box 1 | Risk factors for colorectal cancer

#### Sociodemographic factors

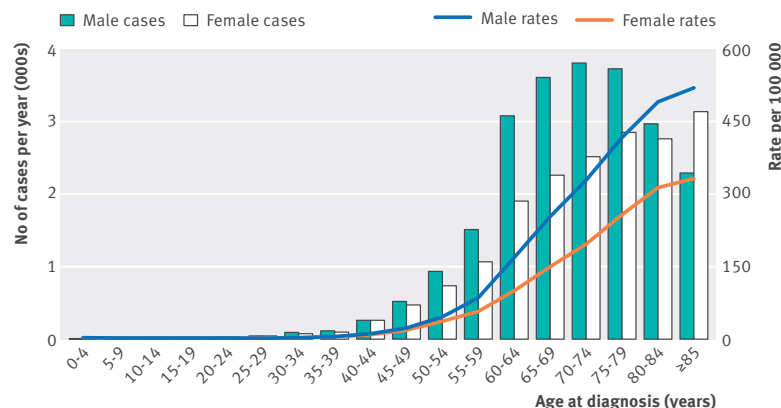
- Older age
- Male sex

#### Lifestyle factors

- Red meat and processed meat consumption
- Obesity
- Alcohol
- Tobacco smoking

#### Medical factors

- Family history
- Colorectal adenomas or polyps
- Inflammatory bowel disease (IBD)
- Diabetes



**Fig 3 | Age specific incidence rates of colorectal cancer per 100 000 population, UK (2009-11) (adapted from Cancer Research UK)**

**Table 2 | Summary of recommendations for colorectal cancer (CRC) screening and surveillance in moderate risk family groups (adapted from Cairns et al<sup>26</sup>)**

| Family history of colorectal cancer (CRC)                   | Lifetime risk of colorectal cancer death without surveillance | Screening recommended |                               |                                       |
|---|---|-----------------------|-------------------------------|---------------------------------------|
|   |   | Procedure             | Age at initial screen (years) | Screening interval                    |
| In 3 relatives in first degree kinship*, none <50 years old | ~1 in 6-10  | Colonoscopy           | 50                            | Every 5 years to age 75 years         |
| In 2 relatives in first degree kinship*, mean age <60 years | ~1 in 6-10  | Colonoscopy           | 50                            | Every 5 years to age 75 years         |
| In 2 first degree relatives ≥60 years old                   | ~1 in 12  | Colonoscopy           | 55                            | No follow-up if initial screen normal |
| In 1 first degree relative <50 years old                    | ~1 in 12  | Colonoscopy           | 55                            | No follow-up if initial screen normal |
| Other family history of CRC                                 | <1 in 12  | None                  | NA                            | NA                                    |

\*Relatives who are first degree relatives of each other and at least one is a first degree relative of the consultand. No affected relative <50 years old (otherwise high risk criteria apply).<sup>26</sup>

**Table 3 | Pre-diagnostic features of colorectal cancer (adapted from Hamilton et al<sup>20</sup>)**

| Feature                                       | Positive predictive value (95% CI) (%) | P value |
|---|--|---------|
| <b>Presenting symptoms</b>                    |  |         |
| Rectal bleeding                               | 2.4 (1.9 to 3.2)                       | <0.001  |
| Weight loss                                   | 1.2 (0.91 to 1.6)                      | <0.001  |
| Abdominal pain                                | 1.1 (0.86 to 1.3)                      | <0.001  |
| Diarrhoea                                     | 0.94 (0.73 to 1.1)                     | <0.001  |
| Constipation                                  | 0.42 (0.34 to 0.52)                    | <0.001  |
| <b>Examination and investigation findings</b> |  |         |
| Abnormal rectal examination                   | 4.0 (2.4 to 7.4)                       | <0.001  |
| Abdominal tenderness                          | 1.1 (0.77 to 1.5)                      | <0.001  |
| Anaemia (serum haemoglobin <100 g/L)          | 2.3 (1.6 to 3.1)                       | <0.001  |

### CT colonography

CT colonography (“virtual colonoscopy”) may be indicated after failed colonoscopy, in light of patient preference, or when a patient is deemed unsuitable for colonoscopy. Unlike conventional colonoscopy, CT colonography allows intraluminal visualisation of the colorectum without the need for sedation, while it offers a similar sensitivity for cancer detection but a lower specificity for polyp and tumour detection (table 5).<sup>38</sup> CT colonography may detect extraluminal pathology in patients referred for weight loss or abdominal pain. Intravenous contrast and oral faecal tagging agents (such as Gastrografin, which also has a laxative effect) are used to differentiate stools and mass lesions (polyps and cancers). CT colonography is not suitable for pregnant patients. It is contraindicated in patients with iodine allergies and may not be possible for those with impaired swallowing or high aspiration risk.

As with colonoscopy, patients must be given comprehensive information about stopping certain medications and adopting a low residue diet in the days before the test. Special instructions are provided for diabetic patients.

### Other tests

Testing for faecal occult blood (FOB) and serum tumour markers (such as carcinoembryonic antigen) are not useful in the investigation of suspected colorectal cancer. While FOB testing is effective for population screening in asymptomatic cohorts, it is too insensitive to guide the investigation of patients with colorectal symptoms. Similarly, tumour markers lack sensitivity and specificity but are useful in the follow-up of treated patients. A negative FOB test or normal serum tumour markers should not delay the referral of symptomatic patients.

### What can be done to prevent colorectal cancer?

#### Primary prevention

##### Diet

A meta-analysis of 25 prospective studies revealed a 10% risk reduction in developing colorectal cancer for an extra 10 g of total dietary fibre ingested daily. In particular, cereal fibre and whole grains were associated with a reduction in colorectal cancer risk.<sup>39</sup>

A meta-analysis of 19 cohort studies suggested that, for every 400 g of dairy products consumed daily, the risk of developing colorectal cancer was significantly reduced (relative risk 0.83 (95% CI 0.78 to 0.88)). Similarly, the daily consumption of 200 g of milk or 50 g of cheese was associated with a lower risk of developing colorectal cancer.<sup>40</sup>

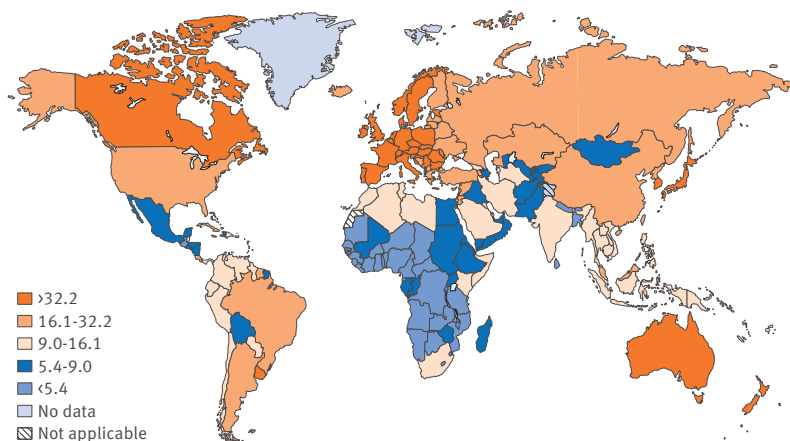
Another meta-analysis of 15 studies including 12 305 patients revealed that every 300 mg of daily calcium intake (up to 1900 mg/day) reduced the risk of developing colorectal cancer.<sup>41</sup>

##### Physical activity

It is estimated that 5% of colon cancers (but not rectal cancers) in the UK are linked to inadequate physical activity.<sup>42-43</sup> Meta-analyses of cohort studies have revealed a 17-24% risk reduction in colon cancer from the most to the least physically active people.<sup>43-45</sup>

##### Pharmacological

Two large trials in the 1980s, designed to evaluate the prevention of vascular events by aspirin, revealed a 37% risk reduction of colorectal cancer in patients



**Fig 4 | Estimated worldwide age standardised (per 100 000) incidence of colorectal cancer in men in 2012 (adapted from GLOBOCAN 2012<sup>1</sup>)**

## Box 2 | General advice for patients referred for colonoscopy

- All patients referred for colonoscopy should be sent comprehensive written instructions by their endoscopy unit, including the following:
  - Deadline for stopping iron preparations, anti-diarrhoeal and codeine-containing preparations, and fibre-containing laxatives beforehand
  - Consuming a specific low fibre diet and increasing fluid intake in the week before
  - Avoiding all solid food 24 hours before endoscopy, and taking an oral bowel cleansing preparation (such as macrogols or sodium picosulfate with magnesium citrate) at fixed times during this period
- The main risks of bowel preparations are dehydration and electrolyte imbalance
- Absolute contraindications to the use of bowel cleansing preparations include allergies to these agents, bowel obstruction, perforation or ileus, gastric emptying disorders, toxic megacolon, and certain drug-specific contraindications
- Relative contraindications include chronic renal failure, heart failure, dehydration, impaired swallow or increased risk of aspiration, acute inflammatory bowel disease, patients who are frail or not self caring, and the use of any medication that may affect fluid or electrolyte balance or is dangerous with hypokalaemia
- It is vital to consider drugs such as antiepileptics, where decreased absorption may cause clinical deterioration



JEAN-PAUL PELLISSIER/REUTERS

with a daily intake of 300 mg aspirin for at least five years.<sup>46</sup> Various observational studies support the use of long term aspirin in the chemoprevention of colorectal cancer,<sup>47</sup> and data from a large randomised controlled trial revealed that taking 600 mg aspirin daily for two years led to a risk reduction (hazard ratio 0.41) in colorectal cancer incidence among patients with HNPCC.<sup>48</sup> Non-steroidal anti-inflammatory drugs (NSAIDs) have also been shown to reduce colorectal cancer risk in various cohort studies and case-control studies,<sup>49</sup> and randomised controlled trials have shown that COX-2 inhibitors reduce adenoma incidence (relative risk 0.72 (0.68 to 0.77)), potentially reducing

subsequent cancer risk.<sup>49</sup> A large, randomised, double-blind trial revealed that daily supplementation with 1200 mg calcium reduced colorectal adenoma recurrence (adjusted risk ratio 0.85 (0.74 to 0.98),  $P=0.03$ ).<sup>50</sup>

Despite insufficient evidence to recommend routine use of most of the above agents for prevention of colorectal cancer, the US Preventive Services Task Force recently recommended use of low dose aspirin for the primary prevention of cardiovascular disease and colorectal cancer in adults aged 50-59 years who have a  $\geq 10\%$  10-year risk of cardiovascular disease, are not at increased risk for bleeding, have a life expectancy of  $\geq 10$  years, and are willing to take low dose aspirin daily for  $\geq 10$  years.<sup>51</sup> No similar recommendations exist in current British or European guidelines.

**Table 4 | Urgent referral criteria for suspected colorectal cancer for an appointment within two weeks (from National Institute for Health and Care Excellence<sup>31</sup>)**

| Symptoms and signs   | Age threshold (years) |
|--|-----------------------|
| Unexplained weight loss and abdominal pain   | $\geq 40$             |
| Rectal bleeding  | $\geq 50$             |
| Iron deficiency anaemia, altered bowel habit*, or a positive faecal occult blood test†                 | $\geq 60$             |
| Rectal bleeding plus any of: abdominal pain, altered bowel habit, weight loss, iron deficiency anaemia | $< 50$                |
| Palpable rectal or abdominal mass  | Any                   |

\*Change in bowel habit to looser stools or increased frequency of defecation, or both.

†Faecal occult blood testing should be offered to adults without rectal bleeding who are aged  $\geq 50$  with unexplained abdominal pain or weight loss; those aged  $< 60$  with altered bowel habit or iron deficiency anaemia; and those aged  $\geq 60$  with anaemia (that is, even in the absence of iron deficiency).

**Table 5 | Common methods of colonic imaging**

| Modality                     | Sedation | Perforation rate (diagnostic) | Biopsy or polypectomy, or both | Sensitivity for detection |        |
|------------------------------|----------|-------------------------------|--------------------------------|---------------------------|--------|
|                              |          |                               |                                | Large polyps ( $> 10$ mm) | Cancer |
| <b>Endoscopic</b>            |          |                               |                                |                           |        |
| Standard colonoscopy         | Usually  | 2:1000*                       | Yes                            | 98%                       | 97%    |
| Flexible sigmoidoscopy       | Rarely   | 1:10 000*                     | Yes                            | Examines left colon only  |        |
| <b>Radiological</b>          |          |                               |                                |                           |        |
| Double contrast barium enema | No       | 1:10 000                      | No                             | 48%                       | 83-94% |
| CT colonography              | No       | 5:10 000                      | No                             | 59-85%                    | 97%    |

\*Highly operator dependent. Many endoscopists have lower rates than quoted in published series.

## Secondary prevention (screening)

Faecal occult blood (FOB) testing is based on the tendency of cancer and polyps to bleed.<sup>52</sup> A meta-analysis of randomised controlled trials suggested that FOB screening reduced colorectal cancer mortality by 25% (relative risk 0.75 (0.66 to 0.84)) and estimated that FOB screening prevented approximately 1 in 6 deaths from colorectal cancer.<sup>53</sup> The NHS bowel cancer screening programme currently offers FOB testing to patients aged 60-74 years, of whom those with a positive FOB test are offered colonoscopy.<sup>54</sup>

In a large randomised controlled trial across 14 UK centres, a single flexible sigmoidoscopy between the ages of 55 and 64 years reduced colorectal cancer incidence by 23% (hazard ratio 0.77 (0.70 to 0.84)) and mortality by 31% (hazard ratio 0.69 (0.59 to 0.82)).<sup>55</sup> Flexible sigmoidoscopy is expected to be fully integrated into the NHS Bowel Cancer Screening Programme by 2018.

Competing interests: None declared.

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Find this at: <http://dx.doi.org/10.1136/bmj.i3590>

# Routine preoperative tests for elective surgery: summary of updated NICE guidance

Frank O'Neill,<sup>1</sup> Eleanor Carter,<sup>1,2</sup> Natalie Pink,<sup>1</sup> Ian Smith<sup>1,3</sup>

**Routine preoperative investigations are expensive, labour intensive, and of questionable value, especially as they may contribute to morbidity or cause additional delays due to spurious results.<sup>1-5</sup> Preoperative assessment clinics are usually based in the hospital where surgery will occur and are run according to local policies and procedures. The number of elective surgeries within the NHS has risen: 10.6 million operations took place in 2012-13 compared with 6.61 million in 2002-03. Even if only a small percentage of tests are unnecessary, large numbers of patients will be affected.**

Elective surgeries are those scheduled in advance and exclude medical emergencies. The guidance covers patients over 16 years old. It includes healthy people and those who have one or more of the following comorbidities—cardiovascular, respiratory, renal, diabetes, and obesity—who are having minor, intermediate, or major or complex elective surgery (box 1). Individuals are classified by the severity of disease using the American Society of Anesthesiologists (ASA) classification system (box 2), and extent of surgery to guide testing.

All recommendations in this guideline were made in line with recommendations (including those on

## WHAT YOU NEED TO KNOW

- Excessive preoperative testing may cause anxiety, delays in treatment, and further unnecessary treatments without influencing outcome or changing perioperative management
- Include the results of tests undertaken in primary care when referring people for surgical consultation to avoid unnecessary repetition
- Patients who are relatively healthy or having relatively non-invasive surgery may require few, if any, preoperative tests
- Before ordering lung function tests or an echocardiogram, consider discussing the patient with an anaesthetist

consent and capacity) from the NICE patient experience guideline.<sup>7</sup>

NICE recommendations are based on systematic reviews of best available evidence and explicit consideration of cost effectiveness. However, a review of newly published material highlighted the paucity of evidence in this subject, and a modified Delphi consensus survey was undertaken to evaluate the use of most preoperative tests. In addition, the experience and opinion of the Guideline Development Group (GDG) of what constitutes good practice were used to update and replace all recommendations from the 2003 guideline.

### Box 1 | Surgery grades and examples

#### Minor

- Excising skin lesion
- Draining breast abscess

#### Intermediate

- Primary repair of inguinal hernia
- Excising varicose veins in the leg
- Tonsillectomy or adenotonsillectomy
- Knee arthroscopy

#### Major or complex

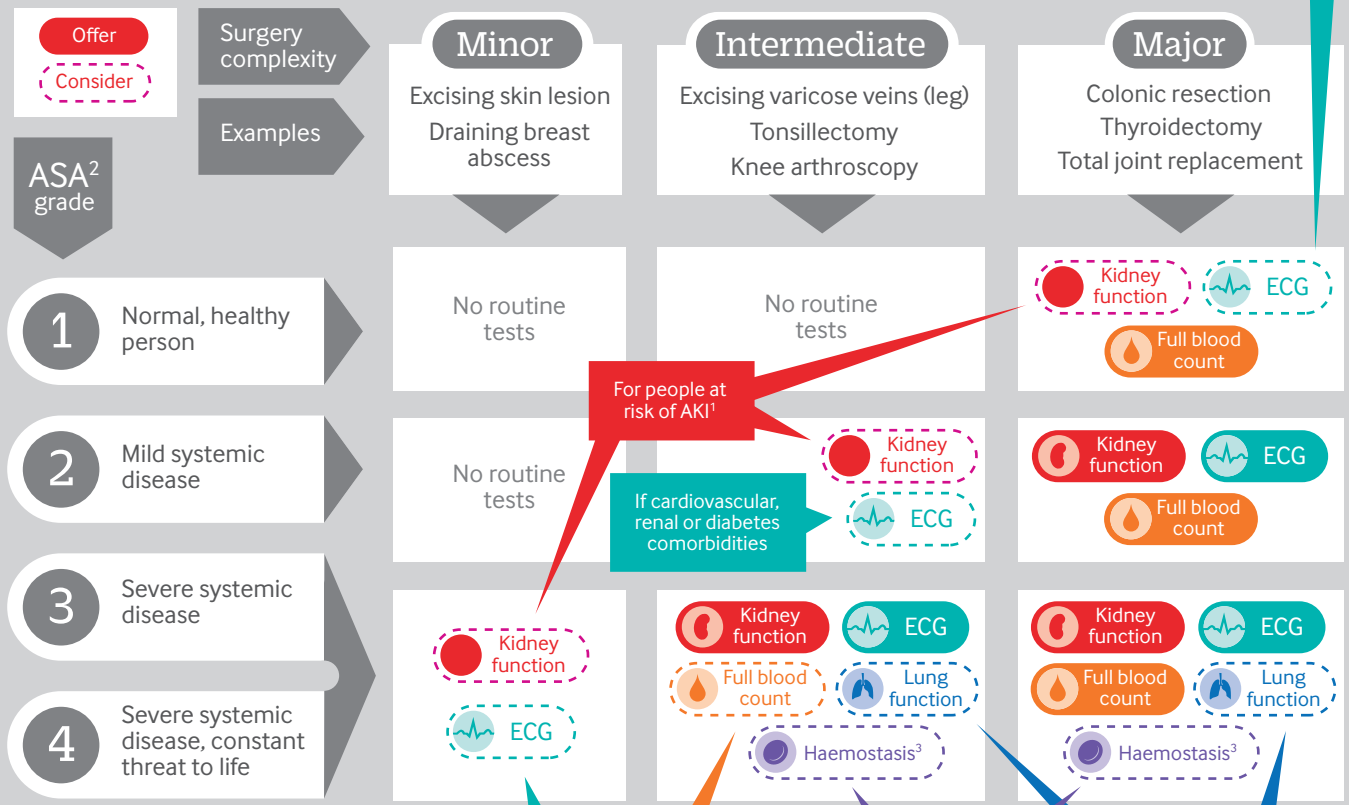
- Total abdominal hysterectomy
- Endoscopic resection of prostate
- Lumbar discectomy
- Thyroidectomy
- Total joint replacement
- Lung operations
- Colonic resection
- Radical neck dissection

There is no widely accepted and validated system for classifying the stressfulness of operative procedures, so the Guideline Development Group adopted a simple scale, illustrated with examples for the updated guidance.



MARK THOMAS

# Recommended tests before elective surgery by patient's physical status and surgery grade



<sup>1</sup> Acute kidney injury—people at risk include:

- Intraperitoneal surgery
- eGFR < 60ml/min/1.73m<sup>2</sup>
- Diabetes
- Heart failure
- Age 65 years +
- Liver disease
- Use of drugs with nephrotoxic potential in the perioperative period

<sup>2</sup> American Society of Anesthesiologists

<sup>3</sup> Tests such as (Activated) Partial Thromboplastin Time (APTT or PTT), and platelets

## Box 2 | American Society of Anesthesiologists (ASA) Physical Status Classification System

This box sets out the ASA grades used in this guideline (adapted from the ASA website<sup>6</sup>)

ASA grade 1—A normal healthy person

ASA grade 2—A person with mild systemic disease

ASA grade 3—A person with severe systemic disease

ASA grade 4—A person with severe systemic disease that is a constant threat to life

The ASA classification is a simple scale describing fitness to undergo an anaesthetic. The ASA does not endorse any elaboration of these definitions, but anaesthetists in the UK often qualify (or interpret) these grades as relating to functional capacity (that is, ASA grade 2 = comorbidity that does not limit a person's activity, ASA grade 3 = comorbidity that does limit a person's activity).

<sup>1</sup>National Clinical Guideline Centre

<sup>2</sup>Cambridge University Hospitals NHS Trust

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Further information about the guidance, a list of members of the guideline development group, and the supporting evidence statements are in the full version on thebmj.com.

## CHANGES SINCE THE 2003 GUIDELINE

- Most patients are seen up to 12 weeks before surgery in a preoperative assessment clinic in the UK, where a structured history is taken and targeted examination performed by nursing staff according to protocols developed by anaesthetists<sup>11,12</sup>
- Unnecessary preoperative tests, particularly in young and healthy people, have been reduced since the 2003 guidance,<sup>13</sup> but some continue to be ordered<sup>14</sup>
- New tests such as cardiopulmonary exercise testing and polysomnography are used in preoperative assessment for patients
- In view of evidence that people with obesity and diabetes require different preoperative tests, because of the associated risk of complications, separate recommendations have been made for these populations
- Preoperative testing of children and of patients undergoing cardiothoracic procedures or neurosurgery is specialised, and guidance on the care of such patients is covered elsewhere

## Recommendations

See infographic for summary of preoperative tests (including blood tests) before elective surgery.

### Existing test results

- Ensure that the results of any preoperative tests undertaken in primary care are included when referring people for surgical consultation.
- Take into account any medicines people are taking when considering whether to offer any preoperative test.

Other healthcare professionals or teams, or those referring for surgery, may have information of use to those carrying out preoperative assessments, such as blood tests or an electrocardiogram. Including this information at the time of referral may avoid unnecessary duplicate tests. Include tests tailored to specific comorbidities or medication that the patient is taking—for example, consider renal function testing in those taking diuretics, the latest international normalised ratio (INR), or enclosing an electrocardiogram for those with a known cardiac problem.

### Pregnancy tests

The need to test for pregnancy depends on the risk presented to the woman and the fetus by the anaesthetic and the procedure.<sup>8</sup> Anaesthesia and surgery are associated with an increased risk of spontaneous miscarriage. A systematic review found 5.8% spontaneous miscarriage in women who underwent a surgical intervention in pregnancy; 10.5% if the surgery occurred in the first trimester.<sup>9</sup>

- On the day of surgery, sensitively ask all women of childbearing potential whether there is any possibility they could be pregnant.
- Make sure that women who could possibly be pregnant are aware of the risks of the anaesthetic and the procedure to the fetus.
- Document all discussions with women about whether to carry out a pregnancy test.
- Carry out a pregnancy test with the woman's consent if there is any doubt about whether she could be pregnant.
- Develop locally agreed protocols for checking pregnancy status before surgery.
- Make sure protocols are documented and audited, and in line with statutory and professional guidance.

### HOW PATIENTS WERE INVOLVED IN THE CREATION OF THIS ARTICLE

Two patient representatives contributed to the development of the published recommendations as members of the Guideline Development Group. Patient organisations took part in stakeholder consultation processes during the scoping and development phases. Both of the patient representatives checked and approved the contents of this article.



### Sickle cell disease or sickle cell trait tests

Sickle cell disease is of relevance to surgery. By adulthood, sickle cell disease will be clinically evident. In the absence of clinical disease, a test may discover an unknown trait, but this will not alter the patient's management.

- Do not routinely offer testing for sickle cell disease or sickle cell trait before surgery.
- Ask the person having surgery if they or any members of their family have sickle cell disease.
- If the person is known to have sickle cell disease and the disease is managed by a specialist sickle cell service, liaise with this team before surgery.

### HbA<sub>1c</sub> testing

HbA<sub>1c</sub> tests reflect diabetic control over the previous three months and the likely stability of glycaemic control at time of surgery.

- Do not routinely offer HbA<sub>1c</sub> testing before surgery to people without diagnosed diabetes.
- People with diabetes who are referred for surgical consultation from primary care should have their most recent HbA<sub>1c</sub> test results included in their referral information.
- Offer HbA<sub>1c</sub> testing to people with diabetes having surgery if they have not been tested in the past three months.

### Urine tests

- Do not routinely offer urine dipstick tests before surgery.
- Consider microscopy and culture of midstream urine sample before surgery if the presence of a urinary tract infection would influence the decision to operate.

### Chest x ray

- Do not routinely offer chest x rays before surgery.

### Echocardiography

- Do not routinely offer resting echocardiography before surgery.
- Consider resting echocardiography if the person has:
  - Heart murmur and any cardiac symptom (including breathlessness, pre-syncope, syncope, or chest pain) or
  - Signs or symptoms of heart failure.
- Before ordering a resting echocardiogram, carry out a resting electrocardiogram and discuss the findings with an anaesthetist.

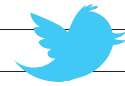
Competing interests: We declare no competing interests, based on NICE's policy on conflicts of interests.

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Find this at: <http://dx.doi.org/10.1136/bmj.i3292>

Unnecessary preoperative tests, particularly in young and healthy people, have been reduced since NICE issued its guidance in 2003, but some continue to be ordered





**SPOT DIAGNOSIS**

**A man with severe abdominal pain**

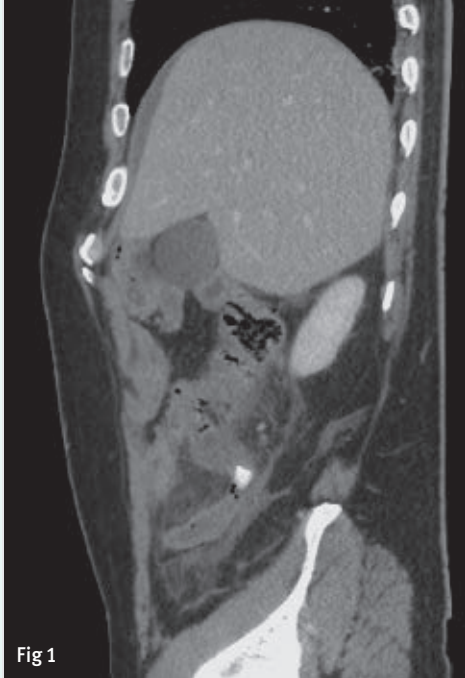


Fig 1

A 38 year old man presented to the emergency department with a 12 hour history of central and right sided severe abdominal pain. The pain had been getting gradually worse, he had vomited, and he was finding it difficult to walk. On examination he looked unwell, his temperature was 38.7°C, and he had a rigid abdomen. What does the computed tomogram of the abdomen and pelvis show (fig 1)?

Submitted by Joseph Dalby Sinnott and David C Howlett  
Patient consent obtained.

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**CASE REVIEW**

**Photophobia and a painful rash**

A 62 year old woman presented to eye casualty with a 10 day history of a left sided headache. Two days after her headache started she developed a painful and pruritic left sided rash. During the 24 hours before presentation, her left eye had become injected, painful, and photophobic.

On examination she had a well demarcated, unilateral area of erythematous and mildly oedematous skin, which extended from her left upper lid up across her forehead. Within this area were discrete tender scabbed lesions, which extended back into her hairline (figure). She had no lesions on the tip of her nose or in her auditory canal. No lesions crossed the midline to the right side of her forehead or scalp.

Ocular examination showed an unaided



visual acuity of 6/6 in the right eye and 6/9 in the left eye. Ocular motility was full. Intraocular pressures were 10 mm Hg in the right eye and 12 mm Hg in the left. Her left cornea was clear and did not stain with fluorescein, while her conjunctiva was diffusely injected. Slit lamp examination of her left anterior chamber showed 1+ for cells and flare. Dilated funduscopy

showed a clear vitreous and healthy fundus. Her right ocular examination was normal.

- 1 What is the most likely diagnosis?
- 2 How is the diagnosis confirmed?
- 3 How is the condition managed?
- 4 What complications might occur?

Submitted by Andrew Malem  
Patient consent obtained.

Cite this as: *BMJ* 2016;353:i3221

**SPOT DIAGNOSIS A man with severe abdominal pain**

of the peri-appendicular mesenteric fat, and a calcified appendicolith within the neck of the appendix (fig 2).

Acute appendicitis: a dilated, thick walled appendix, in continuation with the caecum, with inflammatory changes of the peri-appendicular mesenteric fat, and a calcified appendicolith within the neck of the appendix (fig 2).

**SPOT DIAGNOSIS A man with severe abdominal pain**

gastrointestinal (oesophagitis, gastritis, colitis) systems.

involve neurological (encephalitis, neuritis, myelitis), respiratory (pneumonia), hepatic (hepatitis), and intraocular pressure, cataract, and orbital apex syndrome. Complications from disseminated disease can retinal necrosis, scleritis, optic neuritis, cranial neuropathies, eyelid cicatrization, trabeculitis with raised 4 Local ocular complications of HZO include conjunctivitis, keratitis, corneal scarring, uveitis, vitritis, retinitis, intravenous antiviral treatment, supportive therapy, and monitoring.

Immunocompromised patients or those with severe systemic VZV infections may require hospital admission for 3 Uncomplicated HZO is managed with oral antivirals (aciclovir, valaciclovir, or famciclovir) and analgesia. DNA is the most sensitive and specific test.

2 The diagnosis of HZO is based on a history of varicella zoster virus (VZV) infection and the presence of a characteristic painful dermatomal rash. Further diagnostic tests are not usually needed. If the diagnosis is in doubt, polymerase chain reaction (PCR) of vesicular fluid for VZV

1 Left herpes zoster ophthalmicus (HZO) with associated anterior uveitis.

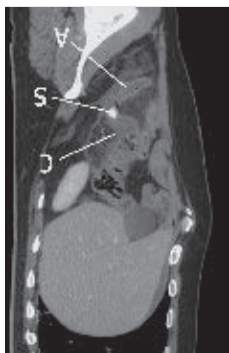


Fig 2

answers

### Triangular lunulae in nail-patella syndrome

A 12 year old girl presented with chronic nail dystrophy and triangular lunulae, which are pathognomonic of nail-patella syndrome (NPS), an autosomal dominant condition (incidence 1/50 000). Skeletal manifestations can include hypoplastic or absent patellae and iliac horns. NPS carries a risk of glaucoma and progressive renal impairment. This girl had raised ocular pressures and urinary protein excretion (protein:creatinine ratio 0.23 g/mmol; reference <0.02). *LMX1B* gene sequencing

identified a novel mutation, c.949C>T (p.Gln317\*). Five relatives have triangular lunulae and are undergoing ophthalmological and renal evaluation. Persistent nail dystrophy, specifically with triangular lunulae, suggests NPS; ophthalmological and renal evaluation is warranted.

Natasha J Brown (natasha.brown@austin.org.au), Department of Clinical Genetics, Austin Health, Melbourne, Australia; Joshua Kausman, Zornitza Starkm Parental consent obtained.

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### Trench fever and typhus

In an overcrowded male youth rehabilitation centre on an island in western Rwanda in 2012, there were nearly 200 cases of major illness and seven deaths from typhus or trench fever (*Am J Trop Med Hyg* doi:10.4269/ajtmh.15-0643). The main organisms responsible were *Rickettsia prowazekii* and *Bartonella quintana*. One hundred years after the Somme, these organisms can still spread easily among louse infected men sharing mattresses and lacking basic hygiene.



### Old and hypotensive

The number of older people taking blood pressure lowering drugs is likely to rise with the publication of the 75 year old or more subgroup analysis of the Systolic Blood Pressure Intervention Trial (SPRINT, *JAMA* doi:10.1001/jama.2016.7050), showing that treatment to a target systolic blood pressure of 120 mm Hg reduces cardiovascular events and mortality over three or more years. But a retrospective observational cohort study of 11 167 people aged more than 70 years registered with primary care providers in Kent found that systolic blood pressure was below 120 mm Hg in 1297 people (844 taking antihypertensives), below 110 mm Hg in 474 (313 taking antihypertensives), and below 100 mm Hg in 128 (89 taking antihypertensives) (doi:10.1093/ageing/afw120). Hypotension was independently associated with mortality, acute kidney injury, and hospital admission.

### 90% of strokes avoidable?

A global survey of risk factors for stroke across 188 countries during 1990-2013 concludes that more than 90% of the burden from strokes is attributable to modifiable risk factors, and achieving control of behavioural and metabolic risk factors could avert more than three quarters of strokes around the world (*Lancet Neurol* doi:10.1016/S1474-4422(16)30073-4). Air pollution is emerging as an important contributor, especially in low and middle income countries. Most of the solutions suggested—increases in physical activity, improvements in diet, reduction in obesity, and improvement in air quality—would have benefits well beyond stroke prevention.

### Futile treatment at end of life

“You do a procedure because it can be done” is one of many telling quotations in a qualitative study of the reasons doctors give for providing futile treatment at the end of life (*J Med Ethics* doi:10.1136/medethics-2016-103370). Many more categories of reasons emerge from 96 semi-structured, in-depth interviews across a range of specialties in three large Brisbane hospitals.

### Suicide after self harm: still unpredictable

A systematic review of 12 studies on risk factors and seven studies on risk scales for suicide after self harm concludes that no predictive scales are useful, and could be dangerous by falsely classifying some people as low risk (*Br J Psychiatry* doi:10.1192/bjp.bp.115.170050). The leading risk factors that emerged were male sex, earlier self harm, physical illness, and suicidal intent: none of them specific enough to be of value in individual assessment.

### Capillary refill in febrile kids

Capillary refill time of more than two seconds in children with fever is supposed to help in the diagnosis of serious bacterial infection. A study of 1193 previously healthy, febrile children who arrived consecutively at a Dutch paediatric emergency department examined the agreement between peripheral and central capillary refill time (pCRT/cCRT) and their diagnostic values for detecting serious bacterial infection (*Arch Dis Child* doi:10.1136/archdischild-2015-308519). It showed that only a small proportion of febrile children at risk for serious infections at the emergency department show abnormal capillary refill time values. Both abnormal pCRT and abnormal cCRT (defined as >2 seconds) performed poorly and were unhelpful for detecting serious bacterial infection in a general population of febrile children.

### Cabbage to soothe troubled breast

Minerva is often portrayed as a rather full bosomed goddess. But being chaste she has never experienced the discomfort of breast engorgement during lactation, the subject of a new Cochrane review (doi:10.1002/14651858.CD006946.pub3). This covers the evidence for treatments ranging across acupuncture, ultrasonography, acupressure, scraping therapy (*Gua Sha*), cold breast-packs and electromechanical massage, and three medical treatments. And cabbage leaves (three studies). There is no good evidence for any treatment, but Minerva's mortal friends tell her that chilled cabbage leaves do provide some comfort to the affected appendage. Also, they can be boiled and eaten after use.



Cite this as: *BMJ* 2016;354:i3803