

NICE clinical guideline:

chest pain of recent onset

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INTRODUCTION

Chest pain is a common presentation in general practice: in the UK, up to 1% of visits to a GP are due to chest pain.¹ Chest pain matters: the risk of death is doubled in the year following a new presentation with chest pain in general practice.¹

The recently published guideline from the National Institute for Health and Clinical Excellence (NICE), *Chest Pain of Recent Onset: Assessment and Diagnosis of Recent Onset Chest Pain or Discomfort of Suspected Cardiac Origin*,² addresses the assessment and diagnosis of patients with recent-onset chest pain (or discomfort) that may be of cardiac origin. It does not make recommendations for the management of the condition once the diagnosis is made. The NICE unstable angina and non-ST elevation myocardial infarction (NSTEMI) clinical guideline³ was published at the same time as the chest pain guideline; local protocols are recommended for management of STEMI, and a NICE clinical guideline for the management of stable angina is currently being prepared.⁴ The chest pain guideline has two separate diagnostic pathways. The first is for patients with acute chest pain who may have an acute coronary syndrome (ACS), and the second for those with intermittent stable chest pain

who may have stable angina. The need to provide information to patients (and, where appropriate, their family or carer/advocate) and to involve them in decisions is emphasised throughout.

The recommendations around acute and 'acute but not current' (that is, recent pain but currently pain free) chest pain are summarised in Boxes 1 and 2. For chronic stable chest pain, a key aspect of the guideline of particular relevance to primary care is the recommendation that formal risk stratification of the likelihood of coronary artery disease (CAD) be undertaken, based on aspects of the history (Box 3) and a range of risk factors (Table 1). As well as summarising the content of the guideline, this article discusses the rationale behind these key changes. It focuses on issues of particular relevance to primary care, especially those areas that represent a change in traditional practice.

CURRENT ACUTE CHEST PAIN

Practices will vary widely in the level of care they offer to patients with acute chest pain. Rather than try to describe all possible scenarios, the guideline makes recommendations to ensure implementation of optimal care irrespective of the healthcare setting (Box 1). The crucial over-arching recommendation is that all such care should start as soon as an ACS is suspected, but that no step should delay transfer to hospital. A 300 mg dose of aspirin is recommended unless there is evidence that the patient has an allergy to aspirin. A major change is the recommendation not to offer oxygen to all patients, but to check oxygen saturation using pulse oximetry and to only offer supplemental oxygen if there is hypoxia, with a lower target recommended in those suspected of being at risk of hypercapnic respiratory failure. This is consistent with other recent oxygen therapy guidance.^{6,7} Implicit in the guidance is the assumption that practitioners equipped to offer oxygen will have available pulse oximetry.

ACUTE BUT NOT CURRENT CHEST PAIN

The guideline makes clear recommendations in the somewhat grey area of patients who have recent chest pain suggestive of being cardiac, but who are not currently in pain (Box 2). A distinction is made

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Box 1. Management of acute chest pain.

Do not delay transfer to hospital.

In the order appropriate to the circumstances, offer:

- pain relief (glyceryl trinitrate and/or an intravenous opiate)
- a single loading dose of 300 mg aspirin unless the person is allergic. Send a written record with the person if given before arriving at hospital
- only offer other antiplatelet agents^a in hospital
- a resting 12-lead ECG. Send to the hospital before the person arrives if possible, but do not delay transfer
- other therapeutic interventions^a as necessary
- pulse oximetry:
 - ▶ offer oxygen if arterial oxygen saturation (SaO₂) is less than 94% with no risk of hypercapnic respiratory failure. Aim for SaO₂ of 94–98%
 - ▶ people with chronic obstructive pulmonary disease (COPD) are at risk of hypercapnic respiratory failure.

Aim for SaO₂ of 88–92% until blood gas analysis is available.

^aFollow acute coronary syndrome guideline or local protocols for STEMI.

between emergency (immediate) and urgent (same-day) referral — a distinction of great importance to the ambulance service. For patients now pain free but who have had pain within the last 12 hours, an immediate resting electrocardiogram (ECG) will help distinguish those patients needing emergency hospital care for possible ACS from patients who can be referred urgently, that is, for same-day assessment but not as an emergency. To be useful, this recommendation depends on GPs having access to immediate ECG recording and interpretation: an aspect of care that is likely to vary widely. If no ECG is available, all patients should be referred as an emergency. For patients whose pain was 12–72 hours ago but who are now pain free, urgent same-day referral is recommended. For patients who have been pain free for 72 hours,

Box 2. Management of non-current but acute chest pain.

Chest pain within the last 12 hours and now pain free

- Clinical assessment
- 12-lead ECG
 - ▶ normal: same-day (urgent) hospital referral for assessment
 - ▶ suggests acute coronary syndrome: manage as Box 1

Chest pain between 12 and 72 hours ago

- Same-day (urgent) hospital referral for assessment

Chest pain more than 72 hours ago

- Detailed assessment including ECG and troponin needed
- Need for referral and its urgency decided by local factors and clinical judgement

troponin measurement as well as an ECG is recommended. These tests could well be undertaken in general practice, providing timely results can be obtained, although contact with the cardiology service at some point remains likely.

CHRONIC STABLE CHEST PAIN

The guideline makes recommendations for diagnosing angina in patients with chest pain, not for screening for CAD. It recognises that there are other causes of angina, such as hypertrophic cardiomyopathy or severe aortic stenosis, that need to be excluded. However, detailed recommendations for their investigation are not made. In addition, the guideline's recommendations are for the diagnosis of angina; recognising that other investigations may be warranted for prognostic purposes among people with diagnosed angina.

The guideline emphasises that angina can be diagnosed or excluded based on the history and clinical examination alone. For those patients where diagnostic uncertainty persists, who need diagnostic tests, two major changes are proposed: first that the first-line investigation of choice is decided by a formal assessment of the risk of CAD, that is, by estimating a pretest likelihood of the patient having CAD; secondly, the recommended investigations themselves differ quite markedly from current usual practice, notably favouring other tests that are more accurate, over the exercise ECG for diagnostic purposes.

The guideline recommends stratifying patients with chest pain into those with typical angina, atypical angina, and non-anginal pain, with a further recommendation emphasising features that make a diagnosis of angina unlikely (Box 3). There is further stratification by age, sex, risk factors (smoking, diabetes, and hyperlipidaemia), and the presence of ECG changes, leading to an estimated likelihood of CAD. These estimates are presented in Table 1, with the resulting risk estimate being used to decide which investigation is most appropriate based on clinical and cost-effectiveness data (Table 2).

For a clinical diagnosis or exclusion, the cut-offs for diagnostic probability chosen have in part been driven by the consequences of an incorrect diagnosis: for patients with typical angina a >90% likelihood of CAD has been chosen as confirming angina. A <10% likelihood of CAD was chosen as effectively ruling out angina due to CAD, while noting that in such patients with typical angina, other causes such as hypertrophic cardiomyopathy should be considered. Note that for people with 'non-anginal' symptoms, further investigation is not recommended routinely but may be undertaken based on clinical judgement of increased concern.

The guideline recommends two types of testing: (i) anatomical testing, which diagnoses coronary artery luminal narrowing, and/or (ii) non-invasive functional testing, which diagnoses myocardial ischaemia based on the estimated pretest likelihood of CAD.

When the likelihood of CAD is 10–29%, computed tomography (CT) scanning is recommended, explicitly with 64-slice CT or above. This will be applicable to a small population of low-risk (no diabetes, smoking, or dyslipidaemia) women with atypical angina, and also low-risk women aged <45 years with typical angina. Among men, only those with atypical angina and at low risk, aged <45 years will be eligible for CT scanning. CT scanning has a higher sensitivity for the diagnosis of CAD than exercise testing and non-invasive functional imaging, and is therefore more effective as a 'rule-out' test, with a very low false-negative rate. Radiation exposure with contemporary scanners is low.⁸ However, it remains important to minimise exposure, and thus a calcium score should be undertaken initially, with no further testing if this is zero on the grounds that significant CAD has been ruled out with a high degree of accuracy; sensitivity is up to 99%.⁹ If the calcium score is 1–400 Agatston units, the recommendation is to proceed to CT coronary angiography. However, if the calcium score is >400 Agatston units, proceeding straight to invasive coronary angiography is proposed because CT coronary angiography is unlikely to be informative in the presence of such a high calcium score.

If the likelihood of CAD is estimated to be 30–60%, non-invasive functional imaging, with either myocardial perfusion scintigraphy with single photon emission computed tomography (SPECT), stress echocardiography, first-pass contrast-enhanced magnetic resonance (MR) perfusion, or MR imaging for stress-induced wall motion abnormalities, is recommended as the most cost-effective

Box 3. Clinical assessment of chest pain.

Anginal pain is:

- constricting discomfort in the front of the chest, or in the neck, shoulders, jaw, or arms
- precipitated by physical exertion
- relieved by rest or glyceryltrinitrate within about 5 minutes.
- Three of the features above are defined as typical angina.
- Two of the three features above are defined as atypical angina.
- One or none of the features above are defined as non-anginal chest pain.

Use clinical assessment and the typicality of anginal pain features listed in Table 1 to estimate the likelihood of CAD.

investigation. The choice of non-invasive functional imaging test will be determined by local availability and expertise, relevant contraindications, and patient preferences.

If the likelihood of CAD is 61–90%, invasive coronary angiography is recommended as the most cost-effective first test, providing coronary revascularisation is being considered and the test is clinically appropriate and acceptable to the patient.

The guideline explicitly avoids making recommendations about healthcare settings, focusing on the most clinically and cost-effective strategies for the assessment of patients. Clearly, the risk stratification recommended (Box 3 and Table 1) is well within the scope of everyday general practice. However, the pretest likelihood estimates included in Table 1 are derived from a US hospital clinic population. As noted in the Table, these are likely to overestimate risk in a primary care population, but data to provide better estimates for GPs are currently lacking. In order to obtain a reliable UK-based estimate of pre- and post-test likelihood of CAD, the establishment of a national registry for people

Table 1. Percentage of people estimated to have coronary artery disease according to typicality of symptoms, age, sex, and risk factors.

Age, years	Non-anginal chest pain				Atypical angina				Typical angina			
	Men		Women		Men		Women		Men		Women	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
35	3	35	1	19	8	59	2	39	30	88	10	78
45	9	47	2	22	21	70	5	43	51	92	20	79
55	23	59	4	25	45	79	10	47	80	95	38	82
65	49	69	9	29	71	86	20	51	93	97	56	84

For men older than 70 years with atypical or typical symptoms, assume an estimate >90%. For women older than 70 years, assume an estimate of 61–90%, except women at high risk and with typical symptoms, where a risk of >90% should be assumed. Values are per cent of people at each mid-decade age with significant coronary artery disease (CAD).⁵ High = high risk = diabetes, smoking, and hyperlipidaemia (total cholesterol >6.47 mmol/litre). Low = Low risk = none of these three. The area in bold represents people with symptoms of non-anginal chest pain, who would not be investigated for stable angina routinely. Note: these results are likely to overestimate CAD in primary care populations. If there are resting ECG ST-T changes or Q waves, the likelihood of CAD is higher in each cell of the table.

Table 2. Diagnostic strategy in patients with stable chronic chest pain of suspected cardiac origin.

Prior probability of coronary artery disease	Investigative strategy and rationale
<10% (and/or non-anginal chest pain)	Trust your clinical judgement: no further testing for CAD
10–30%	Rule-out test needed: CT calcium +/- CT angiography
30–60%	Uncertainty: non-invasive functional imaging
61–90%	Rule-in test needed: invasive coronary angiography
>90% (with typical angina)	Trust your clinical judgement: no further diagnostic testing

undergoing initial assessment for stable angina is one of the main research recommendations included in the guideline. Currently, many GPs have open access to exercise ECG testing. Such testing is no longer recommended as a routine diagnostic tool, being replaced by CT coronary angiography (for low-risk patients) and functional imaging (for patients at intermediate risk of CAD). For the investigation of chronic stable chest pain to occur in general practice, as opposed to chest pain clinics, quite major changes in terms of access to imaging would be required. Guidance on primary care access to imaging has been published jointly by the Royal College of General Practitioners (RCGP) and the Royal College of Radiologists, and provides an excellent framework for taking forward work in this area.¹⁰ As well as capacity issues, the agreement of local pathways and addressing training needs will be key aspects.¹¹

CONCLUSION

This guideline should help practitioners in the often difficult area of the diagnosis and management of both acute and chronic chest pain. For acute pain, the guideline aims to ensure that emergency care is focused on those patients who are likely to have an ACS. For people who present acutely but are not currently in pain, the guideline offers clarity and aims to ensure that when referral is needed, this is done with an appropriate degree of urgency. For chronic stable chest pain, the guideline aims to make the diagnosis of CAD quicker and more efficient, so that people are diagnosed, or have a diagnosis of CAD excluded, at an earlier stage. For acute and acute but not current pain, the recommendations are largely clarifications and refinements of current practice. The value of an immediate ECG is given prominence, particularly in distinguishing those patients who require emergency transfer to hospital from those patients who need urgent (same-day, but not emergency) assessment. This may encourage some

practitioners and providers to increase the availability of immediate ECGs. For chronic chest pain, the recommendations are quite sweeping and are likely to have major effects both in general practice and in chest pain clinics. The extent to which the investigation of chronic stable chest pain occurs in general practice is likely to become clearer as the guideline is implemented.

Full membership of the Guideline Development Group

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Competing interests

Dr Jane S Skinner was the clinical adviser and Professor Adam Timmis the chair for the NICE guideline, *Chest Pain of Recent Onset: Assessment and Diagnosis of Recent Onset Chest Pain or Discomfort of Suspected Cardiac Origin*. All the authors were members of the Guideline Development Group.

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