Cardiac chest pain: Initial assessment

Abstract

Chest pain is a common presenting complaint for adult patients. Chest pain can be a symptom of multiple conditions, which some may be life threatening. A structured approach to the assessment of these patients can promote high quality patient care ensuring appropriate diagnosis and intervention. The nurse has a vital role in chest pain assessment as they are often the first person the patient encounters and so are ideally placed to complete this assessment, order investigations, and recognise and escalate deteriorating patients. Nurses may have built a rapport with patients and are key to supporting patients and their families through this process.

Keywords: Cardiac chest pain; patient assessment

The term chest pain is used to describe any pain occurring in the thorax and may have cardiac or non-cardiac causes (National Institute for health and Care Excellence (NICE), 2022). Chest pain is a common presentation across all settings (Kaur et al., 2023), making up 1-2% of primary care presentations and 5% in accident and emergency departments (NICE, 2022). Chest pain can be a distressing symptom for patients and may present as an acute or longer-term complaint. Nurses may be the first point of contact and play a crucial role in the assessment, monitoring and co-ordination of medical assessment that may impact timely interventions. Although chest pain is often caused by non-life-threatening conditions, it must be carefully assessed due to the risk of serious and potentially fatal causes such as myocardial infarction (MI) (Lakshmanadoss, 2020). MI alone accounts for around 100,000 hospital admissions in the UK each year, and as part of coronary heart disease (CHD), contributes to approximately 66,000 deaths annually with an average of 180 people every day, or one death every eight minutes (British Heart Foundation, 2025).

Causes of chest pain

Chest pain has numerous causes (Maleki et al., 2018) that include both cardiac and non-cardiac causes (table 1). Conditions such as MI, pulmonary embolism and aortic dissection require urgent intervention (Thomsett and Cullen, 2018). However, non-cardiac causes can also be life threatening and should not be dismissed without further exploration. Identifying “red flag” symptoms (Table 2), or warning signs

associated with life-threatening conditions, may support clinicians' recognition of patient deterioration and prompt urgent escalation for medical review (Da Bie *et al*., 2019).

Chest pain can present either acutely or chronically. The European Society of Cardiology (ESC) 2024 guidelines for the management of Chronic Coronary Syndromes note that while chronic chest pain is often linked to non-cardiac causes (see table 1), it can also be associated with chronic and acute coronary syndromes (CCS) (Vrints et al., 2024). CCS traditionally known as angina occurs as a results of atheromatous plaques lining and therefore narrowing the coronary arteries (Hussain et al., 2021). The Canadian Cardiovascular Society classification (Campeau, 1976) can be used to grade angina, considering whether symptoms occur at rest or with certain levels of exertion. The severity of symptoms may not correlate to the severity of coronary artery disease (Vrints *et al*., 2024).Patients experiencing CCS often present with chest discomfort due to myocardial ischaemia (Ferraro et al., 2020), brought on by exertion or stress and usually relieved by rest or nitrates. CCS chest pain occurs due to a mismatch between the supply of oxygenated blood to the myocardium via the narrowed coronary arteries and the increased demand that is placed on the heart from the stimulus e.g. exercise. For example, when the patient's activity level or stress level increases then the heart rate will increase and the coronary arteries will need to supply an increased volume of blood to the myocardium to support this increased effort. If this supply cannot meet the demand, then pain will result. In some cases, symptoms may lessen with rest, or the administration of nitrates which can reduce myocardial demand (Patel *et al*., 2025).

Acute cardiac chest pain is associated with both an exacerbation of chronic coronary syndrome as outlined above and more critical conditions including Non-ST elevation MI (STEMI), ST elevation MI (STEMI) and unstable angina, collectively termed acute coronary syndrome. The ESC describes Acute Coronary Syndrome (ACS) as a spectrum of conditions caused by plaque rupture or erosion, leading to clot formation and reduced blood supply to the heart (Byrne et al., 2023). A diagnosis of MI requires evidence of acute myocardial injury, indicated by elevated cardiac biomarkers, alongside clinical signs of acute myocardial ischemia (Thygesen at al., 2018) that include an abnormal ECG and cardiac sounding chest pain. However, it should be noted that patients' ECGs may not have clear changes initially (Ricci et al., 2025) and diabetic patients may not experience chest pain (Kumar et al., 2023), highlighting the importance of a holistic approach to care. Clinical signs of ACS can be found in table 3.

Pain characteristics may guide the clinician in differentiating between numerous cardiac causes and can support diagnostic reasoning. A structured chest pain assessment should be completed documenting site, onset, characteristics, radiation, associated symptoms, timing, exacerbating factors and severity, with further detail discussed below.

Initial assessment

It is imperative nurses are aware of the management of chest pain as they may be the first healthcare professional the patient encounters, in both primary and secondary care environments. The prompt recognition and assessment of the deteriorating patient can assist in ensuring patients receive appropriate treatment to prevent cardiac arrest. Acutely unwell patients' initial assessment should be undertaken using the airway, breathing, circulation, disability and exposure (ABCDE) approach (Resuscitation Council UK, 2024). This ensures deteriorating patients are effectively assessed and life-threatening interventions are prioritised and can be commenced as appropriate (Resuscitation council UK, 2024). If patients show signs of deterioration, or red flags symptoms, follow local escalation protocol to ensure they receive urgent treatment.

The patient's haemodynamic status should be assessed by gaining routine observations which include pulse rate, blood pressure, respiratory rate, oxygen saturations, temperature and conscious level/onset of new confusion. Physiological parameters are given a numeric scores based on the degree of abnormality, to identify those at risk of deterioration, these scores are then used to calculate the National Early Warning Score 2 (NEWS2) (Royal College of Physicians, 2017). Though early warning scores are helpful in assessment and management of the deteriorating patient they should be utilised alongside the nurse's intuition, assessment and clinical judgement to identify deteriorating patients (Rehman and Ali, 2020).

Investigations

A 12-lead electrocardiogram (ECG) is a rapid and non-invasive investigation that is a vital first line diagnostic tool for those suffering with cardiac chest pain (Lee *et al*., 2023). ECGs measure the electrical activity of the myocardium and can show changes representative of ACS and other conditions such as pericarditis or arrythmias, such as atrial fibrillation or heart blocks. The ECG should be carefully assessed for ST segment changes, which may indicate MI. MIs are classified based on the ST changes, with ST segment elevation suggesting a STEMI and ST depression or no elevation a NSTEMI (Kusumoto, 2020) or unstable angina. When performing an ECG, technique and timing should be considered. Correct ECG electrode placement is crucial to accurate interpretation as incorrect placement can cause the results to display differently (Simon and Nelson, 2018). An ECG provides information for the time

it is taken. For patients presenting with chest pain and a nondiagnostic initial ECG, repeat ECGs should be done to identify evolving ischaemic changes, particularly if there are ongoing symptoms, clinical deterioration, or a high suspicion of ACS (Gulati *et al*., 2021).

Blood investigations can also be initiated by nursing staff and should include a full blood count and renal profile to assess for infection, anaemia, electrolyte disturbance, and other contributing causes. Measuring cardiac biomarkers should be considered in patients presenting with chest pain, as well as in high-risk groups (such as people with diabetes) who may present with atypical symptoms, since troponin testing is a key diagnostic tool in evaluating possible cardiac causes (Cullen et al,. 2022). Troponin I or Troponin T may be taken depending on local protocol. Troponin is a protein found in the cardiac cell muscle that leaks into the bloodstream when the cell membrane is damaged. A raised Troponin level may indicate an acute coronary syndrome (Thomsett and Cullen, 2018), but it can also be elevated with conditions like sepsis, arrythmias or chronic kidney disease (Chauin, 2021). The troponin result should therefore be reviewed alongside the rest of the patient's history and should not be used in isolation. Repeat Troponin measurements should be undertaken as it may take time for the markers to rise after a cardiac event (Harskamp et al., 2022). Previously troponin tests needed to be repeated after 10-12 hours. However, NICE (2020) guidelines now recommend using high sensitivity Troponin assays, which can detect lower levels of the protein earlier and allow for repeat testing within 30 minutes to three hours.

Further additional bloods such as lipid profile and cardiac imaging such as an echocardiogram, which is used to assess the heart's size, contraction and valve function, may also be required.

Pain assessment

Assessment of pain can be challenging (Kucia et al., 2022), cardiac chest pain may not always present typically. Atypical pain is where a person does not experience the typical characteristics of cardiac chest pain. With acute coronary syndromes certain patient groups may present differently. Women and the elderly are more likely to present with atypical pain, or associated symptoms such as shortness of breath or nausea and vomiting (Gulati et al., 2021), although term 'atypical' pain may be used in practice the ESC Guidelines for the management of chronic coronary syndromes recommend not using this term (Vrints et al., 2024). Patients with dementia may not be able to communicate about the pain they are experiencing. Patients with diabetes may have 'silent' MI's, where their symptoms are mild or atypical (Soejima et al., 2019), due to autonomic neuropathy (Griffin et al., 2019). Patients may present with complex conditions including adult congenital heart disease, for this patient group chest pain can be clinically important for non-ischemic cardiac conditions (Gales et al., 2020).

It is important to note if the chest pain is ongoing at the time of assessment as this may impact the management and may indicate ongoing ischemia requiring urgent intervention. If the pain is present on assessment it is important to ensure that adequate pain relief is provided. Increase pain levels create an unwanted adrenaline response and can worsen the clinical picture. Intravenous morphine may be required to relieve the pain (NICE, 2020). Patients with known CCS may require sublingual Glyceryl Trinitrate for pain relief. GTN, a vasodilator, is commonly used as an antianginal medication but can also be administered Intravenously in acute situations for patients with suspected ACS (Twiner et al., 2022). A comprehensive assessment of the pain may assist diagnosis so patients should be encouraged to describe the pain using their own words. There are numerous tools available that can help structure the assessment (Kucia et al., 2022). The SOCRATES mnemonic (Table 4) is not a diagnostic instrument but may be used as an aide-mémoire to support a comprehensive structured assessment of pain characteristics (Peart, 2022). Assessing the **S**ite of the pain is important, central chest pain is commonly associated with a MI but can also indicate pulmonary, gastro-oesophageal, pericarditis, or Musculo-skeletal. Review **O**nset of pain and how long it lasted, if it came on suddenly during exercise it could be either an ACS or muscular skeletal injury. Certain pain **C**haracteristics are associated with conditions, pericarditis or pleuritic pain may be felt as a 'sharp pain' or an ACS may be felt as a crushing chest pain. Patients may use different terminology to describe the characteristics of their pain such as a discomfort, tightness or an ache (Rahman, 2024). Pain **R**adiating into the left arm is associated with an ACS (Bryne et al., 2023), however with this condition pain can also radiate across the chest, into the right arm, the neck, jaw or even teeth (Dover et al., 2024). A ripping pain radiating into the back can be associated with a dissecting aortic aneurysm (Fukui, 2018). Consider if the pain is **A**ssociated with any other symptoms, such as nausea and vomiting or sweating which may be associated with ACS but is also related to severe pain. Chest pain that's associated with syncope (sudden loss of consciousness) or palpitations could be due to an arrythmia. **T**iming of the pain is also pertinent; does it occur at specific times of the day or has the pain changed over time. Enquire about **E**xacerbating or relieving factors, does the pain come on with exercise which may be associated with angina, or does it get worse with deep breathing which may indicate pleurisy or pericarditis. Does it increase with certain movements which could indicate Musculo-skeletal or is it related to food suggesting gastric. Ascertain the **S**everity of the pain by using a numerical rating scale and asking the patient to score their pain on a scale from zero to ten may help assessment and is easily documented (Karcioglu et al., 2018). Though pain scores can be useful in pain management, the intensity of the pain may not directly reflect the severity of the condition (Gulati et al., 2021).

Supporting patients with chest pain through monitoring and escalation

Chest pain can be a worrying symptom, causing anxiety for some patients and their family or loved ones (Stephens, 2019), they should undergo a person-centred assessment and be involved and informed about their care (Byrne et al., 2023). Patients should be made aware of the importance of reporting all acute or re-occurring episodes and any associated symptoms to nursing staff so their condition can be closely monitored. The nurse's assessment and ongoing monitoring allow up to date clinical information for the medical team to review. The information provided on escalation may help the doctor or advanced clinical practitioner decide on the appropriate timing of review and what further investigations are required. The assessment and investigations should be documented and accessible to the multidisciplinary team. Patients with chest pain may go onto need a cardiologist review for management advice or treatment such as percutaneous coronary intervention for those with suspected ACS. By ensuring patients are escalated in a timely manner they may receive specialist input and interventions as required

Conclusion

Chest pain is a frequently encountered patient complaint and can stem from a wide range of conditions. Effective management emphasises prompt assessment and timely intervention to prevent complications. Using a structured approach to evaluate the patient and gathering detailed information about the pain is essential for accurate diagnosis. Key investigations, including vital signs, ECG, and blood tests, provide valuable insights into the patient's haemodynamic status and aid in identifying the underlying cause. Chest pain can be distressing for patients, communication and is an important aspect of nursing care, allowing patients to express their concern and the nurse to support the individual as needed. Nurses play an important role in the initial assessment, ensuring timely escalation for medical review allowing patients to receive the appropriate medical care and referral for interventions as required.

Conflict of interest

The authors declare no conflict of interest.

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Table 1

Causes of chest pain

Cardiac	**Respiratory**	**Other**
Acute and chronic coronary syndromes	Malignancy	Muscular skeletal
Coronary artery dissection	Pleurisy	Oesophagitis
Coronary artery spasm	Pneumonia	Psychological
Myocardial infarction with normal coronary arteries	Pneumothorax	Pancreatitis
Acute Heart Failure	Pulmonary embolism	Reflux
Aortic dissection		
Aortic stenosis		
Arrythmias		
Myocardial trauma		
Myocarditis/pericarditis		

Table 2

Red Flags of chest pain
Crushing (or pressure) chest pain
Syncope
Palpitations
Breathlessness
Severe backpain
Impending feeling of doom

Table 3 (ESC, 2023)
Chest pain or pressure
Diaphoresis
Epigastric pain/ Indigestion
Shoulder/ Arm pain
Dizziness
Nausea/ Vomiting
Jaw/Neck pain
Shortness of breath

Table 4
SOCRATES
Site – where is the pain
Onset – when did it start and how long did it last
Character – describe the type of pain (sharp, dull, crushing)
Radiation – does the pain occur anywhere else
Associated symptoms – any other symptoms that the patient has alongside the pain (dizziness, sweating, nausea)
Timing – has the pain changed over time
Exacerbating or relieving factors – what makes it better or worse
Severity – a pain scale could be used here such as ‘rate your pain 0-10’