Pancreatitis

An overview of the management of patients with chronic pancreatitis

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Conflict of interest
None declared

Abstract
Chronic pancreatitis is a complex inflammatory condition characterised by irreversible damage to the pancreas. This article explores the pathophysiology of this condition and its effects on pancreatic function. It outlines the causes and presenting features of chronic pancreatitis, as well as its effect on patients’ quality of life and the changes to their lifestyle that are likely to be required. Chronic pancreatitis cannot be cured; therefore, treatment aims to control pain, manage problems associated with malabsorption, and assess and manage long-term complications that may develop, such as insulin dependence.

Keywords
alcohol misuse, chronic conditions, chronic pancreatitis, pancreas, pancreatitis

Aims and intended learning outcomes
The aim of this article is to provide an overview of chronic pancreatitis. It considers the pathophysiology of the condition and its associated care and management strategies. After reading this article and completing the time out activities you should be able to:
» Discuss the role of the pancreas in gastrointestinal function.
» Explain the pathophysiology of chronic pancreatitis.
» Outline the presenting features of chronic pancreatitis and how they are related to its pathophysiology.
» Describe the main principles of management of chronic pancreatitis.
» Discuss the effects that chronic pancreatitis might have on a patient’s quality of life, and the lifestyle changes that might be necessary.

Introduction
Pancreatitis is a complex inflammatory condition of the pancreas that can be either acute or chronic (Andris 2010). Chronic pancreatitis is primarily associated with long-term alcohol misuse (Porth 2015), while acute pancreatitis is linked to a wider range of causes, with gallstones accounting for around 50% of cases and alcohol misuse accounting for around 20-25% of cases (Johnson et al 2014). An important difference between acute and chronic pancreatitis is reversibility. In acute pancreatitis, it is possible for damage to the pancreas to be reversed, whereas chronic pancreatitis results in ongoing irreversible destruction of pancreatic tissue (Porth 2015), leading to a risk of the patient developing long-term complications, such as insulin dependence.

Figures on the current prevalence of chronic pancreatitis in the UK are difficult to obtain; however, NHS Choices (2016) stated that more than 35,000 people attended hospitals in England with chronic pancreatitis between 2012 and 2013. Kocher (2008) estimated the yearly incidence to be 3-9 people per 100,000, with 70% of cases related to alcohol misuse. However, there are several other causes of the condition, including autoimmune disorders, inflammatory bowel disease and obstruction of the pancreatic ducts (Porth 2015).
The healthy pancreas

The pancreas is a small but complex gland. It has endocrine and exocrine functions (VanPutte et al 2016) that are related primarily to digestion and metabolic function. It sits in the abdominal cavity behind the greater curvature of the stomach (Tortora and Derrickson 2011), with the tail of the pancreas extending left to touch the spleen (Figure 1) (VanPutte et al 2016). It is connected to the small intestine at the duodenum via the hepatopancreatic duct and the accessory duct (Tortora and Derrickson 2011), which enables the flow of pancreatic juices containing digestive enzymes into the duodenum. Bile produced by the liver and stored in the gall bladder reaches the small intestine via the common bile duct, which joins with the hepatopancreatic duct at the hepatopancreatic ampulla, known as the ampulla of Vater, forming a shared entry point to the small intestine (Figure 2) (Tortora and Derrickson 2011).

TIME OUT 1
Review gastrointestinal function using a standard anatomy and physiology textbook or a reputable online resource. In your own words, describe the role of the pancreas in healthy gastrointestinal function.

Endocrine function

Endocrine function of the pancreas is primarily associated with the production of the hormones insulin and glucagon and their role in maintaining blood glucose levels. Specialised cells in the pancreas known as the islets of Langerhans, or pancreatic islets (Figure 3a), produce these hormones at varying levels according to requirements (VanPutte et al 2016). There are two main cell types in the pancreatic islets: alpha cells, which secrete glucagon, and beta cells, which secrete insulin (Figure 3a) (Tortora and Derrickson 2013).

TIME OUT 2
Review the process by which the body maintains blood glucose levels. Make notes on how this would be affected in patients with pancreatitis.

Two other hormones are produced by the pancreatic islets: somatostatin and pancreatic polypeptide, which support digestive function. These hormones are secreted by the delta and PP cells respectively (Figure 3a). Somatostatin slows gastrointestinal activity and inhibits the secretion of insulin and glucagon after eating, allowing more time for absorption of nutrients, while the role of pancreatic polypeptide is less clear (Porth 2015, VanPutte et al 2016). Tortora and Derrickson (2013) stated that pancreatic polypeptide inhibits all other pancreatic hormones, while also inhibiting gall bladder contraction and the release of pancreatic enzymes. The relationship between the pancreatic hormones is complex and not understood fully.
Exocrine function
Pancreatic acini are clusters of glandular epithelial cells and make up 99% of pancreatic tissue (Figure 3b) (Tortora and Derrickson 2013). These cells secrete a fluid into the pancreatic ducts that contains digestive enzymes, and is alkaline because of the presence of bicarbonate ions (Colbert et al 2016, VanPutte et al 2016). When the hepatopancreatic duct enters the small intestine via the ampulla of Vater, pancreatic fluid mixes with intestinal fluid in the duodenum, helping to neutralise the acid chyme from the stomach (Tortora and Derrickson 2013).

The pancreatic acini produce enzymes that are involved in the digestion of proteins, carbohydrates and fats. These enzymes include: lipase for fat digestion, which requires the fats to be emulsified by bile to act; pancreatic amylase for carbohydrate digestion; and various enzymes to break down deoxyribonucleic acid (DNA) and ribonucleic acid (RNA). There are also several protein-digesting enzymes; the major ones are trypsin and chymotrypsin (VanPutte et al 2016). It is important to note that the protein-digesting enzymes produced in the pancreas are produced in an inactive form to prevent digestion of pancreatic tissue. The pancreatic acini also produce trypsin inhibitors to prevent any enzymes that are produced accidentally from acting on the pancreatic tissue. The protein-digesting enzymes are activated in the duodenum, enabling them to participate in digestion (Tortora and Derrickson 2013).

Pathophysiology
Chronic pancreatitis is a long-term inflammatory condition that is most commonly caused by alcohol misuse, and is associated with ongoing and irreversible damage to the pancreas (Porth 2015). Although the damage caused by alcohol is not understood fully, several theories indicate that alcohol damages the sphincter of Oddi (Figure 2), the small ducts and acinar cells (Vonlaufen et al 2007). It has been suggested that alcohol can cause the sphincter of Oddi to go into spasm, while it is also possible that alcohol assists the formation of protein plugs, leading to pancreatic stones. These stones cause obstruction of the small ducts, leading to inflammation and scarring (Vonlaufen et al 2007). Vonlaufen et al (2007) indicated that this mechanism could explain the increase in the incidence of chronic pancreatitis associated with cystic fibrosis. Cystic fibrosis is known to enhance the viscosity of pancreatic secretions, thereby promoting stone formation; approximately 90% of people with cystic fibrosis experience loss of exocrine pancreatic function (Porth 2015).

The effect of alcohol on the acinar cells, in particular on the enzymes produced by the acinar cells, is significant. The pancreas can metabolise alcohol, producing by-products that are toxic to the pancreas (Vonlaufen et al 2007). These by-products influence the
acinar cells to increase the production of digestive enzymes (Lee et al 2015). Haber et al (1998) found that alcohol stresses the acinar cells, leading to the release of lysosomes (organelles containing enzymes that break down cells), resulting in exposure of inactive enzymes to these lysosomes and premature activation in the pancreas (Lee et al 2015). The activation of the protein-digesting enzymes triggers the inflammatory response in the pancreas, leading to the destruction of pancreatic tissue and the development of fibrotic tissue. In the long term, patients with chronic pancreatitis will experience regular episodes of pancreatic inflammation, presenting as episodes of abdominal pain that is usually in the epigastric region or the left upper quadrant. These episodes of pain can be severe, with patients presenting with symptoms of an acute exacerbation of chronic pancreatitis (Porth 2015). When alcohol misuse is the cause of chronic pancreatitis, the common presenting pattern is of repeated episodes of acute disease and the eventual diagnosis of chronic pancreatitis (NICE 2016), since repeated destruction of tissue leads to the development of increased fibrotic tissue and the gradual irreversible replacement of functional tissue.

The quantity of alcohol consumption implicated in the development of chronic pancreatitis is not clear. However, Andris (2010) found that drinking 5-8 alcoholic drinks per day presents a significant risk. Lee et al (2015) suggested that the effects of a high level of alcohol intake alone, did not explain the development of long-term disease progression in all individuals, and that the development of fibrotic tissue may be attributed to another cause. They indicated that fibrotic tissue development can be enhanced by cigarette smoking, thereby increasing the risk of disease progression in people who smoke.

Assessment and diagnosis
A diagnosis of chronic pancreatitis requires consideration of several issues, including assessment of the patient's current and previous alcohol intake. Chronic pancreatitis may be initially suspected, based on the patient's history of recurrent abdominal pain, especially when this is associated with a history of high levels of alcohol intake. Suspicion may be heightened if there are also signs of chronic liver disease, such as jaundice (NICE 2016). Majumder and Chari (2016) noted that the severity of symptoms in the later stages of chronic pancreatitis may mean that diagnosis is 'obvious', but that the condition can be difficult to diagnose in the early stages when symptoms are subtle. It may be that the presence of chronic pancreatitis can only be confirmed using a combination of patient history, analysis of pancreatic function and medical imaging (Majumder and Chari 2016). However, there is no specific test that will diagnose chronic pancreatitis.

It is important to assess abdominal pain and its potential triggers, for example binge-drinking of alcohol or eating a large meal. Assessment of pain should include

Figure 3. Pancreatic cells
a) Islet of Langerhans
b) Acinar cells

Zymogen granules
A diagnosis of chronic pancreatitis does not always necessitate treatment, because the patient may experience few symptoms (Witt et al 2007). However, for most patients, chronic pain is one of the main debilitating features of the condition (Wassef et al 2014). Pain assessment and early intervention are essential to improve quality of life.

Nurses have a professional responsibility to carry out a holistic assessment of the patient that includes pain, alcohol intake and weight loss associated with malabsorption. Since chronic pancreatitis often has long-term effects on the patient’s quality of life, ongoing healthcare support should consider the wider health concerns associated with long-term alcohol misuse. Pain management in patients with chronic pancreatitis can begin with changes to the patient’s lifestyle, such as abstaining from alcohol and maintaining a low-fat diet, before progressing to pharmaceutical interventions (Gachago and Draganov 2008). It is likely that concerns identified during patient assessment will lead to interventions that encompass physical, social and psychological issues, which should be considered part of a patient’s long-term plan of care.

TIME OUT 3
Think about someone you have met or provided care for who has chronic pancreatitis. If you have not met anyone with this condition, speak to a colleague who has experience of supporting a patient with pancreatitis. Make short notes on the following:

» How did the patient present?
» What were the most concerning symptoms?
» Why these symptoms were present?

Effects and management
Patients with chronic pancreatitis may experience a range of effects caused by the destruction of pancreatic tissue, which gradually affect endocrine and exocrine function. Reduction of exocrine function means a reduction in the production of digestive enzymes, which affects the digestion of foodstuffs, leading to malabsorption in the small intestine (Porth 2015). Symptoms of malabsorption include loss of appetite, weight loss, steatorrhoea (fatty stools) and flatulence, which can have a significant effect on a patient’s life; Jupp et al (2010) noted that patients with chronic pancreatitis report physical, psychological and social difficulties. In addition to loss of exocrine function, there is also a gradual destruction of endocrine cells, leading to an increasing loss of ability to maintain blood glucose levels. Disease progression leads to the development of diabetes (Porth 2015) and longer-term consequences, including possible insulin dependence. The symptoms of chronic pancreatitis can be challenging for patients, because of the effect they have on quality of life and the need to make lifestyle changes to manage them. Treatment is usually conservative, and aims to control pain, manage problems associated with malabsorption, and assess and manage diabetes (Witt et al 2007).

Pain
A diagnosis of chronic pancreatitis does not always necessitate treatment, because the patient may experience few symptoms (Witt et al 2007). However, for most patients, chronic pain is one of the main debilitating features of the condition (Wassef et al 2014). Pain assessment and early intervention are essential to improve quality of life; therefore, analgesia is a central part of management (Jupp et al 2010). NICE (2016) and Witt et al (2007) suggested commencing treatment with paracetamol and/or non-steroidal anti-inflammatory drugs, with the addition of a mild opiate if this is insufficient to manage the pain. Neuroactive medications such as pregabalin, amitriptyline hydrochloride or gabapentin may be beneficial. However, there is no consensus about the use of pregabalin (Gurusamy et al 2015). Public Health England and NHS England (2014)
have produced joint guidance on the prescription of pregabalin and gabapentin. They noted that while these drugs may be useful for certain types of pain, prescribers should consider the risk of dependency alongside the benefits. The use of opiates in increasing doses can be problematic because of potential side effects and a risk of dependency (Witt et al 2007). Therefore, the use of opiates is assessed as part of a holistic patient assessment. When assessing and supporting patients with chronic pancreatitis, nurses should consider the potential risk of dependency or misuse of medications in people with a history of addiction.

Pancreatic enzyme therapy, which aids digestion by replacing enzymes no longer produced by the pancreas, is likely to be commenced as part of management in primary and secondary care (Witt et al 2007, NICE 2016). A Cochrane review by Shafiq et al (2009) found no conclusive evidence that pancreatic enzyme therapy had any effect on pain or steatorrhoea. However, individual studies that were part of the review showed varying effectiveness for this treatment, indicating that further research is required. Witt et al (2007) discussed the yet unproven effect of antioxidants on pain relief in chronic pancreatitis, and a Cochrane review by Ahmed Ali et al (2014) concluded there was no definitive evidence that antioxidants had any effect on pain in patients this condition, because previous studies were small and limited.

TIME OUT 4
Reflect on the pain assessment tools used in your clinical area. Are these appropriate for assessing pain in patients with chronic pancreatitis? If not, list any additional questions you could ask the patient as part of your assessment.

More invasive interventions can be used to reduce pain, such as the removal of pancreatic stones, although a comprehensive assessment is likely to be required before considering these options. A comprehensive assessment might include X-ray and computerised tomography or magnetic resonance imaging scans to indicate the presence of pancreatic stones or the extent and position of pancreatic damage. NICE (2016) states that treatment options include endoscopic pancreatic stone removal from smaller ducts, endoscopic retrograde cholangiopancreatography with stone removal for stones present in larger ducts, or coeliac axis nerve block. For some patients, surgery is an option when pain is difficult to manage using other methods. In a study assessing the outcomes of patients following surgery, van der Gaag et al (2012) found that in most cases, carefully tailored surgery based on the anatomical abnormalities present resulted in effective pain reduction. However, it is important to note that 12% of patients in this study did not respond to surgery, and that the overall quality of life of all patients continued to be compromised because of the presence of other symptoms.

Alcohol and smoking
As previously noted, alcohol misuse is the cause of chronic pancreatitis in more than 70% of cases. Therefore, abstinence from alcohol is central to management of the condition, and is recommended by NICE (2016). However, in practice this is often complex, because the addictive nature of alcohol means that abstinence can be challenging for many patients, and some may not want or feel able to make this choice. It is essential that nurses adopt a non-judgemental approach and support the decisions made by patients, regardless of their understanding of the possible risks. Nordback et al (2009) indicated that around half of patients presenting with acute pancreatitis caused by alcohol misuse go on to experience repeated exacerbations of the condition and subsequent hospital admissions. This suggests that there is an opportunity to engage with many patients with chronic pancreatitis during the acute phase. Nordback et al (2009) studied the effect of early intervention at the first presentation of acute pancreatitis, finding that patients who engaged in regular brief interventions at 6-month intervals showed a significant reduction in recurrence of acute episodes.
A range of options are available to support patients who wish to stop drinking alcohol. In countries such as Scotland, there are initiatives to change the relationship with alcohol at individual and public health levels (The Scottish Government 2009). Many of the public health initiatives in Scotland have been well publicised, such as minimum pricing and lowered safe-driving limits, but there is also a commitment to individualised support through brief interventions and training for staff (The Scottish Government 2009). Since nurses work closely with patients, they are in an ideal position to support patients in abstaining from alcohol. Joseph et al (2014) found that nurse-led brief interventions were an effective method of reducing alcohol intake. Although chronic pancreatitis cannot be cured, there is an opportunity to slow its progress by supporting patients through the process of reducing or stopping alcohol intake when they present with acute pancreatitis.

TIME OUT 5
Find out what support is available in your local area for adults who want to reduce their alcohol intake or stop smoking. How are these services accessed?

Smoking adversely affects the progression of chronic pancreatitis (Witt et al 2007); therefore, discussions about smoking cessation should be part of the management of the condition. This may be challenging and something the patient does not wish to do; however, it is important that healthcare professionals provide information about the support available for those who do wish to stop smoking.

Nutritional support and managing diabetes
Nutritional support, along with abstinence from alcohol, is an essential aspect of care for patients with chronic pancreatitis. This is particularly important as the disease progresses towards the end stages and complete pancreatic failure (O’Keefe 2015), when there are significant features of malabsorption and inability to maintain glycaemic control (Porth 2015). Curtis and Kudsk (2007) suggested that many nutritional issues can be managed pharmacologically, using a combination of enzyme replacement therapy, antidiabetic medications (including insulin) and vitamin supplements.

Nurses providing care for patients with chronic pancreatitis should begin nutritional support with a nutritional assessment using an appropriate tool, such as the Malnutrition Universal Screening Tool (MUST) (British Association for Parenteral and Enteral Nutrition 2016), to identify patients who are malnourished or at risk of malnutrition. Following the assessment, an individualised plan can be developed that should take account of any pain that is experienced following dietary intake (Rasmussen et al 2013) and the presence of diabetes. Rasmussen et al (2013) recommended that patients are given between four and eight small meals per day to reduce the demand on the pancreas that may result from larger meals. In addition, they noted that calorie demand might be higher than average as a result of increased energy expenditure at rest. Carbohydrate intake may require careful consideration, where diabetes is present. Supplementation with medium-chain fatty acids, from sources such as coconut oil, can aid weight gain because they are well absorbed without lipase; however, these may be unpalatable (Rasmussen et al 2013).

O’Keefe (2015) recommended assessing the stool for steatorrhoea by observing for a pale colour, possibly with the presence of oil droplets, or carrying out a clinical assessment that involves stool collection over a 72-hour period. If steatorrhoea is present, O’Keefe (2015) recommended commencing pancreatic enzyme supplements that are high in lipase. He suggested that these supplements may be better tolerated if the capsules are opened and scattered over food, because up to four large capsules might be required with dietary intake. If taken in this manner, medication that slows movement through the gastrointestinal tract is beneficial and might be prescribed, because this can maximise the effectiveness of the enzyme supplements.
It may be difficult for some patients with chronic pancreatitis to maintain adequate weight, leading to an ongoing risk of malnutrition. If a patient is thought to be at risk of malnutrition, Rasmussen et al (2013) suggested oral nutritional supplements should be given to provide additional protein, energy and vitamins. In severe cases, enteral feeding may provide short-term benefit, particularly before surgery (Rasmussen et al 2013). There are potential risks associated with enteral nutrition, and careful assessment and support of the patient are essential. Longer-term enteral feeding via gastrostomy is rare, but may be required in severe cases if nasojejunal feeding cannot be tolerated and more time is required to stabilise the patient’s nutritional status before surgery. Rasmussen et al (2013) added that parenteral nutrition should rarely be used in the management of chronic pancreatitis, because of the risk of catheter infections and sepsis. However, it is not completely contraindicated and is likely to be part of management during a severe acute exacerbation.

Diabetes will develop slowly as chronic pancreatitis progresses, and requires specialist support from a diabetologist (O’Keefe 2015, NICE 2016). NICE (2016) recommends that patients with chronic pancreatitis should have an annual glucose tolerance test to identify any deterioration in glucose levels that may be problematic. The complexity of maintaining glycaemic control, because of the destruction of glucagon-producing cells and the cells that produce enzymes that participate in overall gastrointestinal function, means that early specialist support is required for patients with chronic pancreatitis (O’Keefe 2015).

**Quality of life**
The quality of life of patients with chronic pancreatitis can be compromised significantly, and this should be considered as part of any nursing assessment. A range of tools is available to assess quality of life, although these tend to be non-specific. Cronin and Begley (2012) studied patients living with chronic pancreatitis and found that the condition resulted in ongoing physical, social and psychological disruption to their lives. While many patients were able to develop acceptance of their condition, it appeared that this could be disrupted because of its unpredictable nature.

Wassef et al (2014) developed and tested a chronic pancreatitis-specific tool to assess quality of life for patients living with the condition, because there were no disease-specific tools available at the time of the study. The Pancreatitis Quality of Life Instrument (PANQOLI) (Wassef et al 2014) was tested at one centre and identified variables that affect quality of life, such as stigma and economic issues, which may not be addressed sufficiently in other quality of life tools. The PANQOLI appears to offer a new approach to assessing quality of life for patients with the condition; however, the authors recommended further study and testing to refine the tool and to test its validity more widely.

**Conclusion**
Chronic pancreatitis is a complex condition because of its underlying pathophysiology and the range of symptoms that patients can experience. Its effect on quality of life can be considerable, with the potential development of long-term complications, such as insulin dependence. Providing care for patients with chronic pancreatitis requires understanding of the altered physiology and its effects on the health and quality of life of patients, together with the ability to be empathetic towards the possible lifestyle choices that may have contributed to the development of the condition.

Interventions are both physical and psychological, and it is likely the patient will need to consider abstinence from alcohol and the challenges that this may involve. Pain can be a significant problem for patients with chronic pancreatitis, and pharmacological management of this is complex. It is necessary to consider whether the patient has a history of dependency, because this is a risk associated with certain medications used in pain management. Nurses should adopt a non-judgemental approach to care that...
considers these challenges and supports the patient, who may be having difficulty in coping with significant long-term ill health. In addition, it is necessary to recognise the symptoms that might indicate a decline in health related to progression towards the end of life, as well as worsening symptoms that might signify development of an acute exacerbation requiring immediate intervention.

TIME OUT 6
Now that you have completed the article you might like to write a reflective account as part of your revalidation.

References


### Chronic pancreatitis

**TEST YOUR KNOWLEDGE BY COMPLETING THE SELF-ASSESSMENT QUESTIONNAIRE 871**

1. Where is the pancreas positioned?  
   - a) In front of the stomach  
   - b) Behind the greater curvature of the stomach  
   - c) To the left of the spleen  
   - d) Above the stomach

2. The pancreas is connected to the small intestine at the duodenum via:  
   - a) The aorta  
   - b) The common bile duct  
   - c) The hepatopancreatic duct and accessory duct  
   - d) The pulmonary artery

3. What do the islets of Langerhans produce?  
   - a) Glucagon  
   - b) Insulin  
   - c) Pancreatic polypeptide  
   - d) All of the above

4. Which of these is not produced by the pancreas?  
   - a) Enzymes  
   - b) Leucocytes  
   - c) Hormones  
   - d) Pancreatic fluid

5. The main difference between acute and chronic pancreatitis is:  
   - a) Damage to the pancreas is reversible in chronic pancreatitis  
   - b) Damage to the pancreas is reversible in acute pancreatitis  
   - c) Chronic pancreatitis is linked to a wider range of causes  
   - d) Acute pancreatitis is associated with increased long-term complications

6. What is the main cause of chronic pancreatitis?  
   - a) Alcohol misuse  
   - b) Autoimmune disorders  
   - c) Inflammatory bowel disease  
   - d) Drug misuse

7. Which of these would not be used to diagnose chronic pancreatitis?  
   - a) Taking a patient’s history  
   - b) Analysis of pancreatic function  
   - c) Blood pressure monitoring  
   - d) Medical imaging

8. Which of the following is not a symptom of malabsorption?  
   - a) Increased appetite  
   - b) Weight loss  
   - c) Steatorrhoea  
   - d) Flatulence

9. What is recommended in the management of chronic pancreatitis?  
   - a) Smoking cessation  
   - b) Abstinence from alcohol  
   - c) Nutritional support  
   - d) All of the above

10. Which statement is true?  
    - a) Chronic pancreatitis is curable  
    - b) Chronic pancreatitis can lead to the development of insulin dependence  
    - c) Chronic pancreatitis does not affect a patient’s quality of life  
    - d) Most patients with chronic pancreatitis do not experience pain

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**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 54. 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 7 December.  
- Subscribers making use of their RCNi Portfolio can complete this and other questionnaires online and save the result automatically.  
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