

Fellowship Questions_Respiratory Medicine

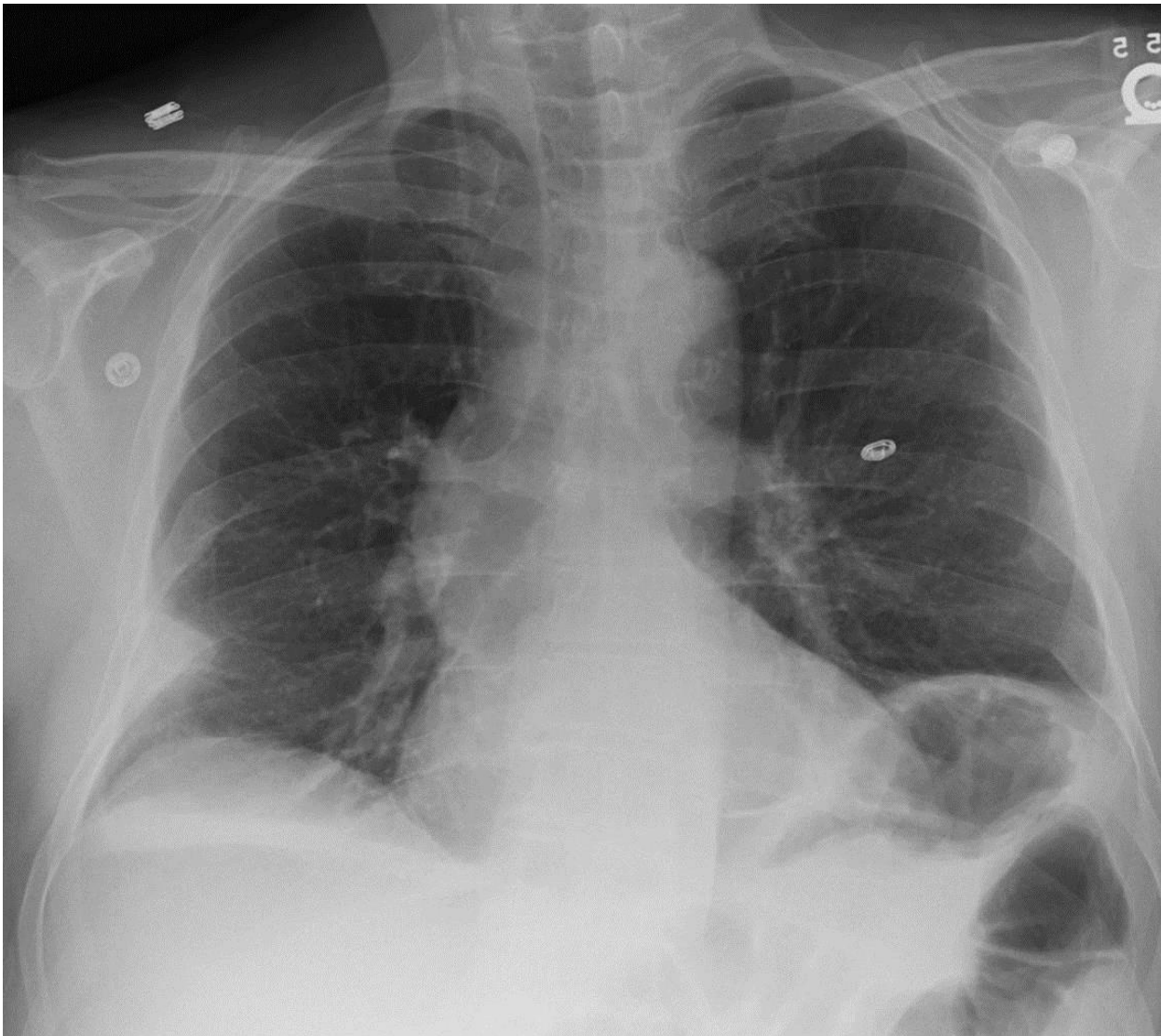
Q1

A 38 year old, previously well pregnant female presents with 1 hour of SOB and chest pain. She is 26 weeks pregnant. The registrar is concerned that she has a PE

She has the following observations.

P 130
BP 70/40
Sats 91%RA
T 37.2
RR 40

VBG
pH 7.52
pCO₂ 20
HCO₃ 12
Lact 6.0
Cr 67



a) What does the VBG show (2 marks)

Respiratory Alkalosis

CO₂ dropped by 25 – expect $2.5 \times 2 = 5$ mmol rise drop in the bicarb

Drop is actually 12 therefore concomitant metabolic acidosis

Hypoperfusion and lactate are the culprit metabolic causes

b)The RMO suggests that you could use the PERC rule to exclude a PE in this lady. How do you reply to his suggestion? (2 marks)

No

High risk – tachycardic/pregnant

c) In the table below list 4 tests that you could use to risk stratify whether there is there is a PE, include 2 pros and 2 cons of each modality (20 marks)

TEST	PROS	CONS
DDimer	Fairly non invasive Easy and quick Acceptable to patient No radiation Doesn't require leaving ED when unstable High NPV in a low risk patient (i.e not this one)	Not diagnostic/specific – raised level merely suggests need for further imaging Will still need imaging Useless in pregnancy
Echo	Can be done at bedside Non invasive No radiation	Uses surrogate markers for clot – e.g RV size/PAP but don't see clot itself Negative study doesn't exclude Requires specific expertise to perform
Doppler legs	Can be done at bedside Presence of clot in legs in this clinical context is highly suspicious No radiation Painless, acceptable to pt Non invasive	Requires experienced technician Only a surrogate marker for PE – doesn't specifically confirm PE
VQ	Requires leaving ED – too unstable Radiation to fetus (quantify) Less sensitive than CTPA for small/subsegmental clots – frequent indeterminate studies	Less radiation to breasts
CTPA	Requires leaving ED when unstable Need to lie flat – Caval compression Radiation to fetus and breasts/thyroid more than	Gold standard test – more sensitive and specific than VQ???? College documents – table. Non invasive

	VQ (quantify) Requires contrast – risk of renal imp in already hypoperfused patient	
Pulmonary Angiography	Invasive Few centres perform Need to leave ED Risk of surgical complications e.g. bleeding/vascular injury	Can proceed immediately to embolectomy if in diagnosis proven in CT centre Definitive diagnosis

Q2

A 54 year old man with a history of COPD and bronchiectasis presents to ED with SOB and chest pain. He has no wheeze, fever or cough.

P 130

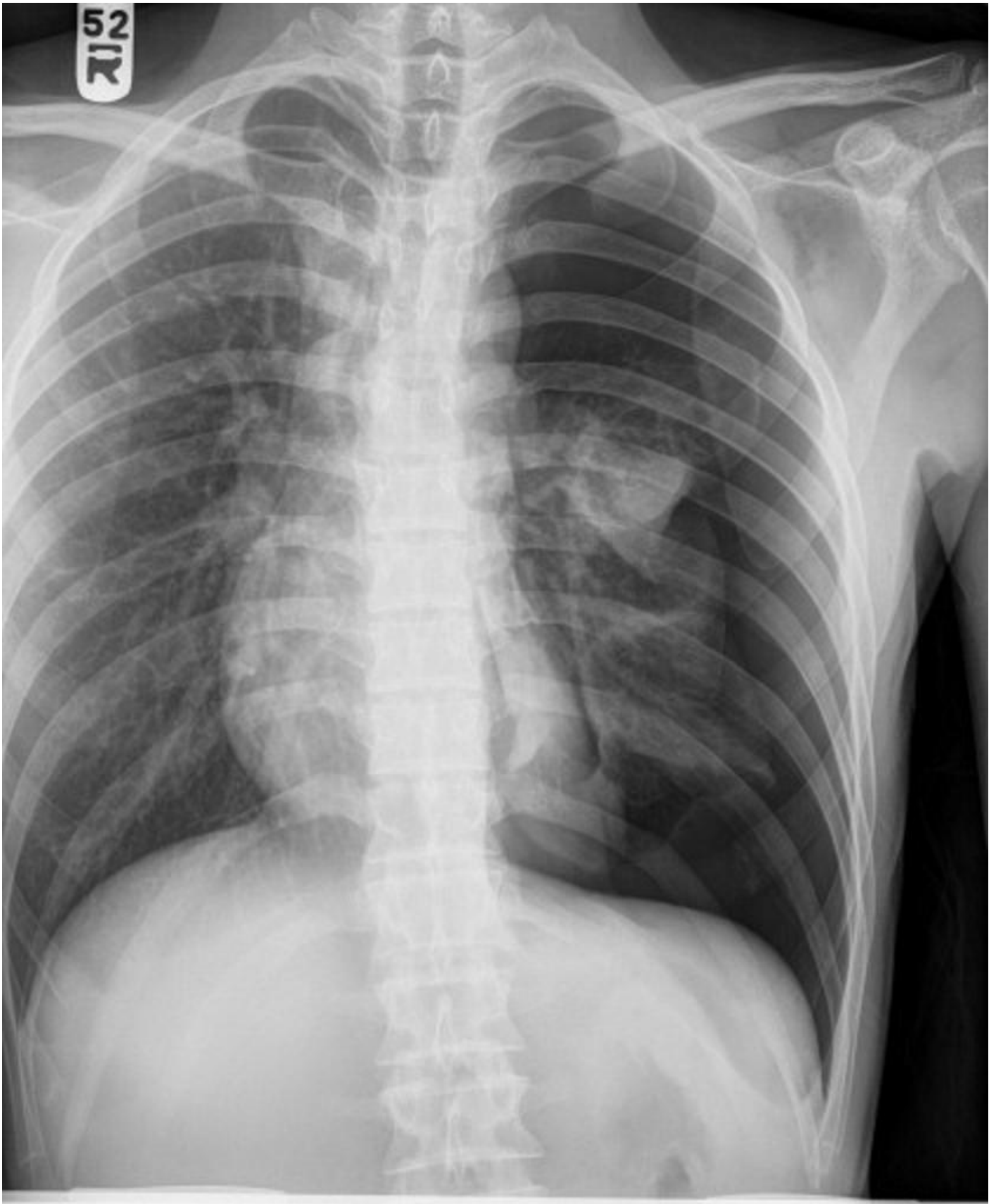
BP 90/30

Sats 91%

RR 40

Temp 37.0

His Chest XRay is shown below



a) List the management steps you will perform for this patient (4 marks)

Immediate needle decompression right 2nd IS MCL with large bore cannula

O2 High flow via NRB

Analgesia with titrated opiates (morphine 0.1mg/kg/Fentanyl 0.5-1mg/kg)

Surgical or pig tail chest drain right side, in safe triangle - aspiration of PTX not appropriate without an ICC inserted as >4cm at level of hilum AND is a secondary PTX due to lung disease as per BTS guideline

Facilitated with local anaesthetic 1% lignocaine infiltrated, and asepsis

May require sedation e.g. ketamine 0.5-1mg/kg titrated to aid insertion

There are no beds in the hospital and the patient remains in the ED short stay area for 24hrs

b) What criteria must be met before this patient can be safely discharged home (3 marks)

PTX resolved and drain removed after 24hrs– with period of observation to ensure doesn't reform – CXR at end of that period

c) Outline the discharge advice that you would give to this patient prior to him leaving the hospital (6 marks)

Do not fly on an aircraft for 4 weeks and until the ptx has completely resolved (as per BTS)

Never SCUBA dive

Return to ED if develops SOB/cough/worsening CP/other symptoms that concern the patient

Requires resp team follow up in OPD – referral sent

Repeat CXR in 7 days

Simple analgesia

Q3

A 7 year old boy presents with worsening asthma for the past 12 hours.

a) List four features of life threatening asthma (4 marks)

Confusion/altered conscious state

Cyanosis

Exhaustion/ poor respiratory effort

Silent chest

Other: hypotension, bradycardia, pulsus paradoxus > 25mmHg, unable to speak, $PEFR < 50\%$, $SaO_2 < 92\%$, paradoxical respiration

On examination he has marked use of respiratory muscles, appears emotionally distressed and is only able to speak single words.

HR 150, RR 60, SaO_2 88% on room air.

b) List your immediate management in the first 30 minutes, including drug doses (5 marks)

b) High flow O₂ for $SaO_2 > 96\%$

Ongoing reassurance from next of kin and staff

Bronchodilators: salbutamol 6-12 puffs via spacer q20min x3, if poor technique then nebulised 2.5mg

Ipratropium bromide MDI via spacer or 250mg neb stat

Prednisolone 1mg/kg po stat (or IV hydrocortisone 4mg/kg)

c) What other therapies might you consider if your first line medications fail (2 marks)

Magnesium IV

0.1 to 0.2 mmol/kg (up to 10 mmol) diluted in sodium chloride 0.9%, given over at least 20 minutes, as a single dose

Aminophylline

1 to 12 years: 5 to 10 mg/kg (up to 500 mg); younger children are more likely to require doses at the upper end of the range due to increased drug clearance

FOLLOWED BY

IV infusion:(1 to 9 years): 0.9 to 1.1 mg/kg/hour

Target theophylline plasma concentration: 55 to 110 micromol/L (10 to 20 mg/L)

Note: dosing not required for Aminophylline and Magnesium – as long as stipulate IV infusion with dosing as per eTG etc

d) The patient's condition worsens and despite appropriate escalation of therapy he is intubated in the ED.

Outline your ventilator settings with rationale (10 marks)

Parameter	Setting	Rationale
Respiratory Rate		
Tidal volume		
Peak insp pressure		
PEEP		
I:E ratio		

Parameter	Setting	Justify
Respiratory Rate	<10/min	Normal RR in 5y 20-30, answer should be less than this to allow time for expiration
Tidal volume	6 ml/kg	Decreases barotrauma
Peak inspiratory pressure	35-50cmH20	Necessary to overcome high airway pressures
PEEP	0-5cm H20	Patient has high intrinsic PEEP - low extrinsic PEEP prevents gas trapping
I:E ratio	1:>4	While bronchospasm is marked, allows time for expiration and reduces breath stacking

Following intubation the patient becomes progressively more tachycardic and hypotensive.

e) List 4 possible causes (4 marks)

Tension pneumothorax
Breath stacking/hyperinflation
Effect of induction/sedative agents
Hypovolaemia

5. What is your immediate action in managing this situation? (1 mark)

Disconnect from ventilator and hand ventilate at rate 6 breaths/min

Q4

A 54 year old homeless indigenous male presents to a tertiary ED with ½ cup of haemoptysis. He partner tell you he has been subjectively febrile and has an obvious cough and increased work of breathing. He is complaining of vague, non-specific chest pain. He is heavily intoxicated and unable to provide you with much history

P120

Sats 91% RA

RR 34

Temp 37.4

BP 90/70

a) List the differential diagnosis for her condition (7 marks)

Pneumonia – bacterial

Lung abscess

TB

Malignancy – bronchial

Trauma

Autoimmune – Goodpasture's, Wegeners

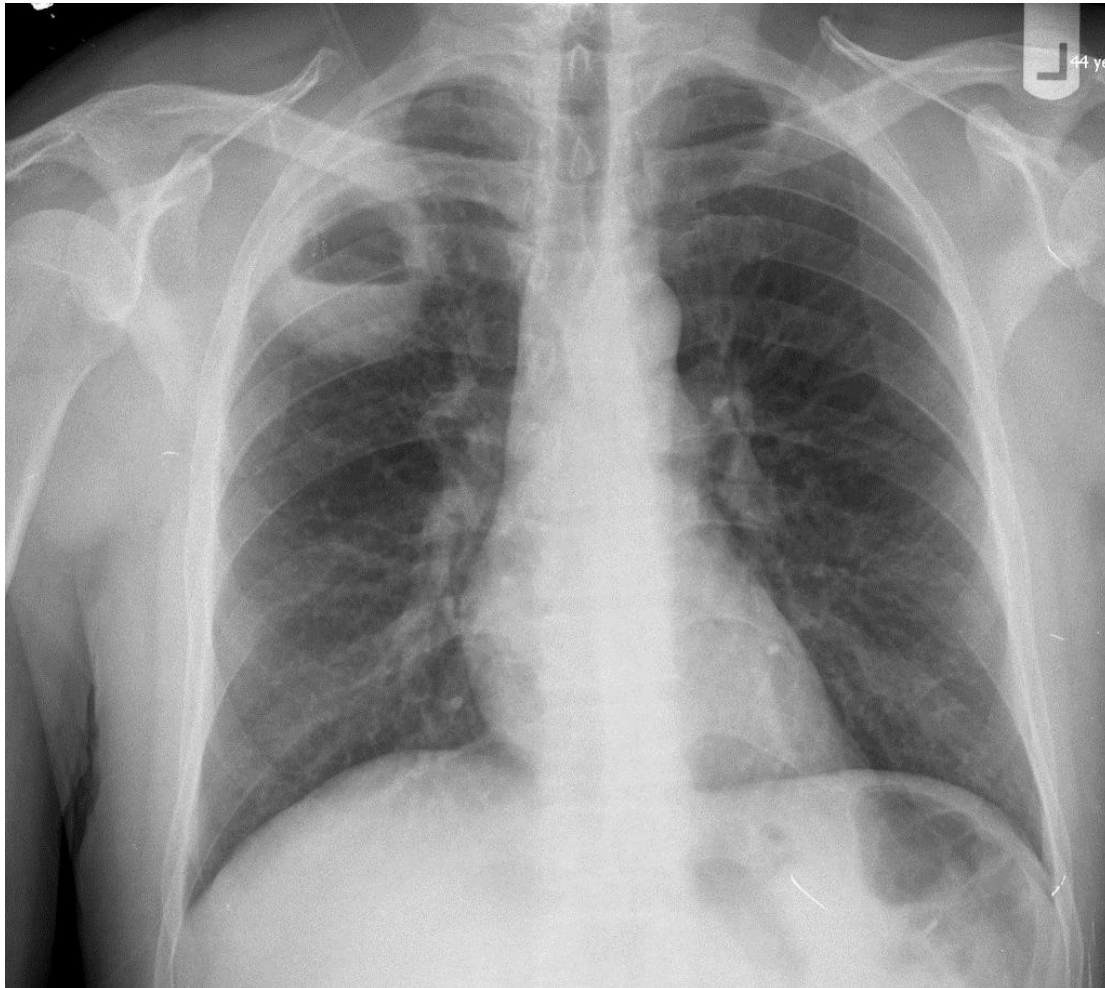
Bronchiectasis

PE

LVF

Coagulopathy

Her chest XRay is shown below



b) List the positive abnormal findings on this CXR

Right upper lobe thick walled cavity

Air fluid level

c) Excluding blood tests, list the 3 most important investigations you will order, give a reason for each (6marks)

CT scan chest – to delineate nature of abscess - ?malignant features/pneumonia/TB

Sputum samples for MCS and TB (culture and ZN stain) – ideally first am sample – to detect mycobacterium

ECG – as a screening test in chest pain – to exclude an immediately treatable STEMI in a patient that cant further quantify his chest pain

d) List your ED management steps for this patient (5 marks)

Isolate, respiratory precautions

Antibiotics – as per eTG patient is high risk due to hazardous etoh,

Ceftriaxone 1g daily

Or Cefotaxime 1g tds plus Metronidazole 500mg tds IV

Or Tazocin 4.5g tds

IV fluids – titrated 500mls stat and reassess clinically e.g for signs of overload and observations after each 500mls.

AWS for alcohol withdrawal – diazepam as per local protocol

Thiamine 300mg IV stat

Q5

You are the morning consultant after a busy nightshift and are about to get handover from the night team. A 54 year old man from interstate has been placed onto CPAP via facemask. He has had some chronic worsening SOB but became acutely more SOB at 4am this morning. He has bilateral swollen legs.

You learn that the patient has become confused, has lashed out and punched the night ED registrar in the face

P120

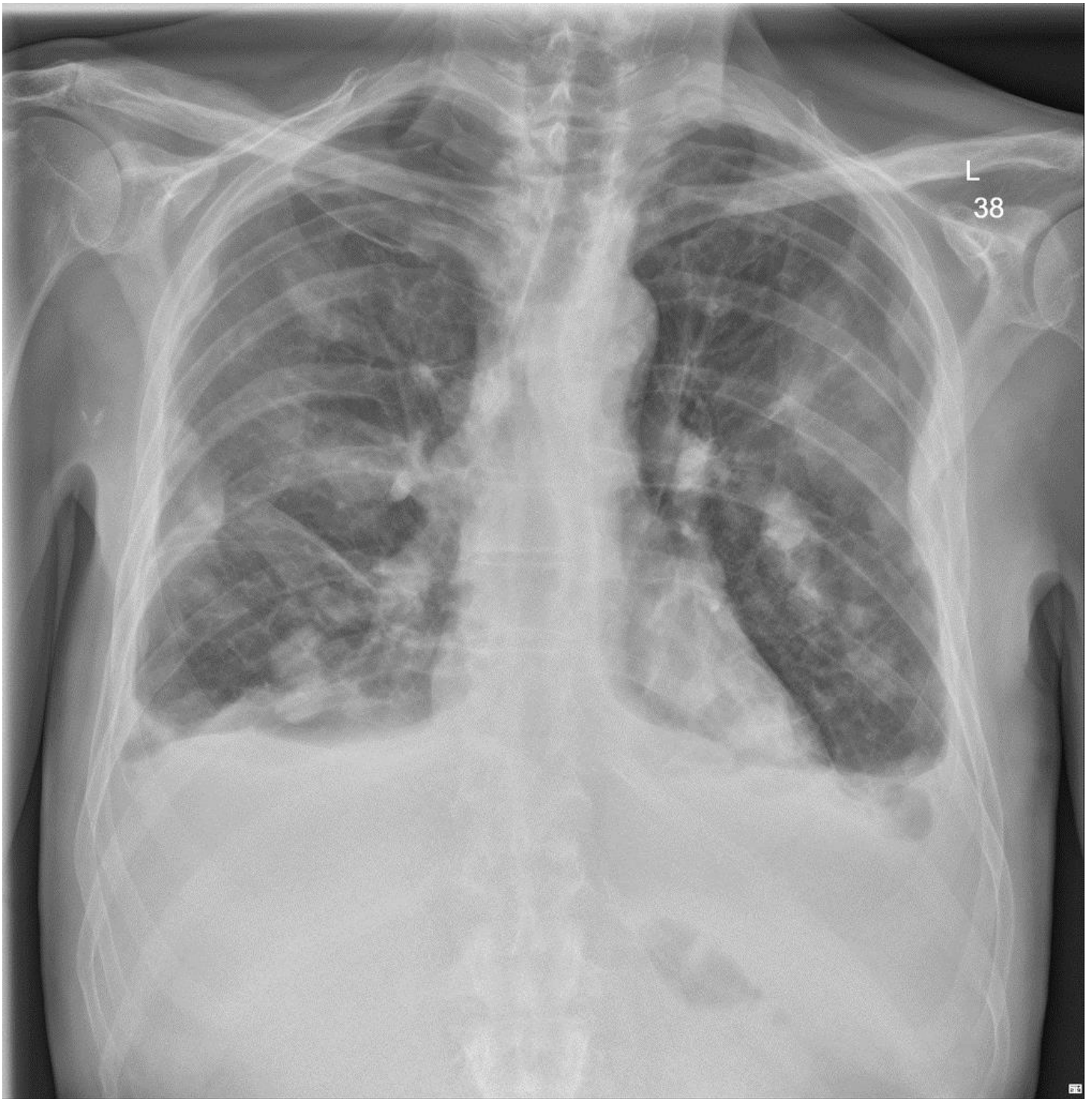
BP 90/50

Sats 89% on 100% FIO2 CPAP

RR 34

Temp 37.9

His CXR is shown below



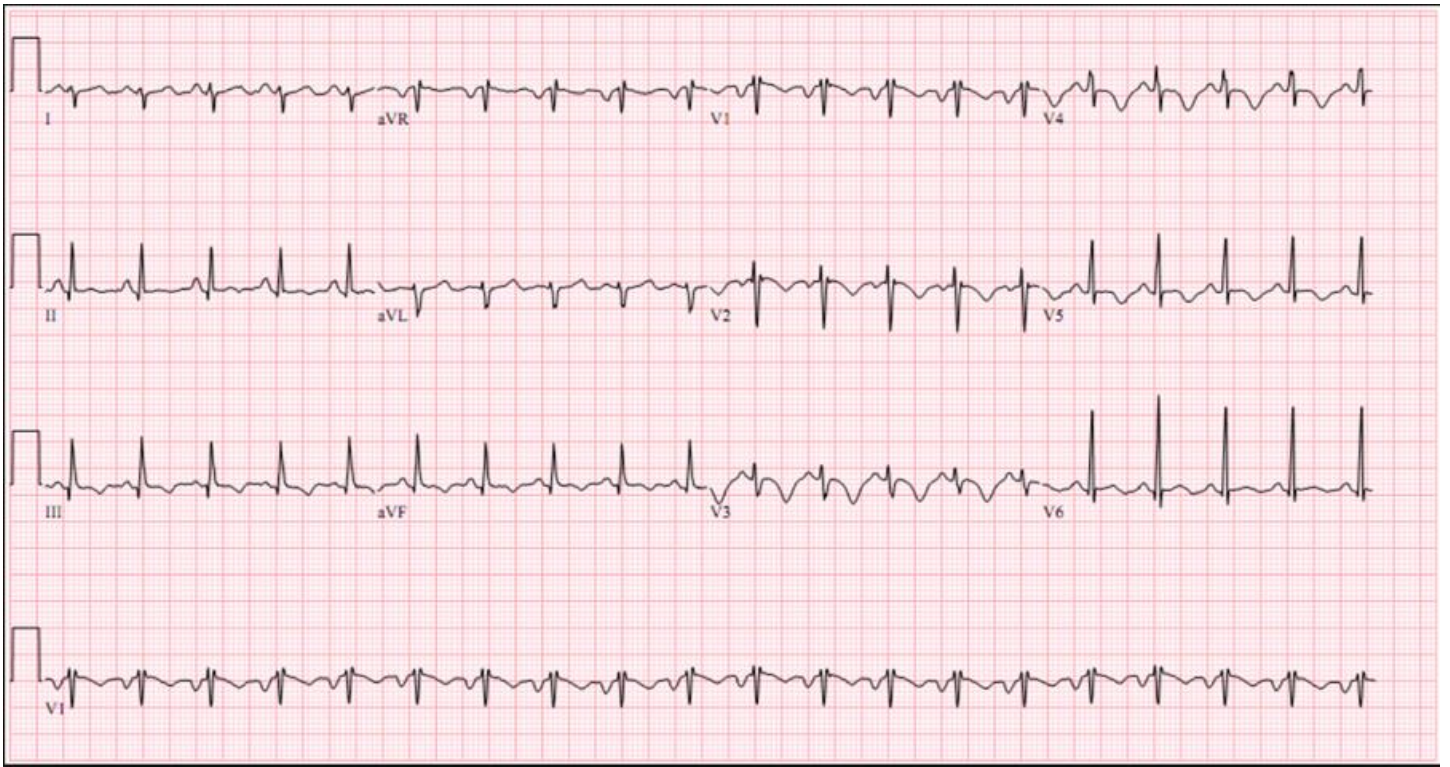
a) List the abnormal findings on this CXR (2 marks)

Multiple discrete well circumscribed lesions – cannon ball metastases
Bilateral pleural effusions

b) What is the most likely **underlying** cause for this? (1 mark)

Secondary Malignancy - renal cell carcinoma commonest
Others include choriocarcinoma, sarcoma, prostate endometrial

His ECG is shown



c) List the abnormal features in this ECG (5 marks)

Sinus Tachcardia 120bpm

S1Q3T3

T inversion V2-5

Right Axis

Long QT

d) What acute diagnosis does this ECG suggest?

Large PE

e) List the steps you will take to deal with the assault on the ED registrar (5 marks)

Ensure that medical needs of registrar dealt with – needs to be triaged and assessed if appears injured

Take the workload of the registrar and ensure his tasks are handed over to other am doctors

Ensure that medical needs of patient are met e.g. detect cause for confusion e.g. hypoxia and address appropriately.

Gather information as to what happened – notes/staff/family and patient

Risk Man

M&M – could this have been prevented

Review policies and procedures

Follow up with registrar – pastoral care

Q6

A 74 year old man with known mild COPD presents with SOB. He was recently admitted to hospital with an exacerbation of COPD. He has been shown to have a left pleural effusion on CXR. He feels “terrible”. The registrar looking after the patient has performed a diagnostic pleural tap. The results are shown below.

P120

BP 100/80

Sats 91% RA

RR 30

Temp 37.9

Pleural Fluid Levels

5 mls cloudy yellow fluid

pH 7.1

WCC 6000/mm (neutrophils 80%)

Protein 32g/L

Albumin 34g/L

LDH 225 IU/L

Glucose 3.0mmol/L

Serum Levels

Protein 46g/L

LDH 260 IU/L (ref range 140-280)

Glucose 5.2mmol/L

Serum Albumin 35g/L

a) Does this represent transudative or exudative effusion, give 3 reasons? (4 marks)

Exudate

Lights Criteria

LDH pleural:serum >0.6

LDH >2/3 upper limit for LDH

Protein pleural:serum >0.5

Protein > 30g/L

b) What is the most likely cause for this result? (1 mark)

Paramneumonic/Emphyema

c) List your immediate actions over the next hour (5 marks)

Oxygen titrated to sats > 95%

Analgesia – titrated opiates (with doses)

Formal surgical chest drain – either under bedside or radiology USS guidance/in collaboration with resp/cardiothoracics

Antibiotics – ideally Tazocin 4.5g as has systemic upset, ADF po when uncomplicated parapneumonic

Involve cardiothoracic surgeons/respiratory as needs admission

+/- CT chest

d) List 5 other causes of a transudate and 5 of an exudate in the table below (10 marks)

TRANSUDATE	EXUDATE

TRANSUDATE	EXUDATE
CCF	PE
Hepatic Failure/Cirrhosis/Ascites	Malignancy
PE (can be either)	Rhematoid/SLE
Nephrotic Syndrome	TB

Iatrogenic eg. CVC	Dressler's
Dialysis	Asbestos
	Pancreatitis
	Booerhaaves
	Meigs

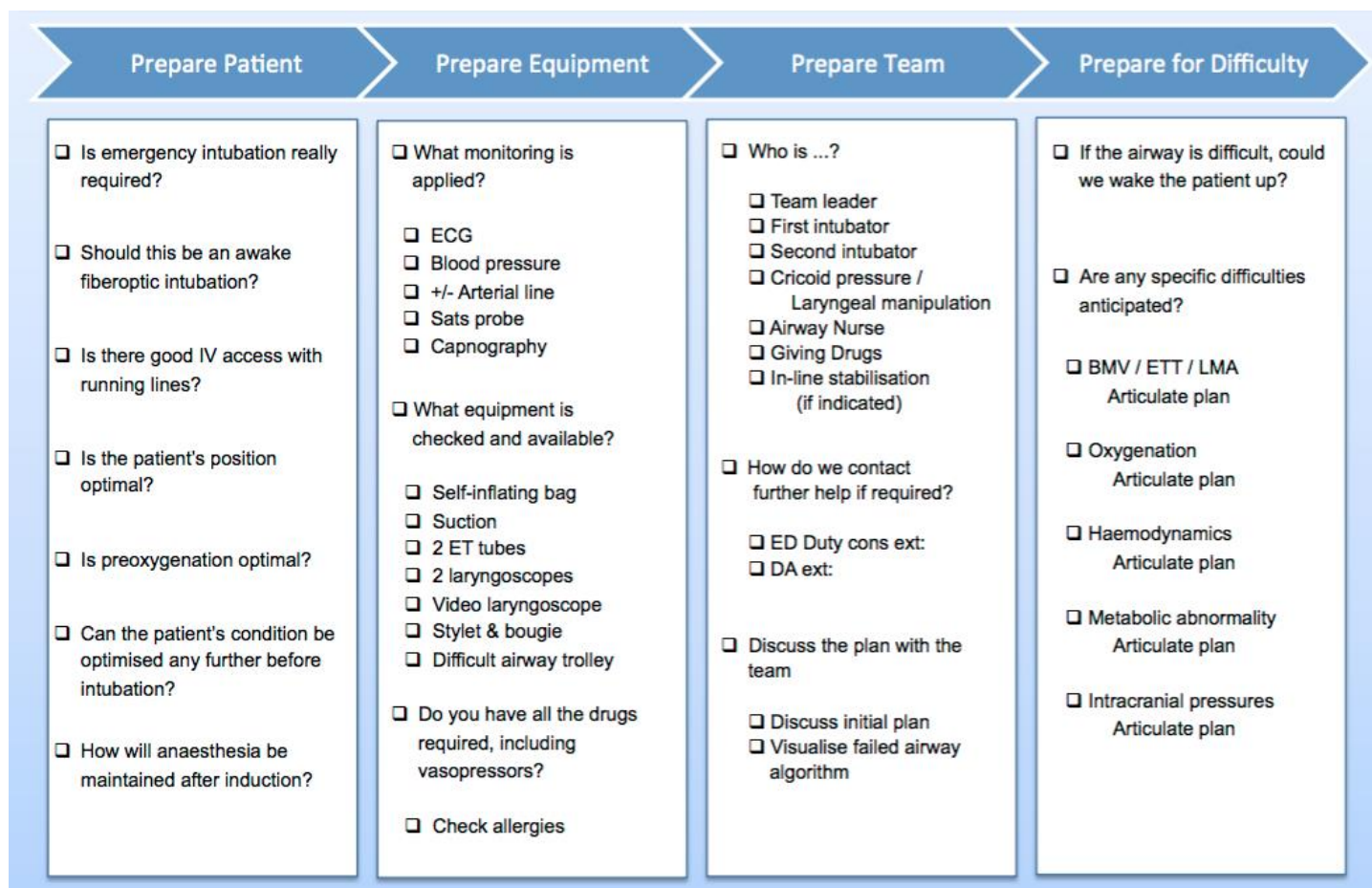
Q7

You are designing an intubation checklist for your department, and are putting together a draft for review by the consultant group.

a) Complete the following template with your proposed checklist items, 7 items per column (28 marks)



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Q8

A 2 year boy presents with stridor. Mum thinks it is croup and has had him in a steamy shower for 30 minutes without effect. He has moderate work of breathing and stridor at rest.

P 140

BP 80/50

Temp 37.6

Sats 98%

RR 40

a) Aside from croup, list the possible causes of stridor in this child (5 marks)

Bacterial tracheitis

Epiglottitis

Retropharyngeal abscess

Laryngeal FB

Angioneurotic oedema

Subglottic haemangioma

Laryngomalacia

b) List the initial crucial medical management steps (2 marks)

Adrenaline nebulisers 5mls 1:1000

Steroid – Dexamethasone 0.15mg/kg single dose, Pred 1mg/kg, Budesonide 2mg inhaled

The child deteriorates despite maximal medical therapy.

c) What are the indications for intubation (4 marks)

Exhaustion/extreme work of breathing
Hypercapnia
Hypoxaemia despite O2 therapy
Decreased LOC, unable to protect airway
Airway obstruction

d) List the essential preparation steps, equipment and drugs that you will require should you need to intubate this child (15 marks)

Get Help from anaesthetics
Position child upright
Nasal Prong O2 for apneic oxygenation post induction 3/L per kilo
NRB mask/ongoing adrenaline neb driven by O2 100%
IV or IO access
Explain to Mum

Miller or Mac Blade Size 2/3 or appropriate VL
ETT 4.0 cuffed (high vol, low pressure cuff) – one size above and below
Suction
NG
LMA/Cric as difficult airway plan
ETCO2
Vent set up

Drugs –
Suxamethonium 1-2mg/kg, Rocuronium 1-1.5mg/kg
Ketamine 2mg/kg or Propofol 1-2mg/kg, Fentanyl 3-5mcg/kg
Ongoing sedative – propofol, M&M infusion, ketamine infusion

Q9

A 52 year old lady is recovering in the resus bay after a closed reduction of an Colle's fracture under Bier's block. She had a fall from 1m earlier in the day, and also has a femoral shaft fracture that will be operated on within 24 hours, but there are currently no available theatre slots. She has a morphine PCA for ongoing analgesia

You have been asked to review her because she has become peripherally and centrally cyanosed. She has sats of 88% on a NRB mask at 15L and feels SOB.

a) List the possible differential diagnoses (5 marks)

Opioid Narcosis - hypercapnia
Hypoventilation and hypoxia – opioids
Fat Embolus
LA toxicity
Methaemoglobinaemia
Occult chest injury from fall

The ICU registrar attends and takes an arterial blood gas

pH 7.46
pCO2 32
pO2 326
HCO3 22

c) What now is the most likely diagnosis? (1 mark)

MethHb

d) What is the most appropriate definitive treatment

Methylene Blue 1-2mg/kg IV