

A patient was diagnosed with TB and had been on treatment for two months.

He was lost to follow up. Four months later he presented with haemoptysis and fatigue. On examination his temperature was 38.2°C. Sputum analysis for acid fast bacilli was positive.

The patient is suspected of having multiple drug resistant tuberculosis (MDR TB).

Which of the following would be the strongest risk factor for MDR TB?

(Please select 1 option)

| | |
|-----------------------|------------------------|
| <input type="radio"/> | Age 12-20 years |
| <input type="radio"/> | Female gender |
| <input type="radio"/> | Herpes simplex virus |
| <input type="radio"/> | HIV |
| <input type="radio"/> | Resident in Manchester |

Please select 1 option

| | |
|----------------------------------|---|
| <input type="radio"/> | Age 12-20 years |
| <input type="radio"/> | Female gender |
| <input type="radio"/> | Herpes simplex virus |
| <input checked="" type="radio"/> | HIV This is the correct answer |
| <input type="radio"/> | Resident in Manchester Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Risk factors for MDR TB

Explanation

The risk factors for MDR TB are:

- History of prior TB drug treatment; prior TB treatment failure
- Contact with a known case of drug-resistant TB
- Birth in a foreign country, particularly high-incidence countries
- HIV infection
- Residence in London
- Age profile, with highest rates between ages 25 and 44, and
- Male gender.

Listed below are the five causes of hypoxia.

Which one of the five inevitably causes an increased PaCO_2 ?

(Please select 1 option)

| | |
|-----------------------|--------------------------------|
| <input type="radio"/> | Diffusion impairment |
| <input type="radio"/> | Hypoventilation |
| <input type="radio"/> | Low inspired PO_2 |
| <input type="radio"/> | Right-to-left shunt |
| <input type="radio"/> | Ventilation-perfusion mismatch |

| | | |
|----------------------------------|--------------------------------|----------------------------|
| <input type="radio"/> | Diffusion impairment | |
| <input type="radio"/> | Hypoventilation | This is the correct answer |
| <input type="radio"/> | Low inspired PO_2 | |
| <input type="radio"/> | Right-to-left shunt | |
| <input checked="" type="radio"/> | Ventilation-perfusion mismatch | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- This question requires an understanding of the pathophysiology of respiratory failure.

Explanation

Hypoventilation, where inadequate alveolar ventilation results in low alveolar PO_2 , is the only cause of hypoxia that inevitably causes raised $PaCO_2$.

If the hypoxia is out of proportion to the hypercapnia and the Alveolar-arterial (A-a) PO_2 gradient increased then another mechanism (diffusion impairment, right-to-left shunt or ventilation-perfusion mismatch) must also be present.

The primary effects of right-to-left shunts and ventilation-perfusion mismatching are to raise arterial CO_2 content, however this is usually corrected (and sometimes over-corrected) by a reflex increase in ventilation.

A 76-year-old lady with COPD wants to visit a friend in Japan.

Her FEV1 is 40 %. Her last hospital admission was four months ago. She is known to have significant kyphoscoliosis. Her O₂ sat on air is 93 %. You perform a hypoxic challenge and her PO₂ is 7.8.

What would you advise?

(Please select 1 option)

| | |
|-----------------------|-------------------------------------|
| <input type="radio"/> | Advise inflight oxygen 28% |
| <input type="radio"/> | Advise inflight oxygen 35% |
| <input type="radio"/> | Advise not to fly |
| <input type="radio"/> | Allow flight and no oxygen required |
| <input type="radio"/> | Perform a walking test |

| | |
|----------------------------------|--|
| <input type="radio"/> | Advise inflight oxygen 28% |
| <input type="radio"/> | Advise inflight oxygen 35% |
| <input type="radio"/> | Advise not to fly |
| <input checked="" type="radio"/> | Allow flight and no oxygen required Correct |
| <input type="radio"/> | Perform a walking test |

Key Learning Points

Respiratory Medicine

- Indication of hypoxic challenge and indication of inflight oxygen requirement.

Explanation

An hypoxic challenge test gives the patient FiO_2 15% for 15 minutes and measures PO_2 .

- $\text{PaO}_2 > 7.4 \text{ kPa}$ ($> 55 \text{ mmHg}$) - Oxygen not required.
- $\text{PaO}_2 6.6\text{--}7.4 \text{ kPa}$ ($50\text{--}55 \text{ mmHg}$) - Borderline. A walk test may be helpful.
- $\text{PaO}_2 < 6.6 \text{ kPa}$ ($< 50 \text{ mmHg}$) - In-flight oxygen (2L/min).

A 48-year-old woman presented with shortness of breath, cough with heavy sputum production, and a low grade fever.

She has smoked 20 cigarettes per day for 30 years.

Her arterial blood gases revealed:

| | | |
|------------------|---------|-----------|
| pH | 7.4 | 7.36-7.44 |
| pCO ₂ | 6 kPa | (4.5-6) |
| pO ₂ | 7.9 kPa | (8-12) |

What is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|-------------------------------|
| <input type="radio"/> | Bronchial asthma |
| <input type="radio"/> | Chronic bronchitis |
| <input type="radio"/> | Idiopathic pulmonary fibrosis |
| <input type="radio"/> | Paraneoplastic syndrome |
| <input type="radio"/> | Pulmonary embolism |

Dr. Assem

(Please select 1 option)

| | | |
|----------------------------------|-------------------------------|----------------------------|
| <input type="radio"/> | Bronchial asthma | |
| <input type="radio"/> | Chronic bronchitis | This is the correct answer |
| <input type="radio"/> | Idiopathic pulmonary fibrosis | |
| <input type="radio"/> | Paraneoplastic syndrome | |
| <input checked="" type="radio"/> | Pulmonary embolism | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- High CO₂ can help distinguish COPD from other causes of respiratory failure.

Explanation

The most likely explanation based on the symptoms and the relative hypoxia with high pCO₂ is an acute exacerbation of chronic obstructive airways disease (COAD) - towards the chronic bronchitic end of the spectrum.

Dr Assem

A 26-year-old man presents with gradual onset of cough and shortness of breath on exertion.

He has no medical history of note. He is single and smokes 20 cigarettes a day. He reports in the last year he has had a number of infections, and last month was diagnosed with oesophageal candidiasis on endoscopy.

His oxygen saturations are 93% on air at rest, but drop to 82% on minimal exertion. Chest examination is unremarkable. A chest x ray is requested.

What is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Asthma |
| <input type="radio"/> | COPD |
| <input type="radio"/> | Lung abscess |
| <input type="radio"/> | <i>Pneumocystis jiroveci</i> pneumonia (PCP) |
| <input type="radio"/> | Pulmonary embolism |

Asthma

COPD

Lung abscess

Pneumocystis jirovecii pneumonia (PCP)

This is the correct answer

Pulmonary embolism

Incorrect answer selected

Key Learning Points

Respiratory Medicine

- Recognition of lung disease in HIV

Explanation

The history of recurrent infections in this young patient should lead you to consider immunosuppression as an underlying diagnosis and therefore *Pneumocystis jirovecii* pneumonia.

Pneumocystis jirovecii is a eukaryotic microorganism. In immunosuppressed patients it can cause a pneumonia, which is most recognised in patients with AIDS but can also be seen in those with organ transplants or when undergoing chemotherapy. A CD4 count of less than 200 is associated with significant risk. In Europe, the USA and Australia *P. jirovecii* pneumonia in HIV-positive patients is seen largely in those unaware of their HIV status. Unfortunately it is a major cause of death in Africa, especially in children. Previously it was thought that disease was caused by reactivation of latent infection acquired in childhood, but de novo infection is increasingly recognised.

The pneumonia caused by *P. jirovecii* is potentially severe and fatal in immunosuppressed patients. Clinically it presents with several weeks' history of dry cough, fever and dyspnoea. Examination findings are often subtle, but include tachypnoea, tachycardia, cyanosis and fine respiratory crackles. Typically, patients desaturate markedly on exertion. There may be reduced transfer factor, vital capacity and total lung capacity on spirometry. Bronchoalveolar lavage or induced sputum can be used to demonstrate the organism (open lung biopsy is gold standard, but rarely performed in clinical practice). Giemsa, Papanicolaou and Grocott's stains are used.

There are a variety of different chest radiograph findings. Typically it causes bilateral symmetrical perihilar reticular or granular interstitial shadowing. Less often there can be asymmetric shadowing, or progression to a reticular-alveolar pattern. The following can occasionally be seen:

- lobar consolidation
- nodular lesions
- prominent pulmonary arteries
- pneumothorax**
- pneumomediastinum
- cysts, or
- pneumatoceles.

In patients who have been on prophylactic inhaled pentamidine the infiltrates may predominantly affect the upper lobes. A normal chest x-ray does not exclude the diagnosis. Pleural effusions and lymphadenopathy are not typical, but be aware of the possibility of multiple disease processes in an immunosuppressed patient.

If allowed to progress, *P. jirovecii* can disseminate via the lymphatic and haematogenous routes to affect the thyroid, liver, bone marrow, lymph nodes and spleen.

If PCP is suspected, treatment with full dose co-trimoxazole should be started as soon as possible. It should be given for 21 days in HIV-positive cases, but shorter doses can be used in other causes of immunosuppression. In patients who are intolerant, or co-trimoxazole, intravenous pentamidine can be used. Some studies have shown that corticosteroids can reduce the risk of respiratory failure, and they are therefore used in some cases.

Prophylaxis should be used in immunosuppressed patients who are at risk of developing PCP: all those with a CD4 count of <200, patients started on high dose steroids, and those on chemotherapeutic regimens associated with significant immunosuppression. Co-trimoxazole is also the first line prophylactic agent.

It would be unusual for someone this young to develop **COPD**, even if they are a heavy smoker. Asthma would have classical signs on examination if severe enough to cause hypoxia. If the patient had a **lung abscess** you would expect some systemic features of sepsis. A **pulmonary embolism** could account for these clinical signs, but there are no risk factors given in the question which makes PCP more likely.

A 32-year-old man presents with fever, shortness of breath and productive cough for five weeks.

Prior to that he was fit and well with no respiratory complaints. His only medical history is that he frequently visits his dentist for teeth problems and has been a heavy drinker for a long time.

Three weeks ago he was given antibiotics by his GP with slight improvement but then got worse.

What is the most likely diagnosis?

(Please select 1 option)

☐ Asthma precipitated by pneumonia

☐ Bronchiectasis

☐ Empyema

☐ Lung abscess

☐ Pulmonary embolism (PE)

| | |
|----------------------------------|----------------------------------|
| <input type="radio"/> | Asthma precipitated by pneumonia |
| <input type="radio"/> | Bronchiectasis |
| <input type="radio"/> | Empyema |
| <input checked="" type="radio"/> | Lung abscess Correct |
| <input type="radio"/> | Pulmonary embolism (PE) |

Key Learning Points

Respiratory Medicine

- Differentiation between different suppurative lung diseases

Explanation

Predisposing factors for lung abscess include dental disease, impaired consciousness, for example, alcohol, post-anaesthesia, bronchial carcinoma and immunosuppression.

Empyema usually does not cause productive cough.

PE is unlikely in this scenario as well as asthma.

Bronchiectasis is a chronic condition and usually there is underlying cause.

Which of the following is not true with regard to the radiological appearance of a chest x ray?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | Consolidation of the left lower lobe will elevate the left hemidiaphragm |
| <input type="radio"/> | Consolidation of the lingular lobe will obliterate the aortic knuckle and pulmonary trunk in the PA view |
| <input type="radio"/> | Consolidation of the right middle lobe will extend to the right horizontal transverse fissure and the right heart border in PA view. |
| <input type="radio"/> | Collapse of the right upper lobe displaces the horizontal fissure in the PA view |
| <input type="radio"/> | The oblique fissures can only be seen on the lateral chest film |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Consolidation of the left lower lobe will elevate the left hemidiaphragm | This is the correct answer |
| <input type="radio"/> | Consolidation of the lingular lobe will obliterate the aortic knuckle and pulmonary trunk in the PA view | |
| <input type="radio"/> | Consolidation of the right middle lobe will extend to the right horizontal transverse fissure and the right heart border in PA view. | |
| <input type="radio"/> | Collapse of the right upper lobe displaces the horizontal fissure in the PA view | |
| <input checked="" type="radio"/> | The oblique fissures can only be seen on the lateral chest film | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Consolidation in the left lower lobe obliterates the diaphragm whilst lingular consolidation will obliterate the left heart border.

Explanation

Consolidation in the left lower lobe obliterates the diaphragm whilst lingular consolidation will obliterate the left heart border. Elevation of a hemidiaphragm is not typically caused by consolidation in adjacent lung.

Consolidation of the right middle lobe obscures the right heart border (right atrial edge). More extensive consolidation also involves the right and left peri-hilar regions. The superior extent is well demarcated, due to the horizontal fissure.

Right upper lobe collapse results in displacement of the horizontal fissure upwards. The right hilum can also appear enlarged.

The oblique fissure runs obliquely at 45 degrees from T4-5 to the anterior costophrenic angle, but is only seen on the lateral chest radiograph.

The horizontal fissure runs from the hilum anteriorly to anterior chest wall, on the right side. The area above the horizontal fissure is the upper lobe, below the horizontal fissure is the middle lobe and below the oblique fissure is the lower lobe.

A 48-year-old gentleman with moderate chronic obstructive pulmonary disease (COPD), and multiple previous presentations to the Emergency department presents with a two hour history of mild pleuritic chest pain.

He is minimally breathless, with oxygen saturations of 96% on air (he usually has saturations of 95-97%).

A chest x ray is performed and an observant CT1 recognises a 1.8 cm (18 mm) apical pneumothorax on a background of chronic changes consistent with emphysema/emphysematous changes.

Accordingly to current guidelines, what intervention should be undertaken?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Admit and treat with high flow oxygen and repeat CXR in 24 hours |
| <input type="radio"/> | Aspirate and admit for 24 hours observation |
| <input type="radio"/> | Aspirate and discharge home after 12 hours if well |
| <input type="radio"/> | Discharge with advice to return if symptoms worsen |
| <input type="radio"/> | Intercostal chest drain insertion (Seldinger technique) |

☐ Admit and treat with high flow oxygen and repeat CXR in 24 hours

☒ Aspirate and admit for 24 hours observation **This is the correct answer**

☐ Aspirate and discharge home after 12 hours if well

☐ Discharge with advice to return if symptoms worsen

☒ Intercostal chest drain insertion (Seldinger technique) **Incorrect answer selected**

Key Learning Points

Respiratory Medicine

- In patients under 50 with COPD who present with chest pain, the guidelines advise to aspirate and admit for 24 hours observation in respect to management of their pneumothorax.

Explanation

This patient has a small apical **pneumothorax** most likely as a result of his underlying lung disease and as such can be classed as a secondary pneumothorax.

According to current BTS guidelines, if the patient is under 50, minimally breathless and the rim of air is less than 2 cm the initial intervention should be simple aspiration. Even if successful the patient should be admitted and observed for at least 24 hours.

Unlike a primary **pneumothorax**, a secondary **pneumothorax** always requires intervention.

Aspiration is less likely to be effective in a secondary **pneumothorax** and so if it fails or does not meet the above criteria, a chest drain needs to be inserted. The Seldinger technique using a 16G is the preferred method for this.

Blunt dissection is usually reserved for trauma cases.

A 32-year-old man who is a lifelong non-smoker presents to the respiratory clinic with shortness of breath, wheeze and a chronic cough. He works as a stone mason carving grave stones and has a property on a farm.

At the same time, his father maintains that he only ever used to smoke between five and ten cigarettes per day, yet he is 59-years-old with severe COPD on home oxygen.

On examination the patient has bilateral wheeze and coarse crackles consistent with obstructive lung disease.

Investigations show:

| | | |
|---------------------------|----------------------------------|-----------------|
| Haemoglobin | 121 g/L | (135-177) |
| White cell count | $6.2 \times 10^9/L$ | (4-11) |
| Platelets | $172 \times 10^9/L$ | (150-400) |
| Sodium | 137 mmol/L | (135-146) |
| Potassium | 4.2 mmol/L | (3.5-5) |
| Creatinine | 88 $\mu\text{mol/L}$ | (79-118) |
| Alanine amino transferase | 86 U/L | (5-40) |
| PEFR | 280 l/min | (Predicted 550) |
| Chest x ray | Evidence of lower lobe emphysema | |

Which of the following is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|--------------------------------|
| <input type="radio"/> | Alpha-1 antitrypsin deficiency |
| <input type="radio"/> | Asthma |
| <input type="radio"/> | Chronic bronchitis |
| <input type="radio"/> | Extrinsic allergic alveolitis |
| <input type="radio"/> | Silicosis |

| | | |
|----------------------------------|--------------------------------|----------------------------|
| <input type="radio"/> | Alpha-1 antitrypsin deficiency | This is the correct answer |
| <input type="radio"/> | Asthma | |
| <input type="radio"/> | Chronic bronchitis | |
| <input type="radio"/> | Extrinsic allergic alveolitis | |
| <input checked="" type="radio"/> | Silicosis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Alpha-1 antitrypsin deficiency results in the very early development of obstructive lung disease, often with co-existent liver disease.

Explanation

The clues are the very early development of obstructive lung disease, with lower lobe emphysema seen on CXR, and the fact that despite a relatively low pack year history of smoking, his father has developed severe chronic obstructive pulmonary disease (COPD).

Many patients with alpha-1 antitrypsin deficiency develop significant liver disease, including cirrhosis, and the raised alanine aminotransferase (ALT) seen here is suggestive of that.

Management of alpha-1 antitrypsin deficiency is similar to that for smoking-related COPD, with high dose inhaled steroids and bronchodilators. Additionally, patients should be advised to avoid consumption of alcohol as this can exacerbate the liver disease.

Alpha-1-antitrypsin replacement is available, but currently it is not recommended by NICE in their guidance on [Chronic obstructive pulmonary disease in over 16s: diagnosis and management \(NG115\)](#)

The presence of emphysema and persistent rather than episodic symptoms make asthma less likely.

Chronic bronchitis is a constituent of chronic obstructive pulmonary disease, but the family history and the fact that this gentleman is a lifelong non-smoker makes alpha-1 antitrypsin deficiency much more likely.

Extrinsic allergic alveolitis causes a recurrent pneumonitis, which can result in emphysema. In this scenario, we are not given a history of exposure to a causative agent or any suggestion that the symptoms are episodic again makes alpha-1 antitrypsin deficiency more likely.

This gentleman may be exposed to crystalline silica dust, inhalation of which leads to silicosis, but radiologically this is characterised by nodular scarring of the upper lobes rather than emphysema.

A 65-year-old obese man presents with night time sweats, nocturia, poor concentration and day time somnolence.

To which of the following conditions does this diagnosis predispose?

(Please select 1 option)

☐ Hypoglycaemia

☐ Hypotension

☐ Insulin sensitivity

☐ Osteoporosis

☐ Sudden death

| | | |
|----------------------------------|---------------------|----------------------------|
| <input type="radio"/> | Hypoglycaemia | |
| <input type="radio"/> | Hypotension | |
| <input type="radio"/> | Insulin sensitivity | |
| <input checked="" type="radio"/> | Osteoporosis | Incorrect answer selected |
| <input type="radio"/> | Sudden death | This is the correct answer |

Key Learning Points

Respiratory Medicine

- Sleep apnoea is an independent risk factor for stroke (and death from all causes), and is associated with hypertension, impaired glucose tolerance (IGT), and insulin resistance.

Explanation

This history is typical of sleep apnoea.

Sleep apnoea is an independent risk factor for stroke (and death from all causes), and is associated with hypertension, impaired glucose tolerance (IGT), and insulin resistance.

A 16-year-old girl presents with an acute exacerbation of asthma.

On examination her respiratory rate was 30 per minute, her heart rate was 120 beats per minute and a peak expiratory flow rate (PEFR) was 30% of the predicted value.

Her blood gas analysis on air shows:

| | | |
|-------------------|---------|-------------|
| PaO ₂ | 9 kPa | (11.3-12.6) |
| PaCO ₂ | 3.5 kPa | (4.7-6.0) |

After the administration of oxygen and corticosteroids what is the most appropriate next step in management?

(Please select 1 option)

- ☐ Intravenous aminophylline
- ☐ Intravenous salbutamol
- ☐ Ipratropium bromide via oxygen-driven nebuliser
- ☐ Salbutamol via oxygen-driven nebuliser
- ☐ Salmeterol via breath-actuated inhaler

Please select 1 option)

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Intravenous aminophylline | |
| <input type="radio"/> | Intravenous salbutamol | |
| <input type="radio"/> | Ipratropium bromide via oxygen-driven nebuliser | |
| <input type="radio"/> | Salbutamol via oxygen-driven nebuliser | This is the correct answer |
| <input checked="" type="radio"/> | Salmeterol via breath-actuated inhaler | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- In cases of acute severe asthma, β_2 -agonists should be administered as soon as possible, preferably nebulised driven by oxygen.

Explanation

This patient fits the criteria for acute severe asthma. In such cases β_2 -agonists should be administered as soon as possible, preferably nebulised driven by oxygen. Repeat doses should be given at 15-30 minute intervals, or continuous nebulisation can be used where there is inadequate response to bolus therapy. Nebulised ipratropium bromide should be added for patients with acute severe or life threatening asthma, or those with a poor initial response. It's addition produces significantly greater bronchodilation than a β_2 -agonist alone.

Oxygen should be given to maintain saturations at 94-98%. Patients with saturations less than 92% on air should have an ABG to exclude hypercapnia. However, starting treatment should not be delayed to do the ABG. Initially high-flow oxygen is used, and then weaned to maintain adequate saturations. Unless you suspect COPD there is no need to be cautious with oxygen therapy.

Steroids reduce mortality, relapses, subsequent hospital admission and requirement for β_2 -agonists¹. The earlier they are given in the attack, the better the outcome. A dose of 40-50 mg should therefore be given once oxygen and nebuliser therapy has been established. This should be continued for 5 days, or until recovery, and can then be stopped abruptly unless the patient has taken long-term oral corticosteroids.

Failure to respond to the above treatment steps may warrant the use of intravenous magnesium sulphate and aminophylline. However, these should not be used without discussion with your senior colleagues.

Intensive care is indicated for patients with severe acute or life threatening asthma who are failing to respond to therapy. Consider it in patients with deteriorating peak flow, persisting or worsening hypoxia, hypercapnia, acidosis, exhaustion or altered conscious state. All patients who are transferred to an intensive care unit should be accompanied by a doctor who can intubate if necessary.

As an aside, chest radiographs are not indicated unless you suspect pneumothorax or consolidation, or there is life-threatening asthma, a failure to respond to treatment or a need for ventilation.

A 16-year-old girl presents with shortness of breath and insomnia prior to an examination.

Clinical examination is normal. CXR and PEFR are normal.

Which of the following investigations is most suggestive of asthma?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | Diurnal variation in PEFR >20% |
| <input type="radio"/> | Increased total IgE |
| <input type="radio"/> | Past medical history of hay fever and eczema |
| <input type="radio"/> | Positive skin prick test to common allergens |
| <input type="radio"/> | Resolution of symptoms the day after the examination |

| | |
|----------------------------------|---|
| <input type="radio"/> | Diurnal variation in PEFR >20% This is the correct answer |
| <input type="radio"/> | Increased total IgE |
| <input type="radio"/> | Past medical history of hay fever and eczema |
| <input type="radio"/> | Positive skin prick test to common allergens |
| <input checked="" type="radio"/> | Resolution of symptoms the day after the examination Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Diurnal variation of peak expiratory flow rate (PEFR) greater than 20% is one of the diagnostic criteria for asthma

Explanation

Shortness of breath in a young person may be attributable to asthma. These symptoms are often worse at night, and can cause disturbed sleep.

IgE being elevated is non-specific, but can suggest an atopic phenotype. Skin prick tests can confirm allergy, but this does not necessarily mean the patient will develop asthma.

The resolution of symptoms after the examination may suggest anxiety, but be cautious of making this diagnosis prior to excluding other diagnoses (especially in a patient this young).

Diurnal variation of peak expiratory flow rate (PEFR) greater than 20% is one of the diagnostic criteria for asthma, and **this is the** most appropriate answer in this case.

A 28-year-old woman comes to see you with her partner. She has a brother who has been diagnosed with cystic fibrosis and her partner has tested positive as a carrier for the disease.

They want to know about what the future holds if one of their children is born with cystic fibrosis.

Which of the following is true?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Constipation is common in patients with CF |
| <input type="radio"/> | Diabetes only occurs in those patients who are overweight |
| <input type="radio"/> | Females with the disease are infertile |
| <input type="radio"/> | Median survival is expected to be around 27 years |
| <input type="radio"/> | Pancreatic enzyme supplements are only required if patients cannot maintain their weight |

- ☐ Constipation is common in patients with CF **This is the correct answer**
- ☐ Diabetes only occurs in those patients who are overweight
- ☒ Females with the disease are infertile **Incorrect answer selected**
- ☐ Median survival is expected to be around 27 years
- ☐ Pancreatic enzyme supplements are only required if patients cannot maintain their weight

Key Learning Points

Respiratory Medicine

- Constipation even after the initial few days of life during which meconium ileus occurs is common in patients with cystic fibrosis.

Explanation

Constipation even after the initial few days of life during which meconium **ileus** occurs is common in patients with cystic fibrosis. It usually responds to an increase in fluids coupled with adequate soluble fibre in the diet and pancreatic enzyme supplementation.

Pancreatic endocrine, as well as exocrine, failure occurs in patients with cystic fibrosis.

Diabetes mellitus occurs in >65% of patients by age 25 and this is independent of weight gain.

Females with CF have a relatively minor reduction in their fertility, and many have now gone on to have successful pregnancies.

Median survival has increased significantly over the past 10 years, and is now around 37 years.

Pancreatic enzyme supplements are required to help patients maintain weight.

With which of the following is obstructive sleep apnoea characteristically associated?

(Please select 1 option)

☐ Hypersomnolence

☐ Impotence

☐ Insomnia

☐ Macrognathia

☐ Polydipsia

☐ Hypersomnolence **This is the correct answer**

☐ Impotence

☐ Insomnia

☒ Macrognathia **Incorrect answer selected**

☐ Polydipsia

Key Learning Points

Respiratory Medicine

- Sleep apnoea is commonly associated with obesity, but myxoedema, acromegaly and retro/micrognathia are also recognised causes.

Explanation

The dominant symptom is hypersomnolence (sleepiness).

Other more common symptoms include:

- Apparent personality changes
- Witnessed apnoeas, and
- True nocturnal polyuria.

Reduced libido is less common.

Sleep apnoea may be associated with:

- Acromegaly
- Myxoedema
- Obesity, and
- Micrognathia/retrognathia.

A 72-year-old lifelong smoker presents with progressive dyspnoea on exertion. He has a chronic, non-productive cough.

On examination he is thin, breathing with pursed lips, respiratory rate 25/min, with mild wheezing on chest auscultation.

Investigations show

| | |
|--------------------------------|-----------------|
| FEV ₁ | 0.8 L |
| FVC | 1.6 L |
| pH | 7.35 |
| p _a CO ₂ | 6kPa (45mmHg) |
| p _a O ₂ | 7.2kPa (55mmHg) |

What is the predominant mechanism of the airflow limitation in this gentleman?

(Please select 1 option)

| | |
|-----------------------|-------------------------------------|
| <input type="radio"/> | Bronchospasm |
| <input type="radio"/> | Foreign body obstruction |
| <input type="radio"/> | Increased airways resistance |
| <input type="radio"/> | Loss of elastic recoil |
| <input type="radio"/> | Mucus plugging in the small airways |

Dr. Assem

Please select 1 option)

| | | |
|----------------------------------|-------------------------------------|----------------------------|
| <input type="radio"/> | Bronchospasm | |
| <input type="radio"/> | Foreign body obstruction | |
| <input type="radio"/> | Increased airways resistance | |
| <input type="radio"/> | Loss of elastic recoil | This is the correct answer |
| <input checked="" type="radio"/> | Mucus plugging in the small airways | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The pathology of chronic obstructive airways disease is centrilobular or panacinar with loss of elastic tissue.

Explanation

This patient has typical features of chronic obstructive airways disease (COAD) with a predominant emphysematous element.

The pathology is centrilobular or panacinar with loss of elastic tissue.

Dr. Assem

A 17-year-old patient with known atopic asthma presents to the Emergency department with an acute asthma attack.

He had been over at his friend's house playing with his dog about 10 minutes before he felt wheezy and short of breath. He is given bronchodilators and has a good response. He is discharged later that day following a period of observation with an asthma management plan.

Which of the below immunomodulators is involved in this immediate response (bronchoconstriction)?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Eosinophil cationic protein (ECP) |
| <input type="radio"/> | Leukotriene C ₄ (LTC ₄) |
| <input type="radio"/> | Major basic protein (MBP) |
| <input type="radio"/> | Platelet activating factor (PAF) |
| <input type="radio"/> | T _{H2} lymphocytes |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Eosinophil cationic protein (ECP) | |
| <input type="radio"/> | Leukotriene C ₄ (LTC ₄) | This is the correct answer |
| <input type="radio"/> | Major basic protein (MBP) | |
| <input type="radio"/> | Platelet activating factor (PAF) | |
| <input checked="" type="radio"/> | T _{H2} lymphocytes | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- This question demands an understanding of the pathophysiology of atopic asthma.

Explanation

Inhalation of allergens by individuals with atopic asthma initiates an immediate bronchoconstriction reaction. This usually subsides within two hours and is reversible with bronchodilators.

This is an example of type I hypersensitivity and is caused by degranulation of mast cells and release of histamine, prostaglandin D₂ and leukotriene C₄ and D₄.

The other immunomodulators listed form part of the late phase (or type IV hypersensitivity) response which results in bronchoconstriction, airways inflammation, hyper-responsiveness and oedema. This typically occurs three to 12 hours after the immediate response and is less susceptible to bronchodilators.

The increased hypersensitivity may promote recurrent asthma attacks over the following days.

A 23-year-old man presents to the Emergency department with sudden onset left sided pleuritic chest pain. He has had a cough over the past few days and says the pain came on after a coughing fit.

On examination his BP is 148/82 mmHg, pulse is 82 and regular, his saturations are 95% on air. Chest sounds appear normal.

Investigations show:

| | | |
|------------------|-------------------------------------|-------------|
| pH | 7.42 | (7.35-7.45) |
| pCO ₂ | 4.8 kPa | (4.8-6.1) |
| pO ₂ | 10.2 kPa | (10-13.3) |
| CXR | Small left sided pneumothorax (<5%) | |

What is the most appropriate management?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Admit for overnight oxygen therapy |
| <input type="radio"/> | Chest drain |
| <input type="radio"/> | Discharge and review in 24 hours |
| <input type="radio"/> | Discharge and review in the clinic in two to three weeks |
| <input type="radio"/> | Pleural aspiration |

(Please select 1 option)

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Admit for overnight oxygen therapy | |
| <input type="radio"/> | Chest drain | |
| <input type="radio"/> | Discharge and review in 24 hours | |
| <input type="radio"/> | Discharge and review in the clinic in two to three weeks | This is the correct answer |
| <input checked="" type="radio"/> | Pleural aspiration | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Conservative management with review in the clinic in two to three weeks is most appropriate management for a small pneumothorax

Explanation

This man has a small **pneumothorax** without significant hypoxia. There is nothing in his history or examination to suggest a sinister cause for his **pneumothorax**, as such conservative management with review in the clinic in two to three weeks is most appropriate.

This spontaneous **pneumothorax** is primary (defined as age less than 50, no significant smoking history, and no evidence of underlying lung disease). Management depends on the size, and the patient's symptoms. If it is small (as in this case) the patient can be discharged and reviewed in an outpatient clinic in 2-4 weeks. If the rim of air measures more than 2 cm at the level of the hilum, and/or the patient is breathless the **pneumothorax** can be aspirated.

A chest drain is indicated if aspiration fails in a large or symptomatic primary pneumothorax. They can also be used in the management of secondary pneumothorax.

Supplemental oxygen accelerates reabsorption of air by a factor of four, but overnight treatment does not feature as part of the current UK guidelines in small primary pneumothoraces.

Dr. Arshad

A 60-year-old lady with rheumatoid arthritis has been on long term therapy to control her disease.

She presents with increasing shortness of breath and a chest x ray shows 'bilateral interstitial shadowing'.

Which of the following medications is the most likely cause for her symptoms?

(Please select 1 option)

| | |
|-----------------------|--------------------|
| <input type="radio"/> | Azathioprine |
| <input type="radio"/> | Hydroxychloroquine |
| <input type="radio"/> | Infliximab |
| <input type="radio"/> | Methotrexate |
| <input type="radio"/> | Penicillamine |

| | | |
|----------------------------------|--------------------|----------------------------|
| <input type="radio"/> | Azathioprine | |
| <input type="radio"/> | Hydroxychloroquine | |
| <input type="radio"/> | Infliximab | |
| <input type="radio"/> | Methotrexate | This is the correct answer |
| <input checked="" type="radio"/> | Penicillamine | Incorrect answer selected |

Key Learning Points

Respiratory Medicine, Rheumatology

- Methotrexate is a recognised cause of pulmonary fibrosis. However, it is sometimes used in the treatment of idiopathic pulmonary fibrosis as a steroid sparing agent.

Explanation

Methotrexate is a recognised cause of pulmonary fibrosis. However, it is sometimes used in the treatment of idiopathic pulmonary fibrosis as a steroid sparing agent.

"Pulmonary parenchymal or pleural reactions to chemotherapeutic agents used in the management of patients with malignant diseases are being recognized with increasing frequency. Alkylating agents, asparaginase, bleomycin, methotrexate and procarbazine have all been implicated."¹

"Drug-related interstitial pneumonia should also be considered in rheumatoid arthritis patients on methotrexate or newer drugs such as leflunomide."²

A 61-year-old heavy smoker with a BMI of 37 kg/m^2 presents with impotence, nocturia and depression.

He is hypoxic at rest on air and has ankle oedema.

Which is the most appropriate investigation to determine the aetiology?

(Please select 1 option)

| | |
|-----------------------|----------------------------|
| <input type="radio"/> | Arterial blood gas |
| <input type="radio"/> | Chest x ray |
| <input type="radio"/> | Sleep study |
| <input type="radio"/> | Thyroid function test |
| <input type="radio"/> | Ventilation-perfusion scan |

Please select 1 option

- ☐ Arterial blood gas
- ☒ Chest x ray
- ☐ Sleep study **This is the correct answer**
- ☐ Thyroid function test
- ☒ Ventilation-perfusion scan **Incorrect answer selected**

Key Learning Points

Respiratory Medicine

- A combination of obesity and hypoxia should lead you to consider obstructive sleep apnoea (OSA) as a diagnosis.

Explanation

The combination of obesity and hypoxia in this scenario should lead you to consider obstructive sleep apnoea (OSA) as a diagnosis.

Sleep apnoea is defined as repeated episodes of obstructive apnoea and hypopnoea during sleep, together with daytime sleepiness or altered cardiopulmonary function. It affects 2-4% of middle aged adults, although it is important to note that a significant proportion of cases probably go undiagnosed.

Obstructive sleep apnoea has been increasingly implicated in the initiation and progression of cardiovascular diseases. The repeated nocturnal hypoxaemia is associated with activation of a number of neural, humoral, thrombotic, metabolic and inflammatory mechanisms. Patients have an increased risk of diurnal hypertension, nocturnal dysrhythmias, pulmonary hypertension, right and left ventricular failure, myocardial infarction and stroke.

The hypoxaemia, catecholamine surges and increased blood pressure during sleep, together with daytime hypertension may predispose to hypertensive heart disease, which can manifest as either systolic or diastolic dysfunction. Systolic dysfunction can also be induced by inflammatory cytokines, and increases in afterload and myocardial wall stress caused by negative intrathoracic pressure during episodes of obstruction.

Fatigue, irritability and personality change have also been attributed to nocturnal desaturation and chronic sleep deprivation. Nocturia and [erectile dysfunction](#) are also symptoms of OSA.

A sleep study is used to confirm the presence of upper airway closure during sleep, and lab-based polysomnography is the gold standard for diagnosis. Increasingly, home monitoring systems may be used.

Arterial blood gases vary depending on the time taken, and whether cor pulmonale has developed. The findings are not specific.

Whilst a chest x ray is important when presented with a patient with hypoxia, it will not help with the diagnosis of OSA.

Hypothyroidism could account for this gentleman's depression and [erectile dysfunction](#), but OSA is a much more likely diagnosis.

Ventilation-perfusion scans are used in the diagnosis of pulmonary emboli, although are being increasingly replaced by CTPAs. Whilst recurrent pulmonary thromboembolism can lead to cor pulmonale this does not fit the clinical scenario presented here.

Therapeutic strategies for OSA are behavioural (avoid alcohol and strategies, weight loss etc.), medical (positive airway pressure, oral appliances) and surgical (tracheostomy, palatal and maxillofacial procedures). Treatment decisions are based on daytime symptoms and cardiopulmonary function. The goals are to establish normal nocturnal oxygenation and ventilation, abolish [snoring](#) and eliminate disruption of sleep.

A 62-year-old man presents to the respiratory clinic with increasing shortness of breath and reduced exercise tolerance over the past few months.

He has recently commenced a course of immunosuppressive therapy for mixed connective tissue disease.

On examination his BP is 125/72 mmHg, pulse is 80 and regular, saturations are 94% on air. There are fine inspiratory crackles on auscultation of the chest, and a CXR reveals evidence of diffuse interstitial shadowing.

Which of the following is the most likely causative agent?

(Please select 1 option)

| | |
|-----------------------|------------------|
| <input type="radio"/> | Cyclophosphamide |
| <input type="radio"/> | Methotrexate |
| <input type="radio"/> | Penicillamine |
| <input type="radio"/> | Prednisolone |
| <input type="radio"/> | Sulphasalazine |

| | | |
|----------------------------------|------------------|----------------------------|
| <input type="radio"/> | Cyclophosphamide | |
| <input checked="" type="radio"/> | Methotrexate | This is the correct answer |
| <input type="radio"/> | Penicillamine | |
| <input type="radio"/> | Prednisolone | |
| <input checked="" type="radio"/> | Sulphasalazine | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Methotrexate is recognised to be associated with pulmonary fibrosis, it is however extremely effective in control of rheumatoid and psoriatic arthritis.

Explanation

Methotrexate is recognised to be associated with pulmonary fibrosis, it is however extremely effective in control of rheumatoid and psoriatic arthritis. Baseline pulmonary function tests are recommended prior to starting therapy, and physicians are warned to be alert to increased shortness of breath.

Cyclophosphamide is rarely associated with non-cardiogenic pulmonary oedema, rather than pulmonary fibrosis.

Penicillamine may rarely be associated with pulmonary haemorrhage.

The main concern of sulphasalazine therapy is its association with blood dyscrasias.

You are called to see a 67-year-old lady on the ward because of severe dyspnoea. She was admitted three days ago with an exacerbation of COPD.

Her respiratory rate is 36 /min, temp 37.2°C and BP 136/80 mmHg with a pulse of 102 / min. O₂ sat is 88% on 35 % O₂ (venturi mask). Her chest shows scattered wheezes with decreased air entry.

She is on IV antibiotics, nebulised B2 agonists, ipratropium and oral prednisolone 30 mg.

You check her blood gases and the results are as follows:

| | | |
|------------------|----------|-------------|
| Ph | 7.28 | (7.35-7.45) |
| PCO ₂ | 9.4 | (4.7-6.0) |
| PO ₂ | 6.8 | (11.3-12.6) |
| Bicarbonate | 29mmol/L | (21-29) |

Which is the best option for her next treatment?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | BIPAP (bilevel positive airway pressure) |
| <input type="radio"/> | CPAP (continuous positive airway pressure) |
| <input type="radio"/> | Decrease O ₂ to 28% |
| <input type="radio"/> | Intravenous corticosteroids |
| <input type="radio"/> | Mechanical ventilation |

| | |
|---|----------------------------|
| <input checked="" type="radio"/> BIPAP (bilevel positive airway pressure) | This is the correct answer |
| <input type="radio"/> CPAP (continuous positive airway pressure) | |
| <input type="radio"/> Decrease O_2 to 28% | |
| <input type="radio"/> Intravenous corticosteroids | |
| <input checked="" type="radio"/> Mechanical ventilation | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Indication of BIPAP in COPD

Explanation

This patient has an exacerbation of **COPD**, defined as sustained worsening of the patient's symptoms which is acute in onset. This may include worsening breathlessness, cough, increased sputum and change in sputum colour. The diagnosis is usually made clinically. Supporting investigations include a chest radiograph, arterial blood gases, ECG, routine bloods and sputum and blood cultures.

Treatment is with bronchodilators, nebulised in the majority of patients. If a patient is hypercapnic or acidotic, as in this case, these should be driven by compressed air. If oxygen therapy is needed it should be administered simultaneously by nasal cannulae.

Oxygen should be given to maintain SpO_2 within the patient's individual target range, if available (**COPD** patients are being given cards with this information, so always ask). ABGs should be repeated at regular intervals to monitor response to treatment, and oxygen weaned when available. High-flow oxygen can potentially worsen hypercapnia and should be avoided.

Oral corticosteroids should also be given. 30mg prednisolone for 7-14 days. Prolonged courses offer no additional benefits. Intravenous can be used if the patient is unable to tolerate oral tablets. The effect is delayed, and nebuliser therapy should be initiated first.

Antibiotics should be used to treat exacerbations associated with more purulent sputum, consolidation on chest radiograph, or clinical signs of pneumonia. Empirical antibiotic choice should be guided by local policy, and altered to take account of any subsequent culture results.

Non-invasive ventilation (NIV) is the treatment of choice for persistent hypercapnic ventilation failure despite optimal medical therapy. It has been shown in RCTs to reduce intubation rate and mortality in **COPD** patients with decompensated respiratory acidosis ($pH < 7.35$ and $pCO_2 > 6kPa$). NIV should therefore be considered within the first 60 minutes of hospital arrival in all patients with an acute exacerbation of **COPD** in whom a respiratory acidosis persists despite maximal medical therapy (controlled oxygen, nebulised salbutamol and ipratropium, prednisolone, antibiotic (where indicated)). Exceptions may be: life threatening hypoxaemia (when invasive ventilation may be more appropriate), severe co-morbidity, severe cognitive impairment (where NIV is not tolerated), facial burns/trauma/surgery, vomiting, fixed upper airway obstruction, undrained **emphysematous** upper GI surgery, unprotected airway, copious respiratory secretions, haemodynamic instability requiring inotropes.

Patients should be sitting or semi-recumbent, and a full-face mask used initially. An initial inspiratory positive airway pressure (IPAP) of 10cm H₂O and expiratory positive airway pressure (EPAP) of 4-5cm H₂O should be used. IPAP should be increased by 2-5cm increments every 10 minutes, with a usual target of 20cm H₂O until a therapeutic response is achieved. Oxygen can be introduced into the circuit, usually with a target saturation of 88-92%. Bronchodilators are preferably administered off NIV. Patients should be closely monitored, including ABG, respiratory rate and heart rate. ABGs should be repeated after 1 hour of NIV therapy, and 1 hour after subsequent change in settings or 4 hours in stable patients.

All non-invasive ventilation services should have their own local protocol based on these guidelines. There should be a clear plan of what to do in the event of deterioration.

Patients with a $pH < 7.26$ should be managed with a low threshold for intubation. Functional status, BMI, requirement for oxygen when stable, comorbidities and previous admissions should be considered in addition to age and FEV1 when assessing suitability. Whilst in clinical practice you would give NIV whilst awaiting consideration from intensive care, it is important to consider intubation in a patient who is failing to improve.

This lady is already severely hypoxic, and reducing her FiO_2 is only going to worsen it. She needs help to 'blow off' her pCO_2 and reducing the FiO_2 isn't going to do this. It would result in a worsening of the pO_2 (which would be life threatening) with most likely no significant change in the pCO_2 . BIPAP is the only option available which will improve O_2 delivery whilst also removing CO_2 .

A 50-year-old Asian lady with severe rheumatoid arthritis has failed on most traditional DMARD treatments.

She is currently on methotrexate 20 mg weekly and for the last six months has been receiving regular infusions of the anti-TNF-alpha monoclonal antibody, infliximab. Her joint disease has dramatically improved.

She now presents with fevers, pleuritic chest pain and a large left sided pleural effusion, but little evidence of joint synovitis.

What is the most likely diagnosis?

(Please select 1 option)

- | | |
|-----------------------|-----------------------------|
| <input type="radio"/> | Primary bronchial carcinoma |
| <input type="radio"/> | Pulmonary embolus |
| <input type="radio"/> | Pulmonary metastases |
| <input type="radio"/> | Rheumatoid related effusion |
| <input type="radio"/> | Tuberculosis |

| | | |
|----------------------------------|-----------------------------|----------------------------|
| <input type="radio"/> | Primary bronchial carcinoma | |
| <input type="radio"/> | Pulmonary embolus | |
| <input type="radio"/> | Pulmonary metastases | |
| <input checked="" type="radio"/> | Rheumatoid related effusion | Incorrect answer selected |
| <input type="radio"/> | Tuberculosis | This is the correct answer |

Key Learning Points

Respiratory Medicine

- Treatment with anti-TNF-alpha increases the risk of opportunistic infections and in particular, there is a significant increase in the risk of TB reactivation in conjunction with infliximab.

Explanation

The most likely answer is TB.

All of the other answers are possible and need to be excluded.

A rheumatoid effusion is unlikely when peripheral joint disease is so well controlled.

Treatment with anti-TNF-alpha increases the risk of opportunistic infections and in particular, there is a significant increase in the risk of TB reactivation in conjunction with infliximab.

A lifelong non-smoker is diagnosed with emphysema.

Which of the following would be the most likely aetiological agent?

(Please select 1 option)

| | |
|-----------------------|------------------|
| <input type="radio"/> | Asbestos |
| <input type="radio"/> | Cadmium exposure |
| <input type="radio"/> | Isocyanates |
| <input type="radio"/> | Steel |
| <input type="radio"/> | Zinc |

| | |
|----------------------------------|--|
| <input type="radio"/> | Asbestos |
| <input type="radio"/> | Cadmium exposure This is the correct answer |
| <input type="radio"/> | Isocyanates |
| <input type="radio"/> | Steel |
| <input checked="" type="radio"/> | Zinc Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Cadmium is a cause of emphysema.

Explanation

It should be noted that this question asks about 'emphysema' specifically and not chronic obstructive pulmonary disease (COPD).

Cadmium inhalation is a recognised cause of emphysema.

The relationship between asbestos exposure and emphysema is not so clear. Asbestos exposure typically causes lung fibrosis.

Other industrial associations with COPD include:

- Coal
- Cotton
- Grain
- Cement.

There are many others.

A 22-year-old woman is brought to the Emergency room by her boyfriend. She has been suffering from a heavy cold over the past few days and now has worsening wheeze and a dry cough.

There is a past history of asthma for which she takes high dose Seretide and salbutamol prn.

On examination her BP is 135/72 mmHg, her pulse is 95 and regular. She has severe wheeze on auscultation of the chest and her respiratory rate is 34/min.

Investigations show:

| | | |
|------------------|-------------------------------|-------------|
| pH | 7.42 | (7.35-7.45) |
| PCO ₂ | 4.5 kPa | (4.8-6.1) |
| pO ₂ | 12.9 kPa | (10-13.3) |
| PEFR | 170 ml/min (32% of predicted) | |

Which of the following features in her presentation is consistent with life-threatening asthma?

(Please select 1 option)

| | |
|-----------------------|--------------------------|
| <input type="radio"/> | pH 7.42 |
| <input type="radio"/> | pO ₂ 12.9 kPa |
| <input type="radio"/> | pCO ₂ 4.5 kPa |
| <input type="radio"/> | Peak flow 170 ml/min |
| <input type="radio"/> | Respiratory rate 34/min |

Dr. Assem

Please select 1 option

| | | |
|----------------------------------|--------------------------|----------------------------|
| <input type="radio"/> | pH 7.42 | |
| <input type="radio"/> | pO ₂ 12.9 kPa | |
| <input type="radio"/> | pCO ₂ 4.5 kPa | |
| <input type="radio"/> | Peak flow 170 ml/min | This is the correct answer |
| <input checked="" type="radio"/> | Respiratory rate 34/min | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Peak flow less than 33% predicted is recognised as being a feature of life-threatening asthma.

Explanation

Peak flow less than 33% predicted is recognised as being a feature of life-threatening asthma. Other features listed in the BTS asthma guidelines include:

- SpO₂ <92%
- PaO₂ <8 kPa
- Normal PaCO₂ (4.6-6.0 kPa)
- Silent chest
- Cyanosis
- Poor respiratory effort
- Arrhythmia
- Exhaustion, and
- Altered conscious level.

The pH and O₂ are both in the normal range and as such are not features consistent with life-threatening asthma.

The CO₂ is slightly below the normal range, which is as expected and consistent with increased respiratory effort.

Respiratory rate >25 is a feature consistent with acute severe asthma.

Reference:

Dr Assem

An 18-year-old boy is suspected of having cystic fibrosis.

Which of the following results would be most suggestive of this condition?

(Please select 1 option)

- | | |
|-----------------------|---------------------------------------|
| <input type="radio"/> | Abnormal pancreatic function tests |
| <input type="radio"/> | Abnormalities in lung function tests |
| <input type="radio"/> | Bronchiectasis on a chest x ray |
| <input type="radio"/> | Elevated sweat chloride concentration |
| <input type="radio"/> | Low immunoreactive plasma trypsinogen |

| | | |
|----------------------------------|---------------------------------------|----------------------------|
| <input type="radio"/> | Abnormal pancreatic function tests | |
| <input type="radio"/> | Abnormalities in lung function tests | |
| <input type="radio"/> | Bronchiectasis on a chest x ray | |
| <input checked="" type="radio"/> | Elevated sweat chloride concentration | This is the correct answer |
| <input type="radio"/> | Low immunoreactive plasma trypsinogen | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Up to 99% of children with cystic fibrosis have sweat chloride and sodium levels above 70 and 60 mM respectively.

Explanation

The sweat test is the most important test for cystic fibrosis (CF).

Up to 99% of children with CF have sweat chloride and sodium levels above 60 and 70 mM respectively.

In normal children, sweat sodium is higher than chloride. The reversed ratio is another pointer to CF.

Two sweat tests should be performed spontaneously on both arms with pilocarpine iontophoresis. Older children with CF and pancreatic insufficiency have low immunoreactive trypsin.

This and the other tests mentioned may be suggestive of CF but are not diagnostic.

A 39-year-old chef, who arrived in the United Kingdom from Pakistan eight months ago, presents to the chest clinic with a two month history of weight loss, dry cough and night sweats.

Investigations reveal he has multi-drug-resistant tuberculosis (MDR-TB).

What is the minimum overall duration of treatment for MDR-TB once the sputum is negative?

(Please select 1 option)

| | |
|-----------------------|-----------|
| <input type="radio"/> | 3 months |
| <input type="radio"/> | 6 months |
| <input type="radio"/> | 9 months |
| <input type="radio"/> | 12 months |
| <input type="radio"/> | 24 months |

| | | |
|----------------------------------|-----------|----------------------------|
| <input type="radio"/> | 3 months | |
| <input type="radio"/> | 6 months | |
| <input type="radio"/> | 9 months | This is the correct answer |
| <input type="radio"/> | 12 months | |
| <input checked="" type="radio"/> | 24 months | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Treatment of MDR-TB is complex and time consuming. Treatment must be continued for a minimum of 18 months, with at least 9 months of treatment after the patient becomes culture-negative.

Explanation

This question requires an understanding of the definition of MDR-TB and the differences in treatment duration.

Multi-drug-resistant TB as the name suggests is *Mycobacterium tuberculosis* resistant to two or more first line agents, which most commonly are isoniazid and rifampicin. There can be monoresistance to each of the first line agents, but this is not MDR-TB.

Treatment of MDR-TB is complex and time consuming. Treatment must be continued for a minimum of 18 months, with at least 9 months of treatment after the patient becomes culture-negative.

Risk factors for acquiring MDR-TB include previous TB treatment, HIV infection, contact with drug resistant disease and treatment failure.

Initial treatment includes the use of five agents until sputum is negative and then continuation of three to which the TB is sensitive to for a minimum of nine months but sometimes up to 24 months.

A 42-year-old man presented to his GP with increasing shortness of breath.

He has been previously noted to have a raised ALT, which was put down by the GP to a problem with excessive drinking. He was given a salbutamol inhaler which brought about some relief, particularly when he was playing football with his friends, but most recently he has had to give up due to reduced exercise tolerance.

On examination his BP is 142/82 mmHg. He is thin with a BMI of 19 kg/m², and his chest looks hyper-expanded. There is scattered wheeze throughout both lung fields. Abdominal examination is normal.

Investigations show

| | | |
|-----------------------|-------------------------|-----------|
| Hb | 129 g/L | (135-180) |
| WCC | 8.1 ×10 ⁹ /L | (4-10) |
| PLT | 203 ×10 ⁹ /L | (150-400) |
| Na | 138 mmol/L | (134-143) |
| K | 4.4 mmol/L | (3.5-5) |
| Cr | 110 µmol/L | (60-120) |
| FEV ₁ | 70% of predicted | |
| FEV ₁ /FVC | 60% of predicted | |

Which of the following is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|--------------------------------|
| <input type="radio"/> | Alpha-1 antitrypsin deficiency |
| <input type="radio"/> | Asthma |
| <input type="radio"/> | Chronic bronchitis |
| <input type="radio"/> | Idiopathic pulmonary fibrosis |
| <input type="radio"/> | Primary biliary cirrhosis |

| | | |
|----------------------------------|--------------------------------|----------------------------|
| <input type="radio"/> | Alpha-1 antitrypsin deficiency | This is the correct answer |
| <input type="radio"/> | Asthma | |
| <input type="radio"/> | Chronic bronchitis | |
| <input type="radio"/> | Idiopathic pulmonary fibrosis | |
| <input checked="" type="radio"/> | Primary biliary cirrhosis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Replacement alpha-1 antitrypsin is available in A1AT deficiency, although its cost effectiveness and long term clinical effectiveness is yet to be established.

Explanation

This man's abnormal alanine aminotransferase (ALT) raises the possibility of accelerated liver disease, characterised by accelerated hepatic fibrosis/cirrhosis as a result of alpha-1 antitrypsin deficiency.

Additionally, his lung function tests fit the diagnosis of chronic obstructive pulmonary disease ([COPD](#)). As such, emphysema is the most likely underlying respiratory diagnosis. It is likely that he has the PiMS, PiMZ or PiSS genotype.

Replacement alpha-1 antitrypsin is available, although its cost effectiveness and long term clinical effectiveness is yet to be established.

A 37-year-old lady with well controlled asthma since a teenager presents with a six week history of gradually worsening asthma, sinusitis, weight loss, and fatigue.

On examination, there is scattered wheeze bilaterally, and there is a non-blanching petechial rash on the shin. Muscle strength is normal.

Recent blood tests show:

| | | |
|---------------------------------|----------------------|-----------|
| Haemoglobin | 111 g/L | (115-165) |
| WBC | $14.8 \times 10^9/L$ | (4-11) |
| Neutrophils | 60% | (40-75) |
| Lymphocytes | 10% | (20-45) |
| Eosinophils | 30% | (1-6) |
| Platelet | $270 \times 10^9/L$ | (150-400) |
| ESR | 86 mm/hr | (0-20) |
| CRP | 143 mg/L | (<10) |
| Anti-myeloperoxidase antibody | Positive | |
| pANCA | Positive | |
| cANCA | Negative | |
| Urea, electrolytes & creatinine | Normal | |

What is the diagnosis?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Allergic bronchopulmonary aspergillosis |
| <input type="radio"/> | Churg-Strauss syndrome |
| <input type="radio"/> | Eosinophilic pneumonia |
| <input type="radio"/> | Hypersensitivity pneumonitis |
| <input type="radio"/> | Wegener's granulomatosis |

Please select 1 option)

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Allergic bronchopulmonary aspergillosis | |
| <input checked="" type="radio"/> | Churg-Strauss syndrome | This is the correct answer |
| <input type="radio"/> | Eosinophilic pneumonia | |
| <input type="radio"/> | Hypersensitivity pneumonitis | |
| <input checked="" type="radio"/> | Wegener's granulomatosis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Churg-Strauss syndrome (CSS) is a rare form of small vessel vasculitis, characterised by asthma, allergic rhinitis and prominent peripheral blood eosinophilia.

Explanation

Churg-Strauss syndrome (CSS) is a rare form of small vessel vasculitis, characterised by asthma, [allergic rhinitis](#) and prominent peripheral blood eosinophilia. All of these are present in the history and should lead you to the diagnosis of Churg-Strauss.

The most commonly involved organ is the lung, followed by the skin. CSS, however, can affect any organ system, including the cardiovascular, gastrointestinal, renal, and central nervous systems. The unifying feature of patients presenting with CSS is asthma. Vasculitis involving the peripheral nervous system is also a characteristic feature, and [mononeuritis multiplex](#) occurs in 75% of patients.

Vasculitis of extrapulmonary organs is largely responsible for the morbidity and mortality associated with CSS. Forty per cent to 60% are associated with positive ANCA, usually pANCA/MPO.

ANCA are antineutrophil cytoplasmic antibodies. Several different staining patterns and antigen specificities are recognised. The cytoplasmic staining pattern, cANCA, and specificity for the PR3 antigen is most specific for Wegener's granulomatosis. Perinuclear staining, pANCA, and/or antibody to MPO are far less specific than cANCA and can be present in a range of inflammatory conditions such as microscopic polyangitis, Churg-Strauss syndrome and Goodpasture's syndrome.

MPO and pANCA may also be present in SLE, [rheumatoid arthritis](#), [Sjogren syndrome](#) and occasionally in chronic infections.

Intravenous glucocorticoid is used for initial therapy of acute multi-organ involvement in Churg-Strauss syndrome, followed by oral glucocorticoid therapy, often with azathioprine as a steroid-sparing agent. Loss of vision is rare but can occur and must be treated aggressively.

Allergic bronchopulmonary [aspergillosis](#) is a hypersensitivity reaction to *Aspergillus*. Its clinical presentation varies from corticosteroid-dependent asthma to diffuse [bronchiectasis](#) with fibrosis. Visual loss is not an associated feature.

Wegener's granulomatosis is a multi-organ autoimmune disease, which can be fatal. The classical triad consists of necrotising granulomatous inflammation of the respiratory tract, [glomerulonephritis](#) and a small vessel vasculitis. A prolonged history of [epistaxis](#) or sinusitis is commonly found in Wegener's granulomatosis, which in some patients is also associated with an eosinophilia.

Hyper-eosinophilic syndrome is characterised by a peripheral blood eosinophil count of >1.5 for more than six months. Generalised symptoms are fatigue, myalgia, fever, night sweats, diarrhoea and pruritus. Other symptoms depend on the organ involved: cardiac disease causes chest pain and dyspnoea, respiratory disease presents with a dry cough.

A 28-year-old man who works on a local mushroom farm comes to the clinic with increased shortness of breath. In addition to feeling increasingly short of breath, he has suffered intermittent fevers and sweats over the past few months.

On examination his BP is 135/72 mmHg, pulse is 72 and regular. There are fine inspiratory crackles at both bases on auscultation of his chest.

Investigations show:

| | | |
|------------------|-----------------------|-----------|
| Haemoglobin | 135 g/L | (135-177) |
| White cell count | $9.3 \times 10^9/L$ | (4-11) |
| Platelets | $204 \times 10^9/L$ | (150-400) |
| Sodium | 138 mmol/L | (135-146) |
| Potassium | 4.3 mmol/L | (3.5-5) |
| Creatinine | 116 $\mu\text{mol/L}$ | (79-118) |

Chest x ray shows diffuse interstitial shadowing. Spirometry shows mixed restrictive/obstructive picture.

Which of the following is the most appropriate course of action for the longer term?

(Please select 1 option)

| | |
|-----------------------|----------------------------|
| <input type="radio"/> | Change of job plan |
| <input type="radio"/> | Inhaled anticholinergics |
| <input type="radio"/> | Inhaled high dose Seretide |
| <input type="radio"/> | Oral prednisolone |
| <input type="radio"/> | Regular azithromycin |

Dr. Assem

Please select 1 option.

| | | |
|----------------------------------|----------------------------|----------------------------|
| <input type="radio"/> | Change of job plan | This is the correct answer |
| <input type="radio"/> | Inhaled anticholinergics | |
| <input type="radio"/> | Inhaled high dose Seretide | |
| <input type="radio"/> | Oral prednisolone | |
| <input checked="" type="radio"/> | Regular azithromycin | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- In hypersensitivity pneumonitis, a short course of oral steroids may improve symptoms but optimal management is removal of exposure to the antigen.

Explanation

This man's occupation as a mushroom picker raises the possibility of mushroom picker's lung, a form of hypersensitivity pneumonitis. Optimal management is removal of exposure to the antigen, although in the short term a course of oral corticosteroids is likely to be appropriate.

Inhaled anticholinergics are used in the management of chronic obstructive pulmonary disease (COPD) and are therefore not appropriate here.

Inhaled corticosteroids are not as effective as oral corticosteroids in managing subacute or chronic hypersensitivity pneumonitis, so oral prednisolone is the treatment of choice after removal of exposure to the antigen has occurred.

There is no role for antibiotic therapy.

A 32-year-old man is admitted by ambulance after being caught up in a house fire and gas explosion whilst trying to rescue a neighbour.

He has been resuscitated at the scene, but on arrival in the Emergency department is extremely unwell. His saturations are 91% on a non-rebreather; his BP is 142/82 mmHg with a pulse of 84. There is audible stridor and bibasal crackles on auscultation of the chest. Portable chest is suggestive of pulmonary oedema.

Which of the following is the most appropriate management?

(Please select 1 option)

- | | |
|-----------------------|----------------------------|
| <input type="radio"/> | BIPAP |
| <input type="radio"/> | Intubation and ventilation |
| <input type="radio"/> | IV furosemide |
| <input type="radio"/> | IV nitrate |
| <input type="radio"/> | IV noradrenaline |

| | | |
|----------------------------------|----------------------------|----------------------------|
| <input type="radio"/> | BIPAP | |
| <input checked="" type="radio"/> | Intubation and ventilation | This is the correct answer |
| <input type="radio"/> | IV furosemide | |
| <input type="radio"/> | IV nitrate | |
| <input type="radio"/> | IV noradrenaline | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The optimal management of patients at significant risk of airways obstruction is intubation and ventilation.

Explanation

The suspicion here is that this patient has non-cardiogenic pulmonary oedema as a result of smoke inhalation. There is also stridor, a sign of laryngeal oedema and this patient is at significant risk of airway obstruction. As such the optimal management is intubation and ventilation.

BIPAP is inappropriate because of the risk of airway obstruction.

The other treatments are conventional ones for cardiogenic pulmonary oedema.

A 26-year-old man who works in a car body shop spray painting vehicles comes to the respiratory clinic complaining of increasing shortness of breath and wheeze. He says that he is fine at the end of a weekend off, and particularly well when he goes on holiday, but steadily gets worsening symptoms from Monday to Friday.

He is a non-smoker who has no significant past medical history. On examination his BP is 125/75 mmHg, his pulse is 75 and regular. He has significant bilateral wheeze and a non-productive cough.

Investigations show

| | | |
|------------------|----------------------|-----------|
| Haemoglobin | 149 g/L | (135-180) |
| White cell count | $5.6 \times 10^9/L$ | (4-11) |
| Platelets | $192 \times 10^9/L$ | (150-400) |
| Serum sodium | 140 mmol/L | (135-146) |
| Serum potassium | 4.0 mmol/L | (3.5-5) |
| Creatinine | 90 $\mu\text{mol/L}$ | (79-118) |
| PEFR | 245 l/min | |

Which of the following is the best initial way to elucidate any link between the workplace and possible asthma?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Bronchial hyper-responsiveness testing |
| <input type="radio"/> | Radioallergosorbent testing |
| <input type="radio"/> | Serial peak flow measurement including weekdays and weekends |
| <input type="radio"/> | Skin testing |
| <input type="radio"/> | Specific bronchial provocation testing |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Bronchial hyper-responsiveness testing | |
| <input type="radio"/> | Radioallergosorbent testing | |
| <input type="radio"/> | Serial peak flow measurement including weekdays and weekends | This is the correct answer |
| <input type="radio"/> | Skin testing | |
| <input checked="" type="radio"/> | Specific bronchial provocation testing | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- A peak flow diary with multiple measurements at different times in the day and involving both weekdays and weekends, is the most useful tool in diagnosing workplace asthma.

Explanation

The most obvious initial investigation is to get the patient to keep a peak flow diary with multiple measurements at different times in the day and involving both weekdays and weekends.

Detailed pulmonary function tests, and radioallergosorbent (RAST) or skin testing may also be part of the work up, but the peak flow diary is the best way to establish the temporal relationship between asthma and the paint spraying. Once the specific trigger is identified he may either need to be given special equipment to protect him from exposure, or moved to a different role.

Simply treating his asthma with appropriate medication is not appropriate.

In restrictive lung disease due to respiratory muscle weakness, which of the following statements is true?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Low FEV_1/FVC , high RV/TLC |
| <input type="radio"/> | Low FEV_1/FVC , normal TLC |
| <input type="radio"/> | Low VC , low FEV_1 , normal TLC , low RV/TLC |
| <input type="radio"/> | Low VC , low RV , low TLC |
| <input type="radio"/> | Low VC , low TLC , high RV/TLC |

(Please select 1 option)

| | |
|----------------------------------|---|
| <input type="radio"/> | Low FEV_1/FVC , high RV/TLC |
| <input type="radio"/> | Low FEV_1/FVC , normal TLC |
| <input type="radio"/> | Low VC, low FEV_1 , normal TLC, low RV/TLC |
| <input type="radio"/> | Low VC, low RV, low TLC |
| <input checked="" type="radio"/> | Low VC, low TLC, high RV/TLC Correct |

Key Learning Points

Respiratory Medicine

- In restrictive lung disease due to respiratory muscle weakness the lung itself can function normally but muscle weakness will result in grossly low lung volumes including forced expiratory volume in one second (FEV_1), forced vital capacity (FVC) and total lung capacity (TLC).

Explanation

In restrictive lung disease due to respiratory muscle weakness the lung itself can function normally but muscle weakness will result in grossly low lung volumes including forced expiratory volume in one second (FEV_1), forced vital capacity (FVC) and total lung capacity (TLC).

However residual volume (RV) will be relatively high as a consequence of this weakness.

Consequently, RV/TLC will be elevated.

However the transfer of carbon monoxide (TCO) will be unaffected.

A 67-year-old man with known COPD attends the emergency department via ambulance with a severe exacerbation.

On arrival the ambulance crew hand over the oxygen alert card provided to him by his local chest clinic.

Which of the following pieces of information is listed on the standardised oxygen alert cards?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | His previous oxygen saturations (when well) |
| <input type="radio"/> | His previous $p\text{CO}_2$ reading (when well) |
| <input type="radio"/> | His previous $p\text{O}_2$ reading (when well) |
| <input type="radio"/> | The oxygen concentration via venturi mask to be used |
| <input type="radio"/> | Underlying respiratory condition |

| | | |
|----------------------------------|--|---------|
| <input type="radio"/> | His previous oxygen saturations (when well) | |
| <input type="radio"/> | His previous $p\text{CO}_2$ reading (when well) | |
| <input type="radio"/> | His previous $p\text{O}_2$ reading (when well) | |
| <input checked="" type="radio"/> | The oxygen concentration via venturi mask to be used | Correct |
| <input type="radio"/> | Underlying respiratory condition | |

Key Learning Points

Respiratory Medicine

- Patients at risk of type II respiratory failure should be provided with oxygen alert cards to give to medical professionals in the event of becoming unwell.

Explanation

The British Thoracic Society in conjunction with the Intensive Care Society has produced oxygen alert cards that can be downloaded and printed to give to patients.

The details provided include the patient's name, that they are at risk of type II respiratory failure (with raised CO_2 levels), the concentration of oxygen to be delivered via venturi mask and their target oxygen saturations.

It also contains advice regarding the use of air and oxygen driven nebuliser machines in such patients.

The early identification of at risk patients is essential in avoiding over-oxygenation and precipitating CO_2 retention.

A 41-year-old woman comes to the clinic with increasing shortness of breath. She has a history of systemic sclerosis, takes omeprazole for reflux symptoms and nifedipine slow release for Raynaud's disease.

On examination her BP is 155/85 mmHg, pulse is 82 and regular. There is peripheral calcinosis on examination of the hands and pinching of the corners of the mouth consistent with scleroderma. Auscultation of the chest reveals scattered inspiratory crackles across both lung fields.

Investigations show:

| | | |
|------------------|-----------------------|-----------|
| Haemoglobin | 122 g/L | (115-160) |
| White cell count | $8.3 \times 10^9/L$ | (4-11) |
| Platelets | $199 \times 10^9/L$ | (150-400) |
| ESR | 62 mm/hr | (<10) |
| Sodium | 138 mmol/L | (135-146) |
| Potassium | 4.3 mmol/L | (3.5-5) |
| Creatinine | 131 $\mu\text{mol/L}$ | (79-118) |

Chest x ray shows bilateral interstitial infiltrates. Echocardiogram shows ejection fraction 53%.

Which of the following is the most likely diagnosis?

(Please select 1 option)

| | |
|----------------------------------|-------------------------------|
| <input type="radio"/> | Bacterial pneumonia |
| <input checked="" type="radio"/> | Eosinophilic pneumonitis |
| <input type="radio"/> | Idiopathic pulmonary fibrosis |
| <input type="radio"/> | Interstitial fibrosis |
| <input type="radio"/> | Pulmonary oedema |

| | | |
|----------------------------------|-------------------------------|----------------------------|
| <input type="radio"/> | Bacterial pneumonia | |
| <input type="radio"/> | Eosinophilic pneumonitis | |
| <input type="radio"/> | Idiopathic pulmonary fibrosis | |
| <input checked="" type="radio"/> | Interstitial fibrosis | This is the correct answer |
| <input type="radio"/> | Pulmonary oedema | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Systemic sclerosis is a chronic autoimmune disease characterised by increased fibroblast activity and fibrosis in a number of different organ systems. 90-95% of patients have positive antinuclear antibodies.

Explanation

Systemic sclerosis is a chronic autoimmune disease characterised by increased fibroblast activity and fibrosis in a number of different organ systems. 90-95% of patients have positive antinuclear antibodies. There are two major subtypes:

- limited cutaneous, and
- diffuse cutaneous.

CREST syndrome is an older term for the limited cutaneous form (calcinosis, Raynauds' phenomenon, oesophageal dysmotility, sclerodactyly, telangiectasia). Patients with systemic sclerosis can present with skin abnormalities, musculoskeletal changes, gastrointestinal complications, pulmonary disease, renal crisis and dry eyes and mouth.

A number of autoantibodies against extractable nuclear antigens can be detected in patients with systemic sclerosis. Anti-centromere antibodies and anti-topoisomerase I antibodies are the classic autoantibodies associated with the disease. Anti-centromere antibodies are linked with limited cutaneous involvement and isolated pulmonary hypertension, and a good prognosis, whereas anti-topoisomerase I are linked with diffuse skin disease and pulmonary fibrosis and a higher mortality.

Respiratory symptoms are common in patients with systemic sclerosis, but it is often difficult to distinguish between interstitial lung disease and pulmonary hypertension as the cause. Echocardiography, pulmonary hypertension and chest radiographs or CT are often required.

Inspiratory crackles heard here, coupled with bilateral interstitial infiltrates on chest radiograph, make interstitial lung disease the most likely diagnosis, but it is important to note they are not always present in the early stages of disease. The condition may be steroid responsive, as such a trial of prednisolone plus or minus an appropriate second line agent is indicated. Signs of pulmonary hypertension are jugular venous distension, right ventricular heave and an accentuated pulmonary second heart sound.

Given the chronic nature of her disease bacterial infection is unlikely.

Idiopathic pulmonary fibrosis is by definition of unknown aetiology and this too therefore cannot be the correct answer.

Given the normal ejection fraction pulmonary oedema is also unlikely.

The absence of leukocytosis, and normal eosinophil count makes eosinophilic pneumonitis unlikely.

A 43-year-old woman presents to the respiratory clinic with increasing shortness of breath and a dry cough. She also has fever and night sweats which have worsened over the past six to nine months and has lost a few kg in weight.

On examination her BMI is 23, BP is 135/72 mmHg, pulse is 73, and there are scattered crackles on auscultation of the chest. She also has erythema nodosum on examination of both lower limbs.

Investigations show:

| | | |
|------------------|---------------------------------|-------------|
| Haemoglobin | 121 g/L | (115-160) |
| White cell count | $9.1 \times 10^9/L$ | (4-11) |
| Platelets | $192 \times 10^9/L$ | (150-400) |
| Sodium | 137 mmol/L | (135-146) |
| Potassium | 4.2 mmol/L | (3.5-5) |
| Creatinine | 108 $\mu\text{mol/L}$ | (79-118) |
| pH | 7.41 | (7.35-7.45) |
| pCO ₂ | 4.7 kPa | (4.8-6.1) |
| pO ₂ | 9.8 kPa | (10-13.3) |
| CRX | Bilateral hilar lymphadenopathy | |

Which of the following is the most appropriate initial treatment?

(Please select 1 option)

| | |
|-----------------------|--------------------|
| <input type="radio"/> | Azathioprine |
| <input type="radio"/> | Hydroxychloroquine |
| <input type="radio"/> | Infliximab |
| <input type="radio"/> | Methotrexate |
| <input type="radio"/> | Prednisolone |

| | |
|----------------------------------|-----------------------------|
| <input type="radio"/> | Azathioprine |
| <input type="radio"/> | Hydroxychloroquine |
| <input type="radio"/> | Infliximab |
| <input type="radio"/> | Methotrexate |
| <input checked="" type="radio"/> | Prednisolone Correct |

Key Learning Points

Respiratory Medicine

- Prednisolone is the mainstay of initial treatment for sarcoid, continued for 12 months or more in those patients who respond, but tapered to the minimal effective dose.

Explanation

This patient has sarcoidosis as evidenced by the hilar lymphadenopathy, erythema nodosum and mild hypoxia on blood gas analysis. Prednisolone is the mainstay of initial treatment for sarcoid, continued for 12 months or more in those patients who respond, but tapered to the minimal effective dose.

All of the other agents have been used in the management of sarcoidosis, although they are all subsidiary to use of corticosteroids. Systematic reviews have not so far however supported the use of any particular second line agent.

A 71-year-old man presents to the Emergency department with an influenza-like illness.

He says this has been accompanied by a dry cough and diarrhoea over the past few days, and his wife tells you that he is becoming increasingly drowsy and forgetful. They have returned from a hotel in Spain some two days earlier, where they were staying for the winter.

On examination he is pyrexial 38.2°C, pulse is 92 and BP is 100/60 mmHg. There is bilateral wheeze on auscultation of the chest.

Investigations show:

| | | |
|----------------------|--|-----------|
| Haemoglobin | 130 g/L | (135-177) |
| White cell count | $13.0 \times 10^9/L$ | (4-11) |
| Platelets | $222 \times 10^9/L$ | (150-400) |
| Sodium | 130 mmol/L | (135-146) |
| Potassium | 4.1 mmol/L | (3.5-5) |
| Creatinine | 129 $\mu\text{mol/L}$ | (79-118) |
| Alkaline phosphatase | 30 U/L | (39-117) |
| CXR | Left sided pleural effusion and patchy consolidation | |

Which of the following is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|---------------------------------|
| <input type="radio"/> | <i>Klebsiella pneumoniae</i> |
| <input type="radio"/> | <i>Legionella pneumophila</i> |
| <input type="radio"/> | <i>Mycoplasma pneumoniae</i> |
| <input type="radio"/> | <i>Staphylococcus aureus</i> |
| <input type="radio"/> | <i>Streptococcus pneumoniae</i> |

| | | |
|----------------------------------|---------------------------------|----------------------------|
| <input type="radio"/> | <i>Klebsiella pneumoniae</i> | |
| <input checked="" type="radio"/> | <i>Legionella pneumophila</i> | This is the correct answer |
| <input type="radio"/> | <i>Mycoplasma pneumoniae</i> | |
| <input type="radio"/> | <i>Staphylococcus aureus</i> | |
| <input checked="" type="radio"/> | <i>Streptococcus pneumoniae</i> | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Flu-like symptoms, coupled with SIADH and low alkaline phosphatase, with pleural effusion on CXR point towards possible *Legionella*.

Explanation

The flu-like symptoms, coupled with SIADH and low alkaline phosphatase, with pleural effusion on CXR point towards possible *Legionella*. The source of infection may have been the air conditioning system at his Spanish hotel. Macrolides are the drug of choice in managing the condition.

Klebsiella and *Staphylococcus* tend to be cavitating pneumonias, with *Klebsiella* being associated with chronic alcoholism, and *Staphylococcus* with post-influenza pneumonia.

Mycoplasma tends to affect a single lobe, and is associated with haemolytic anaemia.

A 38-year-old man presents with episodic wheeze and non-productive cough which occurs particularly at night. He has been employed in the plastics industry.

Which of the following suggests a diagnosis of occupational lung disease?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | Absent family history of asthma |
| <input type="radio"/> | Commencement of symptoms on his first day in this employment |
| <input type="radio"/> | Elevated serum IgE concentration |
| <input type="radio"/> | Improved symptomatology when on holiday |
| <input type="radio"/> | Increased bronchial reactivity |

Please select 1 option

| | |
|----------------------------------|--|
| <input type="radio"/> | Absent family history of asthma |
| <input type="radio"/> | Commencement of symptoms on his first day in this employment |
| <input type="radio"/> | Elevated serum IgE concentration |
| <input checked="" type="radio"/> | Improved symptomatology when on holiday Correct |
| <input type="radio"/> | Increased bronchial reactivity |

Key Learning Points

Respiratory Medicine

- Patients with occupational asthma are characteristically better when on holiday.

Explanation

Episodic cough and wheeze with nocturnal symptoms are classical of asthma.

Occupational asthma is the commonest industrial lung disease with over 400 causes and accounts for up to 10% of adult onset asthma. The commonest occupations affected are spray painters, bakers, chemical processors, plastics workers and welders and soldering.

Patients are characteristically better when on holiday.

The diagnosis is confirmed by serial peak expiratory flow (PEF) measurements at home and at work. Recordings should be performed two hourly for four weeks or if this is not possible metacholine/histamine challenges can be undertaken **after days** at work and away from work.

Following objective confirmation of the diagnosis the underlying cause should be identified.

By which of the following is sleep apnoea syndrome best diagnosed?

(Please select 1 option)

| | |
|-----------------------|-------------------------------------|
| <input type="radio"/> | Blood gases during apnoeic episodes |
| <input type="radio"/> | EEG |
| <input type="radio"/> | Polygraphic sleep studies |
| <input type="radio"/> | Presence of HLA-DR2 and DQw1 |
| <input type="radio"/> | Therapeutic trial of amphetamines |

Dr. Assem

| | | |
|----------------------------------|-------------------------------------|----------------------------|
| <input type="radio"/> | Blood gases during apnoeic episodes | |
| <input type="radio"/> | EEG | |
| <input type="radio"/> | Polygraphic sleep studies | This is the correct answer |
| <input checked="" type="radio"/> | Presence of HLA-DR2 and DQw1 | Incorrect answer selected |
| <input type="radio"/> | Therapeutic trial of amphetamines | |

Key Learning Points

Respiratory Medicine

- The diagnosis of sleep apnoea syndrome is established by polygraphic recording of sleep showing at least 30 of 10 or more seconds' duration in seven hours of sleep of apnoea associated with a fall in arterial oxygen saturation.

Explanation

Sleep apnoea is characterised by cessation of breathing during sleep.

This causes extreme restlessness with frequent respiratory pauses during night sleep. Consequently patients report daytime drowsiness and irritability.

It is associated with snoring.

The diagnosis is established by polygraphic recording of sleep which shows periods (at least 30 of 10 or more seconds' duration in seven hours of sleep) of apnoea associated with a fall in arterial oxygen saturation.

A 19-year-old girl with known cystic fibrosis is under regular follow up at her local specialist centre.

Which one the following conditions associated with cystic fibrosis is she most likely also to have?

(Please select 1 option)

| | |
|-----------------------|--------------------------|
| <input type="radio"/> | Biliary cirrhosis |
| <input type="radio"/> | Infertility |
| <input type="radio"/> | Nasal polyps |
| <input type="radio"/> | Pancreatic Insufficiency |
| <input type="radio"/> | Sinusitis |

- ☐ Biliary cirrhosis
- ☐ Infertility
- ☐ Nasal polyps
- ☒ Pancreatic Insufficiency This is the correct answer
- ☐ Sinusitis Incorrect answer selected

Key Learning Points

Respiratory Medicine

- This question requires an understanding of cystic fibrosis and the conditions associated with it.

Explanation

Pancreatic insufficiency is very common, with 85% of patients affected.

Almost all male CF patients will be infertile; but there is only a 20% incidence amongst female patients. Almost 100% of children with **cystic fibrosis** will have delayed development and puberty.

Biliary **cirrhosis** is far rarer with approximately 5% of adults affected.

Dysfunctional gallbladder and gallstones can be seen in 10-30% of cases.

Symptomatic sinusitis is seen in 10% of children and 20% of adult patients.

Nasal polyps are less common with an estimated incidence of 15-20% (most of these occurring in the second decade).

Other associated conditions include **vitamin D deficiency** resulting in bone demineralisation, hypertrophic osteoarthropathy and rectal prolapse.

Based on the current British Thoracic Society (BTS) guidelines, which is the first line empiric antibiotic therapy regime for patients with severe community acquired pneumonia (CAP) based on a CURB-65 score of 4?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Amoxicillin 500 mg TDS |
| <input type="radio"/> | Amoxicillin 1 g TDS and clarithromycin 500 mg BD |
| <input type="radio"/> | Benzylopenicillin 1.2 g QDS and levofloxacin 500 mg BD |
| <input type="radio"/> | Co-amoxiclav 1.2 g TDS and clarithromycin 500 mg BD |
| <input type="radio"/> | Doxycycline 200 mg loading dose and then 100 mg OD |

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Amoxicillin 500 mg TDS | |
| <input type="radio"/> | Amoxicillin 1 g TDS and clarithromycin 500 mg BD | |
| <input type="radio"/> | Benzylpenicillin 1.2 g QDS and levofloxacin 500 mg BD | |
| <input checked="" type="radio"/> | Co-amoxiclav 1.2 g TDS and clarithromycin 500 mg BD | This is the correct answer |
| <input type="radio"/> | Doxycycline 200 mg loading dose and then 100 mg OD | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- High severity community acquired pneumonia (CURB 3-5) should be treated as soon as possible with co-amoxiclav 1.2g TDS and clarithromycin 500mg BD.

Explanation

BTS has issued clear guidelines on the most appropriate antibiotic regime to treat **community-acquired pneumonia**, according to the severity, which is often based on the CURB-65 score.

Community acquired pneumonia (CAP) is defined as symptoms and signs consistent with an acute lower respiratory tract infection associated with new radiological signs consistent with consolidation, not explained by another cause.

The severity of each case of CAP should be assessed using the CURB 65 tool in conjunction with clinical judgement. Patients score 1 point for each of:

- Confusion
- Urea >7 mmol/L
- Respiratory rate ≥30/min
- Blood pressure: systolic <90 or diastolic ≤60 mmHg
- Age ≥65 years

A CURB-65 score of 0 or 1 are at low risk of death, and can be treated at home if the social circumstances are compatible. A score of 2 usually indicates inpatient treatment is required, but hospital-supervised outpatient treatment can be considered. Patients who have a CURB-65 score of 3 or more are at high risk of death. Those with scores of 4 and 5 should be considered for treatment in a critical care unit (ICU, ITU).

In the majority of patients CAP should be confirmed by chest radiography before the commencement of antibiotics. However, if patients are critically unwell they should be treated for the presumptive diagnosis. Antibiotic treatment should be initiated within 4 hours of presentation.

Low severity CAP (CURB 0-1) can be treated with amoxicillin 500 mg TDS PO. CURB 2 CAP should be treated with amoxicillin 500 mg-1 g TDS and clarithromycin 500 mg TDS. Alternatives are available if patients are allergic to any of the above combinations. High severity CAP (CURB 3-5) should be treated as soon as possible with co-amoxiclav 1.2 g TDS and clarithromycin 500 mg BD.

The oral route is recommended in those with low and moderate severity CAP. Patients treated with parenteral antibiotics initially should be switched to an oral regimen once clinical improvement is seen and the patients has been afebrile for at least 24 hours. For most patients with uncomplicated CAP 7 days of antibiotic treatment is recommended. For those with high severity pneumonia where an organism has not been identified, 7-10 days treatment is indicated and extended to 14-21 days where clinically needed.

Which one of the following is correct regarding severe bullous emphysema?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Helium dilution is more accurate than body plethysmography in measuring residual volume. |
| <input type="radio"/> | Hypoxaemia at rest will improve with exercise. |
| <input type="radio"/> | Pulmonary compliance is reduced. |
| <input type="radio"/> | Reduced elastic recoil opposes airway collapse in expiration. |
| <input type="radio"/> | The carbon monoxide transfer factor is reduced. |

☐ Helium dilution is more accurate than body plethysmography in measuring residual volume.

☐ Hypoxaemia at rest will improve with exercise.

☐ Pulmonary compliance is reduced.

☐ Reduced elastic recoil opposes airway collapse in expiration.

☒ The carbon monoxide transfer factor is reduced. **Correct**

Key Learning Points

Respiratory Medicine

- Carbon monoxide transfer factor is reduced in severe bullous emphysema.

Explanation

- Whole body plethysmography also measures trapped gas, that is, intrathoracic gas (including within bullae and other poorly ventilated areas) which barely communicates with the airway. Standard gas dilution measures gas that communicates with the airway. Mixing in helium dilution is more difficult in airways obstruction requiring multibreath methods lasting five minutes rather than single breath test.
- Exertion will exacerbate breathlessness and hypoxia.
- The characteristic changes of severe emphysema are increase in static compliance and reduction in lung recoil pressure.
- Loss of lung recoil causes a reduction of alveolar pressure (elastic recoil pressure of lung + pleural pressure) leading to collapse of peripheral airways on expiration. Emphysematous patients purse their lips in expiration to increase airway pressure to prevent this collapse.
- CO transfer factor is reduced.

A 30-year-old man is referred to the chest clinic with an eight month history of progressive shortness of breath. He has smoked 20/day for 15 years.

Investigations reveal a diagnosis of severe panacinar emphysema. On questioning he informs the consultant that his father died from COPD in his early 40s. Following a diagnosis of alpha-1 antitrypsin (A1AT) deficiency, he undergoes genetic testing.

Given his history what is most likely to be his genotype?

(Please select 1 option)

| | |
|-----------------------|------|
| <input type="radio"/> | PiMM |
| <input type="radio"/> | PiMS |
| <input type="radio"/> | PiSZ |
| <input type="radio"/> | PiZZ |
| <input type="radio"/> | PiSS |

| | | |
|----------------------------------|------|----------------------------|
| <input type="radio"/> | PiMM | |
| <input type="radio"/> | PiMS | |
| <input type="radio"/> | PiSZ | |
| <input type="radio"/> | PiZZ | This is the correct answer |
| <input checked="" type="radio"/> | PiSS | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- This question requires an understanding of A1AT deficiency and the genetic variations of this condition.

Explanation

The genotype PiZZ is associated with the most severe form of alpha 1-antitrypsin deficiency as the circulating levels of A1AT are 10-15% of normal.

The serum levels of some of the other common genotypes are:

- PiMM: 100% (normal)
- PiMS: 80% of normal serum level of A1AT
- PiSS: 60% of normal serum level of A1AT
- PiMZ: 60% of normal serum level of A1AT
- PiSZ: 40% of normal serum level of A1AT.

Cigarette smoking is especially harmful to those with A1AT deficiency and can accelerate the progression of emphysema by 10 years.

A 20-year-old female with cystic fibrosis presents in early pregnancy wanting advice.

Genetic analysis reveals that her partner is a carrier of the cystic fibrosis gene.

Which of the following percentages best represents the chance of her child having cystic fibrosis?

(Please select 1 option)

☐ 10%

☐ 25%

☐ 50%

☐ 75%

☐ 100%

| | |
|----------------------------------|---------------------------------------|
| <input type="radio"/> | 10% |
| <input type="radio"/> | 25% |
| <input type="radio"/> | 50% This is the correct answer |
| <input type="radio"/> | 75% |
| <input checked="" type="radio"/> | 100% Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- There is a 50% chance that a child will be homozygous for CF and a 50% chance that the child will be a carrier if one parent is a carrier and the other has the disease.

Explanation

The patient is homozygous for CF (CF/CF) and the father is heterozygous for CF (CF/N).

Thus there is a 50% chance that her child will be homozygous for CF and a 50% chance that the child will be a carrier.

A 17-year-old boy with known cystic fibrosis is under regular follow up at his local specialist centre.

Which one the following conditions (associated with cystic fibrosis), is he most likely also to have?

(Please select 1 option)

| | |
|-----------------------|-------------------|
| <input type="radio"/> | Biliary cirrhosis |
| <input type="radio"/> | Delayed puberty |
| <input type="radio"/> | Gallstones |
| <input type="radio"/> | Nasal polyps |
| <input type="radio"/> | Sinusitis |

(Please select 1 option)

| | |
|----------------------------------|---|
| <input type="radio"/> | Biliary cirrhosis |
| <input type="radio"/> | Delayed puberty This is the correct answer |
| <input type="radio"/> | Gallstones |
| <input checked="" type="radio"/> | Nasal polyps Incorrect answer selected |
| <input type="radio"/> | Sinusitis |

Key Learning Points

Respiratory Medicine

- This question requires an understanding of cystic fibrosis and the conditions associated with it.

Explanation

Almost 100% of children with cystic fibrosis will have delayed development and puberty.

Dysfunctional gallbladder and gallstones can be seen in 10-30% of cases.

Symptomatic sinusitis is seen in 10% of children and 20% of adult patients.

Nasal polyps are less common with an estimated incidence of 15-20% (most of these occurring in the second decade).

Biliary cirrhosis is far rarer with approximately 5% of adults affected.

Almost all male CF patients will be infertile; there is a 20% incidence amongst female patients.

Pancreatic insufficiency is also common, with 85% of patients affected.

Other associated conditions include vitamin D deficiency resulting in bone demineralisation, hypertrophic osteoarthropathy and rectal prolapse.

A 43-year-old Caribbean female comprehensive school teacher complains of slowly increasing breathlessness. She has no smoking history.

Investigations reveal she has bilateral enlarged hilar lymph nodes, elevated serum calcium, interstitial lung disease, and enlarged liver and spleen.

What is the most likely diagnosis?

(Please select 1 option)

- | | |
|-----------------------|---------------------|
| <input type="radio"/> | Coccidioidomycosis |
| <input type="radio"/> | Hyperparathyroidism |
| <input type="radio"/> | Hypervitaminosis D |
| <input type="radio"/> | Sarcoidosis |
| <input type="radio"/> | Tuberculosis |

| | |
|----------------------------------|---|
| <input type="radio"/> | Coccidioidomycosis |
| <input type="radio"/> | Hyperparathyroidism |
| <input type="radio"/> | Hypervitaminosis D |
| <input checked="" type="radio"/> | Sarcoidosis This is the correct answer |
| <input type="radio"/> | Tuberculosis Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Sarcoid is common in subjects of Caribbean origin and is associated with better prognosis.

Explanation

Sarcoid is common in subjects of Caribbean origin.

Subacute increasing breathlessness also suggests the diagnosis of sarcoid, and an elevated calcium narrows the differential diagnosis further.

Hyperparathyroidism would not cause symptoms of breathlessness.

Coccidioidomycosis is a non-infective fungal infection caused by inhalation of the spores of *Coccidioides immitis*. It usually presents with fever, cough, myalgia and rash. It is endemic mainly to the south-western USA and North Mexico.

TB is the major differential in this case.

Hypercalcaemia and bilateral hilar lymphadenomegaly (BHL) however are in favour of a diagnosis of sarcoid.

A 55-year-old man who has a 25 year pack history of smoking presents with a productive cough with mucoid sputum of two year duration.

On examination he has scattered coarse crackles and wheezing.

Which of the following is the likeliest diagnosis?

(Please select 1 option)

| | |
|-----------------------|--------------------|
| <input type="radio"/> | Bronchial asthma |
| <input type="radio"/> | Bronchiectasis |
| <input type="radio"/> | Chronic bronchitis |
| <input type="radio"/> | Pneumonitis |
| <input type="radio"/> | Pulmonary fibrosis |

| | | |
|----------------------------------|--------------------|----------------------------|
| <input type="radio"/> | Bronchial asthma | |
| <input type="radio"/> | Bronchiectasis | |
| <input type="radio"/> | Chronic bronchitis | This is the correct answer |
| <input type="radio"/> | Pneumonitis | |
| <input checked="" type="radio"/> | Pulmonary fibrosis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Chronic bronchitis is one of the most common respiratory diseases due to cigarette smoking.

Explanation

Chronic bronchitis is one of the most common respiratory diseases due to cigarette smoking.

Both the smoking history and productive cough for at least two years are indicative of chronic bronchitis.

You were asked to see a 50-year-old man who developed haemoptysis.

Further evaluation showed pulmonary infiltrates and his urine dipstick showed red cells and active urine sediments.

Which of the following evaluations would be most diagnostic?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | A request for anti-glomerular basement membrane (anti-GBM) antibody and antineutrophil cytoplasmic antibody (ANCA) |
| <input type="radio"/> | A smoking history |
| <input type="radio"/> | An ultrasound image of the kidneys |
| <input type="radio"/> | Anti-Smith (Sm) antibodies |
| <input type="radio"/> | Fractional excretion of sodium |

| | |
|----------------------------------|--|
| <input type="radio"/> | A request for anti-glomerular basement membrane (anti-GBM) antibody and antineutrophil cytoplasmic antibody (ANCA) This is the correct answer |
| <input type="radio"/> | A smoking history |
| <input type="radio"/> | An ultrasound image of the kidneys |
| <input type="radio"/> | Anti-Smith (Sm) antibodies |
| <input checked="" type="radio"/> | Fractional excretion of sodium Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Bleeding into alveolar space can be manifested as haemoptysis, and together with renal disease or glomerulonephritis, should prompt an evaluation for systemic vasculitis.

Explanation

Bleeding into alveolar space can be manifested as haemoptysis, and together with renal disease or glomerulonephritis, should prompt an evaluation for systemic vasculitis.

Pulmonary renal syndrome can result from Wegener's granulomatosis or ANCA-associated vasculitis. Goodpasture's syndrome (associated with anti-GBM) is another consideration.

Of interest, smoking appears to be of relevance in causing an epitope that incites an immune response (and thus alveolar damage and haemoptysis manifestation), but this piece of information would not be of the most diagnostic value.

Kidney biopsy, but not ultrasound alone, is occasionally performed in patients with overt manifestations of renal disease (to look for a segmental necrotising lesion in this case).

A 23-year-old woman attends the clinic for asthma review.

She remains significantly short of breath and has wheeze and coughing in the early hours of the morning. At her last appointment you instigated treatment with salmeterol as she was already on a stable dose of 400 mcg per day inhaled beclomethasone.

On examination in the clinic her BP is 100/70 mmHg, her pulse is 70 and regular. She has scattered wheeze on auscultation of the chest and her PEFR is 380 (predicted 550). This is similar to prior to starting the salmeterol from which she perceives she has gained no benefit.

According to asthma guidelines which of the following is the most appropriate next step?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Add low dose oral steroids |
| <input type="radio"/> | Add montelukast |
| <input type="radio"/> | Add theophylline |
| <input type="radio"/> | Stop salmeterol and increase inhaled corticosteroid to 800 mcg/day |
| <input type="radio"/> | Switch to Maintenance and reliever therapy(MART) regime with low dose ICS |

Dr Assem

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Add low dose oral steroids | |
| <input type="radio"/> | Add montelukast | |
| <input type="radio"/> | Add theophylline | |
| <input checked="" type="radio"/> | Stop salmeterol and increase inhaled corticosteroid to 800 mcg/day | Incorrect answer selected |
| <input type="radio"/> | Switch to Maintenance and reliever therapy(MART) regime with low dose ICS | This is the correct answer |

Key Learning Points

Respiratory Medicine

- 2011 guidelines have since been updated in 2017 which state that patients should switch to a MART regime if not deriving benefit from a LABA and ICS

Explanation

2011 guidelines have since been updated in 2017 which state that patients should switch to a MART regime if not deriving benefit from a LABA and ICS rather than stopping the LABA and increasing the ICS as previously stated in 2011.

New guidelines can be found here as well as more information on MART regimes.

Given asthma is a chronic condition low dose oral steroids are considered a treatment of last resort at step five.

What is the most likely cause of upper lobe fibrosis on chest x ray?

(Please select 1 option)

- | | |
|-----------------------|-------------------------------|
| <input type="radio"/> | Ankylosing spondylitis |
| <input type="radio"/> | Idiopathic pulmonary fibrosis |
| <input type="radio"/> | Rheumatoid arthritis |
| <input type="radio"/> | Scleroderma |
| <input type="radio"/> | Systemic lupus erythematosus |

| | | |
|----------------------------------|-------------------------------|----------------------------|
| <input type="radio"/> | Ankylosing spondylitis | This is the correct answer |
| <input type="radio"/> | Idiopathic pulmonary fibrosis | |
| <input type="radio"/> | Rheumatoid arthritis | |
| <input type="radio"/> | Scleroderma | |
| <input checked="" type="radio"/> | Systemic lupus erythematosus | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The commonest causes of upper lobe pulmonary fibrosis are silicosis, sarcoidosis, coal worker pneumoconiosis, ankylosing spondylitis and radiation.

Explanation

Pulmonary fibrosis which predominantly affects the upper lobes is associated with a number of pathologies including:

- Cystic fibrosis
- Pulmonary sarcoidosis
- Langerhans cell histiocytosis
- Pulmonary tuberculosis
- Pneumoconioses
- Silicosis
- Some drug-induced lung disease e.g. carmustine chemotherapy
- Ankylosing spondylitis
- As a complication following lung transplantation

Connective tissue diseases, such as rheumatoid arthritis, SLE and systemic sclerosis, and idiopathic pulmonary fibrosis are often associated with usual interstitial pneumonia which has a variety of radiological manifestations, but if there is fibrosis it usually predominantly affects the lower zones.

A 55-year-old woman on treatment for longstanding rheumatoid arthritis has recently become dyspnoeic on mild exertion and developed a dry cough.

The oxygen saturation was found to be 87% on air. The chest x ray showed a diffuse bilateral interstitial infiltrate. An extensive infection screen was negative and her symptoms were thought to be drug-induced.

Which drug is most likely to have caused this adverse effect?

(Please select 1 option)

- | | |
|-----------------------|--------------------|
| <input type="radio"/> | Azathioprine |
| <input type="radio"/> | Cyclosporin |
| <input type="radio"/> | Hydroxychloroquine |
| <input type="radio"/> | Methotrexate |
| <input type="radio"/> | Sulfasalazine |

Please select 1 option

- ☐ Azathioprine
- ☐ Cyclosporin
- ☐ Hydroxychloroquine
- ☒ Methotrexate **Correct**
- ☐ Sulfasalazine

Key Learning Points

Respiratory Medicine, Rheumatology

- Methotrexate is a well recognised cause of acute pneumonitis and interstitial lung disease.

Explanation

Methotrexate is a well recognised cause of acute pneumonitis and interstitial lung disease.

It is a rare complication of methotrexate therapy but is often fulminant and can be fatal.

Dr Assem

An 18-year-old female presents with an acute exacerbation of asthma associated with a chest infection. She is unable to complete a sentence and her peak flow rate was 35% of her normal level.

She is treated with high flow oxygen, nebulised bronchodilators and oral steroids but this is associated with little change in her condition.

Which of the following treatments, given intravenously, would be the most appropriate for this patient?

(Please select 1 option)

| | |
|-----------------------|----------------------------|
| <input type="radio"/> | Oral aminophylline |
| <input type="radio"/> | Intravenous augmentin |
| <input type="radio"/> | Intravenous hydrocortisone |
| <input type="radio"/> | Intravenous magnesium |
| <input type="radio"/> | Intravenous salbutamol |

Please select 1 option)

| | | |
|----------------------------------|----------------------------|----------------------------|
| <input type="radio"/> | Oral aminophylline | |
| <input type="radio"/> | Intravenous augmentin | |
| <input type="radio"/> | Intravenous hydrocortisone | |
| <input checked="" type="radio"/> | Intravenous magnesium | This is the correct answer |
| <input type="radio"/> | Intravenous salbutamol | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Oxygen should be given to maintain saturations at 94-98% in severe asthma.

Explanation

This patient fits the criteria for acute severe asthma. In such cases β_2 -agonists should be administered as soon as possible, preferably nebulised driven by oxygen. Repeat doses should be given at 15-30 minute intervals, or continuous nebulisation can be used where there is inadequate response to bolus therapy. Nebulised ipratropium bromide should be added for patients with acute severe or life threatening asthma, or those with a poor initial response. Its addition produces significantly greater bronchodilation than a β_2 -agonist alone.

Oxygen should be given to maintain saturations at 94-98%. Patients with saturations less than 92% on air should have an ABG to exclude hypercapnia. However, starting treatment should not be delayed to do the ABG. Initially high-flow oxygen is used, and then weaned to maintain adequate saturations. Unless you suspect **COPD** there is no need to be cautious with oxygen therapy.

SIGN guidelines on the management of asthma state:

"Steroids reduce mortality, relapses, subsequent hospital admission and requirement for β_2 agonist therapy. The earlier they are given in the acute attack the better the outcome."

A dose of 40-50 mg should therefore be given once oxygen and nebuliser therapy has been established. This should be continued for 5 days, or until recovery, and can then be stopped abruptly unless the patient has taken long-term oral corticosteroids.

Failure to respond to the above treatment steps (as is seen here) may warrants the use of intravenous magnesium sulphate and aminophylline, and this should be discussed with senior colleagues.

Intensive care is indicated for patients with severe acute or life threatening asthma who are failing to respond to therapy. Consider it in patients with deteriorating peak flow, persisting or worsening hypoxia, hypercapnia, acidosis, exhaustion or altered conscious state. All patients who are transferred to an intensive care unit should be accompanied by a doctor who can intubate if necessary.

As an aside, chest radiographs are not indicated unless you suspect **pneumothorax** or consolidation, or there is life-threatening asthma, a failure to respond to treatment or a need for ventilation.

A 43-year-old man with asthma develops worsening breathlessness and his full blood count has revealed an eosinophilia. A diagnosis of allergic bronchopulmonary aspergillosis (ABPA) is suspected.

Which of the following statements is true with regard to this diagnosis?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Circulating IgG precipitins to <i>Aspergillus fumigatus</i> are positive |
| <input type="radio"/> | Pleural effusion is a complication |
| <input type="radio"/> | Recurrent haemoptysis is a characteristic feature |
| <input type="radio"/> | The CO transfer factor is unaffected |
| <input type="radio"/> | The immediate skin test to an extract of <i>Aspergillus fumigatus</i> is negative |

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Circulating IgG precipitins to <i>Aspergillus fumigatus</i> are positive | This is the correct answer |
| <input type="radio"/> | Pleural effusion is a complication | |
| <input type="radio"/> | Recurrent haemoptysis is a characteristic feature | |
| <input checked="" type="radio"/> | The CO transfer factor is unaffected | Incorrect answer selected |
| <input type="radio"/> | The immediate skin test to an extract of <i>Aspergillus fumigatus</i> is negative | |

Key Learning Points

Respiratory Medicine

- Immediate (type I) reactions occur in virtually all patients with ABPA following intradermal injections of *A. fumigatus* extracts, with only 16% developing delayed (type IV) reactions.

Explanation

Immediate (type I) reactions occur in virtually all patients with ABPA following intradermal injections of *A. fumigatus* extracts, with only 16% developing delayed (type IV) reactions.

Precipitating IgG antibodies are present in 70% of patients.

Transfer factor may be affected in the later fibrotic stage of the disease.

Haemoptysis is symptom of aspergilloma and bronchiectasis, but is not characteristic of ABPA.

A 21-year-old woman presents to the Emergency department with a one hour history of shortness of breath, and chest tightness.

The symptoms occurred acutely, and she has suffered identical attacks previously which are increasing in frequency.

Her GP has treated her with a salbutamol inhaler, although she has not had any formal pulmonary function testing. Usage of her salbutamol inhaler has not helped her shortness of breath.

On examination she is distressed and chest examination shows vesicular breath sounds with an elevated respiratory rate.

Oxygen saturation is 98% on air which is sustained on exertion.

Chest x ray is normal and arterial blood gas analysis shows:

| | | |
|------------------|----------------------------|---------------|
| pH | 7.52 | (7.35-7.45) |
| pCO ₂ | 2.2kPa | (4.7-7.45) |
| pO ₂ | 18 kPa (increased from 15) | (10.0-13.0) |
| HCO ₃ | 25 | (22.0 - 30.0) |

Which of the following would be your diagnosis?

(Please select 1 option)

| | |
|-----------------------|--------------------------------|
| <input type="radio"/> | Acute asthma attack (mild) |
| <input type="radio"/> | Hyperventilation (psychogenic) |
| <input type="radio"/> | Pulmonary embolism |
| <input type="radio"/> | Respiratory muscle disease |
| <input type="radio"/> | Volume depletion |

Dr. Assem

(Please select 1 option)

| | | |
|----------------------------------|--------------------------------|----------------------------|
| <input type="radio"/> | Acute asthma attack (mild) | |
| <input type="radio"/> | Hyperventilation (psychogenic) | This is the correct answer |
| <input type="radio"/> | Pulmonary embolism | |
| <input type="radio"/> | Respiratory muscle disease | |
| <input checked="" type="radio"/> | Volume depletion | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The blood gas demonstrates respiratory alkalosis. This question requires an understanding of the physiological acid balance, and the causes of disturbances to it.

Explanation

This patient's blood gas sample shows a respiratory alkalosis, as demonstrated by the raised pH, low $p\text{CO}_2$ and normal bicarbonate.

The most likely cause therefore is hyperventilation, possibly due to high levels of anxiety.

Other causes include pain, altitude and excessive mechanical ventilation.

In acute asthma, the $p\text{CO}_2$ may be low, as the patient has an elevated respiratory rate, however in this instance there should be a history of the condition, clinical signs or a reduced $p\text{O}_2$.

Pulmonary embolism can also present similarly, but in the absence of any disclosed risk factors, a normal $p\text{O}_2$ and oxygen saturations maintained on exertion, this becomes less likely.

Respiratory muscle disease typically results in a respiratory acidosis.

Volume depletion (from a number of causes) would typically cause a metabolic alkalosis.

Which of the following would be the least likely finding in a patient with sarcoidosis?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | Hepatic granulomas |
| <input type="radio"/> | Restrictive pulmonary function tests |
| <input type="radio"/> | Skin lesions |
| <input type="radio"/> | Uveitis |
| <input type="radio"/> | X bodies on bronchoalveolar lavage (BAL) fluid |

(Please select 1 option)

- | | | |
|----------------------------------|--|---------|
| <input type="radio"/> | Hepatic granulomas | |
| <input type="radio"/> | Restrictive pulmonary function tests | |
| <input type="radio"/> | Skin lesions | |
| <input type="radio"/> | Uveitis | |
| <input checked="" type="radio"/> | X bodies on bronchoalveolar lavage (BAL) fluid | Correct |

Key Learning Points

Respiratory Medicine

- Pentamalar X bodies (Birbeck granules) found on BAL are considered diagnostic of pulmonary histiocytosis X and so would not be expected with sarcoidosis.

Explanation

Sarcoidosis is associated with:

- Uveitis
- Arthritis
- Pulmonary fibrosis
- Lymphadenopathy and
- Skin changes - lupus pernio/erythema nodosum.

It is characterised histologically by the presence of non-caseating granulomas which may occur anywhere. These granulomas have the capacity to produce 1,25 vitamin D explaining the associated hypercalcaemia.

Pentamalar X bodies (Birbeck granules) found on BAL are considered diagnostic of pulmonary histiocytosis X and so would not be expected with sarcoidosis.

A 45-year-old man is seen in the Emergency department complaining of cough and dyspnoea.

On examination he is disorientated and febrile at 38.5°C. He has a pulse of 100/min and his blood pressure is 85/55 mmHg. He has oxygen saturations of 89% on air and has a respiratory rate of 36/min.

Chest x ray shows left basal consolidation.

Results show:

| | | |
|------------|-------------|-----------|
| Sodium | 140 mmol/L | (137-144) |
| Potassium | 4.0 mmol/L | (3.5-4.9) |
| Urea | 10.2 mmol/L | (2.5-7.5) |
| Creatinine | 96 µmol/L | (60-110) |

Which of the following is not part of the CURB score?

(Please select 1 option)

| | |
|-----------------------|------------------------------|
| <input type="radio"/> | Blood urea concentration |
| <input type="radio"/> | Confusion |
| <input type="radio"/> | Consolidation on chest x ray |
| <input type="radio"/> | Hypotension |
| <input type="radio"/> | Tachypnoea |

| | | |
|----------------------------------|------------------------------|----------------------------|
| <input type="radio"/> | Blood urea concentration | |
| <input type="radio"/> | Confusion | |
| <input type="radio"/> | Consolidation on chest x ray | This is the correct answer |
| <input type="radio"/> | Hypotension | |
| <input checked="" type="radio"/> | Tachypnoea | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The CURB score is calculated by assessment of core adverse prognostic features which are used in assessment of severity of pneumonia.

Explanation

The CURB score is calculated by assessment of core adverse prognostic features which are used in assessment of severity of pneumonia.

Two from four features indicate a severe pneumonia and hospital admission is advised.

The CURB score is calculated using:

- Confusion abbreviated mental test score <8
- Urea >7 mmol/L
- Respiratory rate >30 /min
- Blood pressure: systolic BP <90 mmHg or diastolic BP <60 mmHg.

A 25-year-old woman is admitted with a four month history of cough productive of mucoid sputum streaked with bright red blood, wheezing and diarrhoea.

Her chest and abdominal examination are normal.

Which of the following investigations is the most discriminatory?

(Please select 1 option)

- | | |
|-----------------------|-----------------------------------|
| <input type="radio"/> | Bronchoscopy |
| <input type="radio"/> | Chest x ray |
| <input type="radio"/> | Computed tomography (CT) of chest |
| <input type="radio"/> | Echocardiogram |
| <input type="radio"/> | Ventilation-perfusion scan |

☐ Bronchoscopy **This is the correct answer**

☐ Chest x ray

☐ Computed tomography (CT) of chest

☒ Echocardiogram **Incorrect answer selected**

☐ Ventilation-perfusion scan

Key Learning Points

Respiratory Medicine

- Bronchoscopy identifies up to 80% of carcinoid tumours in the main bronchi.

Explanation

This presentation is classical of a carcinoid tumour. These are neuroendocrine tumours of predominantly enterochromaffin cell origin. They can occur in the small intestine, bronchi, rectum appendix or stomach. Those in the lung are most often located in the main bronchi, and occur most frequently in the right middle lobe. Often, carcinoid tumours are asymptomatic but they can secrete a number of vasoactive compounds (including serotonin and bradykinin), which result in the carcinoid syndrome characterised by bronchospasm, diarrhoea, skin flushing and right-sided valvular heart lesions. Development of the carcinoid syndrome depends on the location of the tumour, and the presence of metastases.

Bronchoscopy identifies up to 80% of carcinoid tumours in the main bronchi. Bronchial carcinoid is seen as a highly vascular 'cherry-like' tumour causing recurrent haemoptysis and bronchial obstruction. Biopsy is usually followed with brisk bleeding and should be done via rigid bronchoscopy.

Plasma chromogranin A is an effective screening test for carcinoid as it is very sensitive, but it is not specific. 24 hour urinary excretion of 5-hydroxyindoleacetic acid is more specific for the diagnosis, but false positives and negatives are present.

CT, VQ scans and chest radiographs can demonstrate carcinoid tumours of the lung, but cannot accurately differentiate between other forms of mass in the lung (for example bronchial carcinoma). Scintigraphic imaging with labelled somatostatin increases the ability to diagnose a carcinoid tumour, but biopsy is required to confirm.

Echocardiogram can demonstrate valvular lesions which suggest carcinoid syndrome, but this will not help to localise the lesion.

A patient with rheumatoid arthritis complains of progressive breathlessness.

Which of the following is the most likely cause?

(Please select 1 option)



Asthma



Fibrosing alveolitis



Pulmonary embolus



Pulmonary eosinophilia



Pulmonary nodules

Please select 1 option)

| | | |
|----------------------------------|------------------------|----------------------------|
| <input type="radio"/> | Asthma | |
| <input checked="" type="radio"/> | Fibrosing alveolitis | This is the correct answer |
| <input type="radio"/> | Pulmonary embolus | |
| <input type="radio"/> | Pulmonary eosinophilia | |
| <input checked="" type="radio"/> | Pulmonary nodules | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Fibrosing alveolitis associated with rheumatoid arthritis is indistinguishable from idiopathic pulmonary fibrosis.

Explanation

Fibrosing alveolitis associated with [rheumatoid arthritis](#) is indistinguishable from idiopathic pulmonary fibrosis. It presents with progressive breathlessness and cough.

Signs include:

- finger clubbing
- cyanosis, and
- bilateral end inspiratory crackles.

Other pulmonary complications of [rheumatoid arthritis](#) include:

- pleural effusions
- [empyema](#)
- cryptogenic organising pneumonia
- [bronchiectasis](#), and
- pulmonary nodules.

The latter are usually asymptomatic but may cavitate, resulting in haemoptysis, and when occurring with coal workers pneumoconiosis (Caplan's syndrome) are associated with breathlessness.

A 56-year-old man presents with night time sweats, nocturia, poor concentration and daytime somnolence.

To which of the following conditions does this diagnosis predispose?

(Please select 1 option)

☐ Hypoglycaemia

☐ Hypotension

☐ Insulin sensitivity

☐ Osteoporosis

☐ Stroke

| | |
|----------------------------------|-----------------------|
| <input type="radio"/> | Hypoglycaemia |
| <input type="radio"/> | Hypotension |
| <input type="radio"/> | Insulin sensitivity |
| <input type="radio"/> | Osteoporosis |
| <input checked="" type="radio"/> | Stroke Correct |

Key Learning Points

Respiratory Medicine

- Sleep apnoea is an independent risk factor for stroke.

Explanation

This history is typical of sleep apnoea.

Sleep apnoea is an independent risk factor for stroke (and death from all causes), and is associated with hypertension, impaired glucose tolerance (IGT) and insulin resistance.

Severe Sleep Apnea and Risk of Ischemic Stroke in the Elderly. Stroke 2006. 37. 2317-2321

Dr Assem

A 32-year-old presents to the Emergency department of her local hospital.

She is complaining of increasing breathless on exertion over the last few weeks. She also reports a dry cough and occasional night sweats. Of note, she is under the care of the infectious disease team for HIV and is also 28 weeks pregnant.

Examination reveals that she is hypoxic, with her oxygen saturations falling still when she is asked to walk. A departmental chest x ray demonstrates bilateral infiltrates.

What is the most appropriate antibiotic treatment for this patient given the likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Amphotericin |
| <input type="radio"/> | Clindamycin and primaquine |
| <input type="radio"/> | Pentamide |
| <input type="radio"/> | Rifampicin, ethambutol, isoniazid, pyrazinamide |
| <input type="radio"/> | Trimethoprim sulfamethoxazole (TMP-SMX) |

Please select 1 option

| | |
|----------------------------------|--|
| <input type="radio"/> | Amphotericin |
| <input type="radio"/> | Clindamycin and primaquine |
| <input type="radio"/> | Pentamidine |
| <input type="radio"/> | Rifampicin, ethambutol, isoniazid, pyrazinamide |
| <input checked="" type="radio"/> | Trimethoprim sulfamethoxazole (TMP-SMX) Correct |

Key Learning Points

Respiratory Medicine

- This patient is immunocompromised and given the clinical history and radiological findings, the likely diagnosis in this lady is PCP (*Pneumocystis pneumonia*). She is also pregnant which affects treatment choice.

Explanation

This patient is immunocompromised and given the clinical history and radiological findings, the likely diagnosis in this lady is PCP (*Pneumocystis pneumonia*). She is also pregnant which affects treatment choice.

Although *Pneumocystis pneumonia* (PCP) is officially a fungal infection it does not respond to anti-fungal medications.

Trimethoprim-sulfamethoxazole (TMP-SMX/co-trimoxazole/Septin) has been shown to be as effective as intravenous pentamidine and more effective than other alternative treatment regimens.

TMP-SMX is the preferred initial therapy during pregnancy according to consensus guidelines. The BNF states that there is a teratogenic risk in the first trimester (as trimethoprim is a folate antagonist), and neonatal haemolysis and methaemoglobinemia in the third trimester. However, there is also considerable risk of harm to the foetus if the mother is unwell. The benefits in this situation therefore outweigh the risks, and it should be used.

For the treatment of infections that are resistant to TMP-SMX, the combination of clindamycin and primaquine is likely to be more effective than intravenous pentamidine¹.

Rifampicin, ethambutol, isoniazid, pyrazinamide are the first line drugs to treat tuberculosis (TB). Although this woman is at risk from TB infection, the clinical history is more in keeping with a diagnosis of PCP.

Adjuvant steroid therapy is indicated in patients with severe PCP infection who have underlying HIV infection.

A 25-year-old man presents to the Emergency department with shortness of breath.

One week ago he developed influenza and has become more short of breath and fatigued in the last 24 hours. His temperature is 38.5°C, his SaO₂ is 90% on 2 L of oxygen, a blood pressure 100/60 mmHg and heart rate 120/min. The CXR shows patchy consolidation.

Which antibiotic therapy should you select for this man?

(Please select 1 option)

| | |
|-----------------------|---------------------------------|
| <input type="radio"/> | Amoxicillin |
| <input type="radio"/> | Amoxicillin and flucloxacillin |
| <input type="radio"/> | Co-amoxiclav and clarithromycin |
| <input type="radio"/> | Co-amoxiclav |
| <input type="radio"/> | Flucloxacillin |

| | | |
|----------------------------------|---------------------------------|----------------------------|
| <input type="radio"/> | Amoxicillin | |
| <input type="radio"/> | Amoxicillin and flucloxacillin | |
| <input type="radio"/> | Co-amoxiclav and clarithromycin | This is the correct answer |
| <input type="radio"/> | Co-amoxiclav | |
| <input checked="" type="radio"/> | Flucloxacillin | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Low severity CAP (CURB 0-1) can be treated with amoxicillin 500mg TDS PO. CURB 2 CAP should be treated with amoxicillin 500 mg-1 g TDS and clarithromycin 500 mg BD.

Explanation

This gentleman has community acquired pneumonia (CAP). The recent history of influenza may lead you to consider staphylococcus aureus as the possible underlying organism, although this is an uncommon cause of CAP in the UK. It is more common in the winter months, and coincident influenza-type symptoms in approximately 40%. Pneumonia complications approximately 3% of cases of influenza, 10% of those admitted have been confirmed to be due to Staphylococcus aureus.

In the majority of patients CAP should be confirmed by chest radiography before the commencement of antibiotics. However, if patients are critically unwell they should be treated for the presumptive diagnosis. Antibiotic treatment should always be initiated within 4 hours of presentation.

CAP caused by Staphylococcus aureus is more likely to present with multilobar shadowing, cavitation, pneumatoceles and spontaneous pneumothorax than other organisms. However, there are no characteristic features of chest radiographs that allow a confident prediction of the likely pathogen. Therefore, the general guidelines for treatment of CAP should be followed until an organism is identified. *Staphylococcus aureus* carries a high mortality, and therefore if suspected treatment should initially be for a severe CAP (see below for details).

Low severity CAP (CURB 0-1) can be treated with amoxicillin 500mg TDS PO. CURB 2 CAP should be treated with amoxicillin 500 mg-1 g TDS and clarithromycin 500 mg BD. Alternatives are available if patients are allergic to any of the above combinations. High severity CAP (CURB 3-5) should be treated as soon as possible with co-amoxiclav 1.2 g TDS and clarithromycin 500 mg BD.

The oral route is recommended in those with low and moderate severity CAP. Patients treated with parenteral antibiotics initially should be switched to an oral regimen once clinical improvement is seen and the patients has been afebrile for at least 24 hours. For most patients with uncomplicated CAP 7 days of antibiotic treatment is recommended. For those with high severity pneumonia where an organism has not been identified, 7-10 days treatment is indicated and extended to 14-21 days where clinically needed.

If *Staphylococcus aureus* is identified, treatment should be altered. Non-MRSA organisms should be treated with flucloxacillin and/or rifampicin; an alternative for penicillin-allergic patients is teicoplanin and rifampicin. MRSA should be treated with vancomycin. A prolonged antibiotic course is indicated.

A 26-year-old patient presented to the Emergency department with severe shortness of breath.

His BP drops to 80/50 mmHg. He is tachycardic and afebrile. His O₂ sat is 74%. Examination has revealed raised JVP and trachea deviated to the left side.

What is the immediate next step?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Aspirate left side of chest using a large bore cannula |
| <input type="radio"/> | Insert a chest drain on the left side |
| <input type="radio"/> | Insert a chest drain on the right side |
| <input type="radio"/> | Request an urgent portable CXR and administer high flow O ₂ while waiting |
| <input type="radio"/> | Request urgent arterial blood gases |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Aspirate left side of chest using a large bore cannula | |
| <input type="radio"/> | Insert a chest drain on the left side | |
| <input type="radio"/> | Insert a chest drain on the right side | This is the correct answer |
| <input type="radio"/> | Request an urgent portable CXR and administer high flow O2 while waiting | |
| <input checked="" type="radio"/> | Request urgent arterial blood gases | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Recognition of tension pneumothorax and immediate course of action.

Explanation

[Pneumothorax](#) can be classified as either primary or secondary. However, more important in this case is the presence of tension.

Tension [pneumothorax](#) results from progressive build-up of air within the pleural space, which is not able to return. This build-up of pressure pushes the mediastinum to the opposite hemithorax and obstructs venous return. The patient then develops severe breathlessness, hypotension, mediastinal shift and, ultimately, [cardiac arrest](#) (often electromechanical dissociation: PEA). The classical signs of a tension [pneumothorax](#) are deviation of the trachea away from the side of tension, hyper-expanded chest that moves minimally with respiration and increased percussion note. JVP may be raised. However, more commonly the only signs are tachycardia, tachypnoea and hypoxia.

Management of tension [pneumothorax](#) is immediate chest decompression with needle thoracostomy. A 14-16G intravenous cannula is inserted into the second rib space in the mid-clavicular line, on the side of the pneumothorax. By acting as a valve, this converts a tension [pneumothorax](#) into a simple pneumothorax.

Definitive treatment of a tension [pneumothorax](#) is chest drain insertion. This is usually done in the Emergency Department with ultrasound guidance. Once the pleura is entered, the tension is relieved and the remainder of the procedure can be undertaken with less time pressure.

In this case, the option of needle thoracostomy is on the incorrect side, so the correct option is inserting a chest drain on the right side. High-flow oxygen is indicated whilst performing this, and chest x ray should be ordered to check the position of the drain. Arterial blood gases may be indicated once the drain is in situ.

Although the above explanation remains correct for the MRCP examination, it is important to be aware that there has been discussion about the use of needle thoracostomy in the medical literature. It has been shown that on occasion it is ineffective in relieving a tension [pneumothorax](#), especially in patients who have very thick chest walls. In addition they are prone to blockage, kinking and dislodging, and can cause a lung laceration which subsequently can lead to air embolisation (especially if a [pneumothorax](#) was not present). Some groups are therefore recommending an urgent chest x ray if there is no haemodynamic compromise.

You are an SHO working in the Emergency department when a 67-year-old gentleman with known COPD attends via ambulance.

He has a short history of increasing breathlessness. He denies a productive cough. On arrival he is dyspnoeic with a respiratory rate of 33. Other observations are as follows saturations 88% on 28% O₂, HR 105 bpm, BP 118/86 mmHg, temperature 36.9°C.

On examination he has a widespread polyphonic wheeze. A blood gas 45 minutes after arrival and following initial treatment is performed, results are as below.

| | | |
|------------------|---------|-------------|
| pH | 7.24 | (7.36-7.44) |
| PCO ₂ | 8.8 kPa | (4.7-6.0) |
| PO ₂ | 8.4 kPa | (11.3-12.6) |

What should your management be?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Call ITU for consideration on invasive ventilation |
| <input type="radio"/> | Continue controlled oxygen and repeated nebuliser therapy - repeat gas in 45 minutes |
| <input type="radio"/> | Continue controlled oxygen, nebulised therapy and IV antibiotics (repeat gas in 45 minutes) |
| <input type="radio"/> | Start non-invasive ventilation (NIV) on settings 10 IPAP and 4 EPAP |
| <input type="radio"/> | Start non-invasive ventilation (NIV) on settings 14 IPAP and 4 EPAP |

- ☐ Call ITU for consideration on invasive ventilation This is the correct answer
- ☐ Continue controlled oxygen and repeated nebuliser therapy - repeat gas in 45 minutes
- ☐ Continue controlled oxygen, nebulised therapy and IV antibiotics (repeat gas in 45 minutes)
- ☐ Start non-invasive ventilation (NIV) on settings 10 IPAP and 4 EPAP
- ☒ Start non-invasive ventilation (NIV) on settings 14 IPAP and 4 EPAP Incorrect answer selected

Remember to wear gloves and goggles, nebulisers in use may irritate patients. If a patient is hypercapnic or acrotic, as in this case, these should be driven by compressed air. If oxygen therapy is needed it should be administered simultaneously by nasal cannulae.

Oxygen should be given to maintain SaO_2 within the patient's individual target range, if available (COPD patients are being given cards with this information, so always ask). ABGs should be repeated at regular intervals to monitor response to treatment, and oxygen weaned when available.

Oral corticosteroids should also be given. 30 mg prednisolone for 7-14 days. Prolonged courses offer no additional benefit.

Antibiotics should be used to treat exacerbations associated with more purulent sputum, consolidation on chest radiograph, or clinical signs of pneumonia. Empirical antibiotic choice should be guided by local policy, and altered to take account of any subsequent culture results.

Non-invasive ventilation (NIV) is the treatment of choice for persistent hypercapnic ventilation failure despite optimal medical therapy. It has been shown in RCTs to reduce intubation rate and mortality in COPD patients with decompensated respiratory acidosis ($\text{pH} < 7.35$ and $\text{pCO}_2 > 6$ kPa). NIV should therefore be considered within the first 60 minutes of hospital arrival in all patients with an acute exacerbation of COPD in whom a respiratory acidosis persists despite maximal medical therapy (controlled oxygen, nebulised salbutamol and ipratropium, prednisolone, antibiotic (where indicated)).

Exceptions may be:

- life threatening hypoxaemia (when invasive ventilation may be more appropriate)
- severe co-morbidity
- severe cognitive impairment (where NIV is not tolerated)
- facial burns/trauma/surgery
- vomiting
- fixed upper airway obstruction
- undrained pneumothorax
- upper GI surgery
- unprotected airway,
- copious respiratory secretions, and
- haemodynamic instability requiring inotropes.

Patients should be sitting or semi-recumbent, and a full-face mask used initially. An initial inspiratory positive airway pressure (IPAP) of 10 cmH_2O and expiratory positive airway pressure (EPAP) of 4-5 cmH_2O should be used. IPAP should be increased by 2-5 cm increments every 10 minutes, with a usual target of 20 cmH_2O or until a therapeutic response is achieved. Oxygen can be introduced into the circuit, usually with a target saturation of 88-92%. Bronchodilators are preferably administered off NIV. Patients should be closely monitored, including ABG, respiratory rate and heart rate. ABGs should be repeated after one hour of NIV therapy, and one hour after subsequent change in settings or four hours in stable patients.

All non-invasive ventilation services should have their own local protocol based on these guidelines. There should be a clear plan of what to do in the event of deterioration.

Patients with a $\text{pH} < 7.25$ should be managed with a low threshold for intubation, and this should be considered in this case. Functional status, BMI, requirement for oxygen when stable, comorbidities and previous admissions should be considered in addition to age and FEV1 when assessing suitability. Whilst in clinical practice you would give NIV whilst awaiting consideration from intensive care, it is important to consider intubation in this patient who is failing to improve and remains persistently severely acidotic.

Intravenous theophylline should be used only if there is an inadequate response to nebulised bronchodilators. Levels should be closely monitored.

Respiratory stimulants are only indicated when NIV is inappropriate, and their use supervised by a specialist physician.

There is no indication from the information provided that this is an infective exacerbation so the use of antibiotics at this time is not indicated.

A 21-year-old woman presents to the Emergency department with an hour history of chest tightness, dyspnoea, tingling in her hands and light-headedness. She has neither past medical history nor family history of note.

Examination is unremarkable aside from an elevated respiratory rate. Her pulse oximetry shows saturations of 96% on air, which do fall when she walks across the room. A chest x ray is also normal. An arterial blood gas sample (on air and at rest) is obtained and the results are as follows:

| | | |
|------------------|-----------|---------------|
| pH | 7.52 | (7.36 - 7.44) |
| pCO ₂ | 2.2kPa | (4.7 - 6.0) |
| pO ₂ | 9.1kPa | (11.3 - 12.6) |
| HCO ₃ | 25 mmol/L | (20 - 28) |

What is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|--------------------------------|
| <input type="radio"/> | Acute asthma attack |
| <input type="radio"/> | Hyperventilation (psychogenic) |
| <input type="radio"/> | Pulmonary embolism |
| <input type="radio"/> | Respiratory muscle disease |
| <input type="radio"/> | Volume depletion |

Please select 1 option

| | | |
|----------------------------------|--------------------------------|----------------------------|
| <input type="radio"/> | Acute asthma attack | |
| <input type="radio"/> | Hyperventilation (psychogenic) | |
| <input type="radio"/> | Pulmonary embolism | This is the correct answer |
| <input type="radio"/> | Respiratory muscle disease | |
| <input checked="" type="radio"/> | Volume depletion | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The blood gas demonstrates respiratory alkalosis with type I respiratory failure. This question requires an understanding of the physiological acid balance, and the causes of disturbances to it.

Explanation

This patient's blood gas sample shows respiratory alkalosis, as demonstrated by the raised pH, low $p\text{CO}_2$ and normal bicarbonate. Her $p\text{O}_2$ is over 8kPa, and she is therefore not technically in type 1 respiratory failure, but it is important to realise she is working hard to maintain this oxygenation. The most likely cause is an acute pulmonary embolism given the relative hypoxia, and saturation dropping on exertion. Given her age she may be taking the oral contraceptive pill, which would be a risk factor.

In acute asthma the $p\text{CO}_2$ may be low, as the patient has an elevated respiratory rate, however in this instance there should be a history of the condition, clinical signs or a reduced $p\text{O}_2$.

Hyperventilation often demonstrates a respiratory alkalosis picture on analysis, however she should have a normal $p\text{O}_2$ and her saturations should not fall on exertion.

Respiratory muscle disease typically results in a respiratory acidosis.

Volume depletion (from a number of causes) would typically cause a metabolic alkalosis.

A 31-year-old motorcyclist becomes confused and dyspnoeic on the orthopaedic ward, 24 hours after fracturing his right femur in an accident.

Which of the following skin lesions may be found on examination?

(Please select 1 option)

- | | |
|-----------------------|---------------------------------------|
| <input type="radio"/> | Multiple petechiae in both axilla |
| <input type="radio"/> | Palpable purpura on buttocks and legs |
| <input type="radio"/> | Target lesions on his chest |
| <input type="radio"/> | Tender red nodules on his shins |
| <input type="radio"/> | Vesicular lesions on his torso |

| | | |
|----------------------------------|---------------------------------------|----------------------------|
| <input type="radio"/> | Multiple petechiae in both axilla | This is the correct answer |
| <input type="radio"/> | Palpable purpura on buttocks and legs | |
| <input type="radio"/> | Target lesions on his chest | |
| <input checked="" type="radio"/> | Tender red nodules on his shins | Incorrect answer selected |
| <input type="radio"/> | Vesicular lesions on his torso | |

Key Learning Points

Respiratory Medicine

- Fat emboli can develop following long bone fractures, and are characterised by dyspnoea, confusion and a petechial rash.

Explanation

The appearance of multiple petechiae in the distribution of the axilla or upper body is characteristic of a fat embolism.

Unlike emboli that arise from a thrombus, fat emboli are small and multiple producing widespread effects. They may occur one to three days following a fracture and are more common in closed fractures on the long bones or pelvis.

The clinical features of fat emboli are predominately:

- Pulmonary (shortness of breath, hypoxia)
- Neurological (confusion and agitation)
- Dermatological (petechiae), and
- Haematological (thrombocytopenia, anaemia).

The petechial rash is pathognomonic of this syndrome, but occurs in only 30-50% of cases.

A 45-year-old woman solicitor presents with shortness of breath and a dry cough. She has been treated by her GP with a salbutamol inhaler but tells you that this has made no difference at all to her symptoms.

In addition she has an itchy raised rash on both shins. On examination her BP is 145/82 mmHg, pulse is 80 and regular. Her BMI is 28. Lungs appear normal on auscultation. There is a rash on her shins consistent with erythema nodosum.

Which of the following investigations is most likely to confirm the diagnosis?

(Please select 1 option)

| | |
|-----------------------|------------------------|
| <input type="radio"/> | AAFB staining |
| <input type="radio"/> | Bronchoalveolar lavage |
| <input type="radio"/> | CT thorax |
| <input type="radio"/> | Serum ACE |
| <input type="radio"/> | Transbronchial biopsy |

| | |
|----------------------------------|--|
| <input type="radio"/> | AAFB staining |
| <input type="radio"/> | Bronchoalveolar lavage |
| <input type="radio"/> | CT thorax |
| <input type="radio"/> | Serum ACE |
| <input checked="" type="radio"/> | Transbronchial biopsy Correct |

Key Learning Points

Respiratory Medicine

- Transbronchial biopsy is the definitive route to confirming a diagnosis of sarcoidosis.

Explanation

A dry cough with the presence of erythema nodosum raises the possibility of sarcoidosis. You are asked to specify the investigation most likely to confirm the diagnosis, as such only transbronchial biopsy will determine whether non-caseating granulomas are present or not.

AAFB staining would be confirmatory for a diagnosis of tuberculosis.

Given this woman is a solicitor, it is less likely she has had significant TB exposure versus sarcoidosis.

Bronchoalveolar lavage may demonstrate increased lymphocytes, although this is a non-specific finding.

Serum ACE is raised in 60% of patients with sarcoidosis.

Transbronchial biopsy is therefore the definitive route to confirming the diagnosis.

A 71-year-old man presents with severe emphysema. He is on maximal therapy including high dose Seretide and tiotropium. He tells you that he is so unwell that he can barely manage the walk of 200 metres to the corner shop.

On examination he looks short of breath at rest. His BP is 155/72 mmHg, pulse is 75 and regular. There are quiet breath sounds, occasional coarse crackles and wheeze on auscultation of the chest.

Investigations show:

| | | |
|------------------|----------------------------------|-------------|
| Haemoglobin | 141 g/L | (135-177) |
| White cell count | $8.1 \times 10^9/L$ | (4-11) |
| Platelets | $292 \times 10^9/L$ | (150-400) |
| Sodium | 136 mmol/L | (135-146) |
| Potassium | 4.0 mmol/L | (3.5-5) |
| Creatinine | 123 $\mu\text{mol/L}$ | (79-118) |
| pH | 7.42 | (7.35-7.45) |
| pCO ₂ | 7.4 kPa | (4.8-6.1) |
| pO ₂ | 9.8 kPa | (10-13.3) |
| CXR | Predominant upper lobe emphysema | |
| FEV1 | 30% of predicted | |

Which of the features of his history, examination or investigations would preclude referral for lung reduction surgery?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | FEV1 30% predicted |
| <input type="radio"/> | pCO ₂ 7.4 |
| <input type="radio"/> | pO ₂ 9.8 |
| <input type="radio"/> | Predominant upper lobe emphysema |
| <input type="radio"/> | Severe limitation of exercise capacity |

| | |
|----------------------------------|--|
| <input type="radio"/> | FEV1 30% predicted |
| <input checked="" type="radio"/> | pCO ₂ 7.4 This is the correct answer |
| <input type="radio"/> | pO ₂ 9.8 |
| <input type="radio"/> | Predominant upper lobe emphysema |
| <input checked="" type="radio"/> | Severe limitation of exercise capacity Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Lung volume reduction surgery is a palliative treatment which can be used in advanced COPD to remove the least functional part of the lungs. The upper cut off for referral for lung reduction surgery for pCO₂ is 7.3.

Explanation

Lung volume reduction surgery is a palliative treatment which can be used in advanced COPD to remove the least functional part of the lungs. Techniques used include median sternotomy, video-assisted thoracoscopy and thoracotomy.

Very mild hypoxia (pO₂ is just below the lower limit of normal) need not necessarily preclude referral for lung reduction surgery, but CO₂ retention does. The upper cut off for referral for lung reduction surgery for pCO₂ is 7.3; as such he is unsuitable for referral.

Severe limitation of exercise capacity despite maximal therapy is an indication for referral for lung reduction surgery. Other factors include predominant upper lobe emphysema, and persistent symptoms despite a period of pulmonary rehabilitation.

In general the following selection criteria are used when assessing suitability for treatment:

- Age <75 years
- Emphysema by clinical evaluation
- Ex-smoker of more than 4 months
- Clinically stable on no more than 20mg prednisolone daily
- Significant functional limitation after 6-12 weeks of pulmonary rehabilitation on optimal medical therapy
- Demonstrated compliance with medical regimen
- FEV-1 >20% predicted
- Post-bronchodilator FEV-1 >45% predicted and >15% if >70 years
- Hyperinflation demonstrated by TLC >100% predicted and RV >150% predicted
- Carbon monoxide lung transfer factor greater than 20% predicted
- Post rehabilitation 6 minute walk distance >140 m
- Low post rehabilitation exercise capacity
- HRCT demonstrating bilateral severe emphysema, ideally with upper-lobe predominance

A 72-year-old man is referred to the lung cancer MDM by his respiratory physician for discussion of treatment following his recent diagnosis with stage IIIa non-small cell lung cancer (NSCLC). He has previously been deemed unsuitable for surgery due to high anaesthetic risk.

According to NICE guidelines, what is the first choice treatment in eligible patients with this stage of NSCLC in whom surgery is not appropriate?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Chemotherapy |
| <input type="radio"/> | Chemotherapy and radical radiotherapy |
| <input type="radio"/> | Radical radiotherapy |
| <input type="radio"/> | Palliation |
| <input type="radio"/> | Symptomatic management including palliative RT |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Chemotherapy | |
| <input type="radio"/> | Chemotherapy and radical radiotherapy | This is the correct answer |
| <input type="radio"/> | Radical radiotherapy | |
| <input type="radio"/> | Palliation | |
| <input checked="" type="radio"/> | Symptomatic management including palliative RT | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- This question requires knowledge of both staging for lung cancer and the treatment modalities available.

Explanation

Sequential chemo-radiotherapy should be offered to patients with stage III NSCLC who are not suitable for surgery but are eligible for radical radiotherapy.

Surgery alone should be the first line option for patients with stage I and II provided there are no medical contraindications and they have adequate lung function.

Radical radiotherapy is indicated for patients with stage I, II or III NSCLC who have good performance status (WHO 0, 1) and whose disease can be encompassed in a radiotherapy treatment volume without undue risk of normal tissue damage.

Symptomatic treatment should be considered as the most appropriate management in patients with stage IV disease and poor WHO performance status.

The NICE guidelines are just that, and treatment decisions will be based on clinical status and performance status of the patient.

A 45-year-old man presents to the clinic for review.

Over the past few months he has suffered increasing night sweats, fatigue, weight loss and a chronic cough. In addition he has presented to his GP with bilateral parotid swelling and red, painful eyes on three occasions in the past year. Most recently he has suffered a weakness of the left side of his face.

On examination his BP is 135/75 mmHg, pulse is 80 and regular, there are bilateral scattered crackles on auscultation of the chest and bilateral parotid swellings. He has a left lower motor neurone seventh nerve palsy.

Investigations show:

| | | |
|------------------|-----------------------|-----------|
| Haemoglobin | 141 g/L | (135-177) |
| White cell count | $6.2 \times 10^9/L$ | (4-11) |
| Platelets | $312 \times 10^9/L$ | (150-400) |
| Sodium | 139 mmol/L | (135-146) |
| Potassium | 3.8 mmol/L | (3.5-5) |
| Creatinine | 110 $\mu\text{mol/L}$ | (79-118) |

Which of the following is the most likely diagnosis?

(Please select 1 option)

| | |
|----------------------------------|----------------------|
| <input type="radio"/> | Felty's syndrome |
| <input type="radio"/> | Heerfordt's syndrome |
| <input type="radio"/> | Lofgren's syndrome |
| <input checked="" type="radio"/> | Meig's syndrome |
| <input type="radio"/> | Turner's syndrome |

(Please select 1 option)

| | | |
|----------------------------------|----------------------|----------------------------|
| <input type="radio"/> | Felty's syndrome | |
| <input checked="" type="radio"/> | Heerfordt's syndrome | This is the correct answer |
| <input type="radio"/> | Lofgren's syndrome | |
| <input type="radio"/> | Meig's syndrome | |
| <input checked="" type="radio"/> | Turner's syndrome | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Heerfordt's syndrome is an acute presentation of sarcoidosis, which presents with fever, uveitis, swelling of the parotid and other salivary and lacrimal glands.

Explanation

Heerfordt's syndrome is an acute presentation of **sarcoidosis**, which presents with fever, **uveitis**, swelling of the parotid and other salivary and lacrimal glands. Facial nerve palsy may be a feature, and other features of **sarcoidosis** may co-exist (e.g. skin lesions, pulmonary involvement). As it represents a form of neurosarcoidosis, other neurological features may be present (e.g. meningism, ophthalmoplegia and pupillary reflex dysfunction).

Felty's syndrome is the association triad of rheumatoid arthritis, neutropenia and splenomegaly. It is rare, and getting rarer with the better treatment of rheumatoid arthritis. Its cause is unknown, but it is associated with the HLA-DR4 genotype which is associated with a more aggressive form of the disease.

Lofgren's syndrome is a subtype of **sarcoidosis** which presents with hilar lymphadenopathy, **erythema nodosum**, arthralgia and fever. Prognosis is good, and the development of chronic disease is rare.

Meig's syndrome is the association of a benign ovarian tumour, ascites and pleural effusion. Classically, the fluid resolves if the tumour is removed. In its original description the tumour is a fibroma, but can be a thecoma, cystadenoma or granulosa cell tumour (when it is referred to as pseudo-Meigs' syndrome).

Turner's is the syndrome associated with the XO sex chromosome type. Affected girls have a classical appearance, including neck webbing, short stature and ovarian failure. There is also an increased risk of congenital heart defects, **lymphoedema**, renal malformations, deafness and osteoporosis.

A 67-year-old man who has a long history of chronic bronchitis is admitted from home with an acute exacerbation.

Investigations show:

| | | |
|------------------|---------|-----------|
| pCO ₂ | 11 kPa | (4.7-6) |
| pO ₂ | 6.7 kPa | (10-13.3) |

Which of the following would be expected in this patient?

(Please select 1 option)

- ☐ A metabolic acidosis with a low bicarbonate would be expected
- ☐ Extensor plantar responses may be expected
- ☐ Gentamicin would be a reasonable initial treatment until cultures are available
- ☐ Oxygen therapy should aim to increase the pO₂ to above 8 kPa (60 mmHg)
- ☐ Peripheral oedema indicates coexisting heart failure

- ☐ A metabolic acidosis with a low bicarbonate would be expected
- ☒ Extensor plantar responses may be expected This is the correct answer
- ☐ Gentamicin would be a reasonable initial treatment until cultures are available
- ☒ Oxygen therapy should aim to increase the pO_2 to above 8 kPa (60 mmHg) Incorrect answer selected
- ☐ Peripheral oedema indicates coexisting heart failure

Key Learning Points

Respiratory Medicine

- One of the CNS signs of type 2 respiratory failure is extensor plantar reflexes.

Explanation

Together with emphysema, chronic bronchitis is part of the spectrum of respiratory disease described as chronic obstructive pulmonary disease (COPD). Chronic bronchitis itself is defined as chronic cough and sputum production for at least three months of two consecutive years in the absence of other disease which could explain these symptoms.

The ABG here demonstrates type 2 respiratory failure. The patient is likely to be acidotic, due to the raised pCO_2 - that is, a respiratory acidosis. The bicarbonate is likely to be normal, or raised if the patient has chronic hypercapnia.

The signs and symptoms of respiratory acidosis are:

| Central nervous system | Respiratory system | Cardiovascular system |
|---|------------------------|---|
| Cerebral vasodilation | Breathlessness | Flushing, bounding pulse |
| Increased intracranial pressure | Cyanosis | Cor pulmonale |
| Headache, confusion, agitation | Pulmonary hypertension | Systemic hypotension |
| Hallucinations, transient psychosis | | Arrhythmias |
| Myoclonic jerks, flapping tremor, extensor plantars, depressed reflexes | | Initially good cardiac output, then decreases |
| Papilloedema, constricted pupils | | |
| Seizures, coma | | |

BT's guidelines would recommend treatment of exacerbations with amoxicillin, co-amoxiclav or cephalosporin (depending on local sensitivities). Gentamicin is not usually indicated.

Oxygen should be given to maintain SpO_2 within the patient's individual target range, if available (COPD patients are being given cards with this information, so always ask). If the individual target is not known, saturations should be maintained at 88-92%. ABGs should be repeated at regular intervals to monitor response to treatment, and oxygen weaned when possible. The ABG is used to see the pH and pCO_2 , and it is these values that guide treatment rather than the pO_2 alone.

Peripheral oedema may be present as a dependent oedema, as patients with COPD may have limited mobility due to dyspnoea, and therefore does not necessarily indicate heart failure.

A 72-year-old man is referred to the chest clinic with a progressive history of dyspnoea, and a dry cough over the last eight months. He currently smokes 20/day and has done for 53 years.

He has had several episodes of acute shortness of breath for which he has received antibiotics from his GP.

On examination he is clubbed, and basal inspiratory crepitations are heard on auscultation. His oxygen saturations are 87% on air.

He undergoes a high-resolution computed tomography (HRCT) which demonstrates bilateral basal and subpleural reticular changes with honeycombing evident.

What is the most likely diagnosis?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | Cryptogenic organising pneumonia (COP) |
| <input type="radio"/> | Desquamative interstitial pneumonia (DIP) |
| <input type="radio"/> | Non-specific interstitial pneumonia (NSIP) |
| <input type="radio"/> | Respiratory bronchiolitis - interstitial lung disease (RB-ILD) |
| <input type="radio"/> | Usual interstitial pneumonia (UIP) |

| | |
|----------------------------------|--|
| <input type="radio"/> | Cryptogenic organising pneumonia (COP) |
| <input type="radio"/> | Desquamative interstitial pneumonia (DIP) |
| <input type="radio"/> | Non-specific interstitial pneumonia (NSIP) |
| <input type="radio"/> | Respiratory bronchiolitis - interstitial lung disease (RB-ILD) |
| <input checked="" type="radio"/> | Usual interstitial pneumonia (UIP) Correct |

Key Learning Points

Respiratory Medicine

- This question addresses the diffuse parenchymal (interstitial) lung diseases (DPLD) and in particular focuses on idiopathic interstitial pneumonitis (IIP).

Explanation

This patient most likely has idiopathic interstitial pneumonitis (IIP).

IIP is further subdivided into

- Usual interstitial pneumonia (previously known as idiopathic pulmonary fibrosis, or cryptogenic fibrosing alveolitis) and
- Non-usual interstitial pneumonitis.

UIP causes 70% of IIP. It is typically found in an older population and is characterised by a gradual onset with acute exacerbations. It is worse in smokers.

Reticular abnormalities, honeycombing and traction **bronchiectasis** are typical HRCT findings. Unfortunately patients with UIP have a poor response to steroids and immunosuppressants and the median survival is two to three years post-diagnosis.

The remaining answers are members of the non-usual interstitial pneumonitis (non-UIP). Of this group non-specific interstitial pneumonia (NSIP) is the most common. On CT there is typically ground glass appearance and there is better steroid responsiveness when compared to UIP, with an improved survival.

COP is subacute and tends to cause patchy consolidation and/or nodules on CT scan.

RB-ILD usually occurs in heavy smokers. CT findings include bronchial wall thickening and patchy ground glass appearance.

DIP is a form of severe RB-ILD.

A 19-year-old intravenous drug user presents to the emergency department with a fever of 38.5°C, dyspnoea, and right sided pleuritic chest pain.

Bilateral cavitating lesions are seen in both lungs on his chest x ray.

What is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Aspiration pneumonia |
| <input type="radio"/> | Endocarditis of the tricuspid valve |
| <input type="radio"/> | <i>Pneumocystis jirovecii</i> pneumonia (PCP) |
| <input type="radio"/> | Pulmonary embolic disease |
| <input type="radio"/> | Pulmonary tuberculosis |

(Please select 1 option)

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Aspiration pneumonia | |
| <input checked="" type="radio"/> | Endocarditis of the tricuspid valve | This is the correct answer |
| <input type="radio"/> | <i>Pneumocystis jirovecii</i> pneumonia (PCP) | |
| <input checked="" type="radio"/> | Pulmonary embolic disease | Incorrect answer selected |
| <input type="radio"/> | Pulmonary tuberculosis | |

Key Learning Points

Respiratory Medicine

- Systemic embolisation occurs in 20-50% of cases of infective endocarditis and can involve the lungs, central nervous system, coronary arteries, spleen, bowel and extremities.

Explanation

PCP can be excluded as it does not present in this manner.

Aspiration pneumonia is more likely to show a single abscess cavity rather than multiple bilateral lesions.

The patient is certainly at higher risk of TB and this is difficult to exclude without additional information regarding constitutional symptoms (weight loss, night sweats, etc).

Pulmonary emboli could arise in this situation, but the chest radiograph is typically normal in that situation. If PEs do result in any change on CXR it is usually in the form of wedge shaped infarcts.

The best answer, therefore, is that these cavities are due to septic emboli arising from infection on the tricuspid valve. Systemic embolisation occurs in 20-50% of cases of infective endocarditis, and can involve the lungs, central nervous system, coronary arteries, spleen, bowel and extremities. This highest incidence of emboli is seen with aortic and mitral valve infections, due to *S. aureus*, *Candida*, HACEK and Abiotrophia. Most occur within the first 2-4 weeks of therapy.

A 22-year-old student who is known to have severe asthma is brought to the Emergency department by his flatmates. He has been suffering from influenza over the past few days, and been getting progressively increasing cough, wheeze and shortness of breath.

He takes regular high dose Seretide and montelukast. His usual peak flow is 460 (predicted 590).

On examination his BP is 123/80 mmHg, his pulse is 105 and regular, respiratory rate is 35. There is marked wheeze on auscultation of his chest.

Investigations show:

| | | |
|------------------|----------|-------------|
| pH | 7.43 | (7.35-7.45) |
| pCO ₂ | 6.4 kPa | (4.8-6.1) |
| pO ₂ | 10.3 kPa | (10-13.3) |

Which of the features is consistent with near fatal asthma according to BTS guidelines?

(Please select 1 option)

| | |
|-----------------------|----------------------|
| <input type="radio"/> | Peak flow 280 |
| <input type="radio"/> | pCO ₂ 6.4 |
| <input type="radio"/> | pO ₂ 10.3 |
| <input type="radio"/> | Pulse 100 |
| <input type="radio"/> | Respiratory rate 35 |

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| | |
|----------------------------------|--|
| <input type="radio"/> | Peak flow 280 |
| <input checked="" type="radio"/> | pCO ₂ 6.4 This is the correct answer |
| <input type="radio"/> | pO ₂ 10.3 |
| <input type="radio"/> | Pulse 100 |
| <input checked="" type="radio"/> | Respiratory rate 35 Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Raised CO₂ or the need for mechanical ventilation with raised pressures is indicative of near fatal asthma.

Explanation

Raised CO₂ or the need for mechanical ventilation with raised pressures is indicative of near fatal asthma.

Indications of life threatening asthma are also defined in the guidelines, these are:

- PEF <33% best or predicted
- SpO₂ <92%
- PaO₂ <8 kPa
- Normal PaCO₂ (4.6-6.0 kPa)
- Silent chest
- Cyanosis
- Poor respiratory effort
- Arrhythmia
- Exhaustion, altered conscious level.

Therefore, pCO₂ 6.4 is the only possible correct answer.

A man is referred to the medical admission unit with increasing breathlessness over the last six months since starting work as a stablehand at a new yard.

He reports initially symptoms of dyspnoea in the evenings with a dry cough. He has also noted occasional fevers at night. His breathing has become steadily worse.

A chest x ray is performed which shows some fluffy nodular shadowing.

What is the most likely causative agent for his condition?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | Avian proteins |
| <input type="radio"/> | <i>Epicoccum nigrum</i> |
| <input type="radio"/> | <i>Klebsiella</i> |
| <input type="radio"/> | <i>Penicillium</i> species |
| <input type="radio"/> | Thermophilic <i>Actinomyces</i> bacteria |

Please select 1 option

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Avian proteins | |
| <input type="radio"/> | <i>Epicoccum nigrum</i> | |
| <input type="radio"/> | <i>Klebsiella</i> | |
| <input checked="" type="radio"/> | <i>Penicillium</i> species | Incorrect answer selected |
| <input type="radio"/> | Thermophilic <i>Actinomyces</i> bacteria | This is the correct answer |

Key Learning Points

Respiratory Medicine

- The most common example of allergic alveolitis is farmer's lung. This is caused by dust from mouldy hay contaminated with thermophilic *Actinomyces* bacteria.

Explanation

The most common example of allergic alveolitis is farmer's lung.

This is caused by dust from mouldy hay contaminated with thermophilic *Actinomyces* bacteria, and as a stablehand this patient is likely to have been in close contact with this allergen. Typically symptoms tend to occur several hours after exposure. Chest x ray may demonstrate fluffy nodular shadowing or ground glass appearances.

Avian proteins are the allergen responsible for pigeon fancier's lung.

Penicillium species are responsible for respiratory disease in cheese and cork workers and are due to fungal contaminants of materials.

Klebsiella and *Epicoccum nigrum* are other bacterial causes of allergic alveolitis and are found in contaminated water, wood shavings, etc.

A 25-year-old man presented to the Emergency Department with cough, shortness of breath and headache. He had been treated by his GP with amoxicillin but did not improve. He had recently been on holiday in Spain. On examination he had bilateral crackles. His liver enzymes were deranged.

What would be the most useful diagnostic test?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | Chest x ray |
| <input type="radio"/> | O ₂ saturation at rest and on exertion |
| <input type="radio"/> | Viral serology |
| <input type="radio"/> | White cell count |
| <input type="radio"/> | Urinary antigen |

Please select 1 option

| | |
|----------------------------------|---|
| <input type="radio"/> | Chest x ray |
| <input type="radio"/> | O ₂ saturation at rest and on exertion |
| <input type="radio"/> | Viral serology |
| <input type="radio"/> | White cell count |
| <input checked="" type="radio"/> | Urinary antigen Correct |

Key Learning Points

Respiratory Medicine

- Recognition of atypical pneumonia and legionnaires' disease

Explanation

Legionella pneumonia is spread via aerosols.

It occurs in 2-15% of community acquired pneumonia. It should be suspected in case of foreign travel or stay in hotels, failure to respond to penicillins, diarrhoea accompanying respiratory symptoms, deranged liver function tests and low sodium.

The diagnostic test is urinary antigen. One should not wait for the result. Sputum cultures (if productive) are also diagnostic.

O₂ saturation at rest and desaturation after exertion will help in *Pneumocystis jirovecii* pneumonia (PCP).

Chest x ray may show unilateral or bilateral lobar pneumonia and there may be small pleural effusions but this is not diagnostic.

WCC may be high or low.

| | | |
|------------------|----------------|-----------------|
| pO ₂ | 10 kPa/75 mmHg | (11.3-12.6 kPa) |
| pCO ₂ | 7 kPa/52 mmHg | (4.7-6.0 kPa) |
| pH | 7.47 | (7.36-7.44) |
| Bicarbonate | 37 mmol/L | (20-28) |

Which of the following is the most likely cause?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Acute exacerbation of chronic obstructive pulmonary disease |
| <input type="radio"/> | Chronic hyperventilation syndrome |
| <input type="radio"/> | Diabetic coma |
| <input type="radio"/> | Pulmonary embolism |
| <input type="radio"/> | Pyloric obstruction |

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| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Acute exacerbation of chronic obstructive pulmonary disease | |
| <input type="radio"/> | Chronic hyperventilation syndrome | |
| <input type="radio"/> | Diabetic coma | |
| <input checked="" type="radio"/> | Pulmonary embolism | Incorrect answer selected |
| <input type="radio"/> | Pyloric obstruction | This is the correct answer |

Key Learning Points

Respiratory Medicine

- Pyloric stenosis is the commonest neonatal surgical condition and hence a detailed understanding of the pathophysiology is essential.

Explanation

These results demonstrate a metabolic alkalosis and there is respiratory compensation with an elevation of $p\text{CO}_2$.

Consequently, $p\text{O}_2$ is slightly low.

The most probable cause out of those given is pyloric stenosis.

A 32-year-old woman presented with daytime sleepiness and fatigue.

She does not take any regular medications. She denies snoring at night. On detailed history, she describes having episodes of probable cataplexy.

Clinical examination is unremarkable. Thyroid function tests are normal.

The patient is suspected of having narcolepsy.

Which of the following tests will be most useful in diagnosis?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Genetic analysis |
| <input type="radio"/> | High hypocretin levels in cerebrospinal fluid (CSF) analysis |
| <input type="radio"/> | Multiple sleep latency test |
| <input type="radio"/> | Polysomnography |
| <input type="radio"/> | Trial of continuous positive airway pressure (CPAP) |

| | |
|----------------------------------|---|
| <input type="radio"/> | Genetic analysis |
| <input type="radio"/> | High hypocretin levels in cerebrospinal fluid (CSF) analysis |
| <input type="radio"/> | Multiple sleep latency test This is the correct answer |
| <input checked="" type="radio"/> | Polysomnography Incorrect answer selected |
| <input type="radio"/> | Trial of continuous positive airway pressure (CPAP) |

Key Learning Points

Respiratory Medicine

- Diagnosis of narcolepsy

Explanation

Cataplexy is an important feature of narcolepsy. There is lower than normal hypocretin levels in CSF. There is high rate of HLA-DQB1*0602 but this is not diagnostic.

Polysomnography can sometimes be done to exclude obstructive sleep apnoea (OSA) but will not diagnose narcolepsy.

Nasal CPAP is used in treatment of OSA and not used for narcolepsy.

A 19-year-old man presents with sudden onset left-sided pleuritic chest pain and dyspnoea. He has no past medical history of note and takes no regular medication.

On examination he looks in pain. He has a respiratory rate of 35 and his BP is 110/70 mmHg, with a pulse of 95. His chest sounds appear normal.

Investigations show

| | | |
|------------------|---|-----------|
| Haemoglobin | 148 g/L | (135-180) |
| White cell count | $5.0 \times 10^9/L$ | (4-10) |
| Platelets | $201 \times 10^9/L$ | (150-400) |
| Sodium | 141 mmol/L | (134-143) |
| Potassium | 4.8 mmol/L | (3.5-5) |
| Creatinine | 94 $\mu\text{mol/L}$ | (60-120) |
| CXR | Small rim of air <2 cm on the left hand side. | |

Which of the following is the most appropriate management?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Air aspiration |
| <input type="radio"/> | Discharge for review the following day |
| <input type="radio"/> | Large bore chest drain |
| <input type="radio"/> | Observe and give oxygen |
| <input type="radio"/> | Small bore chest drain |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Air aspiration | This is the correct answer |
| <input type="radio"/> | Discharge for review the following day | |
| <input type="radio"/> | Large bore chest drain | |
| <input type="radio"/> | Observe and give oxygen | |
| <input checked="" type="radio"/> | Small bore chest drain | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Only primary pneumothoraces (less than 2 cm) which are not associated with dyspnoea should be managed with discharge and instructions to return if they become dyspnoeic.

Explanation

Only primary pneumothoraces (less than 2 cm) which are not associated with dyspnoea should be managed with discharge and instructions to return if they become dyspnoeic.

In this case, aspiration should be considered.

If air aspiration is unsuccessful, a repeat can be attempted. If still unsuccessful then small bore chest drain insertion is the treatment of choice.

If there is a previous history of chest disease, the pneumothorax is considered to be secondary. If the patient is younger than 50 and the rim of air is less than 2 cm, aspiration can be attempted. If the patient is older, the rim is larger, or initial aspiration is unsuccessful then a chest drain should be inserted.

In which of the following have randomised controlled trials shown that long term oxygen therapy (LTOT) reduces mortality?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Asthma |
| <input type="radio"/> | Cor pulmonale due to chronic airflow obstruction |
| <input type="radio"/> | Cystic fibrosis |
| <input type="radio"/> | Idiopathic pulmonary fibrosis |
| <input type="radio"/> | Pulmonary sarcoidosis |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Asthma | |
| <input type="radio"/> | Cor pulmonale due to chronic airflow obstruction | This is the correct answer |
| <input type="radio"/> | Cystic fibrosis | |
| <input type="radio"/> | Idiopathic pulmonary fibrosis | |
| <input checked="" type="radio"/> | Pulmonary sarcoidosis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Long term oxygen therapy reduces mortality from secondary vascular complications but does not affect the progression of the airways disease

Explanation

Adequate data for LTOT prolonging survival exist only for chronic obstructive pulmonary disease (COPD) although in practice it is assumed to apply in other chronic hypoxaemic lung conditions.

A 60-year-old patient attending pre-operative assessment tells you he has had shortness of breath for the last week.

The chest x ray shows right lower lobe consolidation.

Which of the following features should prompt you to consider admission to hospital?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Audible bronchial breathing |
| <input type="radio"/> | A PaO_2 of 9.8 kPa (11-13) |
| <input type="radio"/> | A respiratory rate of 32/min |
| <input type="radio"/> | A SaO_2 of 95% |
| <input type="radio"/> | A white cell count of $16.8 \times 10^9/\text{L}$ (4-10) |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Audible bronchial breathing | |
| <input type="radio"/> | A PaO_2 of 9.8 kPa (11-13) | |
| <input type="radio"/> | A respiratory rate of 32/min | This is the correct answer |
| <input type="radio"/> | A SaO_2 of 95% | |
| <input checked="" type="radio"/> | A white cell count of $16.8 \times 10^9/\text{L}$ (4-10) | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- If the CURB score is 1-2 then risk of death is increased and hospital admission should be considered.

Explanation

The British Thoracic Society guidelines on [community acquired pneumonia in adults](#) recommend use of the CURB-65.

This is a 5-point score, one point for each of:

- Confusion
- Urea more than 7 mmol/L
- Respiratory rate 30/min or more
- Systolic Blood pressure below 90 mmHg (or diastolic below 60 mmHg)
- Age 65 years or older.

If the CURB score is 1-2 then risk of death is increased and hospital admission should be considered.

A CURB score of 3 or more puts the patient at high risk of death and hospital admission is warranted.

A 40-year-old gentleman is referred to the chest clinic with worsening asthma symptoms. He had been diagnosed with late onset asthma aged 35 years.

On questioning the patient reports a short history of malaise, fever and tender subcutaneous nodules on his legs. He has had no haemoptysis.

A full blood count is performed and the results are as follows:

| | | |
|------------------|----------------------|------------|
| Haemoglobin | 145 g/L | (130-180) |
| Platelet count | $240 \times 10^9/L$ | (150-400) |
| White cell count | $12.5 \times 10^9/L$ | (4-11) |
| Neutrophils | $7.8 \times 10^9/L$ | (1.5-7) |
| Lymphocytes | $2.5 \times 10^9/L$ | (1.5-4) |
| Monocytes | $0.1 \times 10^9/L$ | (0-0.8) |
| Eosinophils | $2.0 \times 10^9/L$ | (0.04-0.4) |
| Basophils | $0.09 \times 10^9/L$ | (0-0.1) |

A full blood count from three years earlier was reviewed and its results were as follows:

| | | |
|------------------|---------------------|------------|
| Haemoglobin | 125 g/L | (130-180) |
| Platelet count | $162 \times 10^9/L$ | (150-400) |
| White cell count | $9.5 \times 10^9/L$ | (4-11) |
| Neutrophils | $5.5 \times 10^9/L$ | (1.5-7) |
| Lymphocytes | $3.5 \times 10^9/L$ | (1.5-4) |
| Monocytes | $0.5 \times 10^9/L$ | (0-0.8) |
| Eosinophils | $0.9 \times 10^9/L$ | (0.04-0.4) |
| Basophils | $0.1 \times 10^9/L$ | (0-0.1) |

A chest x ray is performed which shows patchy pulmonary infiltrates.

Given the patient's history and the results of initial investigations, which is the most likely diagnosis?

(Please select 1 option)

- ☐ Acute respiratory distress syndrome
- ☐ Churg-Strauss syndrome
- ☐ Intrinsic asthma
- ☐ Microscopic polyangiitis
- ☐ Wegener's granulomatosis

☐ Acute respiratory distress syndrome

☒ Churg-Strauss syndrome **This is the correct answer**

☐ Intrinsic asthma

☒ Microscopic polyangiitis **Incorrect answer selected**

☐ Wegener's granulomatosis

Key Learning Points

Respiratory Medicine

- Churg-Strauss syndrome (CSS) is characterised by asthma, allergic rhinitis and prominent peripheral blood eosinophilia.

Explanation

Churg-Strauss syndrome (CSS) is a rare form of small-vessel vasculitis, characterised by asthma, **allergic rhinitis** and prominent peripheral blood eosinophilia. Two of these are present in the history and should lead you to the diagnosis of Churg Strauss.

The most commonly involved organ is the lung, followed by the skin. CSS, however, can affect any organ system, including the cardiovascular, gastrointestinal, renal, and central nervous systems. The unifying feature of patients presenting with CSS is asthma. Vasculitis involving the peripheral nervous system is also a characteristic feature, and **mononeuritis multiplex** occurs in 75% of patients.

Vasculitis of extrapulmonary organs is largely responsible for the morbidity and mortality associated with CSS. 40-60% are associated with positive ANCA, usually pANCA/MPO.

ANCA are antineutrophil cytoplasmic antibodies. Several different staining patterns and antigen specificities are recognised. The cytoplasmic staining pattern, cANCA, and specificity for the PR3 antigen is most specific for Wegener's granulomatosis. Perinuclear staining, pANCA, and/or antibody to MPO are far less specific than cANCA and can be present in a range of inflammatory conditions such as microscopic polyangiitis, Churg-Strauss syndrome and Goodpasture's syndrome. MPO and pANCA may also be present in SLE, **rheumatoid arthritis**, Sjögren's syndrome and occasionally in chronic infections.

Intravenous glucocorticoid is used for initial therapy of acute multi-organ involvement in Churg-Strauss syndrome, followed by oral glucocorticoid therapy, often with azathioprine as a steroid-sparing agent.

Wegener's granulomatosis is a multi-organ autoimmune disease, which can be fatal. The classical triad consists of necrotising granulomatous inflammation of the respiratory tract, **glomerulonephritis** and a small-vessel vasculitis. A prolonged history of **epistaxis** or sinusitis is commonly found in Wegener's granulomatosis, which in some patients is also associated with an eosinophilia.

Microscopic polyangiitis is microscopically similar to WG, but does not tend to involve the nasopharynx. It has an association with **hepatitis B** and C.

Acute respiratory distress syndrome describes an acute diffuse inflammatory lung injury, often in previously healthy lungs. It has an acute onset, and patients often require respiratory support. It can be precipitated by a number of insults, including drugs and pancreatitis.

The presence of systemic symptoms makes a diagnosis of asthma alone unlikely.

A 54-year-old woman with multiple medical problems attends the respiratory clinic with increasing shortness of breath.

Medication of note includes dosulepin, omeprazole, amlodipine, ramipril, and atorvastatin.

On examination her BP is 132/78 mmHg, pulse is 72 and regular. There are scattered inspiratory crackles throughout both lung fields. Pulmonary function testing reveals a restrictive defect.

Which of the following agents is most likely to be responsible?

(Please select 1 option)

☐ Amlodipine

☐ Penicillamine

☐ Dosulepin

☐ Omeprazole

☐ Ramipril

Please select 1 option

| | |
|----------------------------------|---|
| <input type="radio"/> | Amlodipine |
| <input type="radio"/> | Penicillamine |
| <input type="radio"/> | Dosulepin This is the correct answer |
| <input type="radio"/> | Omeprazole |
| <input checked="" type="radio"/> | Ramipril Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Dosulepin is a cause of pulmonary fibrosis.

Explanation

Dosulepin is recognised as a very rare cause of pulmonary fibrosis. Both subacute interstitial pneumonia and acute alveolitis have been reported in association with dosulepin therapy.

None of the other agents listed are recognised as causes of pulmonary fibrosis.

More commonly recognised drug causes of pulmonary fibrosis include:

- Amiodarone
- Bleomycin
- Methotrexate
- Busulphan
- Gold, and
- Nitrofurantoin.

Penicillamine can be used in the treatment of pulmonary fibrosis.

Which of the following is classified as a major risk factor in the development of venous thromboembolism (relative risk 5-20)?

(Please select 1 option)

| | |
|-----------------------|-----------------------------------|
| <input type="radio"/> | COPD |
| <input type="radio"/> | Hormone replacement therapy (HRT) |
| <input type="radio"/> | Obesity |
| <input type="radio"/> | Oral contraceptive pill |
| <input type="radio"/> | Varicose veins |

Dr Assem

Please select 1 option

| | |
|----------------------------------|-------------------------------------|
| <input type="radio"/> | COPD |
| <input type="radio"/> | Hormone replacement therapy (HRT) |
| <input type="radio"/> | Obesity |
| <input type="radio"/> | Oral contraceptive pill |
| <input checked="" type="radio"/> | Varicose veins Correct |

Key Learning Points

Respiratory Medicine

- All patients presenting with possible PE or venous thromboembolism (VTE) should have the clinical probability assessed. Therefore it is important to note the major and minor risk factors.

Explanation

Accordingly to the latest British Thoracic Society (BTS) guidelines for pulmonary embolism, lower limb problems including a fracture or varicose veins are classed as a major risk factor in the development of VTE.

Other major risk factors include:

- postoperative intensive care
- hospitalisation
- abdominal/pelvic or advanced malignancy
- previous VTE, and
- pregnancy.

The other risk factors listed in the question are classed as minor risk factors with a relative risk of 2-4.

Other minor risk factors include:

- occult malignancy
- long distance travel
- hypertension
- congestive cardiac failure, and
- thrombotic disorder.

A 17-year-old girl with known cystic fibrosis presents with a chest infection.

Which antibiotic would be most suitable for her?

(Please select 1 option)

☐ Amoxicillin

☐ Augmentin

☐ Cefotaxime

☐ Ceftazidime

☐ Gentamicin

(Please select 1 option)

| | | |
|----------------------------------|-------------|----------------------------|
| <input type="radio"/> | Amoxicillin | |
| <input type="radio"/> | Augmentin | |
| <input type="radio"/> | Cefotaxime | |
| <input checked="" type="radio"/> | Ceftazidime | This is the correct answer |
| <input type="radio"/> | Gentamicin | Incorrect answer selected |

Key Learning Points

Lung Function, Respiratory Medicine

- In CF the bacteria present depends on the age of the patient.

Explanation

In **cystic fibrosis** the airways become obstructed by thick mucus due to defective chloride secretion and increased sodium resorption. This leads to bacterial colonisation early in life.

The bacteria present depend on the age of the patient: infants and young children become colonised by *Staphylococcus aureus* and then *Haemophilus influenzae*. In teenagers, *Pseudomonas aeruginosa* colonisation occurs.

Other organisms which can cause infection include *Streptococcus pneumoniae*, *Burkholderia cepacia* (which confers a worse prognosis), *Mycobacterium tuberculosis*, other mycobacteria, *Aspergillus fumigatus*, and viruses.

In the UK, antibiotics are usually given when the sputum becomes purulent, pulmonary function deteriorates, or the patient is unwell (e.g. weight loss). In this age group, Pseudomonal cover is needed and a combination of intravenous antibiotics is used to reduce the risk of resistance developing. The usual combination is ceftazidime and tobramycin, for a period of two weeks.

Cefotaxime, augmentin, and amoxicillin do not have pseudomonal cover. Gentamicin can be used in place of tobramycin, but has poorer pseudomonal cover and is associated with significant side effects (nephrotoxicity and ototoxicity).

Sputum samples should be obtained, and organism identification and sensitivities can be used to guide treatment of future exacerbations.

A 50-year-old male presented with acute respiratory failure during an episode of acute pancreatitis and was thought to have developed adult respiratory distress syndrome (ARDS).

Which of the following would support a diagnosis of ARDS?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | High protein pulmonary oedema |
| <input type="radio"/> | High pulmonary capillary wedge pressure |
| <input type="radio"/> | Hypercapnia |
| <input type="radio"/> | Increased lung compliance |
| <input type="radio"/> | Normal chest x ray |

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | High protein pulmonary oedema | This is the correct answer |
| <input type="radio"/> | High pulmonary capillary wedge pressure | |
| <input type="radio"/> | Hypercapnia | |
| <input type="radio"/> | Increased lung compliance | |
| <input checked="" type="radio"/> | Normal chest x ray | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- ARDS causes leakage of protein rich fluid into the alveoli, with reduced lung compliance and normal pulmonary capillary wedge pressure.

Explanation

Acute Respiratory Distress Syndrome (ARDS) is a severe form of Acute Lung Injury (ALI) which describes a pulmonary syndrome characterised by non-cardiogenic pulmonary oedema.

It can be caused by a number of insults, the most common of which is systemic inflammation. This causes injury to the alveolar-capillary interface, with increase in the capillary permeability and exudation of protein rich fluid into the interstitium and alveoli. In addition there is a deficiency in surfactant which reduces lung compliance and predisposes to collapse (especially in dependent zones). Chest radiographs, and CT, show heterogenous injury. Spirometry shows a reduced functional capacity, and the patient's work of breathing increases.

ALI has a specific definition:

- $\text{PaO}_2/\text{FiO}_2$ ratio of less than 300
- Bilateral infiltrates on a chest radiograph
- Pulmonary capillary wedge pressure of less than 18 mmHg

ARDS has the same definition except that the $\text{PaO}_2/\text{FiO}_2$ ratio is less than 200. There tends to be a type 1 respiratory failure, rather than type 2.

A 54-year-old woman is referred to the chest clinic by the GP with a history of a non-productive cough. She is severely troubled by her symptoms often waking at night. She is a smoker with a 25-pack year history.

According to the current British Thoracic Society guidelines, at least how long must symptoms be present to be defined as a chronic cough and investigated as such?

(Please select 1 option)

| | |
|-----------------------|----------|
| <input type="radio"/> | 3 weeks |
| <input type="radio"/> | 4 weeks |
| <input type="radio"/> | 8 weeks |
| <input type="radio"/> | 3 months |
| <input type="radio"/> | 4 months |

| | | |
|----------------------------------|----------|----------------------------|
| <input type="radio"/> | 3 weeks | |
| <input type="radio"/> | 4 weeks | |
| <input type="radio"/> | 8 weeks | This is the correct answer |
| <input type="radio"/> | 3 months | |
| <input checked="" type="radio"/> | 4 months | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Debate exists as to what constitutes a cough event and what period of symptoms is needed to define a chronic cough. However guidelines have been produced and knowledge of these is required for effective management of patients.

Explanation

Debate exists as to what constitutes a cough event and what period of symptoms is needed to define a chronic cough. However guidelines have been produced and knowledge of these is required for effective management of patients.

In epidemiological studies 16% of the United Kingdom population reported a persistent cough.

For the purposes of the BTS guidelines, cough is a forced expulsive manoeuvre against a closed glottis with a characteristic sound.

Acute cough is defined as one lasting less than three weeks. A chronic cough is defined as one lasting over eight weeks. There is a grey area between three to eight weeks and this includes post-viral coughs.

There are several serious conditions that may present with an isolated cough including neoplasm, infection (for example, TB), and interstitial lung disease.

In those with a normal chest x ray, reflux disease, asthma syndromes and rhinitis should be considered.

Further Reading:

A 48-year-old man with a history of cirrhosis comes to the respiratory clinic for a consultation because of increased shortness of breath. He smokes 10 cigarettes per day and has done so since the age of 17.

Medication of note includes propranolol, but nil else of note. On examination his BP is 112/70 mmHg, pulse is 62 and regular. Apart from signs of chronic liver disease, you also notice that he has scattered wheeze throughout both lung fields.

Investigations show:

| | | |
|--------------------------|---------------------------------------|-----------|
| Haemoglobin | 129 g/L | (130-180) |
| White cell count | 5.7 ×10 ⁹ /L | (4-10) |
| Platelets | 203 ×10 ⁹ /L | (150-400) |
| Sodium | 138 mmol/L | (134-143) |
| Potassium | 4.8 mmol/L | (3.5-5) |
| Creatinine | 110 µmol/L | (60-120) |
| Chest x ray | Evidence of hyperexpanded lung fields | |
| Pulmonary function tests | FEV1 55% of predicted | |
| | FVC 90% of predicted | |
| | Reduced KCO | |

Which of the following is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|--------------------|
| <input type="radio"/> | Asthma |
| <input type="radio"/> | Chronic bronchitis |
| <input type="radio"/> | Emphysema |
| <input type="radio"/> | Hypoventilation |
| <input type="radio"/> | Pulmonary fibrosis |

| | | |
|----------------------------------|--------------------|----------------------------|
| <input type="radio"/> | Asthma | |
| <input type="radio"/> | Chronic bronchitis | |
| <input checked="" type="radio"/> | Emphysema | This is the correct answer |
| <input type="radio"/> | Hypoventilation | |
| <input type="radio"/> | Pulmonary fibrosis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- A reduced transfer factor and CXR evidence of hyperexpanded lung fields points towards a predominantly emphysematous picture.

Explanation

This man has hyperexpanded lung fields on CXR, reduced transfer factor and an FEV1/FVC of 61%.

Despite smoking a relatively small number of cigarettes he has significant chronic obstructive pulmonary disease (COPD) on pulmonary function tests; the reduced transfer factor and CXR appearance pointing towards a predominantly emphysematous picture.

The fact that he has cirrhosis raises the possibility of alpha-1 antitrypsin deficiency as the underlying diagnosis.

According to current guidelines, which of the below is the recommended duration of warfarin therapy in a patient recently diagnosed with their first pulmonary embolism (PE) in the presence of temporary risk factors?

(Please select 1 option)

| | |
|-----------------------|-----------|
| <input type="radio"/> | 4-6 weeks |
| <input type="radio"/> | 3 months |
| <input type="radio"/> | 6 months |
| <input type="radio"/> | 12 months |
| <input type="radio"/> | Lifelong |

| | | |
|----------------------------------|-----------|----------------------------|
| <input type="radio"/> | 4-6 weeks | |
| <input type="radio"/> | 3 months | This is the correct answer |
| <input type="radio"/> | 6 months | |
| <input type="radio"/> | 12 months | |
| <input checked="" type="radio"/> | Lifelong | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The duration of warfarin treatment therapy varies depending on the cause of the PE and the surrounding risk factors.

Explanation

It is important to know the duration of warfarin treatment following the diagnosis of a PE. The duration of therapy varies depending on the cause of the PE and the surrounding risk factors.

However, NICE guidelines on [Venous thromboembolic diseases \(NG158\)](#) published in 2020 recommend treatment for 3 months. After this period, in the case of an unprovoked PE, the risks and benefits of continuing anticoagulation should be considered and treatment continued if the risk of recurrence is thought to be high and the risk of bleeding low.

A 58-year-old man presents to the Emergency department with an acute episode of breathlessness and pleuritic-sounding chest pain. He is currently receiving treatment for metastatic prostate cancer.

On examination he is dyspnoeic, tachycardic (heart rate of 121 bpm) and has saturations of 85% on air. His blood pressure is 107/67 mmHg.

Following assessment of his clinical probability, he is categorised as a high risk for a pulmonary embolism (PE) - Wells score 5.5. The attending medical doctor requests a CTPA.

What treatment, if any, should this patient receive before the results of his imaging are known?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Low molecular weight heparin (LMWH) |
| <input type="radio"/> | No treatment until the result of the CTPA is known |
| <input type="radio"/> | Thrombolysis |
| <input type="radio"/> | Unfractionated heparin (UFH) |
| <input type="radio"/> | Warfarin |

Dr Assem

| | |
|----------------------------------|---|
| <input type="radio"/> | Low molecular weight heparin (LMWH) This is the correct answer |
| <input type="radio"/> | No treatment until the result of the CTPA is known |
| <input checked="" type="radio"/> | Thrombolysis Incorrect answer selected |
| <input type="radio"/> | Unfractionated heparin (UFH) |
| <input type="radio"/> | Warfarin |

Key Learning Points

Respiratory Medicine

- BTS guidelines recommend patients with a high or intermediate probability of PE should be given LMWH prior to imaging.

Explanation

This patient clinically has a PE.

The British Thoracic Society (BTS) guidelines recommend that in the treatment of patients with a high or intermediate probability of a non-massive **pulmonary embolism** (PE), low molecular weight heparin should be given before imaging.

Thrombolysis should be reserved for those patients with a massive PE (with haemodynamic instability) and may be given in the absence of imaging if **cardiac arrest** is imminent.

Haemodynamic instability may be demonstrated by hypotension, right ventricular strain on an ECG or signs of right heart failure.

Unfractionated heparin should be considered in a massive PE, or if rapid reversal of anticoagulation may be necessary. It may also be given as a bolus dose. However LMWH is preferable to UFH due to ease of use and similar efficacy.

Warfarin therapy should only be started in a proven PE.

A 74-year-old man is admitted to the Emergency department after collapsing in church.

On reviewing his notes you see this is the third time that it has happened in the past eight months, and each time it is when he is dressed in a suit. There is a past medical history of hypertension but nil else of note. According to a bystander his pulse seemed very slow at the time of the collapse.

On examination his BP is 135/70 mmHg, his pulse is 80 and regular. General physical review is unremarkable.

Investigations show:

| | | |
|------------------|-----------------------|-----------|
| Haemoglobin | 132 g/L | (135-177) |
| White cell count | $7.8 \times 10^9/L$ | (4-11) |
| Platelets | $282 \times 10^9/L$ | (150-400) |
| Sodium | 135 mmol/L | (135-146) |
| Potassium | 4.2 mmol/L | (3.5-5) |
| Creatinine | 123 $\mu\text{mol/L}$ | (79-118) |

ECG shows old inferior myocardial infarction.

Chest x ray is unremarkable.

Which of the following is the most appropriate next investigation?

(Please select 1 option)

| | |
|-----------------------|---------------------------|
| <input type="radio"/> | Ambulatory ECG monitoring |
| <input type="radio"/> | CT head |
| <input type="radio"/> | EEG |
| <input type="radio"/> | Exercise test |
| <input type="radio"/> | Tilt table test |

Please select 1 option

| | | |
|----------------------------------|---------------------------|----------------------------|
| <input type="radio"/> | Ambulatory ECG monitoring | This is the correct answer |
| <input type="radio"/> | CT head | |
| <input type="radio"/> | EEG | |
| <input type="radio"/> | Exercise test | |
| <input checked="" type="radio"/> | Tilt table test | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Ambulatory ECG monitoring to discharge the risk of arrhythmia. is the appropriate investigation for rhythm disturbances, or carotid sinus hypersensitivity.

Explanation

The history of collapse raises the possibility of a rhythm disturbance, although the fact he collapses only when wearing his suit raises the possibility of carotid sinus hypersensitivity, with attacks related to the wearing of a tight collar. The first step when each of these diagnoses is considered is the same however, with ambulatory ECG monitoring to discharge the risk of arrhythmia.

A TIA or fit is unlikely, as his recovery period is short, and we have the collateral history of slow pulse which comes from a bystander. As such, EEG or CT head are not next step investigations.

A tilt table test is the definitive investigation for carotid sinus hypersensitivity, but would only be considered after other *cardiac* causes have been excluded.

Whilst myocardial ischaemia is a possibility, an exercise test would not necessarily be the next investigation of choice.

A 22-year-old male is admitted wheezing with a respiratory rate of 35/min, a pulse of 120 beats per min, blood pressure 110/70 mmHg, peak expiratory flow rate <50% predicted.

He has been given back-to-back nebulisers of salbutamol 5 mg and ipratropium 0.5 mg for the last 45 minutes and is on face mask oxygen. He has been given hydrocortisone 100 mg IV. The intensive care team are aware of the patient.

His arterial blood gas (done on high-flow oxygen) reveals:

| | | |
|-------------------|-----------|-------------|
| pH | 7.42 | (7.36-7.44) |
| PaCO ₂ | 5.0 kPa | (4.7-6.0) |
| PaO ₂ | 22 kPa | (11.3-12.6) |
| Base excess | -2 mmol/L | (+/-2) |
| SpO ₂ | 98 | |

Which therapy should be implemented next?

(Please select 1 option)

| | |
|-----------------------|----------------------------|
| <input type="radio"/> | Intubation and ventilation |
| <input type="radio"/> | Magnesium 1-2 g IV |
| <input type="radio"/> | Non-invasive ventilation |
| <input type="radio"/> | Oral aminophylline |
| <input type="radio"/> | Oral prednisolone |

Dr Assem

| | | |
|----------------------------------|----------------------------|----------------------------|
| <input type="radio"/> | Intubation and ventilation | |
| <input checked="" type="radio"/> | Magnesium 1-2 g IV | This is the correct answer |
| <input type="radio"/> | Non-invasive ventilation | |
| <input type="radio"/> | Oral aminophylline | |
| <input checked="" type="radio"/> | Oral prednisolone | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- This gentleman is receiving adequate ipratropium and oxygen, and repeating/increasing these are unlikely to help the situation markedly. Failure to respond to these treatment steps warrants the use of intravenous magnesium sulphate.

Explanation

This patient fits the criteria for life threatening asthma:

A normal PaCO_2 in an asthmatic is a warning of impending respiratory failure as the patient becomes too tired to ventilate adequately.

Initial treatment has been given. β_2 -agonists should be administered as soon as possible, preferably nebulised driven by oxygen. Repeat doses should be given at 15-30 minute intervals, or continuous nebulisation can be used where there is inadequate response to bolus therapy.

Nebulised ipratropium bromide should be added for patients with acute severe or life threatening asthma, or those with a poor initial response. Its addition produces significantly greater bronchodilation than a β_2 -agonist alone.

Oxygen should be given to maintain saturations at 94-98%. Patients with saturations less than 92% on air should have an ABG to exclude hypercapnia. However, starting treatment should not be delayed to do the ABG. Initially high-flow oxygen is used, and then weaned to maintain adequate saturations. Unless you suspect COFD there is no need to be cautious with oxygen therapy.

This gentleman is receiving adequate ipratropium and oxygen, and repeating/increasing these are unlikely to help the situation markedly.

Failure to respond to the above treatment steps warrants the use of intravenous magnesium sulphate (or aminophylline, but this is not an option here). Magnesium has been shown to result in bronchial smooth muscle relaxation. Before intubation and ventilation it is appropriate to trial magnesium sulphate first.

Intensive care is indicated for patients with severe acute or life threatening asthma who are failing to respond to therapy. Consider it in patients with:

- Deteriorating peak flow
- Persisting or worsening hypoxia
- Hypercapnia
- Acidosis
- Exhaustion, or
- Altered conscious state.

All patients who are transferred to an intensive care unit should be accompanied by a doctor who can intubate if necessary. This would be considered if this gentleman fails to respond to magnesium, and in a clinical setting you would want to discuss him with your ITU colleagues whilst the magnesium was being given.

Chest radiographs are not indicated unless you suspect pneumothorax or consolidation, or there is life threatening asthma, a failure to respond to treatment or a need for ventilation.

As an additional point, steroids reduce mortality, relapses, subsequent hospital admission and requirement for β_2 -agonists¹. The earlier they are given in the attack, the better the outcome.

A dose of 40-50 mg prednisolone (or IV equivalent) should therefore be given once oxygen and nebuliser therapy has been established. This should be continued for five days, or until recovery, and can then be stopped abruptly unless the patient has taken long term oral corticosteroids.

An 87-year-old woman was being treated for chronic bronchial asthma. Her daughter wants to talk to you about pneumococcal vaccination. She can't remember whether her mother has taken the vaccine in the past. The medical records are also somewhat doubtful on that aspect. The woman has allergy to egg proteins.

What is the best course of action in this case?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | Egg allergy is a contraindication to the vaccine |
| <input type="radio"/> | Give her one dose of PPV23 |
| <input type="radio"/> | Give her PCV13 followed by PPV23 |
| <input type="radio"/> | No need to give the vaccine |
| <input type="radio"/> | She should be given two doses of PPV23 |

| | |
|----------------------------------|--|
| <input type="radio"/> | Egg allergy is a contraindication to the vaccine |
| <input type="radio"/> | Give her one dose of PPV23 |
| <input type="radio"/> | Give her PCV13 followed by PPV23 This is the correct answer |
| <input checked="" type="radio"/> | No need to give the vaccine Incorrect answer selected |
| <input type="radio"/> | She should be given two doses of PPV23 |

Key Learning Points

Respiratory Medicine

- Pneumococcal vaccine is an essential vaccine for the elderly.

Explanation

Adults 65 years and older, especially with chronic respiratory conditions, like the present case, should receive the pneumococcal vaccine. Now PCV13 is given first, followed by PPV23 at least one year later.

Egg allergy is not a contraindication to pneumococcal vaccine; it is a contraindication to i.m. influenza vaccine.

Usually, the guidelines for elders is to give a dose of PCV13 first, followed by PPV23.

Pneumococcal vaccine is usually advisable now, especially in patients with chronic respiratory diseases.

Two doses of PPV23 is not given now to patients over 65 years of age. It is one dose of PCV13, followed by one dose of PPV23. Some patients may have received PPV23 before 65 years of age. For them, the PPV23 is given again, at least five years after last dose of PPV23.

A 45-year-old male with type 2 diabetes presented to the clinic as his wife complained that he snored excessively.

Which of the following would suggest a diagnosis of obstructive sleep apnoea ?

(Please select 1 option)

| | |
|-----------------------|--------------------|
| <input type="radio"/> | Daytime sleepiness |
| <input type="radio"/> | Nasal polyps |
| <input type="radio"/> | Nocturnal cough |
| <input type="radio"/> | Poor memory |
| <input type="radio"/> | Stridor |

(Please select 1 option)

| | | |
|----------------------------------|--------------------|----------------------------|
| <input type="radio"/> | Daytime sleepiness | This is the correct answer |
| <input type="radio"/> | Nasal polyps | |
| <input type="radio"/> | Nocturnal cough | |
| <input type="radio"/> | Poor memory | |
| <input checked="" type="radio"/> | Stridor | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The typical problem associated with sleep apnoea syndrome is excessive daytime somnolence.

Explanation

The typical problem associated with sleep apnoea syndrome is excessive daytime somnolence, associated with:

- Obesity
- Acromegaly
- Hypothyroidism
- Cushing's syndrome.

It is thought that the somnolence is due to the interruption of rapid eye movement (REM) sleep by frequent episodes of waking due to apnoeic episodes.

A 42-year-old farmer is admitted with a severe cough, fevers and shortness of breath. You understand that he has been clearing out hay from a shed over the past few days which were previously used for over-wintering cattle.

On examination he has a temperature of 38.2°C, his BP is 110/70 mmHg and his pulse is 95 and regular. There are widespread coarse crackles bilaterally on auscultation of his chest.

Investigations show:

| | | |
|------------------|-----------------------|-----------|
| Haemoglobin | 139 g/L | (135-177) |
| White cell count | $12.8 \times 10^9/L$ | (4-11) |
| Platelets | $222 \times 10^9/L$ | (150-400) |
| Sodium | 138 mmol/L | (135-146) |
| Potassium | 4.1 mmol/L | (3.5-5) |
| Creatinine | 110 $\mu\text{mol/L}$ | (79-118) |

Chest x ray shows diffuse consolidation bilaterally.

Which of the following is the most likely to treat the underlying cause of his symptoms?

(Please select 1 option)

| | |
|-----------------------|----------------|
| <input type="radio"/> | Amphotericin B |
| <input type="radio"/> | Clarithromycin |
| <input type="radio"/> | Fluconazole |
| <input type="radio"/> | Penicillin |
| <input type="radio"/> | Prednisolone |

Dr. Assen

Please select 1 option

| | |
|----------------------------------|-----------------------------------|
| <input type="radio"/> | Amphotericin B |
| <input type="radio"/> | Clarithromycin |
| <input type="radio"/> | Fluconazole |
| <input type="radio"/> | Penicillin |
| <input checked="" type="radio"/> | Prednisolone Correct |

Key Learning Points

Respiratory Medicine

- Primary treatment for acute hypersensitivity pneumonitis is avoidance of the antigen and systemic corticosteroids.

Explanation

This patient most likely has 'Farmer's lung' which is a form of [hypersensitivity pneumonitis](#) (extrinsic allergic alveolitis). Inhalational exposure to thermophilic *Actinomyces* species results in an immunologically mediated inflammation of the lung. Such species are associated with mouldy hay. Acute episodes are characterised by neutrophilic infiltration followed by lymphocytic infiltration and raised levels of interleukins 1 and 8 and TNF-alpha. This results in direct cellular damage and increased vascular permeability, which results in hypoxia and reduced lung compliance. Prolonged exposure leads to fibrosis and parenchymal destruction.

Acute [hypersensitivity pneumonitis](#) manifests as fever, chills, non-productive cough, chest tightness, dyspnoea, headache and malaise. [Acute respiratory failure](#) can develop if the exposure is large. At the other end of the spectrum, symptoms may settle within 12 hours of removal of the antigen.

There is no specific diagnostic test, but leucocytosis with neutrophilia, elevated ESR and CRP and raised immunoglobulins are suggestive in the right clinical situation. Chest radiographs classically show diffuse air-space consolidation. Spirometry shows reduced forced vital capacity and total lung capacity.

Primary treatment for acute [hypersensitivity pneumonitis](#) is avoidance of the antigen and systemic corticosteroids.

Clarithromycin and penicillin would be considered treatments for bacterial pneumonia. This should definitely be considered as a diagnosis here, but the bilateral radiographic findings and clinical situations should lead you to conclude hypersensitivity pneumonitis is more likely.

Although the aetiology is hypersensitivity to fungal spores, neither amphotericin B nor fluconazole are effective in the treatment of farmer's lung.

A 37-year-old patient presents with dyspnoea and right pleuritic chest pain.

He previously had right pneumothorax eight months ago for which he had a chest drain. He works as plumber. He is an ex-smoker.

On examination he had decreased air entry on right side and hyper-resonance. A CXR confirms a large pneumothorax. A chest drain was inserted and the lung completely re-expanded.

What is the best plan of action?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | Advise bed rest for two weeks and then repeat CXR |
| <input type="radio"/> | Chemical pleurodesis through the chest drain |
| <input type="radio"/> | Recheck if he still smokes and advise to quit. |
| <input type="radio"/> | Remove drain and discharge |
| <input type="radio"/> | Video assisted thoracoscopic surgery |

Please select 1 option.

| | |
|----------------------------------|---|
| <input type="radio"/> | Advise bed rest for two weeks and then repeat CXR |
| <input type="radio"/> | Chemical pleurodesis through the chest drain |
| <input type="radio"/> | Recheck if he still smokes and advise to quit. |
| <input type="radio"/> | Remove drain and discharge |
| <input checked="" type="radio"/> | Video assisted thoroscopic surgery Correct |

Key Learning Points

Respiratory Medicine

- Management of recurrent pneumothorax in the young.

Explanation

Video assisted thoroscopic surgery is indicated in:

- Second ipsilateral pneumothorax
- Bilateral spontaneous pneumothorax
- Spontaneous haemothorax
- Persistent air leak (more than five to seven days of drainage)
- Certain occupations, for example, pilots or divers.

Chemical pleurodesis is used in older patients with recurrent pneumothorax, where surgery would be high risk. Failure rates can be 10-20%.

A 67-year-old man presents with a long history of cough, breathlessness on minimal exertion and ankle swelling. He smokes 30-40 cigarettes per day.

Investigations are as follows:

| | | |
|---------------------------|---------------------|-------------|
| Haemoglobin | 190 g/L | (130-180) |
| White blood count | $7.3 \times 10^9/L$ | (4-11) |
| PaO ₂ | 6.2 kPa | (11.3-12.6) |
| PaCO ₂ | 8.9 kPa | (4.7-6.0) |
| Serum [H ⁺] | 44 nmol/L | (36-44) |
| Serum [HCO ₃] | 36 mmol/L | (21-27.5) |

What is the most likely explanation of these results?

(Please select 1 option)

| | |
|-----------------------|-------------------------------|
| <input type="radio"/> | Acute respiratory acidosis |
| <input type="radio"/> | Chronic respiratory acidosis |
| <input type="radio"/> | Chronic respiratory alkalosis |
| <input type="radio"/> | Metabolic acidosis |
| <input type="radio"/> | Metabolic alkalosis |

| | | |
|----------------------------------|-------------------------------|----------------------------|
| <input type="radio"/> | Acute respiratory acidosis | |
| <input type="radio"/> | Chronic respiratory acidosis | This is the correct answer |
| <input type="radio"/> | Chronic respiratory alkalosis | |
| <input type="radio"/> | Metabolic acidosis | |
| <input checked="" type="radio"/> | Metabolic alkalosis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Chronic respiratory acidosis presents with raised bicarbonate as compensation has occurred.

Explanation

Even if you did not know the normal reference values for H^+ and HCO_3^- you should have been able to make an intelligent guess at compensated respiratory acidosis from the clinical history, type 2 respiratory failure and probable secondary polycythaemia.

A 36-year-old man who is a known asthmatic complains of persistent cough and shortness of breath, which is unresponsive to his normal inhaled therapy.

A CXR shows fibrosis of both upper lobes.

What is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Allergic bronchopulmonary aspergillosis |
| <input type="radio"/> | Ankylosing spondylitis |
| <input type="radio"/> | Cystic fibrosis |
| <input type="radio"/> | Primary pulmonary hypertension |
| <input type="radio"/> | Systemic sclerosis |

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Allergic bronchopulmonary aspergillosis | This is the correct answer |
| <input type="radio"/> | Ankylosing spondylitis | |
| <input type="radio"/> | Cystic fibrosis | |
| <input type="radio"/> | Primary pulmonary hypertension | |
| <input checked="" type="radio"/> | Systemic sclerosis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Allergic bronchopulmonary aspergillosis predominantly affects patients with asthma, cystic fibrosis and bronchiectasis causing fever, wheeze, cough, chronic sinusitis and malaise.

Explanation

The persistent cough is likely to be a symptom of asthma.

Allergic bronchopulmonary aspergillosis (ABPA) is a hypersensitivity reaction to the colonisation of the respiratory tract with Aspergillus. It predominantly affects patients with asthma, cystic fibrosis and bronchiectasis.

The clinical manifestations include fever, wheeze, cough (which can result in haemoptysis and expectoration of large mucus plugs), chronic sinusitis and malaise. Left untreated it can progress to pulmonary infiltrates and fibrosis (which is predominantly apical).

Diagnosis is made when a patient's underlying respiratory disease deteriorates, in the presence of eosinophilia, a positive skin test to Aspergillus, elevated IgE, positive Aspergillus serology or infiltrated on CXR or CT.

High-dose steroids, with or without itraconazole, are the mainstay of treatment. This has minimal benefit if fibrosis is already established.

Whilst systemic sclerosis and ankylosing spondylitis can cause pulmonary fibrosis, you would expect there to be a history of connective tissue symptoms rather than only asthma.

Primary pulmonary hypertension is commoner in women, and does not cause pulmonary fibrosis.

A diagnosis of cystic fibrosis is likely to have been made prior to age 36 (although some genotypes do not present until later in life, so in clinical practice do not exclude it on the basis of age alone).

A 65-year-old man with severe COPD is suspected of having pulmonary hypertension (PH) secondary to his underlying lung disease. Following an echocardiogram which was inconclusive, a right heart catheterisation is organised.

Which of the listed values of mean arterial pressure taken at rest is the lowest value associated with a diagnosis of pulmonary hypertension?

(Please select 1 option)

| | |
|-----------------------|----------|
| <input type="radio"/> | >10 mmHg |
| <input type="radio"/> | >14 mmHg |
| <input type="radio"/> | >18 mmHg |
| <input type="radio"/> | >20 mmHg |
| <input type="radio"/> | >25 mmHg |

Please select 1 option:

| | |
|----------------------------------|-------------------------------|
| <input type="radio"/> | >10 mmHg |
| <input type="radio"/> | >14 mmHg |
| <input type="radio"/> | >18 mmHg |
| <input type="radio"/> | >20 mmHg |
| <input checked="" type="radio"/> | >25 mmHg Correct |

Key Learning Points

Respiratory Medicine

- This question requires an understanding of the normal mean pulmonary arterial pressure and the parameters at which PH may be diagnosed.

Explanation

Pulmonary hypertension is defined as a mean pulmonary arterial (PA) pressure of more than 25 mmHg at rest or more than 30 mmHg during exercise. The normal value is 14 mmHg.

A rise in PA pressure can be due to increased pulmonary vascular resistance (for example, embolism or hypoxia), pulmonary blood flow and back pressure (as seen in left heart failure).

It is most commonly caused by another disorder (secondary PH).

However it may be a disorder of the pulmonary circulation itself (pulmonary arterial hypertension), although this is less common.

Dr. Assem

A 72-year-old patient with COPD would like to spend two weeks in Australia. He lives in Manchester.

His FEV1 is 60%. He was last admitted to hospital a year ago because of an infective exacerbation of COPD. His O₂ sat is 96% on air.

He takes regular inhalers.

What advice would you give?

(Please select 1 option)

| | |
|-----------------------|-------------------------------------|
| <input type="radio"/> | Advise him not to fly |
| <input type="radio"/> | Advise inflight oxygen 28% |
| <input type="radio"/> | Advise inflight oxygen 35% |
| <input type="radio"/> | Allow flight and no oxygen required |
| <input type="radio"/> | Perform a hypoxic challenge test |

Please select 1 option

| | | |
|----------------------------------|-------------------------------------|----------------------------|
| <input type="radio"/> | Advise him not to fly | |
| <input type="radio"/> | Advise inflight oxygen 28% | |
| <input type="radio"/> | Advise inflight oxygen 35% | |
| <input type="radio"/> | Allow flight and no oxygen required | This is the correct answer |
| <input checked="" type="radio"/> | Perform a hypoxic challenge test | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Air travel advice in COPD.

Explanation

History, examination, assessment of severity of chronic obstructive pulmonary disease (COPD) and O_2 sat at sea level should be performed.

Air travel advice can be reviewed in BTS guidelines.

A summary is present in the table below: (additional risk factors: hypercapnia, $FEV_1 < 50\%$ predicted, lung cancer, restrictive lung disease involving the parenchyma [fibrosis], chest wall [kyphoscoliosis] or respiratory muscles, ventilator support, cerebrovascular or cardiac disease, within six weeks of discharge for an exacerbation of chronic lung or cardiac disease).

- Sea level $SpO_2 > 95\%$ - Oxygen not required
- Sea level SpO_2 92-95% and no risk factor - Oxygen not required
- Sea level SpO_2 92-95% and additional risk factor - Perform hypoxic challenge test with arterial or capillary measurements
- Sea level $SpO_2 < 92\%$ - In-flight oxygen
- Receiving supplemental oxygen at sea level - Increase the flow while at cruising altitude.

Dr. Arshad

An otherwise healthy 32-year-old man was the driver of a car involved in a high speed RTA three days ago.

He has sustained a closed fracture of his femur which has been treated surgically with an intramedullary nail, as well as fractures of his right clavicle and left radius. He was managed according to ATLS protocol when he attended the emergency department.

On examination he is acutely short of breath and has a temperature of 37.5°C. The patient seems confused when you speak to him, and as you examine him, you note petechial haemorrhages.

Which do you think is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|----------------------|
| <input type="radio"/> | Asthma attack |
| <input type="radio"/> | Chest infection |
| <input type="radio"/> | Fat embolism |
| <input type="radio"/> | Pulmonary embolism |
| <input type="radio"/> | Tension pneumothorax |

Please select 1 option

| | |
|----------------------------------|---|
| <input type="radio"/> | Asthma attack |
| <input type="radio"/> | Chest infection |
| <input type="radio"/> | Fat embolism This is the correct answer |
| <input checked="" type="radio"/> | Pulmonary embolism Incorrect answer selected |
| <input type="radio"/> | Tension pneumothorax |

Key Learning Points

Lung Function, Respiratory Medicine

- Fat embolism is thought to occur as a result of release of lipid globules from damaged bone marrow fat cells.

Explanation

The two diagnoses which should be considered first in this scenario are pulmonary embolism and fat embolism.

Although the patient is at high risk of pulmonary embolism, and appropriate measures should be undertaken to reduce this, the clinical scenario is more suggestive of fat embolism. Fat embolism is thought to occur as a result of release of lipid globules from damaged bone marrow fat cells. Another mechanism that has been suggested is the increased mobilisation of fatty acids peripherally.

The effects that are seen clinically depend on what part of the microvasculature is affected by the lipid globules.

Pulmonary symptoms are caused by ventilation perfusion mismatch.

Confusion (cerebral effects) may be seen, as well as a petechial rash caused by capillary damage in the skin.

A 58-year-old man presents with a month history of breathlessness. He is a non-smoker.

On examination, his temperature was 36.7°C, with a respiratory rate of 20 breaths per minute and normal breath sounds to auscultation and a pulse of 92 bpm.

Arterial blood gases on air showed:

| | | |
|------------------|---------|---------------|
| pH | 7.51 | (7.36 - 7.44) |
| pO ₂ | 8.4 kPa | (11.3 - 12.6) |
| pCO ₂ | 4.0 kPa | (4.7 - 6.0) |

What is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|-----------------------------|
| <input type="radio"/> | Atypical pneumonia |
| <input type="radio"/> | Hysterical hyperventilation |
| <input type="radio"/> | Inhaled foreign body |
| <input type="radio"/> | Pulmonary fibrosis |
| <input type="radio"/> | Pulmonary thromboembolism |

Dr. Assem

| | |
|----------------------------------|--|
| <input type="radio"/> | Atypical pneumonia |
| <input type="radio"/> | Hysterical hyperventilation |
| <input type="radio"/> | Inhaled foreign body |
| <input type="radio"/> | Pulmonary fibrosis |
| <input checked="" type="radio"/> | Pulmonary thromboembolism Correct |

Key Learning Points

Respiratory Medicine

- Pulmonary embolism presents as respiratory alkalosis with type 1 respiratory failure.

Explanation

This patient has a respiratory alkalosis with type 1 respiratory failure as evidenced by low pO_2 and low pCO_2 .

Chronic venous thromboembolism would be the most likely explanation for this man's presentation.

Hyperventilation would be excluded by the type 1 respiratory failure, an inhaled foreign body would not produce such a picture and an atypical pneumonia would be associated with pyrexia and some clinical signs.

The differential diagnosis here is pulmonary fibrosis but basal crackles may be expected and the history is somewhat short.

A 15-year-old boy presented with wheezing when playing football and nocturnal cough.

Which is the best test to confirm the underlying condition?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | A trial of inhaled corticosteroids |
| <input type="radio"/> | A trial of inhaled salbutamol |
| <input type="radio"/> | A trial of oral corticosteroids |
| <input type="radio"/> | Serial peak expiratory flow rate measurements |
| <input type="radio"/> | Spirometry alone |

Please select 1 option

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | A trial of inhaled corticosteroids | |
| <input type="radio"/> | A trial of inhaled salbutamol | This is the correct answer |
| <input type="radio"/> | A trial of oral corticosteroids | |
| <input checked="" type="radio"/> | Serial peak expiratory flow rate measurements | Incorrect answer selected |
| <input type="radio"/> | Spirometry alone | |

Key Learning Points

Respiratory Medicine

- In those children thought to have a high probability of asthma, it is recommended that clinicians move straight to a trial of treatment, and reserve further testing for those with a poor response.

Explanation

Current clinical guidelines recommended focusing the initial assessment of children suspected of having asthma on the presence of key features in the history and clinical examination, with careful consideration of alternative diagnoses. Structured questionnaires are felt to provide a standardised approach on which to base a diagnosis of asthma.

In those children thought to have a high probability of asthma, it is recommended that clinicians move straight to a trial of treatment, and reserve further testing for those with a poor response.

In children with a low probability of asthma, more detailed investigation and specialised referral is indicated.

Where there is an intermediate probability of asthma, spirometry or a trial of treatment can be considered.

A 64-year-old patient is discussed at the lung cancer MDT following a recent diagnosis of non-small cell lung cancer (squamous sub-type). He is a current smoker, and is known to have COPD for which he takes inhalers.

The lesion appears confined to the right middle lobe, but surgical resection would require a pneumonectomy.

Which of the following is a contraindication to his having radical surgery?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Clubbing |
| <input type="radio"/> | FEV ₁ 1.4 L |
| <input type="radio"/> | Hypertrophic pulmonary osteo-arthritis (HPOA) |
| <input type="radio"/> | Hyponatraemia |
| <input type="radio"/> | Mediastinal lymph node measuring 0.9 cm on staging CT |

- ☐ Clubbing
- ☒ FEV₁ 1.4 L **This is the correct answer**
- ☐ Hypertrophic pulmonary osteoarthropathy (HPOA)
- ☒ Hyponatraemia **Incorrect answer selected**
- ☐ Mediastinal lymph node measuring 0.9 cm on staging CT

Key Learning Points

Respiratory Medicine

- A post-bronchodilator FEV₁ of ≥ 1.5 litres is sufficient if a lobectomy is all that is required. If the tumour necessitates a pneumonectomy, the post-bronchodilator FEV should be more than 2 litres.

Explanation

For an intervention to be considered curative there should be no evidence of metastatic spread, and practical considerations such as a patient's respiratory function reserve need to be considered prior to any operation.

Assessing fitness for surgery in cases of lung carcinoma can be difficult and requires consideration of a number of factors.

Lung function needs to be assessed prior to referral to the thoracic surgical team. A post-bronchodilator FEV₁ of ≥ 1.5 litres is sufficient if a lobectomy is all that is required. If the tumour necessitates a pneumonectomy, the post-bronchodilator FEV should be more than 2 litres.

Below these values, further investigation in the form of estimation of transfer factor, oxygen saturations at rest and quantitative isotope perfusion should be undertaken. These values can be used to calculate estimated postoperative FEV₁ and postoperative transfer factor.

Patients with an estimated postoperative FEV₁ less than 40% predicted, transfer factor more than 40% predicted and oxygen saturations of more than 90% on air are considered to be average risk. Those with an FEV₁ and transfer factor of less than 40% are thought to be high risk. All other combinations are indications for exercise testing (shuttle walk tests or formal cardiopulmonary exercise tests).

High-risk patients identified by this step-wise testing should be discussed at a formal multidisciplinary meeting, and should be considered for more limited resection or non-surgical management.

Peroperative morbidity increases with advancing age, and more elderly patients typically require more intensive perioperative support. However, surgery for clinically stage I and II disease can be as effective in patients over the age of 70 and should be considered regardless of age. Age over 80 alone is not a contraindication to lobectomy or wedge resection for stage I disease, but may be a contraindication to pneumonectomy and each case should be assessed individually.

Cardiovascular fitness should be assessed with a preoperative ECG. Those with an audible murmur should have an echocardiogram. A recent MI (within six months) is an indication for cardiology opinion prior to surgery.

All patients with a history of previous stroke, transient ischaemic attacks, or carotid bruits should be assessed with carotid Doppler studies. Those with significant stenosis should be assessed by a vascular surgeon or stroke physician.

Patients presenting with preoperative weight loss of more than 10% and/or performance status of WHO 2 or worse should have their BMI and albumin measured, and metastatic disease carefully excluded.

Patients who are anatomically suited to resection but have more than one adverse medical factor should have their management discussed formally at a multidisciplinary meeting.

In addition to the above patient factors, there are characteristics of the tumour which will help determine operability. All patients being considered for surgery should have a plain chest radiograph and CT scan of the thorax, liver and adrenal glands. Confirmatory percutaneous biopsy in patients presenting with peripheral lesions is not mandatory, particularly if the lesion was not present on previous chest radiographs. Patients with mediastinal nodes greater than 1cm in diameter on CT should undergo biopsy.

Patients with stage I (cT1N0 and cT2N0) and stage II (cT1N1, cT2N1 and cT3N0) tumours should be considered operable. Patients with stage IIIA (cT3N1 and cT1-3N2) tumours have a low chance of being cured by surgery alone, but it can be used in the context of a trial in combination with adjuvant chemotherapy. Stage IIB and IV tumours should generally be considered inoperable.

Whilst most pleural effusions associated with lung carcinoma are due to the tumour (and result in classification as a T4 tumour), in some patients cytological examination of the fluid is negative. If this is confirmed on more than one occasion, and clinical judgement dictates that the effusion is not related to the tumour, the effusion should be excluded as a staging element. This may mean they are suitable for surgery, and therefore it is not the correct answer here.

Paraneoplastic conditions, such as clubbing, HPOA and syndrome of inappropriate ADH (SIADH) are not linked to the stage of disease and are therefore not automatic contraindications to surgery.

A 56-year-old female presents with a six month history of deteriorating non-productive cough and exertional dyspnoea.

On examination she is noted to be cyanosed, has clubbing of the fingers and there are bilateral basal crackles.

A chest x ray reveals bilateral basal shadowing and pulmonary investigations show:

| | | |
|---------------------------|---------|-------------|
| PaO ₂ (on air) | 8.5 kPa | (11.5-12.5) |
| FEV1/FVC ratio | 85% | - |

Which one of the following investigations is most likely to establish the diagnosis?

(Please select 1 option)

| | |
|-----------------------|----------------------------|
| <input type="radio"/> | Bronchoalveolar lavage |
| <input type="radio"/> | Chest CT scan |
| <input type="radio"/> | Diffusion capacity studies |
| <input type="radio"/> | Echocardiography |
| <input type="radio"/> | Serum ACE level |

| | | |
|----------------------------------|----------------------------|----------------------------|
| <input type="radio"/> | Bronchoalveolar lavage | |
| <input type="radio"/> | Chest CT scan | This is the correct answer |
| <input type="radio"/> | Diffusion capacity studies | |
| <input type="radio"/> | Echocardiography | |
| <input checked="" type="radio"/> | Serum ACE level | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- A high resolution CT scan of the chest will show typical changes associated with idiopathic pulmonary fibrosis.

Explanation

This patient has restrictive lung disease, most likely idiopathic pulmonary fibrosis. The cardinal features are breathlessness and cyanosis; clubbing occurs in two-thirds of cases.

She is hypoxic on air, has a restrictive ventilatory defect, and a high resolution CT scan of the chest will show typical changes.

A 67-year-old man with severe COPD managed with tiotropium, high dose Seretide and salbutamol nebulisers comes to the clinic for review. He tells you that he is increasingly short of breath and finds it very difficult to do anything at all around the house, and asks about long term oxygen therapy (LTOT).

Which of the following features would permit long term home oxygen therapy to be initiated under current NICE guidance?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | FEV1 45% of predicted |
| <input type="radio"/> | PaCO ₂ 5.8kPa repeated whilst stable |
| <input type="radio"/> | PaO ₂ 7.1kPa repeated whilst stable |
| <input type="radio"/> | pH 7.35 |
| <input type="radio"/> | Two or more exacerbations in the past year |

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | FEV1 45% of predicted | |
| <input type="radio"/> | PaCO ₂ 5.8kPa repeated whilst stable | |
| <input type="radio"/> | PaO ₂ 7.1kPa repeated whilst stable | This is the correct answer |
| <input type="radio"/> | pH 7.35 | |
| <input checked="" type="radio"/> | Two or more exacerbations in the past year | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Offer LTOT if PaO₂ less than 7.3 kPa when stable, or greater than 7.3 and less than 8 kPa when stable and with COPD complications.

Explanation

NICE guidance is very clear with respect to requirements for home oxygen therapy.

Offer LTOT to people with PaO₂ less than 7.3 kPa when stable, or greater than 7.3 and less than 8 kPa when stable and with secondary polycythaemia, peripheral oedema, nocturnal hypoxaemia or pulmonary hypertension. Measurements should be repeated whilst stable at least three weeks apart.

NICE guidance does not allow home O₂ therapy based on pH, CO₂, FEV1 or exacerbation criteria.

Apart from criteria based on PaO₂ alone, secondary features of **COPD** such as polycythaemia, peripheral oedema, nocturnal hypoxia or pulmonary hypertension are included.

Dz Hosen

A 61-year-old man presents with a four-day history of dry cough and increasing confusion. He has also suffered diarrhoea and headaches which have increased in severity over the past day.

Past history of hypertension for which he takes perindopril and indapamide is noted as is recent travel to a medical convention in Spain.

On examination his BP is 110/70 mmHg, pulse is 92, he is pyrexial 38.2°C. There are coarse basal crackles bilaterally and signs of a left sided pleural effusion.

Investigations show:

| | | |
|--------------------------|--------------------------|-----------|
| Haemoglobin | 137 g/L | (135-177) |
| White cell count | 11.9 ×10 ⁹ /L | (4-11) |
| Platelets | 173 ×10 ⁹ /L | (150-400) |
| Sodium | 133 mmol/L | (135-146) |
| Potassium | 4.8 mmol/L | (3.5-5) |
| Creatinine | 132 µmol/L | (79-118) |
| Alanine aminotransferase | 180 U/L | (5-40) |
| Alkaline phosphatase | 220 U/L | (39-117) |

CXR - Patchy bilateral consolidation, left pleural effusion.

Which of the following is the best treatment for him?

(Please select 1 option)

| | |
|-----------------------|------------------|
| <input type="radio"/> | Benzyipenicillin |
| <input type="radio"/> | Doxycycline |
| <input type="radio"/> | Erythromycin |
| <input type="radio"/> | Levofloxacin |
| <input type="radio"/> | Rifampicin |

Please select 1 option)

| | |
|----------------------------------|--|
| <input type="radio"/> | Benzylpenicillin |
| <input type="radio"/> | Doxycycline |
| <input type="radio"/> | Erythromycin |
| <input type="radio"/> | Levofloxacin This is the correct answer |
| <input checked="" type="radio"/> | Rifampicin Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Legionnaire's disease should be treated with a fluoroquinolone (such as levofloxacin) or a newer macrolide (such as azithromycin or clarithromycin).

Explanation

The history of recent travel to a convention, coupled with pneumonia with patchy consolidation, a pleural effusion, hyponatraemia, diarrhoea, and non-specific LFT changes raises the possibility of Legionnaire's disease.

There is no definitive national or international consensus on the exact antibiotic choice in this situation, and in clinical practice, local guidelines should be followed. However, the antibiotic must have intracellular activity - in practice, this is usually with a fluoroquinolone (such as levofloxacin) or a newer macrolide (such as azithromycin or clarithromycin). Erythromycin has traditionally been used but has now been superseded by these newer agents.

Legionella is not sensitive to penicillin, therefore benzylpenicillin is an inappropriate choice in this case.

Legionella resistance to rifampicin is noted, therefore this is not a first line option. A small recent study also noted increased liver function abnormalities in patients with Legionnaire's exposed to rifampicin.

Tetracyclines can be used in patients who are allergic to fluoroquinolones and macrolides but are not usually first-line therapy.

A 62-year-old man comes to the respiratory clinic. He was diagnosed with COPD several years ago.

He is on regular steroid inhalers, long acting B2 agonist and ipratropium. He has been discharged from hospital following an infective exacerbation four weeks ago.

On examination he is afebrile and his chest is clear. His FEV1 is 1.2 L. His blood gases on air show the following:

| | | |
|------|---------|-------------|
| pH | 7.4 | (7.35-7.45) |
| PCO2 | 5.5 kPa | (4.7-6.0) |
| PaO2 | 7.3 kPa | (11.3-12.6) |

He stopped smoking six months ago.

Which of the following will you consider?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Discharge from clinic |
| <input type="radio"/> | Give a course of oral steroids |
| <input type="radio"/> | Prescribe oral antibiotics |
| <input type="radio"/> | Repeat blood gases on air in three months |
| <input type="radio"/> | Start LTOT (long term oxygen therapy) |

Please select 1 option)

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Discharge from clinic | |
| <input type="radio"/> | Give a course of oral steroids | |
| <input type="radio"/> | Prescribe oral antibiotics | |
| <input type="radio"/> | Repeat blood gases on air in three months | This is the correct answer |
| <input checked="" type="radio"/> | Start LTOT (long term oxygen therapy) | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Indications for LTOT in the UK are a pO_2 of <7.3 kPa on air, with no evidence of hypercapnia with oxygen therapy. A pO_2 of less than 8 is an indication for LTOT if there is pulmonary hypertension or polycythaemia.

Explanation

Indications of LTOT in the United Kingdom:

- $PO_2 < 7.3$ kPa on air (O_2 saturation $< 88\%$) in a stable clinical state. Borderline results should be repeated in three months. You should demonstrate that the patient does not become hypercapnic on oxygen therapy.
- PO_2 7.3-8 kPa if there is pulmonary hypertension, polycythaemia, or additional nocturnal hypoxaemia.

Blood gases should be performed in a stable state, which should be at least four weeks after an exacerbation of the disease.

There is no indication in this scenario for steroids or antibiotics.

Dr. Assem

A 72-year-old man with severe COPD presents to the clinic for review.

He is on maximal Seretide and tiotropium inhalers yet is suffering from significant shortness of breath and is able to walk only 50-100 m before having to stop.

On examination his BP is 148/88 mmHg, pulse is 82 (atrial fibrillation), there are coarse crackles and wheeze on auscultation of the chest.

Investigations show:

| | | |
|------------------|-----------------------|-------------|
| Haemoglobin | 185 g/L | (135-177) |
| White cell count | $9.1 \times 10^9/L$ | (4-11) |
| Platelets | $280 \times 10^9/L$ | (150-400) |
| Sodium | 138 mmol/L | (135-146) |
| Potassium | 4.2 mmol/L | (3.5-5) |
| Creatinine | 120 $\mu\text{mol/L}$ | (79-118) |
| pH | 7.40 | (7.35-7.45) |
| pCO ₂ | 6.1 kPa | (4.8-6.1) |
| pO ₂ | 7.8 kPa | (10-13.3) |

Which of the above features is an indication for LTOT?

(Please select 1 option)

| | |
|-----------------------|-------------------------------------|
| <input type="radio"/> | pCO ₂ 6.1 |
| <input type="radio"/> | pO ₂ 7.8 |
| <input type="radio"/> | Hb 185 g/L with current ABG results |
| <input type="radio"/> | Presence of atrial fibrillation |
| <input type="radio"/> | Significant exercise limitation |

| | | |
|----------------------------------|-------------------------------------|----------------------------|
| <input type="radio"/> | pCO ₂ 6.1 | |
| <input type="radio"/> | pO ₂ 7.8 | |
| <input type="radio"/> | Hb 185 g/L with current ABG results | This is the correct answer |
| <input type="radio"/> | Presence of atrial fibrillation | |
| <input checked="" type="radio"/> | Significant exercise limitation | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- LTOT is indicated if the pO₂ is between 7.3 and 8.0 and there is secondary polycythaemia (as here), or pulmonary hypertension present.

Explanation

Ordinarily pO₂ above 7.3 would not be an indication for long term oxygen therapy (LTOT), however if the pO₂ is between 7.3 and 8.0, then O₂ may be prescribed if secondary polycythaemia (as here), or pulmonary hypertension are present.

pO₂ 7.8 is an indication for LTOT only if there is coexistent polycythaemia or pulmonary hypertension.

Hypercarbia, significant exercise limitation or atrial fibrillation are not in their own right indications for LTOT.

An otherwise healthy 78-year-old female presents complaining of a three day history of tiredness and breathlessness.

Her pulse oximetry shows oxygen saturation of 90%.

Arterial blood gas analysis performed on air shows

| | | |
|------------------|-----------|-------------|
| pH | 7.3 | (7.36-7.44) |
| PO ₂ | 7.8 kPa | (11.3-12.6) |
| PCO ₂ | 7.5 kPa | (4.7-6.0) |
| Bicarbonate | 30 mmol/L | (20-28) |

What is the most likely cause?

(Please select 1 option)

| | |
|-----------------------|--------------------------|
| <input type="radio"/> | Bronchial asthma |
| <input type="radio"/> | Left ventricular failure |
| <input type="radio"/> | Lobar pneumonia |
| <input type="radio"/> | Neuromuscular weakness |
| <input type="radio"/> | Pulmonary embolism |

Dr. Assem

(Please select 1 option)

- | | | |
|----------------------------------|--------------------------|----------------------------|
| <input type="radio"/> | Bronchial asthma | |
| <input type="radio"/> | Left ventricular failure | |
| <input type="radio"/> | Lobar pneumonia | |
| <input type="radio"/> | Neuromuscular weakness | This is the correct answer |
| <input checked="" type="radio"/> | Pulmonary embolism | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The commonest cause of type 2 respiratory failure is chronic obstructive airway disease.

Explanation

This patient has type 2 respiratory failure as evidence by hypoxia PaO_2 of <8.0 kPa and hypercapnia $\text{PaCO}_2 >6.0$ kPa.

This occurs when alveolar ventilation is insufficient to excrete the amount of CO_2 produced by metabolism. This is due to one or a combination of the following factors:

- Reduced ventilatory effort
- Failure to overcome increased resistance to ventilation, and
- Failure to compensate for an increase in CO_2 production.

The commonest cause is chronic obstructive airway disease, other causes include respiratory muscle weakness, for example, Guillain-Barré syndrome, chest wall deformity, respiratory centre weakness.

The other causes listed here produce type 1 respiratory failure with a mismatch between ventilation and perfusion.

A 29-year-old professional singer presents with a prolonged history of epistaxis and rapidly progressive shortness of breath. The KCO and eosinophil count are raised.

Which of the following is the most likely diagnosis?

(Please select 1 option)

- | | |
|-----------------------|----------------------------------|
| <input type="radio"/> | Alveolar proteinosis |
| <input type="radio"/> | Churg-Strauss syndrome |
| <input type="radio"/> | Goodpasture's syndrome |
| <input type="radio"/> | Granulomatosis with polyangiitis |
| <input type="radio"/> | Microscopic polyangiitis |

Please select 1 option)

| | | |
|----------------------------------|----------------------------------|----------------------------|
| <input type="radio"/> | Alveolar proteinosis | |
| <input type="radio"/> | Churg-Strauss syndrome | |
| <input type="radio"/> | Goodpasture's syndrome | |
| <input checked="" type="radio"/> | Granulomatosis with polyangiitis | This is the correct answer |
| <input type="radio"/> | Microscopic polyangiitis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine, Rheumatology

- Consider granulomatosis with polyangiitis in a patient with alveolar haemorrhage and epistaxis.

Explanation

This patient has shortness of breath and a raised KCO, which leads to you to a diagnosis of alveolar haemorrhage. The condition which links [epistaxis](#) and alveolar haemorrhage in the list above is Granulomatosis with polyangiitis. KCO measures the uptake of carbon monoxide by the lungs, and is equivalent to the transfer factor.

[Granulomatosis with polyangiitis](#) is a multi-organ autoimmune disease, which can be fatal. The classical triad consists of necrotising granulomatous inflammation of the respiratory tract, [glomerulonephritis](#) and a small-vessel vasculitis. A prolonged history of [epistaxis](#) or sinusitis is commonly found in [Granulomatosis with polyangiitis](#), which in some patients is also associated with an eosinophilia. The detection of antineutrophil cytoplasmic antibodies directed against proteinase-3 is highly specific, but is found in only 50% of patients with disease localised to the respiratory tract and 95% with generalised Granulomatosis with polyangiitis.

Standard therapy is with cyclophosphamide and corticosteroids. TNF-alpha blocking agents, anti-thymocyte globulin and monoclonal anti T-cell antibodies can be used in disease refractory to these agents.

Systemic inflammation and vasculitis contribute to accelerated atherosclerosis in patients with [Granulomatosis with polyangiitis](#) and there is therefore a significantly increased incidence of stroke, myocardial infarction and occlusive artery disease.

Alveolar proteinosis is a rare diffuse lung condition, characterised by alveolar and interstitial accumulation of phospholipid protein derived from surfactant. It can be congenital, secondary or acquired, and patients often present with recurrent respiratory infections. Transfer factor (KCO) is typically reduced.

Churg-Strauss syndrome is a rare [systemic vasculitis](#) which affects small and medium sized vessels, in association with asthma. Patients initially present with [allergic rhinitis](#) and asthma, followed by eosinophilia and associated infiltrative disease (e.g. gastroenteritis) and then granulomatous inflammation classically within 3 years.

Goodpasture's syndrome is an important, and potentially rapidly fatal, cause of alveolar haemorrhage. It is caused by circulating antiglomerular basement membrane antibodies, and typically causes an acute glomerulonephritis. [Epistaxis](#) is not as common an association.

Microscopic polyangiitis is a small vessel vasculitis which classically spares the upper respiratory tract.

You are reviewing chemical pathology results which have come to your acute medicine inbox and are collecting a series from patients with chronic respiratory failure.

Which of the following would fit best with a compensated respiratory acidosis?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | pH 6.9, pCO ₂ 3.4, pO ₂ 8.2kPa |
| <input type="radio"/> | pH 7.1, pCO ₂ 3.9kPa, pO ₂ 8.8kPa |
| <input type="radio"/> | pH 7.3, pCO ₂ 3.8kPa, pO ₂ 13.0kPa |
| <input type="radio"/> | pH 7.41, pCO ₂ 7.2kPa, pO ₂ 9.2kPa |
| <input type="radio"/> | pH 7.54, pCO ₂ 4.2 kPa, pO ₂ 12.9kPa |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | pH 6.9, pCO ₂ 3.4, pO ₂ 8.2kPa | |
| <input type="radio"/> | pH 7.1, pCO ₂ 3.9kPa, pO ₂ 8.8kPa | |
| <input type="radio"/> | pH 7.3, pCO ₂ 3.8kPa, pO ₂ 13.0kPa | |
| <input checked="" type="radio"/> | pH 7.41, pCO ₂ 7.2kPa, pO ₂ 9.2kPa | This is the correct answer |
| <input type="radio"/> | pH 7.54, pCO ₂ 4.2 kPa, pO ₂ 12.9kPa | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- In respiratory acidosis with compensation the bicarbonate will be raised.

Explanation

pH 7.41, pCO₂ 7.2kPa, pO₂ 9.2kPa is correct. For all of the other options the pH values are abnormal.

Bicarbonate values are not given, but the presence of pH, O₂ and CO₂ enables us to select the correct option. In the correct option the CO₂ is raised and the O₂ is below the lower limit of normal. The fact that the pH is normal means that there must be bicarbonate retention to compensate.

pH 7.3, pCO₂ 3.8kPa, pO₂ 13.0kPa is consistent with a metabolic acidosis.

pH 6.9, pCO₂ 3.4, pO₂ 8.2kPa and pH 7.1, pCO₂ 3.9kPa, pO₂ 8.8kPa are consistent with a metabolic acidosis, and also with significant hypoxia.

pH 7.54, pCO₂ 4.2 kPa, pO₂ 12.9kPa is consistent with a metabolic alkalosis.

A 40-year-old gentleman presents with wheezing and breathlessness which seem to improve over weekends and holiday periods when he is not at work.

To which of the following is he most likely to be exposed during his work?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | <i>Aspergillus clavatus</i> |
| <input type="radio"/> | Avian bloom |
| <input type="radio"/> | Exposure to spores of <i>Actinomyces</i> |
| <input type="radio"/> | Platinum salts |
| <input type="radio"/> | Work in the silver industry |

| | |
|----------------------------------|--|
| <input type="radio"/> | <i>Aspergillus clavatus</i> |
| <input type="radio"/> | Avian bloom |
| <input type="radio"/> | Exposure to spores of <i>Actinomyces</i> |
| <input type="radio"/> | Platinum salts This is the correct answer |
| <input checked="" type="radio"/> | Work in the silver industry Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Metals causing occupational asthma include isocyanate cobalt, aluminium, chrome, manganese, nickel, zinc and platinum.

Explanation

This is a tricky question, but highlights useful learning points.

Disinfectants and preservatives such as the following can cause occupational asthma:

- Glutaraldehyde
- Chlorhexidine, and
- Formaldehyde.

Metals causing occupational asthma include:

- Isocyanate cobalt
- Aluminium
- Chrome
- Manganese
- Nickel
- Zinc, and
- Platinum.

Extrinsic allergic alveolitis can be caused by exposure to:

- Actinomyces* (farmer's lung, mushroom worker's lung)
- Avian bloom (bird fancier's lung), and
- Aspergillus clavatus* (malt worker's lung).

A 47-year-old gentleman presents to the Emergency department with right sided pleuritic chest pain and dyspnoea. He has no previous medical history. He has no history of smoking.

His BP is 120/75 mmHg. A CXR is done and confirms a right sided pneumothorax with a rim of 2.5 cm.

What is the best plan of action?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | Advise to stop smoking and discharge |
| <input type="radio"/> | Aspirate |
| <input type="radio"/> | Check arterial blood gases and only if hypoxic aspirate |
| <input type="radio"/> | Insert a chest drain |
| <input type="radio"/> | Repeat the CXR in two hours |

(Please select 1 option)

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Advise to stop smoking and discharge | |
| <input type="radio"/> | Aspirate | This is the correct answer |
| <input type="radio"/> | Check arterial blood gases and only if hypoxic aspirate | |
| <input type="radio"/> | Insert a chest drain | |
| <input checked="" type="radio"/> | Repeat the CXR in two hours | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- British thoracic guidelines for pneumothorax.

Explanation

This gentleman has a spontaneous pneumothorax. It is primary, defined as:

- age less than 50-years-old
- no significant smoking history, and
- no evidence of underlying lung disease.

Management depends on the size, and the patient's symptoms. If it is small the patient can be discharged and reviewed in an outpatient clinic in 2-4 weeks. If the rim of air measures more than 2 cm at the level of the hilum, as in this case, and/or the patient is breathless the **pneumothorax** can be aspirated. The level of hypoxia is not a criteria alone to decide management.

A chest drain is indicated if aspiration fails in a large or symptomatic primary pneumothorax. They can also be used in the management of secondary pneumothorax.

Supplemental oxygen accelerates reabsorption of air by a factor of four, but overnight treatment does not feature as part of the current UK guidelines in small primary pneumothoraces.

Repeating the chest radiograph in two hours without any other intervention is unlikely to show any change.

The patient should be advised to stop smoking, as this will increase the risk of recurrence and may lead to the development of other lung disease.

A 24-year-old asthmatic female is admitted with acute severe asthma.

Which of the following statements is correct?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | A high inspired oxygen concentration should be used routinely |
| <input type="radio"/> | Agitation should be managed with a benzodiazepine |
| <input type="radio"/> | Inhaled salmeterol is indicated as first line therapy |
| <input type="radio"/> | Normal arterial $p\text{CO}_2$ is reassuring |
| <input type="radio"/> | Pulsus paradoxus is a reliable sign of severity |

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | A high inspired oxygen concentration should be used routinely | This is the correct answer |
| <input type="radio"/> | Agitation should be managed with a benzodiazepine | |
| <input type="radio"/> | Inhaled salmeterol is indicated as first line therapy | |
| <input type="radio"/> | Normal arterial $p\text{CO}_2$ is reassuring | |
| <input checked="" type="radio"/> | Pulsus paradoxus is a reliable sign of severity | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- High dose oxygen (40-60%) should be used in severe asthma attack, together with steroids and nebulised bronchodilators.

Explanation

A normal or raised arterial $p\text{CO}_2$ is an indication of severe asthma.

Pulsus paradoxus is not reliable and is not part of the criteria in assessing severity of asthma attack.

Salmeterol is used in management of chronic asthma (step 3).

High dose oxygen (40-60%) should be used in severe asthma attack, together with steroids and nebulised bronchodilators.

Sedation must be avoided as it can cause respiratory failure and arrest.

A patient has daytime sleepiness. He wakes up in the morning unrefreshed. He frequently dozes off while watching TV.

He is hypertensive but well controlled with amlodipine 5 mg and ramipril 2.5 mg. He occasionally takes paracetamol for back pain. Neurological examination was normal. His BMI is 45.

His thyroid function tests were normal as well as IGF-1.

Obstructive sleep apnoea (OSA) is suspected.

Which of the following would make OSA more likely?

(Please select 1 option)

| | |
|-----------------------|---------------------------------|
| <input type="radio"/> | Cataplexy |
| <input type="radio"/> | High Epworth sleepiness score |
| <input type="radio"/> | Low Epworth sleepiness score |
| <input type="radio"/> | Low hypocretin levels in CSF |
| <input type="radio"/> | Witness of snoring during sleep |

| | | |
|----------------------------------|---------------------------------|----------------------------|
| <input type="radio"/> | Cataplexy | |
| <input type="radio"/> | High Epworth sleepiness score | This is the correct answer |
| <input type="radio"/> | Low Epworth sleepiness score | |
| <input type="radio"/> | Low hypocretin levels in CSF | |
| <input checked="" type="radio"/> | Witness of snoring during sleep | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Assessment of suspected OSA

Explanation

Epworth sleepiness score consists of questions which are marked out of 24.

Scores greater than 9 raise the suspicion of the possibility of OSA. It should be interpreted in the context of history.

Those with high scores should be referred for further assessment.

A 70-year-old lady with a significant smoking history is referred to the rapid access chest clinic with a three month history of weight loss, a cough and three episodes of haemoptysis. She is otherwise fit and well.

On questioning she has a troublesome cough, some mild right sided chest pain which she describes as an ache and finds she gets fatigued more easily. However she is still able to complete the majority of her usual tasks unaided, although she finds these take her longer than before.

According to the World Health Organisation (WHO) classification, what is her performance status?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | 0 |
| <input type="radio"/> | 1 |
| <input type="radio"/> | 2 |
| <input type="radio"/> | 3 |
| <input type="radio"/> | 4 |

Please select 1 option

| | |
|----------------------------------|---|
| <input type="radio"/> | 0 |
| <input type="radio"/> | 1 This is the correct answer |
| <input type="radio"/> | 2 |
| <input checked="" type="radio"/> | 3 Incorrect answer selected |
| <input type="radio"/> | 4 |

Key Learning Points

Respiratory Medicine

- Assessing a patient's performance status is important when evaluating the most appropriate treatment options. It is commonly used by cancer MDTs, but has a role in assessing patients with chronic illnesses including COPD.

Explanation

Assessing a patient's performance status is important when evaluating the most appropriate treatment options. It is commonly used by cancer MDTs, but has a role in assessing patients with chronic illnesses including COPD.

| WHO (Zubrod) Scale | Description |
|--------------------|---|
| 0 | Asymptomatic |
| 1 | Symptomatic but ambulatory (can carry out light work) |
| 2 | In bed less than 50% of the day. Unable to work but can live at home with some assistance |
| 3 | In bed more than 50% of the day (unable to care for self) |
| 4 | Bedridden |

As taken from NICE guidance on [Lung cancer \(NG122\)](#).

You review a 52-year-old gentleman with COPD in chest clinic three weeks after a recent admission for an exacerbation.

He has had repeated admissions to hospital with exacerbations of his COPD, but until now has refused to quit smoking. He now reports that he is keen to quit smoking and is requesting help to achieve this.

Which of the following smoking cessation methods is most likely to be successful in this patient?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Acupuncture |
| <input type="radio"/> | Bupropion plus counselling |
| <input type="radio"/> | Counselling |
| <input type="radio"/> | Hypnosis |
| <input type="radio"/> | Nicotine replacement patches plus counselling |

(Please select 1 option)

| | |
|----------------------------------|--|
| <input type="radio"/> | Acupuncture |
| <input type="radio"/> | Bupropion plus counselling |
| <input type="radio"/> | Counselling |
| <input type="radio"/> | Hypnosis |
| <input checked="" type="radio"/> | Nicotine replacement patches plus counselling Correct |

Key Learning Points

Respiratory Medicine

- Smoking cessation is a vital element of management of many respiratory conditions and there has been much research into the different techniques.

Explanation

Research has shown that medication to relieve nicotine cravings (such as nicotine patches or bupropion) coupled with counselling has the greatest potential of success, although rates of cessation are only 20%.

Bupropion is contraindicated in patients with eating disorders or a history of seizures.

It should also be avoided in patients also taking corticosteroids, antimalarials, tramadol and antidepressants, as these lower seizure threshold. Our patient is likely to be on corticosteroids at regular intervals.

Acupuncture success rates are between 5-15%, but the evidence for hypnosis is limited.

A 45-year-old seaman presents with cough and fever.

A CXR demonstrates a cavitating lung lesion.

Which of the following is the most likely cause?

(Please select 1 option)

| | |
|-----------------------|----------------|
| <input type="radio"/> | Amoebiasis |
| <input type="radio"/> | Brucellosis |
| <input type="radio"/> | Histoplasmosis |
| <input type="radio"/> | Sarcoidosis |
| <input type="radio"/> | Syphilis |

| | | |
|----------------------------------|----------------|----------------------------|
| <input type="radio"/> | Amoebiasis | |
| <input type="radio"/> | Brucellosis | |
| <input type="radio"/> | Histoplasmosis | This is the correct answer |
| <input type="radio"/> | Sarcoidosis | |
| <input checked="" type="radio"/> | Syphilis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Histoplasmosis normally evolves slowly, over as long as 20 years, but may follow a more rapid course in the immunocompromised.

Explanation

Histoplasmosis normally evolves slowly over as long as 20 years but may follow a more rapid course in the immunocompromised (seamen may be more prone to sexually transmitted diseases such as HIV).

Amoebic abscesses can develop in the right lower lobe following transdiaphragmatic spread from amoebic liver abscess (tender hepatomegaly, malaise, spiking temperature).

Amoebiasis is also a fresh water pathogen.

A 35-year-old homeless gentleman is admitted to the acute medical unit with a four month history of cough, weight loss and night sweats.

A chest x ray is highly suggestive of miliary tuberculosis (TB).

Which of the following statements is true regarding this condition?

(Please select 1 option)

- ☐ A negative tuberculin test excludes diagnosis
- ☐ A normal chest x ray excludes this diagnosis
- ☐ Anti-TB drugs should not be given unless patient is sputum positive (for acid fast bacilli)
- ☐ Nodules are typically 4-6 mm
- ☐ Tuberculous meningitis is also seen in 15-20% of patients with miliary TB

- | | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | A negative tuberculin test excludes diagnosis | |
| <input type="radio"/> | A normal chest x ray excludes this diagnosis | |
| <input type="radio"/> | Anti-TB drugs should not be given unless patient is sputum positive (for acid fast bacilli) | |
| <input checked="" type="radio"/> | Nodules are typically 4-6 mm | Incorrect answer selected |
| <input type="radio"/> | Tuberculous meningitis is also seen in 15-20% of patients with miliary TB | This is the correct answer |

Key Learning Points

Respiratory Medicine

- Miliary TB is the progressive haematological spread of *Mycobacterium tuberculosis*.

Explanation

Fifteen per cent to 20% of patients who have miliary TB also have TB meningitis at the time of presentation. Conversely 33% of patient with TB meningitis have concomitant miliary TB.

The tuberculin test is often negative.

A chest x ray may be normal in up to one third of patients.

The classic millet seed nodules are small measuring about 1-2 mm.

Not all patients will be sputum positive and with evidence supporting a diagnosis of tuberculosis treatment should be commenced swiftly.

A 69-year-old lady is seen in chest clinic for her increasing breathlessness. She has a significant smoking history having smoked 40/day for 50 years.

When questioned she reports that she notices that she has to walk slower than her husband and friends due to her breathlessness. When walking at her own pace she often stops every 300 m, again due to breathlessness.

What grade of dyspnoea does she have accordingly to the MRC dyspnoea scale?

(Please select 1 option)

| | |
|-----------------------|-----------|
| <input type="radio"/> | Grade I |
| <input type="radio"/> | Grade II |
| <input type="radio"/> | Grade III |
| <input type="radio"/> | Grade IV |
| <input type="radio"/> | Grade V |

| | |
|----------------------------------|---|
| <input type="radio"/> | Grade I |
| <input type="radio"/> | Grade II |
| <input type="radio"/> | Grade III This is the correct answer |
| <input type="radio"/> | Grade IV |
| <input checked="" type="radio"/> | Grade V Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Grade I refers to someone very fit. Grade V refers to someone who is breathless at rest. Think of it as a scale; if you can't remember the details estimate where the patient would be in relation to I and V.

Explanation

One of the main symptoms of chronic obstructive pulmonary disease (COPD) is breathlessness and the MRC dyspnoea scale should be used to quantify this.

| Grade | Degree of breathlessness related to activities |
|-------|--|
| 1 | Not troubled by breathlessness except on strenuous exercise |
| 2 | Short of breath when hurrying or walking up a slight hill |
| 3 | Walks slower than contemporaries on level ground because of breathlessness, or has to stop for breath when walking at own pace |
| 4 | Stops for breath after walking about 100 metres or after a few minutes on level ground |
| 5 | Too breathless to leave the house, or breathless when dressing or undressing |

A 16-year-old male presents to his GP with exertional breathlessness.

The chest x ray reveals a lesion in the anterior mediastinum.

Which one of the following is the most likely cause for such an appearance?

(Please select 1 option)

- | | |
|-----------------------|-------------------|
| <input type="radio"/> | Ascending aorta |
| <input type="radio"/> | Hilar lymph nodes |
| <input type="radio"/> | Left atrium |
| <input type="radio"/> | Oesophagus |
| <input type="radio"/> | Thymus gland |

| | |
|----------------------------------|-----------------------------------|
| <input type="radio"/> | Ascending aorta |
| <input checked="" type="radio"/> | Hilar lymph nodes |
| <input type="radio"/> | Left atrium |
| <input type="radio"/> | Oesophagus |
| <input checked="" type="radio"/> | Thymus gland Correct |

Key Learning Points

Respiratory Medicine

- Abnormalities of the anterior/superior mediastinum may relate to the thymus, thyroid.

Explanation

Abnormalities of the anterior/superior mediastinum may relate to the thymus, thyroid.

Inferior or middle mediastinal masses relate to the aorta, lungs, hilar lymph nodes, oesophagus and heart.

Posterior mediastinal masses may relate to the nerves and vertebrae.

A 19-year-old smoker presents to the Emergency department with right sided pleuritic chest pain and dyspnoea. He has no previous medical history.

His BP is 120/75 mmHg. A CXR is done and confirms a right sided pneumothorax with a rim of 2.5 cm.

Aspiration was done and was successful. He is about to go on holiday abroad in three days time.

Which of the following advice would you give?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | Advise not to drive |
| <input type="radio"/> | Advise not to swim |
| <input type="radio"/> | Allow flight but advise not to do any diving |
| <input type="radio"/> | Do not advise any flight for at least one week |
| <input type="radio"/> | Repeat CXR before the flight and allow if no residual pneumothorax |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Advise not to drive | |
| <input type="radio"/> | Advise not to swim | |
| <input type="radio"/> | Allow flight but advise not to do any diving | |
| <input type="radio"/> | Do not advise any flight for at least one week | This is the correct answer |
| <input checked="" type="radio"/> | Repeat CXR before the flight and allow if no residual pneumothorax | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- General advice for patients with pneumothorax after discharge.

Explanation

Atmospheric air drops during flights and increases in deep sea diving can cause recurrence of pneumothorax. This is due to expansion and rupture of pulmonary blebs. Many commercial airlines previously advised a 6-week interval between pneumothorax and air travel, but this has now been amended to 1 week following full resolution.

However, the British Thoracic Society emphasises that the recurrence risk only significantly falls after 1 year, and therefore in the absence of a definitive surgical procedure patients might wish to defer travel until then.

You are the medical SHO in A and E

A 22-year-old female is admitted very distressed and short of breath. She is struggling to speak in full sentences and is taccypnoeic.

Examination reveals a respiratory rate of 35/min, a pulse of 120 beats per minute, a blood pressure 110/70 mmHg, oxygen saturations of 90% and a peak expiratory flow rate <50% predicted.

The emergency medical services have administered salbutamol 5 mg (twice) and face mask oxygen.

An ABG is pending.

Which of the following is the most appropriate next action in this patient?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | Attempt intubation |
| <input type="radio"/> | Intensive care referral |
| <input type="radio"/> | Oxygen 35% |
| <input type="radio"/> | Prednisolone 40 mg |
| <input type="radio"/> | Salbutamol 5 mg and ipratropium bromide 0.5 mg with oxygen |

Please select 1 option)

| | | |
|----------------------------------|--|---------|
| <input type="radio"/> | Attempt intubation | |
| <input type="radio"/> | Intensive care referral | |
| <input type="radio"/> | Oxygen 35% | |
| <input type="radio"/> | Prednisolone 40 mg | |
| <input checked="" type="radio"/> | Salbutamol 5 mg and ipratropium bromide 0.5 mg with oxygen | Correct |

Key Learning Points

Respiratory Medicine

- In life threatening asthma β_2 -agonists should be administered as soon as possible, preferably nebulised driven by oxygen

Explanation

This patient fits the criteria for life-threatening asthma (saturation under 92% in air). In such cases β_2 -agonists should be administered as soon as possible, preferably nebulised driven by oxygen. Repeat doses should be given at 15-30 minute intervals, or continuous nebulisation can be used where there is inadequate response to bolus therapy. Nebulised ipratropium bromide should be added for patients with acute severe or life threatening asthma, or those with a poor initial response. Its addition produces significantly greater bronchodilation than a β_2 -agonist alone.

Oxygen should be given to maintain saturations at 94-98%. Patients with saturations less than 92% on air should have an ABG to exclude hypercapnia. However, starting treatment should not be delayed to do the ABG. Initially high-flow oxygen is used, and then weaned to maintain adequate saturations. Unless you suspect COPD there is not a need to be cautious with oxygen therapy.

Steroids reduce mortality, relapses, subsequent hospital admission and requirement for β_2 -agonists¹. The earlier they are given in the attack, the better the outcome. A dose of 40-50 mg should therefore be given once oxygen and nebuliser therapy has been established. This should be continued for five days, or until recovery, and can then be stopped abruptly unless the patient has taken long term oral corticosteroids.

Failure to respond to the above treatment steps may warrant the use of intravenous magnesium sulphate and aminophylline. However, these should not be used without discussion with your senior colleagues.

Intensive care is indicated for patients with severe acute or life threatening asthma who are failing to respond to therapy. Consider it in patients with deteriorating peak flow, persisting or worsening hypoxia, hypercapnia, acidosis, exhaustion or altered conscious state. All patients who are transferred to an intensive care unit should be accompanied by a doctor who can intubate if necessary.

As an aside, chest radiographs are not indicated unless you suspect pneumothorax or consolidation, or there is life-threatening asthma, a failure to respond to treatment or a need for ventilation.

Attempting intubation prior to further therapy is the wrong thing to do especially if inexperienced in this technique and there are other treatments you can try first before this step.

A 32-year-old woman is admitted from a party complaining of extreme light-headedness and pleuritic chest pain she also says she has pins and needles in both hands.

She has a past history of asthma which is controlled with a beclomethasone inhaler and prn salbutamol.

On examination her BP is 110/72mmHg, her pulse is 95 and regular. There is scattered wheeze on auscultation of her chest but good air entry bilaterally. Her peak flow is 500, (580 predicted).

Investigations show:

| | | |
|------------------|----------|---------------|
| pH | 7.52 | (7.35 - 7.45) |
| PCO ₂ | 3.5 kPa | (4.8 - 6.1) |
| pO ₂ | 12.9 kPa | (10 - 13.3) |

Which of the following is the most appropriate therapy with respect to reducing the likelihood of future attendance in the Emergency department?

(Please select 1 option)

| | |
|-----------------------|-----------------------------------|
| <input type="radio"/> | Diaphragmatic breathing exercises |
| <input type="radio"/> | Diazepam |
| <input type="radio"/> | Fluoxetine |
| <input type="radio"/> | Montelukast |
| <input type="radio"/> | Seretide |

Dr. Assem

| | | |
|----------------------------------|-----------------------------------|----------------------------|
| <input type="radio"/> | Diaphragmatic breathing exercises | This is the correct answer |
| <input type="radio"/> | Diazepam | |
| <input type="radio"/> | Fluoxetine | |
| <input type="radio"/> | Montelukast | |
| <input checked="" type="radio"/> | Seretide | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- In asthma, teaching diaphragmatic breathing, (as opposed to thoracic breathing which is practised by many asthmatics), may significantly impact on symptoms.

Explanation

This patient is hyperventilating as judged by her symptoms, (peripheral numbness, pleuritic chest pain and shortness of breath), and arterial blood gasses. There is only a minor reduction in peak flow.

In this case, teaching diaphragmatic breathing, (as opposed to thoracic breathing which is practised by many asthmatics), may significantly impact on symptoms.

Diazepam is not recommended in this case as it does not address the underlying problem responsible for her presentation, (likely thoracic breathing).

Fluoxetine is effective in treating anxiety but from the presentation described it does not appear that anxiety / depression is a significant driver.

Whilst montelukast and Seretide are appropriate steps up in asthma therapy, there is only a small reduction in peak flow from that predicted; as such neither is indicated here.

A student from the Indian subcontinent has recently been diagnosed with sputum positive tuberculosis (TB).

He lives on the university campus in a shared flat. His housemates are contacted by public health and requested to undergo screening.

Which of the following investigations is most commonly used in this instance?

(Please select 1 option)

| | |
|-----------------------|-----------------------|
| <input type="radio"/> | Blood test |
| <input type="radio"/> | Chest x ray |
| <input type="radio"/> | Heaf test |
| <input type="radio"/> | Mantoux test |
| <input type="radio"/> | Microbiology (sputum) |

| | | |
|----------------------------------|-----------------------|----------------------------|
| <input type="radio"/> | Blood test | |
| <input type="radio"/> | Chest x ray | |
| <input type="radio"/> | Heaf test | |
| <input checked="" type="radio"/> | Mantoux test | This is the correct answer |
| <input checked="" type="radio"/> | Microbiology (sputum) | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- TB is a notifiable disease and as such public health need to be notified and will screen contacts.

Explanation

The Mantoux test is the most commonly used screening test for contacts of a patient with recently diagnosed TB. If this suggests a risk of infection, then a chest x ray is performed and appropriate follow up arranged.

Heaf tests are now less commonly used as a screening test.

Blood tests may indicate anaemia, hyponatraemia or hypercalcaemia, which are sometimes seen in infection, but would not have a role in screening.

Microbiology - assessing either sputum or bronchial washings for acid-fast bacilli - would not be routinely used in asymptomatic contacts.

A 67-year-old male smoker with a 35 pack/year history is referred to the rapid access lung cancer clinic by the GP following a suspicious chest x ray.

He undergoes a CT scan of his thorax. The report is as follows:

'There is a 4.5 cm mass in the right upper lobe which is involving the right main bronchus. There are several ipsilateral hilar lymph nodes, the largest measuring 2.3 cm. There is no evidence of distant metastases. The overall appearance is in keeping with a lung carcinoma, most likely non-small cell'.

Based on the TNM (tumour, nodes, and metastases) classification, what is the radiological staging of this patient's lung cancer?

(Please select 1 option)

| | |
|-----------------------|--------|
| <input type="radio"/> | T2N1M0 |
| <input type="radio"/> | T2N2M0 |
| <input type="radio"/> | T2N3M0 |
| <input type="radio"/> | T3N1M0 |
| <input type="radio"/> | T3N2M0 |

Please select 1 option

| | | |
|----------------------------------|--------|----------------------------|
| <input type="radio"/> | T2N1M0 | This is the correct answer |
| <input type="radio"/> | T2N2M0 | |
| <input type="radio"/> | T2N3M0 | |
| <input type="radio"/> | T3N1M0 | |
| <input checked="" type="radio"/> | T3N2M0 | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- This question requires an understanding on the TMN staging classification of NSCLC (non-small cell lung cancer).

Explanation

This patient has a T2N1M0 lung cancer. TMN staging is used by the multidisciplinary team to aid the choice of treatment.

T2 = Tumour with any of the following features of size or extent:

- Greater than 3 cm in greatest dimension
- Involves main bronchus
- Greater than 2 cm distal to the carina
- Invades the visceral pleura.
- Associated with atelectasis or obstructive pneumonitis that extends to the hilar region but does not involve the entire lung.

N1 = Metastases to ipsilateral peribronchial and/or ipsilateral hilar lymph nodes and intrapulmonary nodes involved by direct extension of the primary tumour.

M0 = No distant metastases.

Reference:

NICE. [Lung cancer \(NG122\)](#)

Dr Assem

A 20-year-old male student is assessed for shortness of breath that occurs whilst running.

He has no other symptoms and does not smoke. Examination, full blood count, and chest x ray are normal.

Which of the following is most likely to be helpful in confirming the suspected diagnosis?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Arterial blood gas studies before and after exercise |
| <input type="radio"/> | Determination of lung volumes and diffusing capacity |
| <input type="radio"/> | Measurement of venous blood lactate before and after exercise |
| <input type="radio"/> | Spirometry before and after administration of bronchodilators |
| <input type="radio"/> | Spirometry before and after exercise |

| | |
|----------------------------------|---|
| <input type="radio"/> | Arterial blood gas studies before and after exercise |
| <input type="radio"/> | Determination of lung volumes and diffusing capacity |
| <input type="radio"/> | Measurement of venous blood lactate before and after exercise |
| <input type="radio"/> | Spirometry before and after administration of bronchodilators |
| <input checked="" type="radio"/> | Spirometry before and after exercise Correct |

Key Learning Points

Respiratory Medicine

- Spirometry before and after exercise is the most appropriate investigation to diagnose exercise-induced asthma.

Explanation

The most likely diagnosis is exercise-induced asthma and this would be best diagnosed with spirometry before and after exercise, where a typical obstructive pattern may be displayed following exercise.

No abnormalities may be displayed following bronchodilator therapy if it is true exercise-induced asthma. Similarly lung volumes and diffusion capacity are likely to be unaffected.

Blood gas analysis would be relatively unhelpful in this scenario as little change in partial pressures would be expected.

This patient does not have a glycogen storage disease where weakness rather than shortness of breath is more typical, hence lactate measurements are unnecessary.

A 27-year-old woman with a known history of asthma who lives in the countryside comes to the clinic for review.

She has progressively worsening disease and is currently taking high dose Seretide and montelukast. Apparently she coughs every night, occasionally with frank haemoptysis and is finding it impossible to do any regular exercise at all.

On examination her BP is 128/82 mmHg, pulse is 74 and regular. There is extensive wheeze and scattered coarse crackles on auscultation of the chest. Her peak flow is 320 (580 predicted).

Investigations show:

| | | |
|------------------|----------------------|--------------|
| Haemoglobin | 127 g/L | (115 - 160) |
| White cell count | $7.9 \times 10^9/L$ | (4 - 11) |
| Eosinophil count | $1.2 \times 10^9/L$ | (0.04 - 0.4) |
| Platelets | $173 \times 10^9/L$ | (150 - 400) |
| Sodium | 137 mmol/L | (135 - 146) |
| Potassium | 4.2 mmol/L | (3.5 - 5) |
| Creatinine | 98 $\mu\text{mol/L}$ | (79 - 118) |

Which of the following is the best investigation?

(Please select 1 option)

| | |
|-----------------------|-------------------------|
| <input type="radio"/> | Aspergillus precipitins |
| <input type="radio"/> | CT thorax |
| <input type="radio"/> | CXR |
| <input type="radio"/> | IgE |
| <input type="radio"/> | Sputum culture |

(Please select 1 option)

| | | |
|----------------------------------|-------------------------|----------------------------|
| <input type="radio"/> | Aspergillus precipitins | This is the correct answer |
| <input type="radio"/> | CT thorax | |
| <input type="radio"/> | CXR | |
| <input type="radio"/> | IgE | |
| <input checked="" type="radio"/> | Sputum culture | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Aspergillus precipitins can contribute significantly to confirming the diagnosis of allergic bronchopulmonary aspergillosis (ABPA).

Explanation

The most likely diagnosis here is allergic bronchopulmonary aspergillosis (ABPA); as such aspergillus precipitins can contribute significantly to confirming the diagnosis.

Oral steroids are the mainstay of initial treatment and anti-fungals such as itraconazole may also improve resolution of symptoms in some cases.

Whilst both chest x ray and CT thorax may show evidence of infiltrates this is relatively non-specific and therefore would not be optimal investigations; they may, however, prove useful in assessing severity of disease.

IgE is elevated in ABPA but is not as specific an investigation as aspergillus precipitins.

Sputum culture may be positive but negative culture would not exclude the disease.

A 30-year-old patient attends the hospital's asthma clinic.

She has had asthma since childhood and her control is variable. At present she is on low dose beclomethasone inhaler, and is using her salbutamol inhaler at least eight times a day. She has recently been commenced on a long acting beta 2 agonist and noticed some improvement in her symptoms.

On questioning she also reports her asthma symptoms are waking her at night once or twice a week.

On examination she is not acutely dyspnoeic and her oxygen saturations through pulse oximetry are 98% on air. She has scattered wheeze throughout her lung fields on auscultation.

Accordingly to the current British Thoracic Society guidelines what adjustments should be made to her asthma regime?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Add oral corticosteroids |
| <input type="radio"/> | Add salbutamol nebuliser at night |
| <input type="radio"/> | Arrange admission to medical assessment unit |
| <input type="radio"/> | Increase the dose of the inhaled corticosteroid |
| <input type="radio"/> | Stop the long acting beta 2 agonist and add a LAMA |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Add oral corticosteroids | |
| <input type="radio"/> | Add salbutamol nebuliser at night | |
| <input type="radio"/> | Arrange admission to medical assessment unit | |
| <input type="radio"/> | Increase the dose of the inhaled corticosteroid | This is the correct answer |
| <input checked="" type="radio"/> | Stop the long acting beta 2 agonist and add a LAMA | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- This patient has poorly controlled asthma, and needs to have her medications increased in accordance with the stepwise approach of the BTS guidelines.

Explanation

According to the BTS guidelines, the patient needs adjustment in step 3 to achieve greater symptom control.

According to the guidelines a long acting B2 agonist (LABA) should be initiated first, which has already happened.

If the patient has good response to this then a LABA should be continued.

If there is no response then LABA should be stopped and increased dose of ICS should be considered.

If there is inadequate response, then continue LABA and either increase the dose of the inhaled steroid or consider a leukotriene receptor antagonist or SR theophylline or LAMA.

Oral corticosteroids form step 5.

Which of the following is not employed in the laboratory diagnosis of respiratory viral infections?

(Please select 1 option)

| | |
|-----------------------|--------------------------------|
| <input type="radio"/> | ELISA |
| <input type="radio"/> | Haemagglutination |
| <input type="radio"/> | Immunofluorescence |
| <input type="radio"/> | Single radial haemolysis (SRH) |
| <input type="radio"/> | Tissue culture |

(Please select 1 option)

- | | | |
|----------------------------------|--------------------------------|----------------------------|
| <input type="radio"/> | ELISA | |
| <input type="radio"/> | Haemagglutination | |
| <input type="radio"/> | Immunofluorescence | |
| <input type="radio"/> | Single radial haemolysis (SRH) | This is the correct answer |
| <input checked="" type="radio"/> | Tissue culture | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The SRH test is used to screen for rubella antibodies in pregnant women.

Explanation

Rapid antigen detection kits utilising direct immunofluorescence are used to demonstrate the following in respiratory secretions:

- Respiratory syncytial virus (RSV)
- Influenza
- Parainfluenza, and
- Adenovirus.

Respiratory viruses can be grown in various cell lines, for example, HeLa cells or fibroblasts.

Influenza is a haemagglutinating virus as red cells stick to the infected cells after addition to the culture.

Enzyme-linked immunosorbent assay (ELISA) is used to look for antibodies in acute and convalescent sera.

The SRH test is used to screen for rubella antibodies in pregnant women.

A 43-year-old patient with rheumatoid arthritis is sent to the clinic with increasing shortness of breath over a 6 week period.

Lung function tests demonstrate a fall in the FEV₁ which is markedly lower than tests last taken two months ago. The residual volume (RV) is increased by two litres but the measurements of diffusion are normal. The patient is a smoker.

Which of the following is the most likely diagnosis?

(Please select 1 option)

- | | |
|-----------------------|---------------------------------------|
| <input type="radio"/> | Acute interstitial pneumonitis |
| <input type="radio"/> | Atypical pneumonia |
| <input type="radio"/> | Bronchiolitis obliterans |
| <input type="radio"/> | Caplan's syndrome |
| <input type="radio"/> | Chronic obstructive pulmonary disease |

- ☐ Acute interstitial pneumonitis
- ☐ Atypical pneumonia
- ☐ Bronchiolitis obliterans This is the correct answer
- ☐ Caplan's syndrome
- ☒ Chronic obstructive pulmonary disease Incorrect answer selected

Key Learning Points

Respiratory Medicine, Rheumatology

- Bronchiolitis obliterans, with or without organising pneumonia, can be a fatal complication of rheumatoid arthritis (especially in women taking penicillamine).

Explanation

All of the possible options can occur in [rheumatoid arthritis](#) but a progressive and relentless fall in the forced expiratory volume in one second (FEV_1) is the most characteristic of [bronchiolitis obliterans](#).

[Bronchiolitis obliterans](#), with or without organising pneumonia, can be a fatal complication of [rheumatoid arthritis](#) (especially in women taking penicillamine). Histologically there is a mural concentric narrowing of the lumina of the bronchioles. It can present as severe respiratory insufficiency, and diagnosis is best made with lung biopsy. Inflammation in the small distal airways leads to obstructive spirometry and without treatment this is relentlessly progressive. Air trapping can occur, which leads to increased lung volumes. Corticosteroids can induce a quick response and improvement in symptoms. Rheumatoid serology often worsens with the onset of [bronchiolitis obliterans](#).

Other associations are with solid organ or bone marrow transplantation, and other connective tissue disorders.

Caplan's syndrome is the combination of [rheumatoid arthritis](#) with pneumoconiosis related to coal dust. There is a rapid development of basal peripheral nodules, which can progress to severe pulmonary fibrosis.

[COPD](#) is a possibility but it is rare for it to progress at the rate described here. The history is too long for an atypical pneumonia.

Acute interstitial pneumonitis is associated with drug-treatment of [rheumatoid arthritis](#), in particular methotrexate.

A 53-year-old dental secretary presents with a four month history of dry cough. She has never smoked.

She denies haemoptysis, weight loss and dyspnoea. There is no post nasal drip.

Her medical history consists only of hypertension for one year. She is on ramipril 2.5 mg, bendroflumethiazide 2.5 mg and amlodipine 10 mg.

On examination her JVP is not raised and her chest is clear. A CXR was requested.

What would be the most likely cause of her cough?

(Please select 1 option)

| | |
|-----------------------|---------------------------|
| <input type="radio"/> | Allergic rhinitis |
| <input type="radio"/> | Bronchiectasis |
| <input type="radio"/> | Drug induced |
| <input type="radio"/> | Interstitial lung disease |
| <input type="radio"/> | Lung cancer |

| | |
|----------------------------------|--|
| <input type="radio"/> | Allergic rhinitis |
| <input type="radio"/> | Bronchiectasis |
| <input type="radio"/> | Drug induced This is the correct answer |
| <input checked="" type="radio"/> | Interstitial lung disease Incorrect answer selected |
| <input type="radio"/> | Lung cancer |

Key Learning Points

Respiratory Medicine

- Awareness of causes of cough and side effects of drugs.

Explanation

ACE inhibitors can cause dry cough. They can then be replaced with an angiotensin receptor blocker. It is important to ask about the onset of cough and the start of a new drug.

There no history to suggest allergic rhinitis.

Bronchiectasis causes a productive cough.

Interstitial lung disease and lung cancer may be causes but they are not the most likely and in this scenario there is nothing to suggest either.

A 63-year-old woman presents with a five day history of progressive shortness of breath. Her family brought her in because she was increasingly sleepy during the last 24 hours.

She was diagnosed with chronic obstructive pulmonary disease (COPD) three years ago and has a FEV1 less than 50% of predicted. She has an oxygen concentrator at home.

Examination revealed depressed consciousness and a respiratory rate of 24 with shallow breaths. There were decreased breath sounds with minimal air movement.

If an arterial blood gas on room air were to be performed which of the following results would you expect?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | pH 7.16 paCO_2 70 paO_2 50 HCO_3 24 |
| <input type="radio"/> | pH 7.24 paCO_2 80 paO_2 55 HCO_3 30 |
| <input type="radio"/> | pH 7.32 paCO_2 60 paO_2 70 HCO_3 30 |
| <input type="radio"/> | pH 7.41 paCO_2 40 paO_2 50 HCO_3 24 |
| <input type="radio"/> | pH 7.48 paCO_2 30 paO_2 85 HCO_3 24 |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | pH 7.16 p _a CO ₂ 70 p _a O ₂ 50 HCO ₃ 24 | |
| <input checked="" type="radio"/> | pH 7.24 p _a CO ₂ 80 p _a O ₂ 55 HCO ₃ 30 | This is the correct answer |
| <input type="radio"/> | pH 7.32 p _a CO ₂ 60 p _a O ₂ 70 HCO ₃ 30 | |
| <input checked="" type="radio"/> | pH 7.41 p _a CO ₂ 40 p _a O ₂ 50 HCO ₃ 24 | Incorrect answer selected |
| <input type="radio"/> | pH 7.48 p _a CO ₂ 30 p _a O ₂ 85 HCO ₃ 24 | |

Key Learning Points

Respiratory Medicine

- COPD is the commonest cause of type 2 respiratory failure.

Explanation

This patient's presentation suggests that she has developed acute carbon dioxide retention and would be expected to have a low pH, low pO₂, high pCO₂ and a high HCO₃ because she has longstanding COPD.

Consequently the last three options really do not fit.

The first option has a pretty much normal bicarbonate and this would be expected to be much higher in chronic COPD (as there would be metabolic alkalosis to compensate for the respiratory acidosis). Therefore this leaves the best fit as the second option.

A 21-year-old gentleman with cystic fibrosis presents with infertility.

What is the most likely cause for this?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | Chronic prostatic insufficiency |
| <input type="radio"/> | Failure of development of the vas deferens |
| <input type="radio"/> | Increasing alkalinisation of semen |
| <input type="radio"/> | Primary failure of testosterone production |
| <input type="radio"/> | Production of anti-sperm antibodies |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Chronic prostatic insufficiency | |
| <input type="radio"/> | Failure of development of the vas deferens | This is the correct answer |
| <input type="radio"/> | Increasing alkalinisation of semen | |
| <input type="radio"/> | Primary failure of testosterone production | |
| <input checked="" type="radio"/> | Production of anti-sperm antibodies | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Infertility occurs in 98% of adult men secondary to maldevelopment of the vas deferens or to other forms of obstructive azoospermia.

Explanation

Infertility occurs in 98% of adult men secondary to maldevelopment of the vas deferens or to other forms of obstructive azoospermia.

In women, fertility is decreased secondary to viscid cervical secretions.

Dr. Assem

A 38-year-old gentleman with known emphysema secondary to alpha 1-antitrypsin (A1AT) deficiency attends the local chest clinic for follow up. He is also known to have liver cirrhosis.

Which of the following conditions is associated with A1AT deficiency?

(Please select 1 option)

| | |
|-----------------------|---------------------------|
| <input type="radio"/> | Bladder carcinoma |
| <input type="radio"/> | Churg-Strauss vasculitis |
| <input type="radio"/> | Polyarteritis nodosa |
| <input type="radio"/> | Primary biliary cirrhosis |
| <input type="radio"/> | Pulmonary fibrosis |

(Please select 1 option)

| | | |
|----------------------------------|---------------------------|----------------------------|
| <input type="radio"/> | Bladder carcinoma | This is the correct answer |
| <input type="radio"/> | Churg-Strauss vasculitis | |
| <input type="radio"/> | Polyarteritis nodosa | |
| <input type="radio"/> | Primary biliary cirrhosis | |
| <input checked="" type="radio"/> | Pulmonary fibrosis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- A1AT deficiency is associated with a number of malignancies including hepatocellular cancer, lung cancer, bladder cancer and lymphoma.

Explanation

A1AT deficiency is has associations with a number of varied conditions.

A1AT deficiency is associated with a number of malignancies including hepatocellular cancer, lung cancer, bladder cancer and lymphoma.

Other associated conditions include

- Cirrhosis
- Pancreatitis
- Gall stones
- COPD
- Bronchiectasis
- Primary sclerosing cholangitis
- Wegener's granulomatosis and
- Pelvic prolapse.

A 47-year-old man with confusion is brought into the emergency department via ambulance.

He has a history of alcohol abuse and is currently living in a homeless shelter. On questioning he reports feeling generally unwell for several months with malaise and weight loss. He has recently complained of a headache to workers at the house, and has been acting strangely over the last few days.

He was treated for tuberculosis (TB) two years ago, but was non-compliant with medication. He is investigated and diagnosed with cerebral tuberculosis. He is commenced on rifampicin, pyrazinamide, ethambutol and isoniazid. He is also started on steroid therapy.

For how long should treatment be continued in total?

(Please select 1 option)

☐ 2 months

☐ 4 months

☐ 6 months

☐ 8 months

☐ 12 months

Please select 1 option)

| | |
|----------------------------------|--------------------------------|
| <input type="radio"/> | 2 months |
| <input type="radio"/> | 4 months |
| <input type="radio"/> | 6 months |
| <input type="radio"/> | 8 months |
| <input checked="" type="radio"/> | 12 months Correct |

Key Learning Points

Respiratory Medicine

- In meningeal or cerebral TB, a four drug regime is continued for 12 months (use of steroids is also recommended) to ensure adequate brain penetration and to prevent cranial nerve compression by meningeal scarring.

Explanation

Worldwide TB affects 10 million people and causes two million deaths. In developed countries it is relatively uncommon. Those who are elderly, malnourished or immunocompromised (HIV, diabetes, alcoholism, corticosteroid therapy) are susceptible.

Uncomplicated pulmonary TB is treated for a total of six months, with a three or four drug regime continued for two months followed by using rifampicin and isoniazid for the remaining four months.

In meningeal or cerebral TB, a four drug regime is continued for 12 months (use of steroids is also recommended) to ensure adequate brain penetration and to prevent cranial nerve compression by meningeal scarring.

Current NICE guidelines on [Tuberculosis \(NG33\)](#) recommend a treatment regimen of isoniazid, pyrazinamide, rifampicin and a fourth drug (for example, ethambutol) for the first 2 months, followed by isoniazid and rifampicin 10 months. In addition a glucocorticoid (equivalent to prednisolone 20-40 mg) is recommended for the first 2-3 weeks, then with gradual reduction.

A 25-year-old chef undergoes a Mantoux test as a colleague has just tested positive for sputum positive tuberculosis.

Which of the following response would indicate she has been infected with the disease?

(Please select 1 option)

☐ 3 mm

☐ 6 mm

☐ 9 mm

☐ 12 mm

☐ 18 mm

(Please select 1 option)

| | |
|----------------------------------|----------------------------|
| <input type="radio"/> | 3 mm |
| <input type="radio"/> | 6 mm |
| <input type="radio"/> | 9 mm |
| <input type="radio"/> | 12 mm |
| <input checked="" type="radio"/> | 18 mm Correct |

Key Learning Points

Respiratory Medicine

- A Mantoux test resulting in a reaction over 15mm in size is suggestive of TB infection, and patients should be referred for further investigation and treatment.

Explanation

The Mantoux test replaced the Heaf test in 2005 in the UK. One of its uses is for patients who have had close contact with a person known to have tuberculosis.

The injection site should be reviewed 48-72 hours following intradermal inoculation of tuberculin. The left forearm is typically used. Only the induration, not surrounding erythema, is used in the measurement and the longest diameter is measured in millimetres:

- Less than 6 mm: negative test, previously unvaccinated individuals can be given the BCG (within three months) provided there are no contraindications
- More than 6 mm but less than 15 mm: hypersensitive to tuberculin protein (may be due to previous TB infection, BCG, or atypical mycobacteria). Patients are not given the BCG if part of an immunisation programme. However, in other contexts (e.g. immigrant screening and contact tracing), further investigation should and follow-up may be indicated.
- More than 15 mm: strongly hypersensitive to tuberculin, suggestive of TB infection. Patients should be referred for further investigation and treatment

The reaction to tuberculin protein may be suppressed by viral infections, live viral vaccines, sarcoidosis, corticosteroids, immunosuppression, severe tuberculous disease and poor nutrition.

A 50-year-old lady presented to the Emergency department with cough and dyspnoea for the past two days.

She was previously well. She smokes 20 cigarettes per day.

She has a temperature of 38.3°C and is agitated and confused. Her pulse is 110/min and her blood pressure is 88/60 mmHg. Her oxygen saturation is 89% on air and she has a respiratory rate of 40/min.

Chest x ray shows left basal consolidation.

Results show:

| | | |
|------------|------------|-----------|
| Sodium | 143 mmol/L | (137-144) |
| Potassium | 3.8 mmol/L | (3.5-4.9) |
| Urea | 9.2 mmol/L | (2.5-7.5) |
| Creatinine | 85 µmol/L | (60-110) |

Her CURB score is documented and she is admitted to hospital with severe pneumonia.

Which of the following would count towards her CURB score?

(Please select 1 option)

| | |
|-----------------------|------------------------------|
| <input type="radio"/> | Consolidation on chest x ray |
| <input type="radio"/> | Oxygen saturation |
| <input type="radio"/> | Peak expiratory flow rate |
| <input type="radio"/> | Raised blood urea |
| <input type="radio"/> | Temperature |

Dr. Assen

Please select 1 option)

| | |
|----------------------------------|---|
| <input type="radio"/> | Consolidation on chest x ray |
| <input type="radio"/> | Oxygen saturation |
| <input type="radio"/> | Peak expiratory flow rate |
| <input type="radio"/> | Raised blood urea This is the correct answer |
| <input checked="" type="radio"/> | Temperature Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The CURB score is calculated by assessment of core adverse prognostic features which are used in assessment of severity of pneumonia, one of which is blood urea.

Explanation

The CURB score is calculated by assessment of core adverse prognostic features which are used in assessment of severity of pneumonia.

Two from four features indicate a severe pneumonia and hospital admission is advised.

The CURB score is calculated using:

- Confusion abbreviated mental test score less than 8.
- Urea more than 7 mmol/L.
- Respiratory rate more than 30/min.
- Blood pressure; systolic BP less than 90 or diastolic BP less than 60 mmHg.

An 80-year-old coal miner who stopped working 16 years previously presents with deteriorating dyspnoea.

Investigations show:

| | | |
|------------------|-------|-----------------|
| FEV ₁ | 1.4 L | (predicted 2.5) |
| FVC | 2.8 L | (predicted 3.0) |

What is the most likely diagnosis?

(Please select 1 option)

- ☐ Chronic obstructive pulmonary disease
- ☐ Hypersensitivity pneumonitis
- ☐ Idiopathic pulmonary fibrosis
- ☐ Silicosis
- ☐ Simple pneumoconiosis

| | | |
|----------------------------------|---------------------------------------|----------------------------|
| <input type="radio"/> | Chronic obstructive pulmonary disease | This is the correct answer |
| <input type="radio"/> | Hypersensitivity pneumonitis | |
| <input type="radio"/> | Idiopathic pulmonary fibrosis | |
| <input type="radio"/> | Silicosis | |
| <input checked="" type="radio"/> | Simple pneumoconiosis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Chronic obstructive pulmonary disease (COPD) results in a spirometry pattern suggestive of obstructive nature

Explanation

Both this man's forced expiratory volume in one second (FEV1) and forced vital capacity (FVC) are reduced. The ratio of FEV1/FVC is also reduced at 50%. This indicates airways obstruction.

Chronic obstructive pulmonary disease (COPD) is the only condition above that results in airways obstruction.

Although no smoking history is given this may be expected and with his occupation these are risk factors for the development of COPD.

A patient is admitted to the intensive care unit for ventilatory support several hours after being admitted to the emergency department following a near drowning incident.

He is extremely hypoxic and a chest x ray shows bilateral infiltrates. He is diagnosed with acute respiratory distress syndrome (ARDS).

Which of the following is a direct pulmonary cause of ARDS?

(Please select 1 option)

| | |
|-----------------------|--------------|
| <input type="radio"/> | Anaphylaxis |
| <input type="radio"/> | Burns |
| <input type="radio"/> | Post arrest |
| <input type="radio"/> | Sepsis |
| <input type="radio"/> | Tuberculosis |

| | |
|----------------------------------|-----------------------------------|
| <input type="radio"/> | Anaphylaxis |
| <input type="radio"/> | Burns |
| <input type="radio"/> | Post arrest |
| <input type="radio"/> | Sepsis |
| <input checked="" type="radio"/> | Tuberculosis Correct |

Key Learning Points

Respiratory Medicine

- Tuberculosis is a direct pulmonary cause of ARDS

Explanation

This question addresses the phenomena of ARDS and its causes both direct and indirect.

Direct pulmonary causes include:

- Inhalation of gastric contents (pH <2)
- Infective (pneumonia, tuberculosis)
- Pulmonary trauma
- Near drowning
- Toxic gas inhalation and
- Oxygen toxicity.

Indirect causes include:

- Sepsis
- Non-thoracic trauma
- Uraemia
- Bowel infraction
- Anaphylaxis and
- Burns.

ARDS mortality is generally high (40%), but is determined by the cause with aspiration pneumonia having a mortality rate of almost 80% when associated with ARDS.

A 42-year-old rough sleeper is admitted from the local park where he has been found collapsed after drinking a flask of amyl nitrite.

On examination his skin is blue grey in colour, his pulse is 100 and regular, and his BP is 105/60 mmHg. He is unconscious, respiratory examination is unremarkable apart from an increased respiratory rate of 31. The pulse oximeter reads 90%.

Which of the following is the most appropriate treatment?

(Please select 1 option)

- | | |
|-----------------------|-------------------|
| <input type="radio"/> | Ascorbic acid |
| <input type="radio"/> | Cimetidine |
| <input type="radio"/> | Hyperbaric oxygen |
| <input type="radio"/> | Methylene blue |
| <input type="radio"/> | Omeprazole |

| | |
|----------------------------------|--|
| <input type="radio"/> | Ascorbic acid |
| <input type="radio"/> | Cimetidine |
| <input type="radio"/> | Hyperbaric oxygen |
| <input checked="" type="radio"/> | Methylene blue This is the correct answer |
| <input type="radio"/> | Omeprazole Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Amyl nitrite ingestion typically results in methaemoglobinaemia, which is treated with methylene blue.

Explanation

Amyl nitrite is known to lead to oxidation of haemoglobin, particularly when ingested in large quantities. The presentation seen here is typical of that for methaemoglobinaemia, when oxidation of the Fe^{2+} component of haemoglobin to Fe^{3+} leads to a significant left shift in the oxygen dissociation curve. Methylene blue is the initial treatment of choice for methaemoglobinaemia.

Ascorbic acid may be considered as a second line therapy to reduce cyanosis in methaemoglobinaemia although some debate exists as to its efficacy.

Cimetidine can be used to inhibit metabolism of agents such as dapsone which are known to lead to methaemoglobinaemia.

Hyperbaric oxygen is used for cases which are resistant to initial medical therapy.

Omeprazole is not thought to have a role in the treatment of the condition.

A 19-year-old smoker presents to the Emergency department with right sided pleuritic chest pain and dyspnoea. He has no previous medical history.

His BP is 120/75 mmHg. A CXR is done and confirms a right sided pneumothorax with a rim of 2.5 cm.

What is the pathogenesis of pneumothorax?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | Leak from pulmonary alveoli |
| <input type="radio"/> | Oesophageal rupture |
| <input type="radio"/> | Ruptured apical bullae on lung surface |
| <input type="radio"/> | Underlying asthma |
| <input type="radio"/> | Underlying emphysema |

- ☐ Leak from pulmonary alveoli
- ☐ Oesophageal rupture
- ☐ Ruptured apical bullae on lung surface **This is the correct answer**
- ☒ Underlying asthma **Incorrect answer selected**
- ☐ Underlying emphysema

Key Learning Points

Respiratory Medicine

- Pathogenesis in spontaneous pneumothorax.

Explanation

Spontaneous rupture of bullae or after minimal trauma causes primary pneumothorax in the young.

Smoking cessation should be advised.

A 58-year-old man is admitted with bacterial pneumonia following influenza. He initially improved but subsequently developed a cough productive of purulent blood-stained sputum and swinging fevers.

On examination he is pyrexial 38.4°C, has a BP of 110/70 mmHg and a pulse of 105. You can hear coarse crackles throughout both lung fields, decreased air entry and a stony dull percussion note at the right base.

Investigations reveal

| | | |
|------------------|---|-----------|
| Haemoglobin | 128 g/L | (135-180) |
| White cell count | $13.1 \times 10^9/L$ | (4-10) |
| Platelets | $192 \times 10^9/L$ | (150-400) |
| Sodium | 141 mmol/L | (134-143) |
| Potassium | 4.3 mmol/L | (3.5-5) |
| Creatinine | 145 $\mu\text{mol/L}$ | (60-120) |
| CXR | Bilateral basal consolidation, right-sided pleural effusion | |

Which of the following is the next appropriate investigation?

(Please select 1 option)

| | |
|-----------------------|-----------------------------------|
| <input type="radio"/> | Sputum cultures |
| <input type="radio"/> | CT thorax |
| <input type="radio"/> | Diagnostic pleural fluid sampling |
| <input type="radio"/> | MRI thorax |
| <input type="radio"/> | Ultrasound thorax |

Please select 1 option

| | | |
|----------------------------------|-----------------------------------|----------------------------|
| <input type="radio"/> | Sputum cultures | |
| <input type="radio"/> | CT thorax | |
| <input type="radio"/> | Diagnostic pleural fluid sampling | This is the correct answer |
| <input type="radio"/> | MRI thorax | |
| <input checked="" type="radio"/> | Ultrasound thorax | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Pleural effusions with a pH of 7.2 or less represent empyemas, and must be managed with a chest drain.

Explanation

This gentleman has a unilateral **pleural effusion**, which in the clinical setting may represent an empyema. It is therefore critical that you urgently obtain a sample of pleural fluid to confirm or exclude this, as an **empyema** requires a chest drain to be inserted. If pus is obtained, a chest drain should be inserted. Other fluid should be tested for pH, and if less than 7.2 this indicates an **empyema** and a drain should again be inserted. Fluid should also be sent for protein and LDH (to determine if it is a transudate or exudate), glucose, gram stain, microscopy, culture and sensitivity and cytology.

Current UK best practice guidelines indicate ultrasound should be used to guide pleural aspiration, but ultrasound alone is unlikely to add further information.

CT thorax may further delineate the consolidation, but is unlikely to influence management at this stage, and may cause contrast-induced nephropathy in this gentleman who has deranged renal function. It may be indicated at a later stage if the chest radiograph changes persist, to exclude an underlying pulmonary lesion.

MRI thorax is also unlikely to add anything at this stage.

Sputum cultures, whilst useful, will take at least 3-5 days to yield diagnostic information and pleural aspiration is therefore more critical at this stage.

A 25-year-old man presented to the Emergency department with cough, shortness of breath and headache. He had been treated by his GP with amoxicillin but did not improve. He had recently been on holiday in Spain. On examination he had bilateral crackles. His liver enzymes were deranged.

Which antibiotic should be used?

(Please select 1 option)

- | | |
|-----------------------|------------------------|
| <input type="radio"/> | Co-amoxiclav |
| <input type="radio"/> | Clarithromycin |
| <input type="radio"/> | Intravenous cefuroxime |
| <input type="radio"/> | Metronidazole |
| <input type="radio"/> | Oseltamivir (Tamiflu) |

Please select 1 option

| | |
|----------------------------------|--|
| <input type="radio"/> | Co-amoxiclav |
| <input type="radio"/> | Clarithromycin This is the correct answer |
| <input type="radio"/> | Intravenous cefuroxime |
| <input checked="" type="radio"/> | Metronidazole Incorrect answer selected |
| <input type="radio"/> | Oseltamivir (Tamiflu) |

Key Learning Points

Respiratory Medicine

- There is no definitive consensus on antibiotic choice for *Legionella pneumophila*, but a fluoroquinolone or newer macrolide is usually used.

Explanation

This gentleman may have *Legionella pneumophila*. Outbreaks are usually related to contaminated water cooling systems, showers, or air conditioning systems. The fact this gentleman has recently returned from Spain is supportive of the diagnosis, as is the presence of deranged liver function.

Legionella causes a flu-like disease, with a dry cough, reduced lymphocytes, hyponatraemia (due to SIADH), deranged LFTs and pyrexia. It can also result in diarrhoea, abdominal pain and creatinine kinase. Diagnosis should be made with urinary antigen testing, or serology.

There is no definitive national or international consensus on the exact antibiotic used to treat Legionnaire's disease, and in clinical practice local guidelines should be followed. However, the antibiotic must have intracellular activity - in practice this is usually with a fluoroquinolone (such as levofloxacin) or a newer macrolide (such as azithromycin or clarithromycin). Erythromycin has traditionally been used, but has now been superseded by these newer agents.

Mortality can be high especially in the immunocompromised, and therefore one should not wait for the results of culture or urinary antigens prior to starting treatment.

A 27-year-old woman is referred to the respiratory clinic with increasing shortness of breath and episodes of syncope. On further questioning it transpires that her mother suffered from a lung / circulatory condition and died a few years after a heart lung transplant, and her aunt died at a young age, from a condition which they were told was heart failure.

Her BP is 145/82 mmHg, her pulse is 85 and regular, and her BMI is 22. There is a murmur of tricuspid regurgitation, and bilateral pitting oedema of the ankles.

Investigations show:

| | | |
|------------------|---|-----------|
| Haemoglobin | 126 g/L | (115-160) |
| White cell count | $6.8 \times 10^9/L$ | (4-11) |
| Platelets | $205 \times 10^9/L$ | (150-400) |
| Sodium | 136 mmol/L | (135-146) |
| Potassium | 3.9 mmol/L | (3.5-5) |
| Creatinine | 119 $\mu\text{mol/L}$ | (79-118) |
| Echocardiogram | Evidence of increased right sided pressures | |

Which of the following is the most likely mode of inheritance?

(Please select 1 option)

| | |
|-----------------------|---------------------|
| <input type="radio"/> | Autosomal dominant |
| <input type="radio"/> | Autosomal recessive |
| <input type="radio"/> | De-novo mutation |
| <input type="radio"/> | X linked dominant |
| <input type="radio"/> | X linked recessive |

(Please select 1 option)

| | | |
|----------------------------------|---------------------|----------------------------|
| <input type="radio"/> | Autosomal dominant | This is the correct answer |
| <input type="radio"/> | Autosomal recessive | |
| <input type="radio"/> | De-novo mutation | |
| <input type="radio"/> | X linked dominant | |
| <input checked="" type="radio"/> | X linked recessive | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Familial primary pulmonary hypertension (PPH) is recognised to account for 15-20% of cases of PPH and is due to an inherited mutation in the BMPR2 gene which codes for a receptor in the TGF beta family.

Explanation

This woman has familial primary pulmonary hypertension (PPH). This is evidenced by her age, and particularly symptoms such as increased shortness of breath and recurrent syncope. The increased right sided pressures are also a give away with respect to the diagnosis.

The fact her aunt and mother suffered from a similar disease points to an inherited component.

The condition is recognised to account for 15-20% of cases of PPH and is due to an inherited mutation in the BMPR2 gene which codes for a receptor in the TGF beta family. Hereditary haemorrhagic telangiectasia, another cause of inherited pulmonary hypertension, also carries an autosomal dominant inheritance pattern.

The occurrence of pulmonary hypertension in a number of family members makes a de novo mutation highly unlikely.

Of the other modes of inheritance listed, only autosomal dominant is correct.

A 53-year-old man presents to the respiratory clinic. He has been involved in nuclear power plant construction for much of his life and has increasing shortness of breath and chronic cough over the past 12 months.

On examination his BP is 138/82 mmHg, pulse is 72 and heart sounds are normal. There are occasional crackles on auscultation of the chest.

Investigations show:

| | | |
|------------------|-----------------------|-----------|
| Haemoglobin | 124 g/L | (135-177) |
| White cell count | $10.2 \times 10^9/L$ | (4-11) |
| Platelets | $203 \times 10^9/L$ | (150-400) |
| Sodium | 139 mmol/L | (135-146) |
| Potassium | 4.0 mmol/L | (3.5-5) |
| Creatinine | 122 $\mu\text{mol/L}$ | (79-118) |

Chest x ray shows bilateral hilar lymphadenopathy.

Which of the following is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|-------------------------------|
| <input type="radio"/> | Asthma |
| <input type="radio"/> | Berylliosis |
| <input type="radio"/> | COPD |
| <input type="radio"/> | Idiopathic pulmonary fibrosis |
| <input type="radio"/> | Sarcoidosis |

| | |
|----------------------------------|---|
| <input type="radio"/> | Asthma |
| <input checked="" type="radio"/> | Berylliosis This is the correct answer |
| <input type="radio"/> | COPD |
| <input type="radio"/> | Idiopathic pulmonary fibrosis |
| <input checked="" type="radio"/> | Sarcoidosis Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Exposure to beryllium is seen in the nuclear power, telecommunications, semi-conductor and electronics industries; it results in a similar clinical picture to that of sarcoidosis.

Explanation

Exposure to beryllium is seen in the nuclear power, telecommunications, semi-conductor and electronics industries. It results in a similar clinical picture to that of sarcoidosis; in this case it is the patient's occupation that pushes us towards berylliosis as the most appropriate answer.

Sarcoidosis is the major differential here, but it is the possible exposure to beryllium because of occupation which points us away from this as the most likely diagnosis.

Idiopathic pulmonary fibrosis would be associated with evidence of interstitial fibrosis on chest x ray.

We are not told of any smoking history consistent with chronic obstructive pulmonary disease (COPD) and there is no evidence of wheeze to suggest asthma.

A 35-year-old man presents after three months of chronic cough with purulent sputum and shortness of breath on exertion.

He gives a history of at least two sinus or bronchial infections per year requiring treatment with antibiotics. He also says he and his wife have been unable to have children. He smokes 15 cigarettes per day.

Examination is normal except for some wheezing and an area of focal crackles at the left lung base. Chest x ray shows patchy infiltrates at both bases.

Investigations revealed

| | |
|--------------------------------|---------|
| FEV ₁ | 2.0 L |
| FVC | 2.7 L |
| pH | 7.38 |
| P _a CO ₂ | 40 mmHg |
| P _a O ₂ | 82 mmHg |

What is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Alpha-1-antitrypsin (antiprotease) deficiency |
| <input type="radio"/> | Asthma |
| <input type="radio"/> | Cystic fibrosis |
| <input type="radio"/> | Hypogammaglobulinaemia |
| <input type="radio"/> | Immotile cilia syndrome |

A 35-year-old man presents after three months of chronic cough with purulent sputum and shortness of breath on exertion. He gives a history of at least two sinus or bronchial infections per year requiring treatment with antibiotics. He also says he and his wife have been unable to have children. He smokes 15 cigarettes per day.

Examination is normal except for some wheezing and an area of focal crackles at the left lung base. Chest x ray shows patchy infiltrates at both bases.

Investigations revealed

| | |
|--------------------------------|---------|
| FEV ₁ | 2.0 L |
| FVC | 2.7 L |
| pH | 7.38 |
| P _a CO ₂ | 40 mmHg |
| P _a O ₂ | 82 mmHg |

What is the most likely diagnosis?

(Please select 1 option)

| | |
|----------------------------------|---|
| <input type="radio"/> | Alpha-1-antitrypsin (antiprotease) deficiency |
| <input type="radio"/> | Asthma |
| <input type="radio"/> | Cystic fibrosis |
| <input type="radio"/> | Hypogammaglobulinaemia |
| <input checked="" type="radio"/> | Immotile cilia syndrome Correct |

Key Learning Points

Respiratory Medicine

- Immotile cilia syndrome, also known as primary ciliary dyskinesia and includes Kartagener's syndrome, is an inherited condition where the cilia lining the airways fail to function or function ineffectively.

Explanation

Immotile cilia syndrome, also known as primary ciliary dyskinesia and includes Kartagener's syndrome, is an inherited condition where the cilia lining the airways fail to function or function ineffectively.

A defect in the dynein molecule causes the cilia either totally to cease to function or to function ineffectively.

Kartagener's syndrome is a subset of patients that account for about half of all people with immotile cilia syndrome.

Other associated conditions of immotile cilia syndrome are

- Male infertility
- Congenital heart defects
- Deafness
- Hydrocephalus

Cystic fibrosis is unlikely to present at this age.

Infertility is not typically associated with hypogammaglobulinaemia.

A 48-year-old male presents feeling progressively short of breath and 'wheezy' for the last couple of months. He smokes 30 a day for the last 20 years. He had lung function tests which showed the following.

His FEV1 (forced expiratory value in one second) was 2.1 litres and his FEV1 /FVC (Forced Vital Capacity) ratio was 50%. His diffusion capacity of carbon monoxide (DL,CO) was 105% of the average value expected for his age and gender.

What is the FVC and what is the most likely diagnosis?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | 1.05L and Emphysema |
| <input type="radio"/> | 1.05L and Idiopathic Pulmonary fibrosis |
| <input type="radio"/> | 2.1L and Neuromuscular Disorder |
| <input type="radio"/> | 4.2L and Chronic Obstructive Pulmonary Disease (COPD) |
| <input type="radio"/> | 4.2L and Pneumonitis |

Please select 1 option!

- ☐ 1.0L and Emphysema
- ☐ 1.0L and Idiopathic Pulmonary fibrosis
- ☐ 2.1L and Neuromuscular Disorder
- ☒ 4.2L and Chronic Obstructive Pulmonary Disease (COPD) Correct
- ☐ 4.2L and Pneumonitis

Key Learning Points

Lung Function, Respiratory Medicine

- In a patient who presents with shortness of breath and a background of an extensive smoking history, COPD is an important diagnosis to consider.

Explanation

This patient has a FEV1 /FVC ratio of 0.5 and FEV1 is 2.1 L the FVC is 2.1L divided by 0.5 which is that same as 2.1 multiplied by 2 which equals 4.2L.

This patient's FEV1 /FVC ratio is 50% which highlights this patient has an obstructive airway picture as it is less than 80%.

The three main causes of obstructive airway disease are:

- asthma
- COPD, and
- emphysema.

It is important to consider lung cancer in the above patient due to the history and a tumour compressing on larger bronchial airway could present with a reduced FEV1 /FVC ratio.

The diffusion capacity of carbon monoxide test measures efficiency of the transfer of gas from air in the lung, to the red blood cells in lung blood vessels.

It is reduced (less than 75% expected in a person of the same gender and age) in the following diseases:

- Loss of lung parenchyma (emphysema etc.).
- Diseases that scar the lung tissue (idiopathic pulmonary fibrosis etc.)
- Swelling of lung tissue (pulmonary oedema)
- Acute inflammatory response to allergens (acute interstitial pneumonitis etc.)
- Diseases of the blood vessels in the lung (pulmonary vasculitis, pulmonary hypertension etc.)

It is increased greater than 125% expected in a person of the same gender and age in the following diseases:

- Alveolar haemorrhage (Goodpasture's syndrome etc.)
- Polycythaemia,
- Left to right intracardiac shunts

This patient has a normal DLCO which rules out of emphysema and makes COPD the most likely diagnosis out the options given.

References:

1. Pellegrino ED, Viegel V, Bartsch RR, Crapo RO, Franco F, Burgos et al. International strategies for lung function tests. Eur Respir J 1999;

A patient post retrosternal thyroidectomy resection has sudden onset shortness of breath.

On examination, she is talking clearly but has decreased breath sounds on her right side with hyper-resonance on percussion. Her blood pressure is 110/80 mmHg, pulse 95 beats per minute, respiratory rate 24/min and SpO₂ 92 on air.

What is the next most appropriate step?

(Please select 1 option)

| | |
|-----------------------|-----------------------------------|
| <input type="radio"/> | Chest x ray |
| <input type="radio"/> | Furosemide 40 mg intravenously |
| <input type="radio"/> | Intercostal chest drain insertion |
| <input type="radio"/> | Needle thoracocentesis |
| <input type="radio"/> | Removal of surgical clips |

| | | |
|----------------------------------|-----------------------------------|----------------------------|
| <input type="radio"/> | Chest x ray | This is the correct answer |
| <input type="radio"/> | Furosemide 40 mg intravenously | |
| <input type="radio"/> | Intercostal chest drain insertion | |
| <input type="radio"/> | Needle thoracocentesis | |
| <input checked="" type="radio"/> | Removal of surgical clips | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The most appropriate first step for a suspected pneumothorax in a stable patient would be confirmation with chest x ray followed by chest drain insertion.

Explanation

According to the scenario above this lady has a pneumothorax.

She is not in extremis (suggesting a tension **pneumothorax**) so needle thoracocentesis is not required.

The history and examination are suggestive of a **pneumothorax** and therefore, with her being relatively stable, the most appropriate first step would be confirmation with chest x ray followed by chest drain insertion.

Furosemide would not help.

A 45-year-old man presents with a three month history of wheezing and dyspnoea whilst at work as a manufacturer of plastics. His symptoms improve significantly when at home and at weekends.

What is the likely causative agent?

(Please select 1 option)

- | | |
|-----------------------|---------------------------|
| <input type="radio"/> | Asbestos |
| <input type="radio"/> | Cotton dust |
| <input type="radio"/> | Isocyanates |
| <input type="radio"/> | Silica |
| <input type="radio"/> | Simple coal worker's lung |

Please select 1 option

| | | |
|----------------------------------|---------------------------|----------------------------|
| <input type="radio"/> | Asbestos | |
| <input type="radio"/> | Cotton dust | |
| <input type="radio"/> | Isocyanates | This is the correct answer |
| <input type="radio"/> | Silica | |
| <input checked="" type="radio"/> | Simple coal worker's lung | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Specifically asking about the timing and location of occurrence of symptoms can help in raising a suspicion of occupational asthma

Explanation

This patient presents with typical symptoms of occupational asthma and the most likely causative substance is isocyanate which is used in the manufacture of foams/plastics.

There are an estimated 1500 to 3000 cases of occupational asthma reported each year.

The most commonly implicated substances in occupational asthma are isocyanates, flour/grain, adhesives, metals, resins, colophony, fluxes, latex, animals, aldehydes and wood dust. Cotton dust can be associated, but is less recognised than isocyanates.

Asbestos is associated with pleural plaques, pleural thickening, pleural effusions, interstitial lung disease, mesothelioma and lung carcinoma but not occupational asthma.

Silica (which is found in coal dust) exposure results in pulmonary fibrosis.

Simple coal worker's disease describes a nodular interstitial lung disease.

Dr Assem

A 41-year-old man with a history of nasal congestion, breathlessness, cough and wheeze presents with a left foot drop.

Which of the following is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|----------------------------------|
| <input type="radio"/> | Churg-Strauss syndrome |
| <input type="radio"/> | Diabetes mellitus |
| <input type="radio"/> | Granulomatosis with polyangiitis |
| <input type="radio"/> | Polyarteritis nodosa |
| <input type="radio"/> | Pulmonary eosinophilia |

| | | |
|----------------------------------|----------------------------------|----------------------------|
| <input checked="" type="radio"/> | Churg-Strauss syndrome | This is the correct answer |
| <input type="radio"/> | Diabetes mellitus | |
| <input type="radio"/> | Granulomatosis with polyangiitis | |
| <input checked="" type="radio"/> | Polyarteritis nodosa | Incorrect answer selected |
| <input type="radio"/> | Pulmonary eosinophilia | |

Key Learning Points

Respiratory Medicine

- Churg-Strauss syndrome (CSS) is a rare form of small-vessel vasculitis, characterised by asthma, allergic rhinitis and prominent peripheral blood eosinophilia. Rarely, it can cause either an anterior or a posterior ischaemic optic neuropathy, which presents with visual loss.

Explanation

Churg-Strauss syndrome (CSS) is a rare form of small-vessel vasculitis, characterised by asthma, [allergic rhinitis](#) and prominent peripheral blood eosinophilia. Rarely, it can cause either an anterior or a posterior ischaemic optic neuropathy, which presents with visual loss.

The most commonly involved organ is the lung, followed by the skin. CSS, however, can affect any organ system, including the cardiovascular, gastrointestinal, renal, and central nervous systems. The unifying feature of patients presenting with CSS is asthma. Vasculitis involving the peripheral nervous system is also a characteristic feature, and [mononeuritis multiplex](#) occurs in 75% of patients, which accounts for the foot drop in this case.

Vasculitis of extrapulmonary organs is largely responsible for the morbidity and mortality associated with CSS. 40-60% are associated with positive ANCA, usually pANCA/MPO.

Intravenous glucocorticoid is used for initial therapy of acute multi-organ disease, followed by oral glucocorticoid therapy, often with azathioprine as a steroid-sparing agent. Loss of vision must be treated aggressively.

[Granulomatosis with polyangiitis](#) is a multi-organ autoimmune disease, which can be fatal. The classical triad consists of necrotising granulomatous inflammation of the respiratory tract, [glomerulonephritis](#) and a small-vessel vasculitis. A prolonged history of [epistaxis](#) or sinusitis is commonly found in [granulomatosis with polyangiitis](#), which in some patients is also associated with an eosinophilia.

Hypereosinophilic syndrome is characterised by a peripheral blood eosinophil count of >1.5 for more than 6 months. Generalised symptoms are fatigue, myalgia, fever, night sweats, diarrhoea and pruritus. Other symptoms depend on the organ involved: cardiac disease causes chest pain and dyspnoea, respiratory disease presents with a dry cough.

Diabetes mellitus can cause a [mononeuritis multiplex](#) (and therefore a foot drop), however the other features do not fit with this diagnosis.

[Polyarteritis nodosa](#) is a vasculitis which affects medium and small arteries, resulting in microaneurysms, aneurysmal rupture, thrombosis and subsequently organ ischaemia and infarction. It most commonly affects skin, joints, peripheral nerves, the gastrointestinal tract and the kidney. The lungs are usually spared. A typical presentation is with fever, night sweats, weight loss, skin ulceration and tender nodules, and severe muscle and joint pains.

Which of the following recognised associations is correct?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | Bronchopulmonary aspergillosis and wheezing |
| <input type="radio"/> | Lung carcinoids and pleural effusion |
| <input type="radio"/> | Pneumoconiosis and clubbing |
| <input type="radio"/> | Pulmonary embolus and left bundle branch block |
| <input type="radio"/> | Pulmonary fibrosis and hypercapnia |

(Please select 1 option)

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Bronchopulmonary aspergillosis and wheezing | This is the correct answer |
| <input type="radio"/> | Lung carcinoids and pleural effusion | |
| <input type="radio"/> | Pneumoconiosis and clubbing | |
| <input type="radio"/> | Pulmonary embolus and left bundle branch block | |
| <input checked="" type="radio"/> | Pulmonary fibrosis and hypercapnia | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Allergic bronchopulmonary aspergillosis is caused by *Aspergillus fumigatus*, which can present with asthma and eosinophilia.

Explanation

Allergic bronchopulmonary **aspergillosis** is caused by *Aspergillus fumigatus*, which can present with asthma and eosinophilia.

Pulmonary fibrosis is associated with type 1 respiratory failure, which is associated with ventilation/perfusion mismatch.

In general, clubbing is only seen in advanced pneumoconiosis. Remember in the MRCP they are 'single best answer' questions - i.e. more than one answer may be correct but you need to choose the most correct answer. There is a stronger association between bronchopulmonary **aspergillosis** and wheeze than there is between pneumoconiosis and clubbing and therefore this is the most correct answer.

Pulmonary embolus is associated with right bundle branch block.

There is not a strong association between bronchial carcinoid and pleural effusion.

65-year-old man came to the hospital for worsening breathlessness. He was a chronic smoker and previously diagnosed with lung cancer.

Chest x ray revealed elevation of left hemidiaphragm and left phrenic nerve palsy was suspected.

Which of the following findings on fluoroscopy of diaphragm will confirm the diagnosis?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | No movement of the left hemidiaphragm |
| <input type="radio"/> | No movement of the right hemidiaphragm |
| <input type="radio"/> | Normal movement of both hemidiaphragms |
| <input type="radio"/> | Paradoxical movement of the left hemidiaphragm |
| <input type="radio"/> | Paradoxical movement of the right hemidiaphragm |

| | | |
|----------------------------------|---|---------|
| <input type="radio"/> | No movement of the left hemidiaphragm | |
| <input type="radio"/> | No movement of the right hemidiaphragm | |
| <input type="radio"/> | Normal movement of both hemidiaphragms | |
| <input checked="" type="radio"/> | Paradoxical movement of the left hemidiaphragm | Correct |
| <input type="radio"/> | Paradoxical movement of the right hemidiaphragm | |

Key Learning Points

Respiratory Medicine

- The diagnosis of phrenic nerve palsy is suspected when on the chest radiograph the diaphragmatic leaflet is elevated and is confirmed fluoroscopically by observing paradoxical diaphragmatic motion on sniff and cough.

Explanation

The diagnosis of phrenic nerve palsy is suspected when on the chest radiograph the diaphragmatic leaflet is elevated and is confirmed fluoroscopically by observing paradoxical diaphragmatic motion on sniff and cough.

In patients with normal lungs unilateral paralysis is usually asymptomatic and rarely requires treatment.

You are examining rates of *Aspergillus* positive sputum samples received at the hospital as part of an audit.

With respect to increasing the positive test rate, which of the following is most likely to be associated with *Aspergillus* colonisation?

(Please select 1 option)

| | |
|-----------------------|---------------------|
| <input type="radio"/> | Asthma |
| <input type="radio"/> | Bronchial carcinoma |
| <input type="radio"/> | COPD |
| <input type="radio"/> | Cystic fibrosis |
| <input type="radio"/> | HIV |

| | |
|----------------------------------|---|
| <input type="radio"/> | Asthma |
| <input type="radio"/> | Bronchial carcinoma |
| <input type="radio"/> | COPD |
| <input checked="" type="radio"/> | Cystic fibrosis This is the correct answer |
| <input type="radio"/> | HIV Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- One Australian study suggested that colonisation rates for *Aspergillus* in patients with cystic fibrosis approach 19%. Rates of ABPA however are much lower at around 5%.

Explanation

One Australian study suggested that colonisation rates for *Aspergillus* in patients with cystic fibrosis approach 19%. Rates of ABPA however are much lower at around 5%.

Allergic bronchopulmonary aspergillosis (ABPA) rates are lower in patients with obstructive lung disease at around 1%.

HIV patients with a known history of *P. jirovecii* are at increased risk of aspergilloma.

Bronchial carcinoma is not particularly associated with aspergillus positivity.

A 68-year-old man who has a 40 year smoking history comes to the surgery complaining of haemoptysis which he describes as coughing up an egg cup full of pink/red frothy sputum on three occasions over the past month.

He has had a chronic cough over the past few months, and has lost 5 kg in weight.

On examination his BP is 155/90 mmHg, pulse is 80 and regular. There is occasional wheeze on auscultation of his chest consistent with COPD. Investigations including a chest x ray are reported as normal, apart from a raised ESR of 70.

What is the next step?

(Please select 1 option)

| | |
|-----------------------|------------------------|
| <input type="radio"/> | Co-amoxiclav |
| <input type="radio"/> | Refer for bronchoscopy |
| <input type="radio"/> | Refer for CT thorax |
| <input type="radio"/> | Salbutamol |
| <input type="radio"/> | Seretide |

| | | |
|----------------------------------|------------------------|----------------------------|
| <input type="radio"/> | Co-amoxiclav | |
| <input type="radio"/> | Refer for bronchoscopy | |
| <input type="radio"/> | Refer for CT thorax | This is the correct answer |
| <input checked="" type="radio"/> | Salbutamol | Incorrect answer selected |
| <input type="radio"/> | Seretide | |

Key Learning Points

Respiratory Medicine

- In 30% of cases of haemoptysis, the initial CXR is reported as normal. CT would be most logical as opposed to proceeding straight to bronchoscopy.

Explanation

In 30% of cases of haemoptysis, the initial CXR is reported as normal. However, given that the patient is a heavy smoker, has lost weight and has a chronic cough, further investigations are definitely warranted.

At this stage a CT would be most logical as opposed to proceeding straight to bronchoscopy.

Treatments for a presumed respiratory tract infection, or for COPD, without ruling out an underlying cancer would be unwise in this situation.

Based on the current British Thoracic Society (BTS) guidelines, which is the first line empiric antibiotic therapy regime for patients with moderate severity community acquired pneumonia (CAP) based on a CURB-65 score of 2?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | Amoxicillin 500 mg TDS |
| <input type="radio"/> | Amoxicillin 1 g TDS and clarithromycin 500 mg BD |
| <input type="radio"/> | Benzympenicillin 1.2 g QDS and levofloxacin 500 mg BD |
| <input type="radio"/> | Co-amoxiclav 1.2 g TDS and clarithromycin 500 mg BD |
| <input type="radio"/> | Doxycycline 200 mg loading dose and then 100 mg OD |

- ☐ Amoxicillin 500 mg TDS
- ☒ Amoxicillin 1 g TDS and clarithromycin 500 mg BD This is the correct answer
- ☐ Benzylpenicillin 1.2 g QDS and levofloxacin 500 mg BD
- ☐ Co-amoxiclav 1.2 g TDS and clarithromycin 500 mg BD
- ☒ Doxycycline 200 mg loading dose and then 100 mg OD Incorrect answer selected

Key Learning Points

Respiratory Medicine

- BTS has issued clear guidelines on the most appropriate antibiotic regime to treat community-acquired pneumonia, according to the severity, which is often based on the CURB-65 score.

Explanation

Community acquired pneumonia (CAP) is defined as symptoms and signs consistent with an acute lower respiratory tract infection associated with new radiological signs consistent with consolidation, not explained by another cause.

The severity of each case of CAP should be assessed using the CURB-65 tool in conjunction with clinical judgement. Patients score 1 point for each of:

- Confusion
- Blood urea nitrogen ≥ 7 mmol/L
- Respiratory rate ≥ 30 /min
- Blood pressure: systolic < 90 or diastolic ≤ 60 mmHg
- Age ≥ 65 years

A CURB-65 score of 0 or 1 are at low risk of death, and can be treated at home if the social circumstances are compatible. A score of 2 usually indicates inpatient treatment is required, but hospital-supervised outpatient treatment can be considered. Patients who have a CURB-65 score of 3 or more are at high risk of death. Those with scores of 4 and 5 should be considered for treatment in a critical care unit (ICU, ITU).

In the majority of patients CAP should be confirmed by chest radiography before the commencement of antibiotics. However, if patients are critically unwell they should be treated for the presumptive diagnosis. Antibiotic treatment should be initiated within 4 hours of presentation.

Low severity CAP (CURB 0-1) can be treated with amoxicillin 500 mg TDS PO. CURB 2 CAP should be treated with amoxicillin 500 mg-1 g TDS and clarithromycin 500 mg BD. Alternatives are available if patients are allergic to any of the above combinations. High severity CAP (CURB 3-5) should be treated as soon as possible with co-amoxiclav 1.2 g TDS and clarithromycin 500 mg BD.

The oral route is recommended in those with low and moderate severity CAP. Patients treated with parenteral antibiotics initially should be switched to an oral regimen once clinical improvement is seen and the patients has been afebrile for at least 24 hours. For most patients with uncomplicated CAP 7 days of antibiotic treatment is recommended. For those with high severity pneumonia where an organism has not been identified, 7-10 days treatment is indicated and extended to 14-21 days where clinically needed.

A 19-year-old smoker presents to the Emergency department with right sided pleuritic chest pain and dyspnoea. He has no previous medical history.

His BP is 120/75 mmHg. A CXR is done and confirms a right sided pneumothorax with a rim of 2.5 cm.

Which of the following is the best course of action?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | Advise to stop smoking and discharge |
| <input type="radio"/> | Aspirate |
| <input type="radio"/> | Check arterial blood gases and only if hypoxic aspirate |
| <input type="radio"/> | Insert a chest drain |
| <input type="radio"/> | Repeat the CXR in two hours |

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Advise to stop smoking and discharge | |
| <input checked="" type="radio"/> | Aspirate | This is the correct answer |
| <input type="radio"/> | Check arterial blood gases and only if hypoxic aspirate | |
| <input type="radio"/> | Insert a chest drain | |
| <input checked="" type="radio"/> | Repeat the CXR in two hours | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Awareness of treatment algorithm for pneumothorax.

Explanation

Aspiration is indicated in spontaneous primary pneumothorax if breathless and/or there is a rim of air greater than 2 cm on chest x ray.

Blood gases will not affect the decision making in the above scenario.

Chest drain is not indicated at this stage.

Consult the most recent pneumothorax guidelines from the British Thoracic Society.

Which of the following statements concerning industrial lung disorders is correct?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | Occupational asthma occurs more frequently in atopic persons |
| <input type="radio"/> | Pneumoconiosis can be diagnosed in the absence of chest x ray abnormalities |
| <input type="radio"/> | Silo filler's disease is caused by allergy to grain |
| <input type="radio"/> | Widespread crepitations are typically heard in hypersensitivity pneumonitis |
| <input type="radio"/> | Symptoms occur within minutes of exposure to mouldy hay in farmer's lung |

Which of the following statements concerning industrial lung disorders is correct?

(Please select 1 option)

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Occupational asthma occurs more frequently in atopic persons | This is the correct answer |
| <input type="radio"/> | Pneumoconiosis can be diagnosed in the absence of chest x ray abnormalities | |
| <input type="radio"/> | Silo filler's disease is caused by allergy to grain | |
| <input type="radio"/> | Widespread crepitations are typically heard in hypersensitivity pneumonitis | |
| <input checked="" type="radio"/> | Symptoms occur within minutes of exposure to mouldy hay in farmer's lung | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Atopy is consistently associated with sensitization to high-molecular-weight (HMW) agents (animals, fish and shellfish, flour and cereals, enzymes, natural rubber latex).

Explanation

Occupational asthma also occurs more frequently in smokers.

Pneumoconiosis is an x ray diagnosis. It is due to deposition of coal dust in parenchyma and reaction to its presence. The types - simple/complicated - are diagnosed on x ray appearance.

Silo filler's disease is pulmonary oedema caused by inhalation of oxides of nitrogen generated by fresh silage.

Symptoms of farmer's lung usually occur within hours.

Examination in hypersensitivity pneumonitis usually reveals inspiratory crepitations which tend to be basal rather than widespread, sometimes squeaks, but wheeze is not typical.

A 26-year-old patient with known AIDS presents with a history of increasing breathlessness and dry cough. He is investigated by the respiratory team and diagnosed with *Pneumocystis pneumonia* (PCP).

Which of the following features is most accurate regarding PCP?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | Amphotericin is the treatment of choice |
| <input type="radio"/> | Blood cultures are positive in 1/3rd of cases |
| <input type="radio"/> | Occurs only in AIDS |
| <input type="radio"/> | Pleural effusions are most often bilateral |
| <input type="radio"/> | The lungs are commonly clear on auscultation |

Please select 1 option

| | |
|----------------------------------|---|
| <input type="radio"/> | Amphotericin is the treatment of choice |
| <input type="radio"/> | Blood cultures are positive in 1/3rd of cases |
| <input type="radio"/> | Occurs only in AIDS |
| <input type="radio"/> | Pleural effusions are most often bilateral |
| <input checked="" type="radio"/> | The lungs are commonly clear on auscultation Correct |

Key Learning Points

Respiratory Medicine

- Patients with *Pneumocystis* pneumonia often present with signs and symptoms of respiratory distress, although on examination of the chest there is often no abnormality detected.

Explanation

Patients with *Pneumocystis* pneumonia often present with signs and symptoms of respiratory distress, although on examination of the chest there is often no abnormality detected.

Although initially reported as a disease associated with AIDS, PCP can affect any immunocompromised patient including transplant patients.

The trophozoite does not enter the blood stream, and the organism is usually identified in pulmonary secretions.

Co-trimoxazole (Septrin) or pentamidine are the treatments of choice.

Dr. Assem

A 48-year-old woman presents to the Emergency department with a one week history of a non-productive cough and increasing breathlessness. She reports her breathing is much worse on exertion.

Her past medical history includes hypertension, migraines and a renal transplant for end stage hypertensive nephropathy.

Examination reveals mild pyrexia of 37.8°C and most notably she was profoundly hypoxic with oxygen saturations of 80% on air. An arterial blood gas confirmed her hypoxia. A CXR showed some patchy bilateral infiltrates, more pronounced on the left.

She is diagnosed with community-acquired pneumonia and treated empirically with recommended antibiotics. The next day she deteriorates and requires intubation and ventilation.

What is the most likely causative organism?

(Please select 1 option)

| | |
|-----------------------|-------------------------------|
| <input type="radio"/> | <i>Chlamydia pneumoniae</i> |
| <input type="radio"/> | <i>Legionella pneumophila</i> |
| <input type="radio"/> | <i>Pneumocystis carinii</i> |
| <input type="radio"/> | <i>Pneumocystis jiroveci</i> |
| <input type="radio"/> | <i>Pseudomonas aeruginosa</i> |

| | |
|--|----------------------------|
| <input type="radio"/> <i>Chlamydia pneumoniae</i> | |
| <input type="radio"/> <i>Legionella pneumophila</i> | |
| <input type="radio"/> <i>Pneumocystis carinii</i> | |
| <input checked="" type="radio"/> <i>Pneumocystis jirovecii</i> | This is the correct answer |
| <input type="radio"/> <i>Pseudomonas aeruginosa</i> | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- This lady has a severe pneumonia on a background of immunosuppression secondary to her renal transplant. As a result she is at risk from atypical and opportunistic organisms.

Explanation

Pneumocystis jirovecii is a eukaryotic microorganism. In immunosuppressed patients (such as those post-transplant) it can cause a pneumonia, which is most recognised in patients with AIDS but can also be seen in those with organ transplants or when undergoing chemotherapy. A CD4 count of less than 200 is associated with significant risk.

In Europe, the USA and Australia *P. jirovecii* pneumonia in HIV-positive patients is seen largely in those unaware of their HIV status. Unfortunately it is a major cause of death in Africa, especially in children. Previously it was thought that disease was caused by reactivation of latent infection acquired in childhood, but de novo infection is increasingly recognised. The organism was initially described as *Pneumocystis carinii*, but this is the variant that causes infection in animals and not humans. The human variant of the organism is *Pneumocystis jirovecii*.

The pneumonia caused by *P. jirovecii* is potentially severe and fatal in immunosuppressed patients. Clinically it presents with several weeks' history of dry cough, fever and dyspnoea. Examination findings are often subtle, but include tachypnoea, tachycardia, cyanosis and fine respiratory crackles. Typically, patients desaturate markedly on exertion. There may be reduced transfer factor, vital capacity and total lung capacity on spirometry. Bronchoalveolar lavage or induced sputum can be used to demonstrate the organism (open lung biopsy is gold standard, but rarely performed in clinical practice). Giemsa, Papanicolaou and Grocott's stains are used.

There are a variety of different chest radiograph findings. Typically it causes bilateral symmetrical perihilar reticular or granular interstitial shadowing. Less often there can be asymmetric shadowing, or progression to a reticular-alveolar pattern. Occasionally lobar consolidation, nodular lesions, prominent pulmonary arteries, pneumothorax, pneumomediastinum, cysts or pneumatoceles can be seen. In patients who have been on prophylactic inhaled pentamidine the infiltrates may predominantly affect the upper lobes. A normal chest x-ray does not exclude the diagnosis. Pleural effusions and lymphadenopathy are not typical, but be aware of the possibility of multiple disease processes in an immunosuppressed patient.

If allowed to progress, *P. jirovecii* can disseminate via the lymphatic and haematogenous routes to affect the thyroid, liver, bone marrow, lymph nodes and spleen.

If PCP is suspected, treatment with full dose co-trimoxazole should be started as soon as possible. It should be given for 21 days in HIV-positive cases, but shorter doses can be used in other causes of immunosuppression. In patients who are intolerant or co-trimoxazole, intravenous pentamidine can be used. Some studies have shown that corticosteroids can reduce the risk of respiratory failure, and they are therefore used in some cases.

Prophylaxis should be used in immunosuppressed patients who are at risk of developing PCP: all those with a CD4 count of <200, patients started on high dose steroids, and those on chemotherapeutic regimens associated with significant immunosuppression. Co-trimoxazole is also the first line prophylactic agent.

Pseudomonas is common in hospital-acquired pneumonia, and in patients with cystic fibrosis.

The other two are atypical pathogens. However given the history and findings, PCP should be excluded first.

Which of the following statements is not true of primary pulmonary tuberculosis?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | A positive tuberculin skin test develops within two weeks of infection |
| <input type="radio"/> | It is characteristically asymptomatic |
| <input type="radio"/> | Miliary spread is commoner in a younger age group |
| <input type="radio"/> | If Pleural effusion occur with infection this is before tuberculin skin testing is positive |
| <input type="radio"/> | The initial immunological response causes hilar lymphadenopathy |

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | A positive tuberculin skin test develops within two weeks of infection | This is the correct answer |
| <input type="radio"/> | It is characteristically asymptomatic | |
| <input type="radio"/> | Miliary spread is commoner in a younger age group | |
| <input type="radio"/> | If Pleural effusion occur with infection this is before tuberculin skin testing is positive | |
| <input checked="" type="radio"/> | The initial immunological response causes hilar lymphadenopathy | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Primary TB is usually asymptomatic.

Explanation

Primary TB is usually asymptomatic with miliary TB most likely to occur in young children.

The Ghon focus is the area of consolidation from cellular infiltration and response to uptake of organisms by macrophages which transform into epithelioid cells and group into granulomata. Bacilli are transported via lymphatics early in the disease process to regional lymph nodes to cause marked lymphadenopathy.

Pleural and pericardial infections (which can result in effusions) occur at or shortly after primary infection.

Positive tuberculin test occurs between three weeks and three months after primary infection.

A 45-year-old female pigeon fancier comes to the Emergency Department with shortness of breath and flu-like symptoms.

She tells you that some of her birds have also been unwell.

There is no past medical history of note. On examination her BP is 110/60 mmHg, her pulse is 65 and regular, and temperature is 38.2°C. There are scattered crackles and wheeze on auscultation of the chest.

Investigations show:

| | | |
|--------------------------|-----------------------|-----------|
| Haemoglobin | 118 g/L | (115-160) |
| White cell count | $3.9 \times 10^9/L$ | (4-11) |
| Platelets | $193 \times 10^9/L$ | (150-400) |
| ESR | 72 mm/hr | (<10) |
| Sodium | 136 mmol/L | (135-146) |
| Potassium | 4.4 mmol/L | (3.5-5) |
| Creatinine | 118 $\mu\text{mol/L}$ | (79-118) |
| Alanine aminotransferase | 102 U/L | (5-40) |
| Alkaline phosphatase | 230 U/L | (39-117) |

CXR - Widespread hazy opacities affecting both lower lobes.

Which of the following is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|---------------------------------|
| <input type="radio"/> | Avian influenza |
| <input type="radio"/> | Legionnaire's disease |
| <input type="radio"/> | Psittacosis |
| <input type="radio"/> | <i>Streptococcus pneumoniae</i> |
| <input type="radio"/> | Q fever |

Please select 1 option

| | | |
|----------------------------------|---------------------------------|----------------------------|
| <input type="radio"/> | Avian influenza | |
| <input type="radio"/> | Legionnaire's disease | |
| <input type="radio"/> | Psittacosis | This is the correct answer |
| <input type="radio"/> | <i>Streptococcus pneumoniae</i> | |
| <input checked="" type="radio"/> | Q fever | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Psittacosis is an infection caught from parrots. It presents as an atypical pneumonia. Complications include joint pain, myocarditis, endocarditis, hepatitis and neutropenia.

Explanation

There are a number of signs and investigations that support a diagnosis of psittacosis in this patient. Relative bradycardia with non-specific chest signs, coupled with diffuse chest x ray changes, a low white count and abnormal LFTs are consistent with the disease. Tetracyclines are the antibiotics of choice.

Avian influenza occurs in epidemics, and as yet H5N1, the strain thought most likely to lead to a human epidemic, has not acquired the ability to spread rapidly between individuals.

Q fever is mainly transmitted by ticks and legionnaire's disease by contaminated air conditioning systems.

Given the history of bird keeping and the diffuse consolidation seen, psittacosis is more likely than streptococcal pneumonia.

A 31-year-old woman is brought to the Emergency department by ambulance. She has just got off a long-haul flight and collapsed at the baggage carousel.

On examination in the department she is hypotensive with a BP of 80/50 mmHg, her pulse is 95 and regular. Her chest is clear and her abdomen is soft and non-tender. You notice that her left leg appears swollen.

Investigations show:

| | | |
|------------------|---------------------------|-------------|
| pH | 7.38 | (7.35-7.45) |
| pO ₂ | 9 kPa (on non-rebreather) | (10-13.3) |
| pCO ₂ | 3.6 kPa | (4.8-6.1) |

ECG shows right heart strain

Which of the following would be an indication for thrombolysis in this patient?

(Please select 1 option)

| | |
|-----------------------|--------------------------------|
| <input type="radio"/> | BP 80/50 |
| <input type="radio"/> | ECG showing right heart strain |
| <input type="radio"/> | pCO ₂ 3.6 |
| <input type="radio"/> | pH 7.38 |
| <input type="radio"/> | pO ₂ 9 |

Dr. Assem

| | | |
|----------------------------------|--------------------------------|----------------------------|
| <input checked="" type="radio"/> | BP 80/50 | This is the correct answer |
| <input type="radio"/> | ECG showing right heart strain | |
| <input type="radio"/> | pCO ₂ 3.6 | |
| <input type="radio"/> | pH 7.38 | |
| <input type="radio"/> | pO ₂ 9 | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- BP of 80/50 is an indication for thrombolysis.

Explanation

Hypotension and cardiogenic **shock** are the most significant factors associated with increased mortality in massive pulmonary embolus (PE). As such it is the BP here which drives progression to thrombolysis rather than anti-coagulation.

The pH is in the normal range, as such it would not be a driver of more aggressive intervention here.

All of the other factors are indications of a large PE, but without hypotension they would not necessarily drive thrombolysis or surgical embolectomy. This is because the evidence for thrombolysis in sub-massive PE is much less strong than that for a massive event.

A 55-year-old plumber presented with a dry nocturnal cough and increasing exertional breathlessness.

On examination he had early finger clubbing, cyanosis and bilateral basal crackles. A chest x ray showed bilateral lower zone shadowing.

Investigations revealed:

| | | |
|----------------------------------|---------|-------------|
| PaO ₂ (breathing air) | 8.2 kPa | (11.3-12.6) |
| FEV1/FVC ratio | 85% | - |

Which of the following investigations is most likely to establish the diagnosis?

(Please select 1 option)

- ☐ Echocardiography
- ☐ High resolution CT scan of chest
- ☐ Measurement of diffusion capacity
- ☐ Serum angiotensin-converting enzyme (ACE) level
- ☐ Transbronchial lung biopsy

Dr Assem

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Echocardiography | |
| <input type="radio"/> | High resolution CT scan of chest | This is the correct answer |
| <input type="radio"/> | Measurement of diffusion capacity | |
| <input type="radio"/> | Serum angiotensin-converting enzyme (ACE) level | |
| <input checked="" type="radio"/> | Transbronchial lung biopsy | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- High resolution CT chest is most likely to establish the diagnosis of pulmonary fibrosis.

Explanation

This patient has a restrictive lung defect and hypoxia, with clinical features of lung fibrosis.

With the occupational history there might have been previous asbestos exposure although the CXR is not reported to show pleural thickening or plaques.

The next test should be one to confirm pulmonary fibrosis.

High resolution CT chest is often diagnostic with good correlation to histological abnormalities. A ground-glass appearance is associated with alveolar inflammation and predominantly cellular appearance on biopsy. This form of IPF is associated with better response to treatment and has a better prognosis.

A reticular pattern is suggestive of destroyed fibrotic lungs.

An 18-year-old attending the emergency department is noted to have central cyanosis.

She is perfectly well but was told to go to the emergency department by her friends who said she looked blue.

What is the most likely cause?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | Anorexia nervosa |
| <input type="radio"/> | Carbon monoxide poisoning |
| <input type="radio"/> | Drinking water contaminated with nitrates |
| <input type="radio"/> | Lead poisoning |
| <input type="radio"/> | Severe anaemia |

Please select 1 option

- | | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Anorexia nervosa | |
| <input type="radio"/> | Carbon monoxide poisoning | |
| <input type="radio"/> | Drinking water contaminated with nitrates | This is the correct answer |
| <input type="radio"/> | Lead poisoning | |
| <input checked="" type="radio"/> | Severe anaemia | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Drinking water contaminated with nitrates can cause methaemoglobinaemia, giving patients a 'blue' appearance.

Explanation

This is typical of methaemoglobinaemia which may be caused by nitrates.

Dr Assem

A 22-year-old man presents with increased shortness of breath, a dry cough, right sided pleuritic chest pain and extreme lethargy over two weeks.

He has no significant medical history of note but says a few other people have been ill in his class at university over the past few weeks.

On examination he is pyrexial 38.2°C, BP is 110/72 mmHg, pulse is 85 and regular. There is scattered wheeze, more marked on the right than the left.

Investigations reveal:

| | | |
|------------------|-----------------------|-----------|
| Haemoglobin | 90 g/L | (115-160) |
| White cell count | $11.9 \times 10^9/L$ | (4-11) |
| Platelets | $163 \times 10^9/L$ | (150-400) |
| Sodium | 138 mmol/L | (135-146) |
| Potassium | 4.3 mmol/L | (3.5-5) |
| Creatinine | 122 $\mu\text{mol/L}$ | (79-118) |
| ESR | 83 mm/hr | (<10) |

CXR - Right lower lobe pneumonia.

Blood film - schistocytes.

Which of the following is the most likely causative organism?

(Please select 1 option)

| | |
|-----------------------|---------------------------------|
| <input type="radio"/> | <i>Legionella pneumophila</i> |
| <input type="radio"/> | <i>Mycoplasma pneumoniae</i> |
| <input type="radio"/> | <i>Pseudomonas aeruginosa</i> |
| <input type="radio"/> | <i>Staphylococcus aureus</i> |
| <input type="radio"/> | <i>Streptococcus pneumoniae</i> |

(Please select 1 option)

| | | |
|----------------------------------|---------------------------------|----------------------------|
| <input type="radio"/> | <i>Legionella pneumophila</i> | |
| <input checked="" type="radio"/> | <i>Mycoplasma pneumoniae</i> | This is the correct answer |
| <input type="radio"/> | <i>Pseudomonas aeruginosa</i> | |
| <input type="radio"/> | <i>Staphylococcus aureus</i> | |
| <input checked="" type="radio"/> | <i>Streptococcus pneumoniae</i> | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Mycoplasma presents with a slow-onset of symptoms (sometimes over weeks) with prominent constitutional upset, including headache, chest pain, myalgia and malaise. There is classically a persistent dry cough.

Explanation

Epidemic pneumonia due to *Mycoplasma* infection is seen occasionally, and the fact that a number of his class mates have recently been ill points to this as a possible cause.

Classically, mycoplasma presents with a slow-onset of symptoms (sometimes over weeks) with prominent constitutional upset, including headache, chest pain, myalgia and malaise. There is classically a persistent dry cough.

Extra-respiratory features include:

- erythema multiforme
- erythema nodosum
- urticaria
- Guillain-Barré syndrome
- transverse myelitis
- aseptic meningitis
- cold agglutinins
- haemolytic anaemia (as seen here)
- arthritis
- pericarditis
- myocarditis and
- pancreatitis (rarely).

It is spread by direct contact, and most cases resolve spontaneously within a few weeks. Often signs on examination are less severe than would be expected once the x ray findings are reviewed, as is the case here.

Macrolides such as clarithromycin are first choice antibiotics if required.

A 24-year-old woman presents to the respiratory clinic some nine months after the birth of her first child.

She has suffered increasing shortness of breath over the past few weeks and months, so much so that she can barely walk up stairs or to the bus stop at the end of her street.

On examination she looks short of breath at rest. Her JVP is elevated and there is mild bilateral ankle swelling. Her lung fields are clear.

Investigations show:

| | | |
|------------------|-----------------------|-----------|
| Haemoglobin | 132 g/L | (115-160) |
| White cell count | $7.3 \times 10^9/L$ | (4-11) |
| Platelets | $201 \times 10^9/L$ | (150-400) |
| Sodium | 137 mmol/L | (135-146) |
| Potassium | 4.2 mmol/L | (3.5-5) |
| Creatinine | 116 $\mu\text{mol/L}$ | (79-118) |

Echocardiogram shows evidence of pulmonary hypertension. VQ scan shows no evidence of pulmonary embolism.

Which of the following is the most appropriate initial management?

(Please select 1 option)

| | |
|-----------------------|--------------------------------|
| <input type="radio"/> | Beta blocker |
| <input type="radio"/> | Calcium antagonist |
| <input type="radio"/> | Endothelin receptor antagonist |
| <input type="radio"/> | PDE-5 inhibitor |
| <input type="radio"/> | Prostaglandin infusion |

(Please select 1 option)

| | | |
|----------------------------------|--------------------------------|----------------------------|
| <input type="radio"/> | Beta blocker | |
| <input type="radio"/> | Calcium antagonist | |
| <input type="radio"/> | Endothelin receptor antagonist | This is the correct answer |
| <input type="radio"/> | PDE-5 inhibitor | |
| <input checked="" type="radio"/> | Prostaglandin infusion | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Examples of endothelin receptor antagonists include bosentan and ambrisentan. They significantly reduce pulmonary artery pressure, but adverse effects include peripheral oedema and liver function test monitoring is recommended.

Explanation

This woman has primary pulmonary hypertension, which often presents in women after the birth of the first child.

Calcium antagonists form the basis of initial therapy only for those patients without right sided heart failure, therefore an endothelin receptor antagonist would be initial therapy of choice. Examples of endothelin receptor antagonists include bosentan and ambrisentan. They significantly reduce pulmonary artery pressure, but adverse effects include peripheral oedema and liver function test monitoring is recommended.

Beta blockers are not recommended in the management of primary pulmonary hypertension as their major effect is on reducing peripheral blood pressure.

Calcium antagonists are effective in only 10-15% of patients and only recommended if there is no right sided heart failure.

Phosphodiesterase Type 5 (PDE-5) inhibitors are used in mild disease, or in stage III or IV NYHA functional status in combination with endothelin receptor antagonists.

Nebulised or subcutaneous prostacyclin analogues are less convenient than oral options and tend to be reserved for combination with oral therapy.

A 63-year-old woman with diabetes presents with a pyrexia, productive cough and shortness of breath for five days. She has RLL consolidation and a small unilateral pleural effusion on CXR.

Which is a marker of poor prognosis?

(Please select 1 option)

| | |
|-----------------------|--------------------------|
| <input type="radio"/> | Her age |
| <input type="radio"/> | Her CXR signs |
| <input type="radio"/> | Her diabetes |
| <input type="radio"/> | Temp >38°C |
| <input type="radio"/> | WCC > $15 \times 10^9/L$ |

| | | |
|----------------------------------|--------------------------|----------------------------|
| <input type="radio"/> | Her age | |
| <input type="radio"/> | Her CXR signs | |
| <input type="radio"/> | Her diabetes | This is the correct answer |
| <input type="radio"/> | Temp >38°C | |
| <input checked="" type="radio"/> | WCC > $15 \times 10^9/L$ | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Diabetes is an indicator of poor prognosis in pneumonia. Remember, each component of the CURB-65 score are also poor prognostic factors.

Explanation

Indicators of poor prognosis in pneumonia include:

- Age more than 65
- Co-existing morbidity including diabetes mellitus, congestive cardiac failure, coronary artery disease, stroke, chronic lung disease
- Respiratory rate more than 30
- Low systolic (<90mmHg) or diastolic (<60mmHg) blood pressure
- Bilateral involvement or involvement of more than two lobes on chest radiograph
- Altered mental state.

Biochemical/haematological markers include:

- White count less than 4 or more than 20
- Hypoxaemia or patients requiring FiO2 greater than 60% to maintain saturations
- Positive blood culture
- Blood urea more than 7.

A 42-year-old lady re-attends the chest clinic following investigations that have confirmed a diagnosis of sarcoidosis.

Which of the following would be a poor prognostic sign?

(Please select 1 option)

| | |
|-----------------------|-----------------------------------|
| <input type="radio"/> | Caucasian race |
| <input type="radio"/> | Current smoker |
| <input type="radio"/> | Erythema nodosum |
| <input type="radio"/> | Lupus pernio |
| <input type="radio"/> | Markedly elevated serum ACE level |

- | | |
|----------------------------------|-----------------------------------|
| <input type="radio"/> | Caucasian race |
| <input type="radio"/> | Current smoker |
| <input type="radio"/> | Erythema nodosum |
| <input checked="" type="radio"/> | Lupus pernio Correct |
| <input type="radio"/> | Markedly elevated serum ACE level |

Key Learning Points

Respiratory Medicine

- Lupus pernio is a chronic, raised, hard skin lesion associated with sarcoid, and is an adverse prognostic factor.

Explanation

The American Thoracic Society has produced a statement on the prognostic indicators associated with sarcoidosis.

Lupus pernio is a chronic raised indurated (hardened) lesion of the skin, often purplish in colour, and is associated with sarcoid.

It is noted to be an adverse prognostic factor.

Other adverse prognostic factors include;

- Age of onset >40 years
- Afro-Caribbean or Afro-American race
- Cardiac involvement
- Chronic hypercalcaemia
- Nasal mucosal involvement
- Neurosarcoidosis
- Progressive pulmonary sarcoidosis.

Which of the following statements regarding idiopathic pulmonary fibrosis is correct?

(Please select 1 option)

- | | |
|-----------------------|--|
| <input type="radio"/> | 80% of patients initially respond well to immunosuppression |
| <input type="radio"/> | Active inflammation may be suggested by a CT scan |
| <input type="radio"/> | Lung volumes show a raised residual volume/total lung capacity ratio |
| <input type="radio"/> | Peak flow rate is a good guide to severity |
| <input type="radio"/> | Peak incidence seen in the fourth decade |

(Please select 1 option)

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | 80% of patients initially respond well to immunosuppression | |
| <input checked="" type="radio"/> | Active inflammation may be suggested by a CT scan | This is the correct answer |
| <input type="radio"/> | Lung volumes show a raised residual volume/total lung capacity ratio | |
| <input type="radio"/> | Peak flow rate is a good guide to severity | |
| <input type="radio"/> | Peak incidence seen in the fourth decade | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- HRCT in IPF may reveal ground glass changes, suggestive of inflammation.

Explanation

About 50% of patients have an improvement in their symptoms with steroids and 25% have improved lung function. A recent study has suggested this treatment may actually be associated with an increased mortality, but further studies are required before this is widely accepted.

High-resolution CT scans can be used to determine the stage of idiopathic pulmonary fibrosis. When ground glass attenuation predominates, it usually represents an inflammatory cell infiltrate which has been shown to respond well to treatment. As the disease progresses it develops a reticular appearance which represents irreversible fibrotic changes. The presence of a predominantly ground glass appearance is also an independent predictor of survival.

Both total lung capacity (TLC) and residual volume (RV) reduce with restrictive disorders like **idiopathic pulmonary fibrosis**, so the ratio is maintained. A raised RV/TLC ratio suggests a combination of airways obstruction and restrictive defect *not* just **idiopathic pulmonary fibrosis** as mentioned in this question.

Peak flow measure airway obstruction. Idiopathic pulmonary fibrosis is characterised by a restrictive defect on lung function testing.

Peak incidence is in the sixth decade.

Dr. Asghar

A 45-year-old woman is referred to the respiratory clinic with shortness of breath. She has been unable to work due to a long term back injury and is therefore on long term sickness benefit.

On examination her BP is 155/85 mmHg, pulse is 85 and regular. Her BMI is 32, there is bilateral lower limb pitting oedema with varicose vein formation. Heart sounds are normal, auscultation of the chest is clear.

Investigations show:

| | | |
|------------------|---------|---------------|
| pH | 7.43 | (7.35 - 7.45) |
| PCO ₂ | 5.8 kPa | (4.8 - 6.1) |
| pO ₂ | 9.9 kPa | (10 - 13.3) |

Which of the following is likely to be the most effective therapy?

(Please select 1 option)

| | |
|-----------------------|------------|
| <input type="radio"/> | Furosemide |
| <input type="radio"/> | Salbutamol |
| <input type="radio"/> | Seretide |
| <input type="radio"/> | Tiotropium |
| <input type="radio"/> | Warfarin |

| | |
|----------------------------------|-------------------------------|
| <input type="radio"/> | Furosemide |
| <input type="radio"/> | Salbutamol |
| <input type="radio"/> | Seretide |
| <input type="radio"/> | Tiotropium |
| <input checked="" type="radio"/> | Warfarin Correct |

Key Learning Points

Respiratory Medicine

- In chronic PE warfarinisation is the optimal long term strategy to reduce the risk of further clots.

Explanation

Given this woman's obesity, slowly progressive shortness of breath, absence of chest signs, and presence of peripheral oedema and varicose veins, chronic pulmonary emboli are the most likely possibility. As such warfarinisation is the optimal long term strategy to reduce the risk of further clots. She should also be encouraged to lose a significant amount of weight.

Salbutamol and Seretide are treatments for asthma and chronic obstructive pulmonary disease (COPD), and tiotropium is a treatment for COPD alone, therefore none of the three are appropriate here.

We are given no history of wheeze or cough which fits with either COPD or asthma as the underlying diagnosis.

A 62-year-old man, who has worked for a long period of his life as a boiler lagger, presents to the clinic for review.

He is worried as over the past year he has suffered increasingly severe shortness of breath with a dry cough. He also reports that his fingers have begun to change shape. His GP has given him a salbutamol inhaler but it has had little effect on his symptoms.

Other history includes smoking of 10 cigarettes per day, and hypertension for which he takes indapamide.

On examination his BP is 142/72 mmHg, his pulse is 80 and regular, and he looks short of breath at rest. There are inspiratory basal crackles.

Investigations show:

| | | |
|------------------|-----------------------|-------------|
| Haemoglobin | 131 g/L | (135-177) |
| White cell count | $7.1 \times 10^9/L$ | (4-11) |
| Platelets | $152 \times 10^9/L$ | (150-400) |
| Sodium | 138 mmol/L | (135-146) |
| Potassium | 3.9 mmol/L | (3.5-5) |
| Creatinine | 110 $\mu\text{mol/L}$ | (79-118) |
| pH | 7.42 | (7.35-7.45) |
| pCO ₂ | 4.2 kPa | (4.8-6.1) |
| pO ₂ | 9.3 kPa | (10-13.3) |

Chest x ray shows nodular opacification, most prominent at the lung bases.

What is the most likely diagnosis?

(Please select 1 option)

| | |
|-----------------------|-------------------------------|
| <input type="radio"/> | Asbestosis |
| <input type="radio"/> | Asthma |
| <input type="radio"/> | COPD |
| <input type="radio"/> | Idiopathic pulmonary fibrosis |
| <input type="radio"/> | Tuberculosis |

(Please select 1 option)

| | | |
|----------------------------------|-------------------------------|----------------------------|
| <input type="radio"/> | Asbestosis | This is the correct answer |
| <input type="radio"/> | Asthma | |
| <input type="radio"/> | COPD | |
| <input type="radio"/> | Idiopathic pulmonary fibrosis | |
| <input checked="" type="radio"/> | Tuberculosis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Asbestos exposure can cause pulmonary fibrosis.

Explanation

The likely exposure to asbestos from working in the boiler industry means that the changes seen here including signs of fibrosis on examination, hypoxia and chest x ray radiograph changes are most likely to be due to asbestosis. Progressive lung fibrosis occurs, eventually leading to respiratory failure, and the fibrotic changes are non-steroid responsive.

Whilst he has been given an inhaler by his GP, there is nothing on the examination to suggest either chronic obstructive pulmonary disease (COPD) or asthma.

Idiopathic pulmonary fibrosis, by definition, has an unknown cause and therefore asbestosis is more likely here.

The onset of asbestosis is typically over 20 years following exposure. The fibrotic changes are more pronounced in the lower lobes, and are heard as fine end inspiratory crackles. Patients present with exertional dyspnoea. Chest radiographs may be normal in early disease, when high resolution CT is more sensitive at demonstrating the characteristic changes (and may demonstrate associated pleural disease). In the later stages, chest radiographs show honeycombing. Spirometry reveals a restrictive defect with a reduced transfer factor.

There is no specific treatment for asbestosis. Further exposure should be avoided, and patients should be vaccinated against pneumococcus and influenza. Patients should be advised to stop smoking (if they do) and long-term oxygen therapy may be required.

A 67-year-old retired plumber presents to the clinic with increasing shortness of breath and dull left sided chest pain.

You understand that this has been a problem for some six months or more. There is no past medical history of note apart from essential hypertension for which he takes ramipril 10 mg / day.

Investigations show:

| | | |
|------------------|-----------------------------|-------------|
| Haemoglobin | 136 g/L | (135-177) |
| White cell count | $9.1 \times 10^9/L$ | (4-11) |
| Platelets | $252 \times 10^9/L$ | (150-400) |
| Sodium | 137 mmol/L | (135-146) |
| Potassium | 3.7 mmol/L | (3.5-5) |
| Creatinine | 119 $\mu\text{mol/L}$ | (79-118) |
| pH | 7.41 | (7.35-7.45) |
| pCO ₂ | 6.2 kPa | (4.8-6.1) |
| pO ₂ | 9.6 kPa | (10-13.3) |
| CXR | Large left pleural effusion | |

Which of the following is the optimal investigation to deliver the diagnosis?

(Please select 1 option)

| | |
|-----------------------|---------------------------------------|
| <input type="radio"/> | Blind pleural biopsy |
| <input type="radio"/> | CT thorax |
| <input type="radio"/> | Sputum cytology |
| <input type="radio"/> | Thoracentesis |
| <input type="radio"/> | Thoracoscopy with drainage and biopsy |

| | | |
|----------------------------------|---------------------------------------|---------|
| <input type="radio"/> | Blind pleural biopsy | |
| <input type="radio"/> | CT thorax | |
| <input type="radio"/> | Sputum cytology | |
| <input type="radio"/> | Thoracocentesis | |
| <input checked="" type="radio"/> | Thoracoscopy with drainage and biopsy | Correct |

Key Learning Points

Respiratory Medicine

- In cases of suspected mesothelioma, tissue can be obtained from thoracoscopy with biopsy from abnormal looking areas

Explanation

This man is most likely to have mesothelioma. Tissue can be obtained from thoracoscopy with biopsy from abnormal looking areas, as such this is the most appropriate investigation to deliver the diagnosis.

Blind pleural biopsy may result in tissue being obtained from an area not affected by mesothelioma. As such this is not correct.

Whilst thoracocentesis is likely to obtain malignant cells, the histopathologist may not be able to type them adequately.

CT scanning may reveal structural abnormalities but will not give a histological diagnosis and sputum cytology would be unlikely to reveal malignant cells.

A 45-year-old man attends the Emergency department with symptoms suggestive of community acquired pneumonia.

On examination he is pyrexial at 38.0°C and has a respiratory rate of 32/min, with a blood pressure of 85/55 mmHg.

Which of the following combination of features are not necessarily an indication for urgent hospital admission?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | BP of 85/55 mmHg and respiratory rate of 32/min |
| <input type="radio"/> | BP of 85/55 mmHg and urea of 7.5 mmol/L |
| <input type="radio"/> | Confusion and BP of 85/55 mmHg |
| <input type="radio"/> | Pyrexia of 38.0°C and serum urea of 7.5 mmol/L |
| <input type="radio"/> | Respiratory rate of 32 and blood urea of 7.5 mmol/L |

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | BP of 85/55 mmHg and respiratory rate of 32/min | |
| <input type="radio"/> | BP of 85/55 mmHg and urea of 7.5 mmol/L | |
| <input type="radio"/> | Confusion and BP of 85/55 mmHg | |
| <input checked="" type="radio"/> | Pyrexia of 38.0°C and serum urea of 7.5 mmol/L | This is the correct answer |
| <input type="radio"/> | Respiratory rate of 32 and blood urea of 7.5 mmol/L | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The CURB-65 score can be used to help guide a patient's treatment in cases of community-acquired pneumonia.

Explanation

This patient has community-acquired pneumonia (CAP).

The severity of each case of CAP should be assessed using the CURB-65 tool in conjunction with clinical judgement. Patients score 1 point for each of:

- Confusion
- Urea >7 mmol/L
- Respiratory rate ≥ 30 /min
- Blood pressure systolic <90 or diastolic ≤ 60 mmHg
- Age ≥ 65 years.

A CURB-65 score of 0 or 1 are at low risk of death, and can be treated at home if the social circumstances are compatible.

A score of 2 usually indicates inpatient treatment is required, but hospital-supervised outpatient treatment can be considered.

Patients who have a CURB-65 score of 3 or more are at high risk of death.

Those with scores of 4 and 5 should be considered for treatment in a critical care unit (HMU, ITU).

In this question, option four has a CURB-65 score of 1 and outpatient treatment can therefore be considered. All the others are indications for inpatient treatment.

Clinical judgement must still however be used particularly if only one feature is present or if there is co-morbidity such as age over 50 years or chronic cardiac, respiratory or renal disease.

A 73-year-old woman is referred to the emergency medical take with a lower respiratory tract infection. She has seen the GP because of an increasingly problematic cough, productive of rusty coloured sputum and severe shortness of breath.

On examination in the Emergency department her blood pressure is 135/82 mmHg. Her temperature is 38.5°C and her pulse is 80 and regular. Her respiratory rate is 22. Auscultation of the chest reveals right lower lobe consolidation.

Investigations show:

| | | |
|------------------|----------------------------|-----------|
| Haemoglobin | 121 g/L | (115-160) |
| White cell count | $12.2 \times 10^9/L$ | (4-11) |
| Platelets | $209 \times 10^9/L$ | (150-400) |
| Serum sodium | 135 mmol/L | (135-146) |
| Serum potassium | 4.4 mmol/L | (3.5-5) |
| Creatinine | 125 $\mu\text{mol/L}$ | (79-118) |
| Urea | 10.2 mmol/L | (2.5-6.7) |
| Glucose | 5.4 mmol/L | (4.5-5.6) |
| Chest x ray | Right lower lobe pneumonia | |

Which of the following features is consistent with scoring a point on the CURB criteria?

(Please select 1 option)

| | |
|-----------------------|-----------------------|
| <input type="radio"/> | BP 135/82 |
| <input type="radio"/> | Creatinine 125 |
| <input type="radio"/> | Respiratory rate 22 |
| <input type="radio"/> | Urea 10.2 |
| <input type="radio"/> | White cell count 12.2 |

| | | |
|----------------------------------|-----------------------|----------------------------|
| <input type="radio"/> | BP 135/82 | |
| <input type="radio"/> | Creatinine 125 | |
| <input type="radio"/> | Respiratory rate 22 | |
| <input type="radio"/> | Urea 10.2 | This is the correct answer |
| <input checked="" type="radio"/> | White cell count 12.2 | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The CURB criteria are based on the presence of urea >7

Explanation

The CURB criteria are based on the presence of:

- Confusion
- Urea >7
- Respiratory rate $>30/\text{min}$
- BP $<90/60 \text{ mmHg}$.

The utility of CURB scoring is in determining possible patients who may be discharged from hospital and those who are at greatest risk with respect to mortality.

High scores can be used to determine which patients should be managed on the respiratory HDU or who needs ITU support.

A 47-year-old patient has daytime sleepiness. He wakes up in the morning un-refreshed. He frequently dozes off while watching TV.

He is hypertensive but well controlled with amlodipine 5 mg and ramipril 2.5 mg. He occasionally takes paracetamol for back pain. Neurological examination was normal. His BMI is 45.

He was referred for suspicion of obstructive sleep apnoea (OSA).

Which of the following tests would you request to confirm diagnosis?

(Please select 1 option)

| | |
|-----------------------|-----------------------------|
| <input type="radio"/> | CT chest |
| <input type="radio"/> | Echocardiogram |
| <input type="radio"/> | Multiple sleep latency test |
| <input type="radio"/> | Polysomnography |
| <input type="radio"/> | Thyroid function tests |

(Please select 1 option)

- | | | |
|----------------------------------|-----------------------------|----------------------------|
| <input type="radio"/> | CT chest | |
| <input type="radio"/> | Echocardiogram | |
| <input type="radio"/> | Multiple sleep latency test | |
| <input checked="" type="radio"/> | Polysomnography | This is the correct answer |
| <input type="radio"/> | Thyroid function tests | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Polysomnography is the diagnostic test of choice for the diagnosis of obstructive sleep apnoea.

Explanation

It is important to be aware of the diagnostic tests for various respiratory problems.

Polysomnography or sleep studies will reveal periods of apnoea during sleep.

Hypothyroidism can be associated with OSA but thyroid function tests are not diagnostic of OSA.

CT chest and echo are not helpful in making the diagnosis.

Polysomnography will provide you with information regarding oxygen saturations and respiratory rate in addition to sleep quality, and can confirm or exclude the diagnosis of OSA. The multiple sleep latency test on the other hand only measures how quickly a person falls asleep in a quiet environment, and whilst it is a standard test for narcolepsy and idiopathic hypersomnia, it doesn't provide the information required to make a diagnosis of OSA.

A 75-year-old woman with a productive cough was admitted by her GP.

She has a temperature of 38.2°C. She is not oriented to time or place. On examination she right basal crackles. Her BP is 110/60 mmHg and respiratory rate is 34/min. Pulse is 105 and regular. O₂ saturation is 92%. Chest x ray shows right basal consolidation.

The patient was given IV antibiotics for the first three days, improved and she was switched to oral antibiotics.

Investigations on admission showed:

| | | |
|------------------|-------------------------|-------------|
| White cell count | 15 × 10 ⁹ /L | (4 - 11) |
| CRP | 75 mg/L | (<10) |
| Na | 140 mmol/L | (137 - 144) |
| K | 3.8 mmol/L | (3.5 - 4.9) |
| Urea | 9.4 mmol/L | (2.5 - 7.5) |
| Serum creatinine | 100 µmol/L | (60 - 110) |

A 7 day course of antibiotics has been completed, and the patient's symptoms have resolved.

What is the best plan of action on discharge?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Check full blood count, U/E and CRP in four weeks |
| <input type="radio"/> | Chest x ray in six weeks |
| <input type="radio"/> | CT chest |
| <input type="radio"/> | Discharge with a prescription of oral antibiotics for five to seven days |
| <input type="radio"/> | Refer to a respiratory physician |

- | | |
|----------------------------------|--|
| <input type="radio"/> | Check full blood count, U/E and CRP in four weeks |
| <input type="radio"/> | Chest x ray in six weeks This is the correct answer |
| <input type="radio"/> | CT chest |
| <input type="radio"/> | Discharge with a prescription of oral antibiotics for five to seven days |
| <input checked="" type="radio"/> | Refer to a respiratory physician Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Chest radiograph should be repeated 6 weeks following treatment for pneumonia, to ensure complete resolution of radiographic findings.

Explanation

It is important for patients who had pneumonia and had a consolidation on chest x ray to have a follow up chest x ray to ensure complete resolution. This is to exclude any underlying cause especially malignancy.

Not all patients need referral to a respiratory physician; only those who have persistent shadowing on the lung.

A 62-year-old man comes to the clinic with increasing shortness of breath and a dry cough. He is known to have worked previously in the ship building industry.

On examination he is mildly short of breath at rest. There is finger clubbing and bilateral inspiratory crackles on auscultation of the chest. It is noted on his pulmonary function testing that the DLCO is reduced.

Which of the following is likely most to affect interpretation of the test?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Consumption of two units of alcohol the night before the test |
| <input type="radio"/> | Mild kyphosis |
| <input type="radio"/> | Mild scoliosis |
| <input type="radio"/> | Smoking on the morning of the test |
| <input type="radio"/> | Use of salbutamol |

| | | |
|----------------------------------|---|---------|
| <input type="radio"/> | Consumption of two units of alcohol the night before the test | |
| <input type="radio"/> | Mild kyphosis | |
| <input type="radio"/> | Mild scoliosis | |
| <input checked="" type="radio"/> | Smoking on the morning of the test | Correct |
| <input type="radio"/> | Use of salbutamol | |

Key Learning Points

Respiratory Medicine

- DLCO measures the lung diffusion capacity for carbon monoxide. As such, smoking within around eight hours of the test can significantly limit interpretation of the results.

Explanation

Although the conventional single breath diffusing capacity (DLCO) has been accepted as a standard non-invasive test to assess the integrity of pulmonary function, there are numerous pitfalls in its use.

One such pitfall is the effect of carbon monoxide in cigarette smoke, which raises carboxyhaemoglobin (COHb) to as high as 10-15% (normal value 1-2%). Most regression values for DLCO are derived from the study of lifetime non-smokers, so that the use of these in smokers underestimates the percent of predicted DLCO values, unless additional adjustments are made. Increasing COHb reduces DLCO because carbon monoxide (CO) is substantially increased, leading to a reduced driving pressure for CO across the air-blood barrier. In addition, some of the patient's haemoglobin (Hb) will already be tightly bound by CO and therefore the overall amount of Hb available for binding by the test CO is decreased.

Whilst alcohol vapours can interfere with interpretation of the test it is highly unlikely that two units of alcohol consumed the night before will have any impact at all.

Severe kyphosis and scoliosis can affect interpretation of the test, therefore DLCO should be adjusted according to the calculated alveolar volume. However, mild thoracic cage abnormalities are unlikely to have significant effects.

Salbutamol should not affect the results.

You are reviewing use of non-invasive ventilation (NIV) by the acute medical admissions team as part of a hospital audit.

According to the latest BTS guidelines, which of the following features on history, examination or investigations would be a criterion for considering NIPPV?

(Please select 1 option)

| | |
|-----------------------|--------------------------|
| <input type="radio"/> | Na 139 mmol/l |
| <input type="radio"/> | pCO ₂ 6.5 kPa |
| <input type="radio"/> | pH 7.42 |
| <input type="radio"/> | pO ₂ 9.2 kPa |
| <input type="radio"/> | Respiratory rate 32 |

| | | |
|----------------------------------|--------------------------|----------------------------|
| <input type="radio"/> | Na 139 mmol/l | |
| <input type="radio"/> | pCO ₂ 6.5 kPa | This is the correct answer |
| <input type="radio"/> | pH 7.42 | |
| <input type="radio"/> | pO ₂ 9.2 kPa | |
| <input checked="" type="radio"/> | Respiratory rate 32 | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The BTS guidelines on NIV from 2008 recommend considering NIV in patients who present with acute respiratory failure due to COPD and have decompensated respiratory acidosis within 60 minutes of admission, after maximal medical therapy has been instituted. pCO₂>6.0 fits the criterion for respiratory acidosis and is therefore the correct answer.

Explanation

The BTS guidelines on NIV from 2008 recommend considering NIV in patients who present with acute respiratory failure due to COPD and have decompensated respiratory acidosis within 60 minutes of admission, after maximal medical therapy has been instituted. pCO₂>6.0 fits the criterion for respiratory acidosis and is therefore the correct answer.

The criteria for initiating NIV are largely independent of the underlying disease process. pH<7.35 is considered acidotic, therefore pH 7.42 is not a consideration for NIV. Hypoxia per se, and respiratory rate are not considered reasons for instigating NIV.

The most common use of NIV is in patients with COPD. The BTS guidelines from 2008 recommend considering NIV in patients who present with acute respiratory failure due to COPD and have decompensated respiratory acidosis despite maximal medical therapy. pCO₂>6.0 fits the criterion for respiratory acidosis and is therefore the correct answer. According to the guidelines, 'maximal medical therapy' is defined as:

- Controlled oxygen to maintain SaO₂ 88-92%
- Nebulised salbutamol 2.5-5 mg
- Nebulised ipratropium 500 µg
- Prednisolone 30 mg
- Antibiotic agent (when indicated).

A 60-year-old woman presents with deteriorating dyspnoea and cough productive of a purulent sputum. She has a two year history of recurrent chest infections and is a smoker of 15 cigarettes daily for the last 30 years.

On examination, she appeared breathless with a pulse of 100 bpm and her temperature was 39°C.

Investigations revealed:

| | | |
|--------------------|----------------------|-------------|
| Haemoglobin | 195 g/L | (115-165) |
| White cell count | $15.7 \times 10^9/L$ | (4-11) |
| Platelet count | $350 \times 10^9/L$ | (150-400) |
| PaO ₂ | 6.8 kPa | (11.3-12.6) |
| Carboxyhaemoglobin | 15.5% | (3-15) |
| Red cell mass | 147% | (75-125) |

What is the most likely explanation for these findings?

(Please select 1 option)

| | |
|-----------------------|-------------------------------------|
| <input type="radio"/> | Chronic obstructive airways disease |
| <input type="radio"/> | Ectopic erythropoietin production |
| <input type="radio"/> | Myelofibrosis |
| <input type="radio"/> | Primary polycythaemia |
| <input type="radio"/> | Pseudo-polycythaemia |

| | | |
|----------------------------------|-------------------------------------|----------------------------|
| <input type="radio"/> | Chronic obstructive airways disease | This is the correct answer |
| <input type="radio"/> | Ectopic erythropoietin production | |
| <input type="radio"/> | Myelofibrosis | |
| <input type="radio"/> | Primary polycythaemia | |
| <input checked="" type="radio"/> | Pseudo-polycythaemia | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- The indications for LTOT are $\text{paO}_2 < 7.3 \text{ kPa}$ (55 mmHg) or $\text{paO}_2 < 8.0 \text{ kPa}$ (60 mmHg) with evidence of pulmonary hypertension, peripheral oedema or polycythaemia.

Explanation

This patient has polycythaemia which is likely to be secondary to her hypoxia.

The cause of the hypoxia is most likely to be due to chronic obstructive pulmonary disease as a result of her heavy smoking history. Her history of increasing breathlessness, cough and sputum production and recurrent chest infections is consistent with this diagnosis.

The treatment is for her to stop smoking and long term oxygen therapy (LTOT) (that is, oxygen for more than 15 hours/day), should the hypoxia be confirmed when fully recovered from this exacerbation.

The indications for LTOT are:

- $\text{paO}_2 < 7.3 \text{ kPa}$ (55 mmHg), or
- $\text{paO}_2 < 8.0 \text{ kPa}$ (60 mmHg) with evidence of pulmonary hypertension, peripheral oedema or polycythaemia.

A 39-year-old gentleman is referred to the chest clinic with an eight month history of progressive shortness of breath. He has smoked 20/day for 20 years.

Investigations reveal a diagnosis of moderate emphysema. On questioning he informs the consultant that his father died from COPD in his early 50s. Following a diagnosis of alpha-1 antitrypsin (A1AT) deficiency, he undergoes genetic testing and is found to have the PiSZ genotype.

What levels of alpha1 antitrypsin would be expected if they were to be measured?

(Please select 1 option)

| | |
|-----------------------|---------------|
| <input type="radio"/> | 10% of normal |
| <input type="radio"/> | 20% of normal |
| <input type="radio"/> | 40% of normal |
| <input type="radio"/> | 60% of normal |
| <input type="radio"/> | 80% of normal |

- | | |
|----------------------------------|---|
| <input type="radio"/> | 10% of normal |
| <input type="radio"/> | 20% of normal |
| <input checked="" type="radio"/> | 40% of normal This is the correct answer |
| <input type="radio"/> | 60% of normal Incorrect answer selected |
| <input type="radio"/> | 80% of normal |

Key Learning Points

Respiratory Medicine

- This question requires an understanding of A1AT deficiency and the genetic variations of this condition.

Explanation

The serum levels of some of the common genotypes are:

- PiMM: 100% (normal)
- PiMS: 80% of normal serum level of A1AT
- PiSS: 60% of normal serum level of A1AT
- PiMZ: 60% of normal serum level of A1AT
- PiSZ: 40% of normal serum level of A1AT
- PiZZ: 10-15% (severe alpha 1-antitrypsin deficiency).

Cigarette smoking is especially harmful to those with A1AT deficiency and can accelerate the progression of emphysema by 10 years.

A known case of chronic obstructive pulmonary disease (COPD) presents to the Emergency department, distressed and cyanosed.

Arterial blood gases reveal:

| | | |
|-------------------|---------|-----------------|
| pH | 7.2 | (7.36-7.44) |
| PaO ₂ | 8.3 kPa | (11.3-12.6 kPa) |
| PaCO ₂ | 10 kPa | (4.7-6.0 kPa) |

He is given high concentration oxygen together with a salbutamol nebuliser. Intravenous hydrocortisone is also given.

The patient becomes even worse with poorer breathing effort although pulse oximetry showed SaO₂ of 93%.

What is the cause of patient's deterioration?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Constriction of bronchioles in response to salbutamol nebuliser |
| <input type="radio"/> | High concentration oxygen administration |
| <input type="radio"/> | Pulmonary artery relaxation causing mismatch between perfusion and ventilation |
| <input type="radio"/> | Pulmonary vein relaxation causing mismatch between perfusion and ventilation |
| <input type="radio"/> | Reaction to IV hydrocortisone |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Constriction of bronchioles in response to salbutamol nebuliser | |
| <input type="radio"/> | High concentration oxygen administration | This is the correct answer |
| <input type="radio"/> | Pulmonary artery relaxation causing mismatch between perfusion and ventilation | |
| <input type="radio"/> | Pulmonary vein relaxation causing mismatch between perfusion and ventilation | |
| <input checked="" type="radio"/> | Reaction to IV hydrocortisone | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Hypoxia and hypercapnia are a result of acute exacerbation of COPD, the respiratory centre is solely stimulated by hypoxia. hence respiratory effort became less and the condition worsened when high concentration oxygen is introduced depriving the patient of hypoxic drive.

Explanation

The patient was suffering from hypoxia and hypercapnia as a result of acute exacerbation of COPD.

His respiratory centre was solely stimulated by hypoxia. That is why his respiratory effort became less and the condition worsened when he was given high concentration oxygen, depriving him of hypoxic drive.

A 22-year-old woman recently returned from a holiday in Malta was admitted with a three day history of fever, generalised lymphadenopathy and a macular rash over the trunk and legs.

Which of the following is the most likely diagnosis?

(Please select 1 option)

- | | |
|-----------------------|------------------------------|
| <input type="radio"/> | Actinomycosis |
| <input type="radio"/> | Familial Mediterranean fever |
| <input type="radio"/> | Infectious mononucleosis |
| <input type="radio"/> | Sarcoidosis |
| <input type="radio"/> | Tuberculosis |

| | | |
|----------------------------------|------------------------------|----------------------------|
| <input type="radio"/> | Actinomycosis | |
| <input type="radio"/> | Familial Mediterranean fever | |
| <input type="radio"/> | Infectious mononucleosis | This is the correct answer |
| <input type="radio"/> | Sarcoidosis | |
| <input checked="" type="radio"/> | Tuberculosis | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Infectious mononucleosis has a two to five week incubation period and presents with fever, malaise, pharyngitis, lymphadenopathy, and rash.

Explanation

Infectious mononucleosis occurs most commonly in adolescents and young adults.

Clinical features occur after a two to five week incubation period and include:

- Fever
- Malaise
- Pharyngitis
- Lymphadenopathy.

Rashes occur more commonly in patients who have received penicillin or ampicillin.

A 42-year-old woman presents to the clinic with a chronic cough.

Which of the following features would increase the suspicion that she is suffering from asthma?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Associated dizziness |
| <input type="radio"/> | Chronic cough without wheeze |
| <input type="radio"/> | Symptoms corresponding with a coryzal illness |
| <input type="radio"/> | Symptoms in response to exercise |
| <input type="radio"/> | Voice disturbance |

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Associated dizziness | |
| <input type="radio"/> | Chronic cough without wheeze | |
| <input type="radio"/> | Symptoms corresponding with a coryzal illness | |
| <input type="radio"/> | Symptoms in response to exercise | This is the correct answer |
| <input checked="" type="radio"/> | Voice disturbance | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Guidelines from BTS/SIGN on the diagnosis and management of asthma suggest that the presence of wheeze, breathlessness, chest tightness or cough, particularly if symptoms are worse at night or in the early morning, after exercise are suggestive of the diagnosis.

Explanation

The answer is symptoms in response to exercise.

Guidelines from BTS/SIGN on the [diagnosis and management of asthma](#) suggest that the presence of wheeze, breathlessness, chest tightness or cough, particularly if symptoms are worse at night or in the early morning, after exercise, allergy exposure or cold air, are suggestive of the diagnosis.

A family history of atopy or asthma, personal history of atopy, widespread wheeze, low forced expiratory volume in one second (FEV1) or peak expiratory flow rate (PEFR) also support the diagnosis.

Dizziness, light-headedness, voice disturbance and chronic cough without wheeze do not support a diagnosis of asthma. In addition, there is no evidence that symptoms which correspond with a cold (coryzal illness) suggest an underlying diagnosis of asthma.

A 22-year-old woman comes to the clinic with tiredness and shortness of breath. She is 30 weeks pregnant. The pregnancy has been uneventful so far.

On examination her BP is 122/72 mmHg, pulse is 75 and regular, saturations are 95% on air.

Respiratory, cardiovascular and abdominal examinations are unremarkable, her BMI is 24.

Investigations show:

| | | |
|------------------|----------------------|-----------|
| Haemoglobin | 95 g/L | (115-160) |
| White cell count | 8.0×10^9 /L | (4-11) |
| Platelets | 200×10^9 /L | (150-400) |
| Sodium | 137 mmol/L | (135-146) |
| Potassium | 4.1 mmol/L | (3.5-5) |
| Creatinine | 90 μ mol/L | (35 - 80) |

Which of the following is the next most appropriate investigation?

(Please select 1 option)

| | |
|-----------------------|----------------------|
| <input type="radio"/> | B ₁₂ |
| <input type="radio"/> | Faecal occult bloods |
| <input type="radio"/> | Ferritin |
| <input type="radio"/> | Folate |
| <input type="radio"/> | Upper GI endoscopy |



B₁₂



Faecal occult bloods



Ferritin

This is the correct answer



Folate



Upper GI endoscopy

Incorrect answer selected

Key Learning Points

Respiratory Medicine

- Ferritin is the most important first investigation in suspected pregnancy related iron deficiency.

Explanation

Ferritin is the most important first investigation, so is the only correct answer.

The most likely explanation is pregnancy related iron deficiency, so with respect to further investigations, faecal occult bloods and upper GI endoscopy are unnecessary.

The need for folate supplements should of course also be reinforced during the consultation.

According to the latest NICE guidance, which of the below combinations of post-bronchodilator results is now classed as severe airflow obstruction in chronic obstructive pulmonary disease (COPD)?

(Please select 1 option)

- | | |
|-----------------------|---|
| <input type="radio"/> | FEV ₁ /FVC <0.7 & FEV ₁ predicted <30% |
| <input type="radio"/> | FEV ₁ /FVC <0.7 & FEV ₁ predicted 30-49% |
| <input type="radio"/> | FEV ₁ /FVC <0.7 & FEV ₁ predicted 50-79% |
| <input type="radio"/> | FEV ₁ /FVC <0.75 & FEV ₁ predicted <30% |
| <input type="radio"/> | FEV ₁ /FVC <0.75 & FEV ₁ predicted 30-49% |

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | FEV ₁ /FVC <0.7 & FEV ₁ predicted <30% | |
| <input type="radio"/> | FEV ₁ /FVC <0.7 & FEV ₁ predicted 30-49% | This is the correct answer |
| <input type="radio"/> | FEV ₁ /FVC <0.7 & FEV ₁ predicted 50-79% | |
| <input checked="" type="radio"/> | FEV ₁ /FVC <0.75 & FEV ₁ predicted <30% | Incorrect answer selected |
| <input type="radio"/> | FEV ₁ /FVC <0.75 & FEV ₁ predicted 30-49% | |

Key Learning Points

Respiratory Medicine

- This question requires an understanding of the investigations used to diagnose COPD, and the measurements used to predict severity.

Explanation

NICE have published clinical guidance on [chronic obstructive pulmonary disease \(NG115\)](#) to help with the assessment of airflow obstruction.

There have been some alterations to previous classification of airflow obstruction, based on the American Thoracic Society, GOLD and European Respiratory Society standards.

Below are the classifications:

| | |
|-------------|--|
| Mild | FEV ₁ predicted more than 80% |
| Moderate | FEV ₁ predicted 50-79% |
| Severe | FEV ₁ predicted 30-49% |
| Very severe | FEV ₁ predicted less than 30% |

FEV₁/FVC ratio is less than 0.7 in COPD.

A 67-year-old patient with a history of COPD is being assessed by the community COPD team for his suitability for treatment at home (under the Hospital at Home scheme) for his latest exacerbation.

Which of the following is a contraindication to Hospital at Home (HaH) treatment?

(Please select 1 option)

| | |
|-----------------------|---------------------------------|
| <input type="radio"/> | Acute changes on a chest x ray |
| <input type="radio"/> | Dementia |
| <input type="radio"/> | Increasing age |
| <input type="radio"/> | Long term oxygen therapy (LTOT) |
| <input type="radio"/> | Longer duration of COPD |

(Please select 1 option)

| | | |
|----------------------------------|---------------------------------|----------------------------|
| <input type="radio"/> | Acute changes on a chest x ray | This is the correct answer |
| <input type="radio"/> | Dementia | |
| <input type="radio"/> | Increasing age | |
| <input type="radio"/> | Long term oxygen therapy (LTOT) | |
| <input checked="" type="radio"/> | Longer duration of COPD | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- A specific subtype of intermediate care is Hospital at Home (HaH), where active treatment is provided by healthcare professionals in the patient's home for a condition that otherwise would require hospital care.

Explanation

A specific subtype of intermediate care is Hospital at Home (HaH), where active treatment is provided by healthcare professionals in the patient's home for a condition that otherwise would require hospital care.

BTS has issued recommendations as to whom HaH should be offered. It recommends that HaH should not be offered in the below instances:

- Impaired level of consciousness
- Acute confusion
- pH <7.35, if arterial blood gases have been measured
- Acute changes on chest radiograph
- Concomitant medical problem requiring inpatient stay
- Insufficient social support, no telephone, residence geographically removed from hospital
- New hypoxaemia (SpO₂ 90%) - a contraindication if oxygen cannot be provided at home.

Although factors such as increasing age and duration of COPD have been shown in studies to identify those at increased risk of relapse, they have only a moderate sensitivity and specificity, and hence are not included in the listed contraindications.

A patient presents to chest clinic with an eight month history of cough and progressive breathlessness.

Simple spirometry is performed and the results are below:

| | | |
|-----------------------|-------|-----------------|
| FEV ₁ | 1.7L | (77% predicted) |
| FVC | 2.3 L | (61% predicted) |
| FEV ₁ /FVC | 0.73 | |

Which of the below conditions are associated with this lung function picture?

(Please select 1 option)

- ☐ Bronchiectasis
- ☐ Emphysema
- ☐ Obesity
- ☐ Obliterative bronchiolitis
- ☐ Simple coal worker's pneumoconiosis

| | |
|----------------------------------|---|
| <input type="radio"/> | Bronchiectasis |
| <input type="radio"/> | Emphysema |
| <input type="radio"/> | Obesity This is the correct answer |
| <input checked="" type="radio"/> | Obliterative bronchiolitis Incorrect answer selected |
| <input type="radio"/> | Simple coal worker's pneumoconiosis |

Key Learning Points

Respiratory Medicine

- Obesity is a cause of restrictive lung defect on spirometry

Explanation

This patient has a restrictive lung defect ($FEV_1/FVC > 0.7$). Obesity is a well recognised cause of restrictive lung defects. It is associated with hypoventilation and as a result can cause hypercapnia.

Patients with simple coal worker's pneumoconiosis do not show significant abnormalities on pulmonary function tests. The other conditions listed all cause an obstructive result ($FEV_1/FVC < 0.7$).

A 35-year-old woman presents with a three month history of arthralgia, increasing fatigue and occasional nose bleeds. More recently she has become short of breath and has had two episodes of haemoptysis.

On investigation she is found to have acute kidney injury, with a creatinine of 656 $\mu\text{mol/L}$ and urine dipstick is positive for blood and protein. A chest x ray is performed which shows several nodules throughout both lung fields.

The treating physician suspects Wegener's granulomatosis.

Which of the below autoantibodies are most associated with this condition?

(Please select 1 option)

| | |
|-----------------------|------------|
| <input type="radio"/> | Anti-dsDNA |
| <input type="radio"/> | Anti-GBM |
| <input type="radio"/> | MPO-ANCA |
| <input type="radio"/> | p-ANCA |
| <input type="radio"/> | PR3-ANCA |

| | |
|----------------------------------|-------------------------------|
| <input type="radio"/> | Anti-dsDNA |
| <input type="radio"/> | Anti-GBM |
| <input type="radio"/> | MPO-ANCA |
| <input type="radio"/> | p-ANCA |
| <input checked="" type="radio"/> | PR3-ANCA Correct |

Key Learning Points

Respiratory Medicine

- This question requires an understanding of pulmonary vasculitis and the diagnostic antibodies involved.

Explanation

Anti-neutrophil cytoplasmic antibodies (ANCA) are diagnostic markers for vasculitis, although they may not be pathological. They are characterised by neutrophil staining: cytoplasmic staining uptake (c-ANCA) and peri-nuclear (p-ANCA).

These are largely synonymous with PR3-ANCA (targeting peroxidase-3) and MPO-ANCA (targeting myeloperoxidase).

PR3-ANCA has 60-90% sensitivity and more than 90% specificity for Wegener's granulomatosis.

Churg-Strauss and microscopic polyangiitis are more commonly associated with MPO-ANCA or p-ANCA, although may be positive for PR3 ANCA also.

Goodpasture's is associated with anti-glomerular basement membrane antibody (anti-GBM).

Systemic lupus erythematosus (SLE) is associated with anti-dsDNA antibodies.

A 25-year-old Afro-Caribbean patient presents to the GP with a progressive history of dyspnoea and a cough.

She is initially treated for possible asthma but this fails to alleviate symptoms. The GP organises a CXR and spirometry. The CXR is reported as bilateral hilar lymphadenopathy and upper lobe pulmonary infiltrates.

On review in the chest clinic, spirometry shows a mild restrictive defect and serum angiotensin converting enzyme (SACE) is positive. She is diagnosed with pulmonary sarcoidosis.

What is the stage (radiological) of her disease?

(Please select 1 option)

| | |
|-----------------------|-----------|
| <input type="radio"/> | Stage 0 |
| <input type="radio"/> | Stage I |
| <input type="radio"/> | Stage II |
| <input type="radio"/> | Stage III |
| <input type="radio"/> | Stage IV |

Please select 1 option

| | | |
|----------------------------------|-----------|----------------------------|
| <input type="radio"/> | Stage 0 | |
| <input type="radio"/> | Stage I | |
| <input type="radio"/> | Stage II | This is the correct answer |
| <input type="radio"/> | Stage III | |
| <input checked="" type="radio"/> | Stage IV | Incorrect answer selected |

Key Learning Points

Respiratory Medicine

- Sarcoidosis is a multisystem disorder although it predominately affects the respiratory system. Radiological staging is based on chest x ray appearance.

Explanation

Chest x ray is abnormal in 85% of lung sarcoid, but 30-60% are asymptomatic (that is, incidental chest x ray finding).

| Stage | Finding | Likelihood of spontaneous resolution |
|-------|-----------------------------------|--------------------------------------|
| 0 | Normal chest radiograph | >90% |
| I | Bilat hilar lymphadenopathy (BHL) | 60-90% |
| II | BHL plus pulmonary infiltrates | 40-60% |
| III | Pulmonary infiltrates (no BHL) | 10-20% |
| IV | Pulmonary fibrosis (+/- bullae) | <20% |

Dr. Assem

A 60-year-old man with ankylosing spondylitis presents with cough, weight loss and tiredness.

His CXR shows longstanding upper lobe fibrosis.

Three sputum tests stain positive for acid fast bacilli (AFB) but are consistently negative for *Mycobacterium tuberculosis* on culture.

Which of the following is the most likely cause?

(Please select 1 option)

| | |
|-----------------------|---|
| <input type="radio"/> | Allergic bronchopulmonary aspergillosis |
| <input type="radio"/> | <i>Mycobacterium avium intracellulare</i> complex |
| <input type="radio"/> | <i>Saccharopolyspora rectivirgula</i> |
| <input type="radio"/> | Sarcoidosis |
| <input type="radio"/> | Tuberculosis |

(Please select 1 option)

| | | |
|----------------------------------|---|----------------------------|
| <input type="radio"/> | Allergic bronchopulmonary aspergillosis | |
| <input type="radio"/> | <i>Mycobacterium avium intracellulare</i> complex | This is the correct answer |
| <input type="radio"/> | <i>Saccharopolyspora rectivirgula</i> | |
| <input checked="" type="radio"/> | Sarcoidosis | Incorrect answer selected |
| <input type="radio"/> | Tuberculosis | |

Key Learning Points

Respiratory Medicine

- The presence of AFB yet absence of TB suggests an atypical AFB such as *M. avium*.

Explanation

The presence of AFB yet absence of TB suggests an atypical AFB such as *M. avium*.

Dr Assem

A 65-year-old woman has smoked 50 cigarettes a day for 40 years.

She has had increasing dyspnoea for the several years, but no cough. A chest x ray shows increased lung size along with flattening of the diaphragms, consistent with emphysema.

Over the next several years she develops worsening peripheral oedema. Her vital signs show temperature 36.7°C, pulse 80 bpm, respiratory rate 15, and BP 120/80 mmHg.

Which of the following cardiac findings is most likely to be present?

(Please select 1 option)

| | |
|-----------------------|---------------------------------------|
| <input type="radio"/> | Constrictive pericarditis |
| <input type="radio"/> | Left ventricular (LV) aneurysm |
| <input type="radio"/> | Mitral valve stenosis |
| <input type="radio"/> | Non-bacterial thrombotic endocarditis |
| <input type="radio"/> | Right ventricular hypertrophy |

Please select 1 option

| | | |
|----------------------------------|---------------------------------------|----------------------------|
| <input type="radio"/> | Constrictive pericarditis | |
| <input type="radio"/> | Left ventricular (LV) aneurysm | |
| <input type="radio"/> | Mitral valve stenosis | |
| <input checked="" type="radio"/> | Non-bacterial thrombotic endocarditis | Incorrect answer selected |
| <input type="radio"/> | Right ventricular hypertrophy | This is the correct answer |

Key Learning Points

Respiratory Medicine

- Pulmonary hypertension occurs as a result of emphysema secondary to long term cigarette smoking.

Explanation

The most likely finding in this woman is pulmonary hypertension as a result of emphysema secondary to long term cigarette smoking.

Peripheral oedema is due to right heart dilatation and failure.

Mitral stenosis is not supported by the history.

Constrictive pericarditis could be caused by a lung malignancy in this patient, but again, there is no suggestion of this in the history.

Constrictive pericarditis would be characterised by soft heart sounds, a diastolic "pericardial knock", and gross signs of right heart failure.

LV aneurysm would lead to symptoms and signs of left heart failure and again is not the most likely finding suggested by the history.

A 59-year-old man presents to the general medical on call with a hoarse voice.

He is known to smoke some 20 cigarettes per day. He has not lost any weight over the past few months but has a chronic cough for which he has been prescribed a steroid inhaler. He drinks 30 units of alcohol per week.

Which of the following would particularly prompt you to investigate him further?

(Please select 1 option)

| | |
|-----------------------|--|
| <input type="radio"/> | Alcohol history |
| <input type="radio"/> | History of cough |
| <input type="radio"/> | Hoarse voice for longer than three weeks |
| <input type="radio"/> | No response to steroid inhaler |
| <input type="radio"/> | Smoking history |

| | | |
|----------------------------------|--|----------------------------|
| <input type="radio"/> | Alcohol history | |
| <input type="radio"/> | History of cough | |
| <input type="radio"/> | Hoarse voice for longer than three weeks | This is the correct answer |
| <input type="radio"/> | No response to steroid inhaler | |
| <input checked="" type="radio"/> | Smoking history | Incorrect answer selected |

Key Learning Points

Respiratory Medicine, Rheumatology

- Under NICE guidelines a hoarse voice for three weeks or more is an indication for investigation to exclude malignancy.

Explanation

Under NICE guidelines a hoarse voice for three weeks or more is an indication for investigation to exclude malignancy. This is particularly the case in patients with a history of alcohol consumption or smoking.

Whilst alcohol and smoking history would both increase the suspicion of an underlying carcinoma it is the duration of hoarseness which would raise most concern.

A history of cough might be expected given he is a smoker and a response to steroid inhaler would not be expected anyway.

A 47-year-old woman presenting with breathlessness has arterial blood gases taken which give the following results:

| | | |
|------------------|-------------------|-------------|
| pO ₂ | 8.7 kPa / 65 mmHg | (11.3-12.6) |
| pCO ₂ | 4.4 kPa / 33 mmHg | (4.7-6.0) |
| pH | 7.46 | (7.36-7.44) |
| HCO ₃ | 24 mmol/L | (20-28) |

Which of the following is the most likely diagnosis?

(Please select 1 option)

- ☐ Acute severe asthma
- ☐ Emphysema
- ☐ Hyperventilation syndrome
- ☐ Kyphoscoliosis
- ☐ Opiate overdose

| | | |
|----------------------------------|---------------------------|----------------------------|
| <input type="radio"/> | Acute severe asthma | This is the correct answer |
| <input type="radio"/> | Emphysema | |
| <input type="radio"/> | Hyperventilation syndrome | |
| <input checked="" type="radio"/> | Kyphoscoliosis | Incorrect answer selected |
| <input type="radio"/> | Opiate overdose | |

Key Learning Points

Respiratory Medicine

- A normal or rising CO₂ is an ominous sign indicative of a life-threatening attack and the need to consider critical care referral.

Explanation

The patient has an acute respiratory alkalosis with associated hypoxia. This is consistent with an acute asthmatic attack.

A normal or rising CO₂ is an ominous sign indicative of a life-threatening attack and the need to consider ventilatory support.

Patients with hyperventilation syndrome do show a respiratory alkalosis but this is not associated with hypoxia.

A 40-year-old man is admitted to the Emergency department after being involved in a house fire. He is extremely drowsy but you notice on examining him that he seems well perfused, with his cheeks looking almost pink.

His BP is 100/60 mmHg and his pulse is 95 and regular. Blood gas analysis reveals a CO level of 12% and a metabolic acidosis with a pH of 7.15.

Which of the following is the most appropriate next intervention?

(Please select 1 option)

| | |
|-----------------------|-----------------------|
| <input type="radio"/> | 100% oxygen by mask |
| <input type="radio"/> | Hyperbaric oxygen |
| <input type="radio"/> | IV mannitol |
| <input type="radio"/> | IV sodium bicarbonate |
| <input type="radio"/> | Nebulised salbutamol |

(Please select 1 option)

☐ 100% oxygen by mask **This is the correct answer**

☐ Hyperbaric oxygen

☐ IV mannitol

☐ IV sodium bicarbonate

☒ Nebulised salbutamol **Incorrect answer selected**

Key Learning Points

Respiratory Medicine

- Key to prognosis is removal from the source of carbon monoxide as quickly as possible, and instigation of high flow oxygen treatment.

Explanation

The answer is 100% oxygen by mask.

Hyperbaric oxygen is recommended by some countries including the United States, although because of a lack of randomised control evidence it is not standard practice in the United Kingdom as there appears to be no significant improvement in outcome versus high flow oxygen alone.

Sodium bicarbonate is not indicated, and IV mannitol is used only if there is suspicion of cerebral oedema. Key to prognosis is removal from the source of carbon monoxide as quickly as possible, and instigation of high flow oxygen treatment.

At a level of 12%, long term psychological disturbance or memory loss is possible.