Acute coronary syndrome: assessment and management

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Conflict of interest
None declared

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Abstract
Acute coronary syndrome is a serious condition that requires urgent assessment and management. This article outlines the nature of the condition, and discusses its underlying pathophysiology. It discusses three types of acute coronary syndrome: unstable angina, ST elevation myocardial infarction and non-ST elevation myocardial infarction. Research and guidelines are used to guide the reader through approaches to initial nursing assessment and the immediate management of patients with suspected acute coronary syndrome.

Keywords
acute coronary syndrome, angina, cardiology, cardiovascular system, coronary heart disease, myocardial infarction, myocardial ischaemia, stable angina, unstable angina

Aims and intended learning outcomes
The aim of this article is to discuss the initial nursing assessment and management of patients presenting with suspected acute coronary syndrome. After reading this article and completing the time out activities you should be able to:
» Describe normal coronary circulation and how it relates to the cardiovascular system.
» Explain the pathophysiology related to acute coronary syndrome.
» Identify the signs and symptoms of acute coronary syndrome, and differentiate between the various types of the condition.
» Discuss the initial nursing assessment and management of patients presenting with suspected acute coronary syndrome.

Relevance to The Code
Nurses are encouraged to apply the four themes of The Code: Professional Standards of Practice and Behaviour for Nurses and Midwives to their professional practice (Nursing and Midwifery Council (NMC) 2015). The themes are: Prioritise people, Practise effectively, Preserve safety, and Promote professionalism and trust.

This article relates to The Code in the following ways:
» The Code states that nurses must act when an emergency arises in their practice setting. Acute coronary syndrome is a medical emergency and nurses should be equipped to undertake urgent assessment and management of patients.
» Emergency care is constantly evolving, and nurses should be aware of up-to-date guidelines and research underpinning their practice. This article provides evidence-based information about the causes, assessment and management of acute coronary syndrome.
» Nurses must recognise and respond to people’s physical, psychological and social needs. This article provides information about how nurses can identify the symptoms of acute coronary syndrome, how to undertake a structured nursing assessment for these patients, and appropriate treatment interventions.
» Patients with suspected acute coronary syndrome and their families might be frightened and anxious. Nurses have a central role in supporting them through this time, which is in accordance with the theme to prioritise people.
Introduction
The incidence of acute coronary syndrome decreased between 2002 and 2016 in most developed countries (Timmis 2015). Between 2002 and 2012, the rate of acute myocardial infarctions decreased by 33% in men and 31% in women in England (Smolina et al 2012). Despite this decrease, acute coronary syndrome remains one of the leading causes of premature death in the UK, and was responsible for 16% of all deaths in men in 2012 (Bhatnagar et al 2015). This article discusses three types of acute coronary syndrome: unstable angina, ST elevation myocardial infarction (STEMI) and non-ST elevation myocardial infarction (NSTEMI).

Survival following acute coronary syndrome is linked to prompt assessment, diagnosis and management (Timmis 2015). Nurses have an important role in increasing survival rates, because they are usually the first healthcare practitioners to come into contact with the patient (Nikolaou et al 2015). Nurses who are knowledgeable and skilled are more likely to ensure that patients presenting with signs and symptoms of acute coronary syndrome are assessed and treated promptly.

The complex nature of acute coronary syndrome can mean that classic signs of acute myocardial injury, such as changes in the ST segment on an electrocardiogram (ECG), might be absent. Evidence indicates that the incidence of acute coronary syndrome without classical ST segment elevation on an ECG is more frequent than the incidence of acute coronary syndrome with ST segment elevation (Yeh et al 2010, Roffi et al 2016). Nurses are increasingly likely to encounter such patients; therefore, it is essential that they understand the pathophysiology of the condition, and how the signs and symptoms might vary.

The in-hospital mortality rate of patients with STEMI is higher than the in-hospital mortality rate of patients with NSTEMI; however, the mortality rate in the six months following the event is similar (Fox et al 2006). This is significant for nurses caring for patients with suspected acute coronary syndrome, because initial assessment and immediate management have significant short-term and long-term effects for patients. Short-term effects include a reduction in 30-day mortality following admission (Chung et al 2014), while long-term effects include a reduction in the frequency of morbidities associated with acute coronary syndrome, including chronic heart failure (Cowie et al 2005).

TIME OUT 1
Using an anatomy and physiology textbook such as that written by Tortora and Derrickson (2013), revise the primary function of the cardiovascular system and list the main components.

Cardiovascular system
When considering disease processes, it might be useful to consider the ‘building blocks’ of human life. The most basic structure in the human body is the cell. For life to exist, the cell must produce energy, and the substances required to produce energy must be delivered to the cells of the body, and the waste products of energy removed.

The primary function of the cardiovascular system is to deliver nutritive substrates to cells, such as oxygen and glucose, and to remove the waste products of metabolism, such as carbon dioxide and water (Tortora and Derrickson 2013). The cardiovascular system comprises the heart, blood and blood vessels. This article focuses on the heart. The heart is responsible for pumping blood to cells and, in conjunction with blood vessels, producing the pressure necessary to perfuse the cells with the nutrients they require (blood pressure).

Unless it is compensated for, a failure of the cardiovascular system will result in an interruption to the supply of nutrients to cells, reducing aerobic respiration, affecting energy production and ultimately leading to cell death (Thiele et al 2015). If this adversely affects one cell, it will have significant effects on whole organs or body systems.

Since this article focuses on acute coronary syndrome, it is important to review what the heart requires to function normally. Coronary blood supply is the most significant factor in maintaining normal cardiac function. The pumping motion of the heart is provided by cardiac muscle (myocardium). The heart beats from an early stage in embryonic development.
until death. Myocardium requires constant perfusion with oxygen and nutrients to function. To meet this need, the heart is supplied with a coronary blood supply.

No single organ other than the heart, has such an adverse effect on the rest of the body if it is compromised. Therefore, any disease process affecting the heart may have a life-threatening effect.

**TIME OUT 2**

List three of the main coronary arteries and outline the areas of the heart they supply.

**Coronary heart disease**

Acute coronary syndrome is often a consequence of coronary heart disease, although in rare cases acute coronary syndrome may be attributed to other causes, for example drug use. The most common cause of acute coronary syndrome is atherosclerosis (Roffi et al 2016). Atherosclerosis is a process by which fatty deposits (plaque) build up on the inner (intimal) lining of arteries. In the coronary arteries, this process gradually leads to a narrowing in the lumen of the artery (Figure 1) (Nable and Braunwald 2012). The needs of the myocardium change depending on activity. For example, at rest the myocardium will have a relatively low demand for blood, whereas on exertion the myocardium must contract faster to meet the demands of skeletal muscle (Tortora and Derrickson 2013). This rise in heart rate increases the demand for oxygenated blood to the myocardium. Healthy coronary vessels will meet this demand because blood is unrestricted. However, coronary vessels that have developed atheromatous plaque will have a reduced capacity to carry blood. The increased demand will not be met, resulting in ischaemia in the affected myocardial tissue.

Coronary heart disease might be non-symptomatic in the early stages of the disease. As the disease progresses, signs and symptoms will develop. The most common symptom the patient will experience is chest pain. Classically, this is described as a tight band around the patient’s chest. The patient may also experience discomfort in one arm or in the jaw (National Institute for Health and Care Excellence (NICE) 2016).

Angina pectoris is the term for chest pain that is usually on exertion or at times of stress. The pain is caused by ischaemia within the myocardium, resulting from inadequate blood supply through the narrowed coronary arteries (Thiele et al 2015). When the patient rests, the pain will usually resolve in less than 15 minutes (NICE 2016). This is an important factor to consider when taking a patient history. Such angina is termed stable angina, because the blood supply to the myocardium meets demand soon after the stressor, for example exercise, is removed. Chest pain that does not resolve with rest, termed unstable angina, will be discussed later in this article.

There are several risk factors that determine how likely an individual is to develop coronary heart disease. These risk factors may be divided into modifiable and non-modifiable (Table 1). Many of the modifiable risk factors in Table 1 can be reduced through changes in lifestyle. Timmis (2015) observed that over the past 50 years, reductions in death from coronary heart disease can be attributed as much to changes in lifestyle as to drug and surgical interventions. From a nursing perspective, this emphasises the importance of effective health promotion at an appropriate time.

**Acute coronary syndrome**

Acute coronary syndrome is a medical emergency in which blood supply to the myocardium has become partially or completely occluded, most commonly

<table>
<thead>
<tr>
<th>TABLE 1. Modifiable and non-modifiable risk factors for coronary heart disease</th>
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</thead>
<tbody>
<tr>
<td><strong>Modifiable risk factors</strong></td>
</tr>
<tr>
<td>Diabetes</td>
</tr>
<tr>
<td>Diet (lack of fruit and vegetables)</td>
</tr>
<tr>
<td>Hypercholesterolaemia</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Lack of exercise</td>
</tr>
<tr>
<td>Obesity</td>
</tr>
<tr>
<td>Smoking and alcohol use</td>
</tr>
<tr>
<td>Stress</td>
</tr>
</tbody>
</table>

(Adapted from Perk et al 2012)
caused by a rupture of atheromatous plaque (Nikolaou et al 2015). The term ‘syndrome’ is used because the signs and symptoms of the disease process are similar; however, the specific disease process might differ. For example, acute myocardial infarction will have a different pathogenesis from unstable angina, but the effect on the myocardium will ultimately be the same if left untreated (Nikolaou et al 2015).

Most nurses will be familiar with myocardial infarction – the death of myocardium as a result of a complete occlusion of a coronary vessel. The occlusion occurs as a result of rupture of the atheromatous plaque, leading to bleeding, which results in the formation of a thrombus (Figure 1). The thrombus lodges in the coronary vessel, occluding it. Myocardial tissue distal to the occlusion becomes ischaemic, and if left untreated becomes necrotic, resulting in damage to the myocardium (Thiele et al 2015).

For a myocardial infarction to be diagnosed, specific criteria must be met, such as an increase or decrease in troponin levels, and ST segment elevation on an ECG or one of the other criteria listed in Box 1 (Timmis 2015). It is possible for acute myocardial ischaemia to occur in the absence of ST segment change on an ECG, for example NSTEMI, or without complete occlusion of a coronary vessel (unstable angina). Therefore, while the signs and symptoms might be identical, the exact cause of the ischaemia may differ.

TIME OUT 3
Describe how you would structure an initial assessment for a patient who is acutely unwell. Why have you used that approach? What alternative approaches are available?

Initial nursing assessment

It is essential that all assessments are undertaken in a structured manner, to ensure the information necessary to formulate an appropriate plan of care is acquired. The ABCDE (airway, breathing, circulation, disability, exposure) approach to initial assessment has been used in emergency care settings for many years (Thim et al 2012). Using the ABCDE approach, the practitioner assesses, identifies and resolves life-threatening problems in a logical order; for example, resolving an obstructed airway takes priority over assessing the circulatory system. This structured approach is efficient and prevents deterioration in an emergency, where reaching a definitive diagnosis is often difficult.

Patients with acute coronary syndrome are likely to be acutely unwell, and the ABCDE approach should be followed in the initial stages of care (Box 2). For the purposes of the treatment and management interventions discussed in this article, it will be presumed that the patient is conscious and has a patent airway.

TIME OUT 4
Mark is a 56-year-old man who has been admitted to your clinical setting, experiencing chest pain. As you take the history, he states he is a secondary school teacher and is married with three children. Mark says he smokes ten

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**Figure 1. Atherosclerosis and formation of a thrombus in a coronary artery**

**BOX 1. Criteria for the diagnosis of myocardial infarction**

- Rise or fall in troponin levels, with at least one value above the 99th percentile upper reference limit, plus at least one of the following:
  - Symptoms of ischaemia, for example chest pain and dyspnoea
  - New ST segment elevation or T wave changes, or new bundle branch block on an electrocardiogram (ECG)
  - Pathological Q waves on an ECG
  - Imaging evidence of infarction
  - Identification of an intracoronary thrombus by angiography or autopsy

(Adapted from Thygesen et al 2012. ©European Society of Cardiology: tinyurl.com/ESC-myocardial)
cigarettes per day, but does not drink alcohol. He states that his father had a myocardial infarction when he was 44 years old and died of a ‘heart attack’ aged 58 years. When asked about his medication, Mark states he takes lisinopril 10mg once daily, and cannot recall why he takes the medication.

List Mark’s risk factors for coronary heart disease and indicate whether they are modifiable or non-modifiable.

Once immediate life-threatening problems have been identified, it is important to obtain a detailed history from the patient. This should include:

» Description of the pain – how long since its onset, and nature and location of the pain.
» Medical history.
» Drug and medication history, including smoking or alcohol intake.
» Allergies.
» Social and occupational history.

The information provided enables the practitioner to develop an understanding of the patient’s risk factors, for example smoking or a history of heart disease.

Patients with acute coronary syndrome should be specifically assessed for (NICE 2016):

» Pain in the chest and/or other areas, for example the arm, jaw, teeth or back, lasting longer than 15 minutes.
» Chest pain with shortness of breath, nausea and vomiting, sweating or abnormal blood pressure.
» Chest pain that is new to the patient, or a worsening pattern of chest pain in the patient with stable angina. This might include increasing regularity of pain caused by minimal exertion.

It is important to appreciate that some patients, such as those with diabetes mellitus, might not present with chest pain (Timmis 2015, Roffi et al 2016). For example, they may present to healthcare services following a collapse or feeling unwell with nausea and vomiting. It is important to consider the risk factors for coronary heart disease (Table 1) when assessing this patient group.

**Cardiac monitoring**

Patients presenting with chest pain should be attached to a cardiac monitor, with a defibrillator, as soon as possible (NICE 2016). Ideally this can be done during the ‘C’ (circulation) part of the ABCDE assessment.

Ischaemia in the myocardium can lead to life-threatening arrhythmias (Zorzi et al 2016). Normal cardiac rhythm requires specific concentrations of electrolytes within the myocardium. Ischaemia may affect these concentrations leading to arrhythmias, which in some cases may lead to cardiac arrest.

**TIME OUT 5**

Review your knowledge of a normal ECG. Draw the shape (morphology) of a normal sinus rhythm. Referring to a 12-lead ECG, indicate the area of the heart that each of the following leads relates to: lead I, lead II, lead III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6.

Table 2 shows the usual anatomical location of ECG leads for a normal 12-lead ECG. Figure 2 shows the limb lead placement, and Figure 3 shows the chest lead placement in a normal 12-lead ECG.

While cardiac monitors will display arrhythmias, they are not effective in assessing the heart for abnormalities such as ischaemia, because they only display the electrical activity in one plane. Typically, in three-lead cardiac monitors this will be lead II, which shows electrical activity in the inferior surface of the myocardium. To record the electrical activity in all planes of the heart, a 12-lead ECG should be recorded within ten minutes of the patient’s arrival in the clinical setting (NICE 2016, Roffi et al 2016).

Detailed analysis of ECGs requires skill and knowledge and is beyond the scope of this article. Figure 4 shows the normal sinus rhythm complex. The most important ECG change that relates to acute coronary

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**BOX 2. ABCDE approach to assessment of the patient with acute coronary syndrome**

- **Airway**: ensure the airway is patent
- **Breathing**: assess the respiratory rate; oxygen saturation; depth and symmetry of chest expansion
- **Circulation**: assess the pulse for rate, rhythm and volume; blood pressure; capillary refill; urine output; general colour; attach the patient to a cardiac monitor and perform a 12-lead electrocardiogram
- **Disability**: establish conscious level using either AVPU (alert, voice, pain, unresponsive) or the Glasgow Coma Scale
- **Exposure**: record the temperature, observe the patient for any external abnormal signs, for example rashes or bruising

(Adapted from Thim et al 2012)
syndrome is in the ST segment. The ST segment (Figure 4) reflects a period in which the ventricle has reached the end of its mechanical contraction, and where the electrolytes responsible for causing the electrical activity are returning to their pre-contraction state (repolarisation). Under normal conditions, the ST and T waves will be in line with the P and QRS waves. This line is known as the isometric line (Booth and O’Brien 2015).

Following an acute myocardial infarction, blood supply to a proportion of the myocardium is obstructed. This obstruction affects the electrical activity in the area of the heart. During the acute phase of the infarction, the time in which the S and T waves return to the isometric line are delayed, causing the ST segment to be raised (Figure 5). This is termed ST segment elevation; when this occurs on an ECG, the patient is diagnosed with STEMI. While this is a classic sign of a myocardial infarction on an ECG, there are cases in which the ST segment remains unaltered, is depressed, or where the T wave changes shape, this is termed NSTEMI (Booth and O’Brien 2015).

Failure to undertake a 12-lead ECG can result in significant cardiac abnormalities being missed. A cardiac monitor trace may show normal sinus rhythm, with no suggestion of ST elevation. However, a 12-lead ECG recording will show ST elevation in leads V1, V2 and V3 (Figure 5).

The abnormality shown demonstrates an anterior myocardial infarction that could not be seen on the three-lead cardiac monitor.

Where possible, it is recommended that a 12-lead ECG is performed in the pre-hospital setting (Nikolaou et al 2015). The ECG may be transmitted electronically to the receiving medical facility for analysis by a senior clinician, or presented on arrival with the patient. Evidence suggests that this enables prompt diagnosis and treatment, resulting in lower overall rates of mortality following acute coronary syndrome (Quinn et al 2014).

**Laboratory investigations**

Injury to myocardial cells caused by occlusion of the coronary artery will be indicated in blood tests. Troponin is a protein found in myocardial tissue that is responsible for regulating myocardial contractility. When myocardial cells become damaged, troponin leaks into the surrounding blood. This increase of troponin levels in the blood may be monitored for diagnostic and prognostic purposes.

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**TABLE 2. Usual anatomical location of electrocardiogram (ECG) leads**

<table>
<thead>
<tr>
<th>ECG leads</th>
<th>Relative location</th>
<th>Coronary artery</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1, V2, V3, V4</td>
<td>Anterior</td>
<td>Left anterior descending</td>
</tr>
<tr>
<td>V1, V2</td>
<td>Septal</td>
<td>Left anterior descending</td>
</tr>
<tr>
<td>I, aVL, V5, V6</td>
<td>Left lateral</td>
<td>Left circumflex</td>
</tr>
<tr>
<td>II, III, aVF</td>
<td>Inferior</td>
<td>Right coronary artery</td>
</tr>
<tr>
<td>aVR, V1</td>
<td>Right atrial</td>
<td>Right coronary artery</td>
</tr>
<tr>
<td>Posterior chest lead placement*</td>
<td>Posterior</td>
<td>Right coronary</td>
</tr>
</tbody>
</table>

*Leads may be placed in the posterior chest wall to help identify specific abnormalities

(Adapted from Booth and O’Brien 2015)
provides an indication of tissue damage. The rise in troponin levels may not be evident for up to four hours following cell injury (Roffi et al 2016). For that reason, guidelines recommend serial blood tests at zero, three and six hours following the patient’s arrival in the clinical setting (Nikolaou et al 2015). Where possible, blood samples should be taken and results available within one hour of the patient’s arrival (Roffi et al 2016). The reliability and validity of troponin results depend on the timing of the blood sample and the laboratory system used to analyse the sample (Shah et al 2015, Cullen et al 2016). From the nurse’s perspective, this means having a clear understanding of local policy about the timing of appropriate blood tests and ensuring this is adhered to.

Immediate management
It is important to understand that the reason the patient will have attended the clinical setting is pain, or anxiety related to pain. Nurses in the emergency care setting will encounter patients who have life-threatening conditions, with little or no warning. Patients may feel frightened and anxious during this time, so it is essential that nurses establish trust, and provide clear communication during the initial critical period of the patient’s arrival to the clinical setting. Aside from the human factors, anxiety increases heart rate, thereby increasing myocardial oxygen demand. When considering the management of the patient, nurses should be aware of their duty to act as an advocate for the patient and engender trust (NMC 2015). Patients experiencing a life-threatening condition such as acute coronary syndrome require compassion and support with decision making. Therapeutic communication is essential and, where necessary, nurses should have the courage to challenge practice that may not be of a sufficiently high standard.

The patient should be made as comfortable as possible. Intravenous opiates are recommended as the first-line treatment for chest pain (NICE 2016). As with all patients, consideration should be given to the contraindications or cautions to the use of opiate-based analgesia, for example a history of chronic obstructive pulmonary disease (COPD) or hypotension. Administering glycerine trinitrate through either the buccal or sublingual route will cause vasodilation, and may relieve chest pain for some patients.

Evidence shows that a single dose of aspirin 300mg enhances the benefits of any reperfusion therapy the patient may receive (Nikolaou 2015), reducing mortality rates in the 30 days following the event (Timmis 2015). As with all medicines, the nurse should consider any contraindications, such as gastric ulceration. If there are contraindications to aspirin, clopidogrel is an effective alternative medicine (NICE 2013).

Figure 3. Chest lead placement in a normal 12-lead electrocardiogram

Figure 4. Normal sinus rhythm complex
The administration of oxygen should be avoided in patients with suspected acute coronary syndrome where their oxygen saturation is greater than 94%, or 88-92% for patients with COPD with a risk of hypercapnic respiratory failure (NICE 2016). The administration of supplemental oxygen may cause vasoconstriction. In patients with acute coronary syndrome, this could result in further occlusion of affected coronary vessels (Stub et al 2015). Where oxygen saturation falls below 94%, supplemental oxygen should be administered with a target range as previously described.

**Medical management**

The nurse should always presume the patient is experiencing a life-threatening condition until proven otherwise. Nurses should also be aware of technological or pharmacological developments in emergency care, because recommendations about investigations and subsequent treatments change frequently. The medical management of the patient will depend on the definitive diagnosis the clinician reaches; whether this is unstable angina, STEMI or NSTEMI.

**ST elevation myocardial infarction**

In the case of STEMI, clear evidence of ST segment elevation on an ECG and a supporting history or blood test results make diagnosis relatively straightforward (Box 1). The definitive treatment for STEMI is restoration of blood supply to the myocardium. This may be achieved by either surgical intervention or pharmacological means. In the UK, surgical intervention in the form of percutaneous coronary intervention is preferred (Figure 6) (NICE 2016). The patient can be taken from the pre-hospital setting directly to the cardiac catheterisation laboratory for this procedure to be undertaken, where possible, which will minimise delays to treatment (Nikolaou et al 2015).

Percutaneous coronary intervention involves inserting a catheter through the arterial system, usually through the radial artery (Timmis 2015). The catheter is inserted under X-ray guidance to the coronary vessels. Once in the coronary vessels, the affected vessel or vessels are identified. The clinician will then inflate the catheter balloon, compressing the thrombus. A stent is then inserted to maintain patency of the vessel (Figure 6).

The crucial factor that determines the success of percutaneous coronary intervention is the time from vessel occlusion to treatment. Guidelines recommend undertaking percutaneous coronary intervention as soon as possible following diagnosis (Nikolaou et al 2015, Roffi et al 2016). Alongside clinical considerations, the nurse should ensure the emotional and psychological needs of the patient are attended to.

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**Figure 5. ST elevation on a 12-lead electrocardiogram**
TIME OUT 6
Refer to the patient information for Mark in Time out 4, and answer the following questions:

» What are your nursing management priorities?

» If Mark was found to have ST segment elevation on leads II, III and aVF of his 12-lead ECG, combined with raised troponin levels, what would the diagnosis be?

» What part of the heart is affected, based on the findings of the ECG?

**Non-ST elevation myocardial infarction and unstable angina**

The nature of acute coronary syndrome means that in the absence of the classic signs of STEMI, diagnosis is may be challenging for clinicians. The symptoms the patient will experience between the three types of acute coronary syndrome might be identical. Therefore, the clinician must interpret the patient’s signs and symptoms to reach a definitive diagnosis. The symptoms associated with unstable angina include chest pain lasting longer than 15 minutes, which may or may not be associated with exertion. Signs include evidence of ischaemia to the myocardium on an ECG. Such changes include ST segment depression or changes to T waves. Blood tests, specifically troponin levels, will be within the normal range.

In NSTEMI, signs may be identical to unstable angina and STEMI. There may be evidence of ischaemia on an ECG. The crucial factor that may enable the clinician to differentiate between NSTEMI and unstable angina is blood results. Troponin levels following NSTEMI typically increase or decrease (Thygesen et al 2012).

In addition to the interventions outlined in the immediate management section in this article, treatment will be determined by the patient’s risk factors. These risk factors can be calculated by the clinician using the GRACE (Global Registry of Acute Coronary Events) risk score (Timmis 2015). This is a web-based model that indicates the risk of death within six months of the cardiac event, taking into account risk factors such as the patient’s age, the presence of heart failure and ST segment elevation (Fox et al 2006). Where possible, patients should be investigated through angiography (Roffi et al 2016). This investigation will confirm the existence and extent of any infarction and the extent of any myocardial damage.

There is evidence that intravenous nitrates may be more effective in patients with NSTEMI or unstable angina than nitrates administered via the buccal or oral route. Cotter et al (1998) found intravenous nitrates were effective in relieving chest pain and in some cases were more effective in reversing ST segment depression on an ECG, which is a sign of myocardial ischaemia. The administration of nitrates has several benefits to the ischaemic myocardium. Dilation of blood vessels results in a lower volume of blood returning to the right side of the heart (preload). This reduces the workload for the myocardium, thereby reducing myocardial oxygen demand (Roffi et al 2016). It should be noted that the research by Cotter et al (1998) is dated, and that more recent additional research is required to validate this evidence.

**Conclusion**

Acute coronary syndrome is a medical emergency that may be challenging for
the nurse. A structured approach to initial assessment, such as the ABCDE approach, will ensure that life-threatening problems are identified rapidly and important clinical information is gathered. While in some cases the cause of the patient’s condition may be obvious, such as in STEMI, in other cases, patients will present with a variety of signs and symptoms. The nurse should always presume the patient is experiencing a life-threatening condition until proven otherwise.

Knowledge of risk factors, ECG interpretation and local protocols will enable the nurse to make informed decisions when planning the patient’s care. Research in emergency care means that recommendations regarding investigations and subsequent treatments change frequently, because of developments in technology and/or pharmacology. However, one factor that will not change is that a human being will be at the centre of the process. Nurses are not simply technicians; they provide care, and an important aspect of nursing care involves demonstrating compassion, providing support and acting as an advocate for the patient during one of the most vulnerable times in their life.

TIME OUT 7
Nurses are encouraged to apply the four themes of The Code (NMC 2015) to their professional practice. Consider how knowledge of the assessment and management of acute coronary syndrome relates to the themes of The Code.

TIME OUT 8
Now that you have completed the article you might like to write a reflective account as part of your revalidation.

References


Acute coronary syndrome
TEST YOUR KNOWLEDGE BY COMPLETING SELF-ASSESSMENT QUESTIONNAIRE 885

1. What is the most common cause of acute coronary syndrome?
   a) Cardiac arrhythmia  
   b) Hypertension  
   c) Atherosclerosis  
   d) Hypotension

2. Which of the following is not a type of acute coronary syndrome?
   a) Unstable angina  
   b) ST elevation myocardial infarction (STEMI)  
   c) Non-ST elevation myocardial infarction (NSTEMI)  
   d) Tachycardia

3. What is the difference between stable and unstable angina?
   a) Chest pain usually resolves on rest within 15 minutes in stable angina  
   b) Stable angina is caused by a widening of the coronary arteries  
   c) Chest pain usually resolves on rest within 15 minutes in unstable angina  
   d) The blood supply to the myocardium remains adequate in stable angina

4. What does the D in ABCDE assessment stand for?
   a) Disease  
   b) Diagnosis  
   c) Deterioration  
   d) Disability

5. How can clinicians differentiate between an NSTEMI and unstable angina?
   a) Troponin levels typically increase or decrease in unstable angina  
   b) ST segment elevation occurs in an NSTEMI, but not in unstable angina  
   c) Troponin levels typically increase or decrease following an NSTEMI  
   d) Atheromatous plaque builds up in the coronary vessels in unstable angina only

6. Which of the following is a modifiable factor for coronary heart disease?
   a) Age  
   b) Diet  
   c) Genetic factors  
   d) Ethnicity

7. Following the patient’s arrival in the clinical setting, it is recommended that serial blood tests are taken at:
   a) 1, 2 and 3 hours  
   b) 0, 2 and 4 hours  
   c) 1, 4 and 8 hours  
   d) 0, 3 and 6 hours

8. What should be used to record the electrical activity in all planes of the heart?
   a) 3-lead cardiac monitor  
   b) 12-lead electrocardiogram  
   c) Angiogram  
   d) Magnetic resonance imaging

9. The preferred treatment to restore blood supply to the myocardium in a STEMI is:
   a) Glycerine trinitrate  
   b) Intravenous nitrates  
   c) Percutaneous coronary intervention  
   d) Aspirin

10. Which statement is true?
    a) Diagnosis is easier for clinicians in the absence of the classic signs of a STEMI  
    b) The time from vessel occlusion to treatment is the crucial factor that determines the success of percutaneous coronary intervention  
    c) A single dose of aspirin 300mg reduces the benefits of reperfusion therapy  
    d) Acute coronary syndrome is rarely life-threatening

This self-assessment questionnaire was compiled by Alex Bainbridge
The answers to this questionnaire will be published on 29 March
The answers to SAQ 883 on implantable cardioverter defibrillators, which appeared in the 1 March issue, are: 1, b, d, 3, b, 4, c, 5, d, 6, b, 7, b, 8, a, 9, d, 10, a

How to complete this assessment
This self-assessment questionnaire will help you to test your knowledge. It comprises ten multiple choice questions that are broadly linked to the article starting on page 61. There is one correct answer to each question.
- You can test your subject knowledge by attempting the questions before reading the article, and then go back over them to see if you would answer any differently.
- You might like to read the article before trying the questions. The correct answers will be published in Nursing Standard on 29 March.

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