

Illawarra Shoalhaven Local Health District Emergency Medicine Fellowship Program



Topic-Based Quiz: Qs and As

RESUSCITATION AND CRITICAL CARE

Candidate Instructions

- Duration = 30min
- Props are included within the examination booklets
- Allocated marks for each question are shown
- Each mark is of equal weight
- There is no negative marking
- Write answers CLEARLY, and cross out any errors
- Answer within space provided
- Do not begin until instructed
- You may take examination book home with you



Good Luck!

Acknowledgement: Thank you to the trainees who have written these SAQs with the hope of making their colleagues sweat, but ultimately gain more exposure to exam practice

Question 1

A 46 year old woman has presented with severe respiratory failure. She has a history of rheumatoid arthritis treated with methotrexate and prednisone.

A chest X-ray shows bilateral interstitial infiltrates. She is in severe respiratory distress and requires intubation for respiratory support.

List 4 considerations in rheumatoid arthritis that may impact on airway management. (4 marks)

List 3 effects of glucocorticoid therapy that may impact your airway management. (3 marks)

List 3 considerations during rapid sequence induction in a patient with pulmonary hypertension, and for each provide two interventions which may improve RSI safety in this patient. (9 marks)

Consideration	Intervention
1	1 2
2	1 2
3	1 2

Question 2

There are two intubated patients occupying both resuscitation rooms in your regional emergency department. The intensive care unit is at capacity.

A third patient has been brought in by a retrieval service. It is a 36 year old man with a well-established diagnosis of schizophrenia who presented with a psychotic episode in the setting of medication non-compliance. He was intubated by the retrieval team.

List 5 items of information you want to know from the retrieval team regarding suitability for extubation in the emergency department. (5)

List 5 features of your assessment of the patient to determine if he is suitable for extubation. (5 marks)

List 4 patient criteria for his readiness for transfer to the psychiatric unit. (4 marks)

Question 3

You have just managed the intubation of an 50 year old female with life-threatening asthma and COPD.

She is orally intubated with a size 6.5 endotracheal tube positioned at 25cm at the teeth. She is on SIMV with a rate of 10, volume 6mL/kg, PEEP 5, I:E ratio 1:4, FiO2 50%.

Her vital signs are:

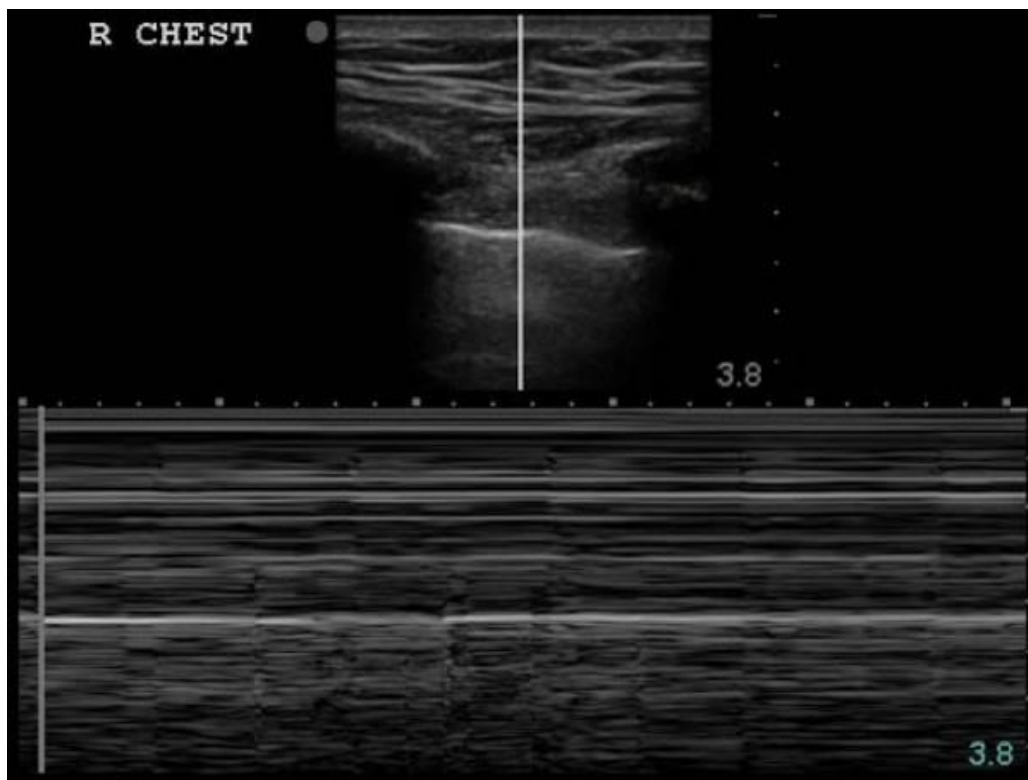
HR 120

NIBP 110/80

SpO2 95%

List 4 causes for low end-tidal CO2 values in this patient. (4 marks)

The patient has a persistent tachycardia and high peak inspiratory pressure. As part of your assessment, you have acquired the ultrasound image below.



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List 4 causes for this finding in this patient. (4 marks)

List 3 methods to further assess this situation. (3 marks)

Question 4

A 23 year old female has been brought by ambulance to your emergency department in a tertiary referral hospital. She had a syncopal episode at home with persistent hypotension and hypoxia. She had an internal fixation of a tibial plateau fracture 2 weeks prior.

CTPA shows saddle pulmonary embolism. She is tachycardic and hypotensive.

List 3 signs of pulmonary hypertension seen on CTPA (3 marks)

Other than intravenous thrombolysis, list 3 strategies of treating massive pulmonary embolism (3 marks)

List 2 potential sequelae of avoiding thrombolysis in this situation. (2 marks)

List 3 principles of treating shock due to pulmonary embolism (3 marks)

List 2 considerations of central line placement in this patient (2 marks)

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Other than thrombolysis, list one other measure to treat massive PE refractory to medical management.

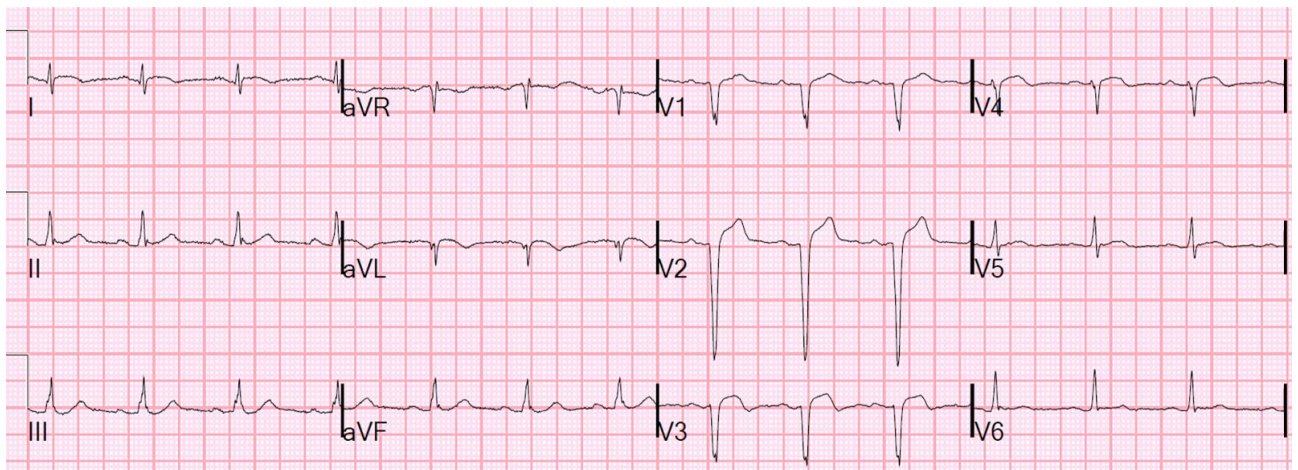
Question 5

A 65 year old woman is brought to your ED. She is pale and diaphoretic. She has had two weeks of intermittent chest pain and two days of dyspnea which worsened today. Her vital signs are:

HR 130
NIBP 85/70
RR 24
SpO2 90% 15LNRB

Examination reveals a pan-systolic murmur at the left lower sternal edge and apex, diffuse pulmonary crackles, and absence of peripheral edema. Bedside echocardiography shows low-normal cardiac contractility and no pericardial effusion.

Her ECG is shown below:



What is the ECG diagnosis? (2 marks)

List 2 likely causes for pulmonary edema in this patient. (2)

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Complete the table below, as numbered, with features of your management plan for this patients shock and respiratory failure. (9 marks)

Management	Rationale
1 mark	2 marks
1 mark	2 marks

Describe two effects of vasopressor agents in this situation (2 marks)

ANSWERS

Question 1

- Elective intubation Ex
- Rheumatoid arthritis G

List 4 considerations in rheumatoid arthritis that may impact on airway management. (4 marks)

- Poor neck extension
- Poor mouth opening
- Cricoarytenoid arthritis
- Pulmonary fibrosis with poor compliance
- Risk of atlanto-occipital subluxation

List 3 effects of glucocorticoid therapy that may impact your airway management. (3)

- 'Bull neck' impairing positioning
- 'Buffalo hump' impairing positioning
- Central obesity impairing mask ventilation
- Pharyngeal crowding impairing mask ventilation and laryngoscopy
- Friable oropharyngeal tissues

List 3 considerations during rapid sequence induction in a patient with pulmonary hypertension, and for each provide two interventions which may improve RSI safety in this patient. (9)

Consideration	Intervention
Avoidance of hypoxia	Adequate preoxygenation Apneic ventilation/PEEP Apneic oxygenation during laryngoscopy Minimise time from mask ventilation to tube ventilation
Avoidance of hypercarbia	Apneic ventilation Minimise time from mask ventilation to tube ventilation
Maintaining right ventricular function	Maintain RV preload with fluids/pressors Avoid excessive airway pressures Inotropes/ inhaled pulmonary vasodilators may be needed

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Question 2 (Critical Care)

- Extubation Ex

List 5 items of information you want to know from the retrieval team regarding suitability for extubation in the emergency department. (5)

- Indication for intubation
- Ease of intubation, especially any difficulties/trauma/aspiration
- Ease of bag-mask ventilation
- Sedation used during transfer
- Last muscle relaxant dose

List 5 features of your assessment of the patient to determine if he is suitable for extubation. (5)

- Minimal O2 requirement
- Low inspiratory pressure and PEEP
- In spontaneous ventilation mode
- Adequate prompted vital capacity
- Level of consciousness - rousable, obeying commands
- Not agitated/aggressive
- Train of four count
- Positive cuff leak test

List 4 patient criteria for his readiness for transfer to the psychiatric unit. (4)

- Reasonable period of monitoring ie 2-4 hours
- No complications peri-extubation
- Not requiring supplemental oxygen or hemodynamic support
- Able to talk, walk, eat and drink
- Behavioural disturbance managed

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Question 3 (Critical Care)

- Asthma Ex
- COPD H
- Capnography Ex
- Ventilators used in EDs Ex

List 4 causes for low end-tidal CO₂ values in this patient. (4 marks)

- Increased alveolar dead space - asthma
- Incomplete expiration - bronchospasm, insufficient expiratory time, narrow/kinked/blocked ETT
- Low pulmonary CO₂ delivery - shock, cardiac arrest
- Circuit leak distal to capnography ie cuff leak, HME
- Low CO₂ production - deep sedation, hypothermia

The patient has a persistent tachycardia and high peak inspiratory pressure. As part of your assessment, you have acquired the ultrasound image below.

List 4 causes for this finding in this patient. (4 marks)

- Pneumothorax
- Absent lung sliding in setting of severe gas trapping
- Absent lung sliding due to acquisition during prolonged expiration
- Bulla

List 3 methods to further assess this situation. (3 marks)

- Repeat USS after disconnecting and reconnecting ventilator
- Confirm/exclude pneumothorax with CXR, given relative stability
- Finger thoracostomy, more appropriate if deteriorates

Question 4 (Critical Care)

- Pulmonary embolism H

List 3 signs of pulmonary hypertension seen on CTPA

- Dilated RV, RV/LV >1
- Interventricular septal flattening
- Increased PA diameter
- Intrahepatic contrast reflux

Other than intravenous thrombolysis, list 3 strategies of treating massive pulmonary embolism.

- Systemic anticoagulation only
- Catheter-directed thrombolysis
- Catheter thrombectomy
- Surgical thrombectomy

List 2 potential sequelae of avoiding thrombolysis in this situation.

- Instability leading to cardiac arrest
- Long term pulmonary hypertension

List 3 principles of treating shock due to pulmonary embolism

- Cautious fluid therapy
- Inotropy to support failing RV
- Vasopressors to maintain RV coronary perfusion pressure in face of 'systemicalised' RV
- Inhaled pulmonary vasodilators or vasopressin are other specific measures

List 2 considerations of central line placement in this patient.

- Avoid subclavian sites - pneumothorax would be lethal and risk of incompressible hemorrhage with thrombolysis
- Avoid femoral sites if possible iliofemoral DVT
- Avoid femoral sites if heading towards ECMO

Other than thrombolysis, list one other measure to treat massive PE refractory to medical management.

- VA ECMO

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Question 5 (Critical Care)

- Thrombolysis in myocardial infarction Ex
- LV failure in MI H
- ST elevation in absence of MI Ex
- VSD G

What is the ECG diagnosis? (2)

- Likely completed anteroseptal MI
- Persisting ST elevation possible ongoing ischemia vs LV aneurysm

List 2 likely causes for pulmonary edema in this patient. (2)

- Acute mitral regurgitation
- Acute VSD

Complete the table below, as numbered, with features of your management plan for this patients shock and respiratory failure.

Management	Rationale
1 mark Positive pressure ventilation (NIV good firstline, but will require intubation for cath lab)	5 marks Increase FiO2 Reduce mitral regurgitation Reduce VSD shunt Reduce work of breathing Improve pulmonary edema
1 mark Refer to cardiology for cardiac catheterisation	2 marks Exclude lesion amenable to PCI in setting of cardiogenic shock Place intra-aortic balloon pump

Describe two effects of vasopressor agents in this situation.

- Increase SVR and increase the mitral regurgitant fraction or L>R VSD shunt fraction, worsening cardiogenic shock
- Increase venous return and worsen pulmonary edema