

BOOK 1 - ANSWERS

Question 1 (14 marks)

You are working in a tertiary emergency department and have an ECG transmitted to you by the ambulance service. The patient is a 45 year old male who has had central chest pain for the last 20 minutes. The estimated time of arrival in your ED is 10 minutes.

A 12 LEAD ECG IS SHOWN IN THE PROPS BOOKLET, PAGE XX

- i. Describe and interpret the critical abnormalities on this ECG? (4 marks)

Hyper acute t wave antero-septal (de Winter)

Up sloping ST segment V3-V6

ST elevation I, aVL

ST depression III, aVF

→ *Proximal LAD occlusion*

→ *Treat as STEMI – lysis or urgent PCI*

- ii. What advice would you offer the paramedics who are transferring the patient? (4 marks)

O2 to maintain sats 92-96%

Aspirin 300mg oral

GTN buccal

Fentanyl/morphine if pain still not controlled

Transfer directly to cath lab (if available) full monitoring including defib pads in transit

- iii. The cath lab is unavailable for 2 hours and a decision is made to give a fibrinolytic. List two (2) fibrinolytic agents that could be used and provide a dosing regime for each (4 marks)

Alteplase: more than 65 kg: 15 mg intravenous bolus, followed by 50 mg by intravenous infusion over 30 minutes, then 35 mg over the next 60 minutes.

65 kg or less: 15 mg intravenous bolus, followed by 0.75 mg/kg by intravenous infusion over 30 minutes, then 0.5 mg/kg over the next 60 minutes

OR

Retaplast: 10 units intravenous bolus, repeat once after 30 minutes

OR

Tenectaplast:

less than 60 kg: 30 mg (6000 units) intravenous bolus

60 to 69 kg: 35 mg (7000 units) intravenous bolus

70 to 79 kg: 40 mg (8000 units) intravenous bolus

80 to 89 kg: 45 mg (9000 units) intravenous bolus

90 kg or more: 50 mg (10 000 units) intravenous bolus.

iv. Outline a suitable peri-fibrinolysis anti-coagulant regime (2 marks)

Unfractionated heparin 60 units/kg (up to 4000 units) intravenous loading dose, followed by 12 units/kg/hour (up to 1000 units/hour) by iIV infusion, adjusted according to APTT OR

Enoxaparin

< 75 years: 30mg loading dose then 1mg/kg SCI 12 hly (24 hly if CrCl low)

> 75 years: no loading dose, variable SCI dose/interval depending on CrCl

QUESTION 2 (15 marks)

You have received a prehospital “batcall” about an 86 year-old female nursing home resident with acute respiratory distress who has just had return of spontaneous circulation (ROSC) after arresting in the ambulance en route. She is intubated and has GCS 3.

i. What is the definition of palliative care? (3 marks)

-life limiting illness includes cancer and chronic disease

-focus on quality of life

-treatment that is not aimed at a cure

-prevent and treat suffering

-holistic approach addressing physical, emotional, mental, social and spiritual needs.

ii. Prescribe one appropriate medication regime or management strategy for each symptom in the palliative semiconscious patient: (4 marks)

SYMPTOM	DRUG	DOSE	ROUTE	FREQ
PAIN	Morphine	2.5-5mg	SC	Q4H
	Fentanyl	25mcg	SC	Q4H
	Hydromorphone	0.5-1mg	SC	
AGITATION	Midazolam	2.5mg	SC	Q1H
	Haloperidol	0.5-1mg	SC	Q4H
	Clonazepam	0.2-0.5 mg	SL/SC	Q2H
NAUSEA	Metoclopramide	10mg	SC	Q8H
	Ondansetron	4-8mg	SL/SC	Q8H
	Haloperidol	0.5-1mg	SC	Q4H
SECRETIONS	Hyoscine butylbromide	10-20mg	SC	Q4H
	Hyoscine hydrobromide	0.4mg	SC	Q4H
	Glycopyrrolate	0.1-0.2mg	SC	Q4H
	*Or non-pharmo options			

* Current evidence does not support use of anti-muscarinic agents as not superior to placebo. They may cause adverse effects including delirium and dry mouth. Recommend

non-pharmacological approaches including positioning, and reassurance of family and carers, including staff.

The patient's daughter appears in the ED distressed. She tells you that her mother would never have wanted this. She has an ACD (Advanced Care Directive) stating not for CPR or ventilation or ICU care. She did not want to be transferred to hospital.

iii. What information should be in an ACD? (4 marks)

The patient's preferences in relation to:

- treatment goals: active versus comfort care/palliation
- levels of active treatment : ICU care/CPR/ventilation vs ward based care
- transfer to hospital in the event of deterioration
- place of death (eg home, residential aged care facility, hospital)
- after-death care (eg funeral director, preference for cremation or burial, cultural practices)
- requests for organ, tissue or body donation
- names and contact details of substitute decision-maker(s)
- other issues that are important to the patient (eg religious, care of pet).

After confirming the ACD details and further family discussion, a decision is made to extubate her in ED

iv. What preparation is needed? (4 marks)

-document family discussion and rationale for withdrawing life-saving treatment ie extubation

-explain plan and likely outcome, specifically estimating timing of death, usually hours

-discontinue unnecessary lines and medications. Turn off monitoring

-continue palliative medications charted above

-private room if possible with family present

-involve social worker and chaplain as appropriate

-reduce FiO₂ and PEEP prior to extubation

-wait until paralysis wears off, or reverse with Achase inhibitors eg neostigmine and use nerve stimulator Train Of Four to assess adequacy .

QUESTION 3 (15 marks)

A 42 year old female presents with haemoptysis at 19 weeks gestation. She was diagnosed with a pulmonary embolism 1 week after her 3rd delivery. Thrombophilic screen was subsequently negative and the PE was thought to have been pregnancy provoked. In this pregnancy she has been receiving a thromboprophylaxis dose of clexane daily.

Over the last 7 days she has had rhinorrhoea and sore throat and now has 24 hours of cough with white sputum. Today she has experienced haemoptysis on 3 occasions. No fever recorded during the illness. There are no peripheral signs of DVT. No past history of malignancy. No recent travel or immobilisation. At triage HR 110, BP 100/-, saturations 98% air.

- i. Stratify the patient's risk for pulmonary embolism using a 3 tier model and justify this stratification (4 marks)

High risk (on Wells or gestalt)

(state risk factors, alternate diagnosis or elements of Wells or revised Geneva)

Wells: signs and symptoms of DVT; PE is likely or equally likely; HR > 100; immobilisation for >/- 3 days or surgery last month; Prior PE or DVT; Haemoptysis; malignancy within 6 months or palliative-

Revised Geneva: age > 65; Prior DVT/PE; surgery under GA or LL # past month; active malignancy; unilateral LL pain; haemoptysis; Hr > 75, > 95; pain on limb palpation)

- ii. Outline your approach to d-dimer testing in this patient (3 points)

Correct answer could be Y or N so long as justification is sound

- iii. List 3 causes of a false negative d dimer? (3 points)

(small clot load eg below knee dvt; mature thrombus; defective native fibrinolysis; immediate post injury; M.F; elderly; recent bleeding; cancer; renal insufficiency; presence of anticoagulation; collection errors)
- iv. List 5 ECG findings typically seen in pulmonary embolism (5 marks)
 - *Sinus tachycardia – the most common abnormality; seen in 44% of patients.*
 - *Complete or incomplete RBBB – associated with increased mortality; seen in 18% of patients.*

- Right ventricular strain pattern – T wave inversions in the right precordial leads (V1-4) ± the inferior leads (II, III, aVF). This pattern is seen in up to 34% of patients and is associated with high pulmonary artery pressures.
- Right axis deviation – seen in 16% of patients. Extreme right axis deviation may occur, with axis between zero and -90 degrees, giving the appearance of left axis deviation (“pseudo left axis”).
- Dominant R wave in V1 – a manifestation of acute right ventricular dilatation.
- Right atrial enlargement (P pulmonale) – peaked P wave in lead II > 2.5 mm in height. Seen in 9% of patients.
- ***SI QIII TIII pattern*** – deep S wave in lead I, Q wave in III, inverted T wave in III. This “classic” finding is neither sensitive nor specific for pulmonary embolism; found in only 20% of patients with PE.
- Clockwise rotation – shift of the R/S transition point towards V6 with a persistent S wave in V6 (“pulmonary disease pattern”), implying rotation of the heart due to right ventricular dilatation.
- ***Atrial tachyarrhythmias*** – AF, flutter, atrial tachycardia. Seen in 8% of patients.
- ***Non-specific ST segment and T wave changes***, including ST elevation and depression. Reported in up to 50% of patients with PE.

QUESTION 4 (16 marks)

i. Define “ED overcrowding”

ED overcrowding refers to the situation where ED function is impeded primarily because the number of patients waiting to be seen, undergoing assessment and treatment, or waiting for departure exceeds either the physical bed and/or staffing capacity of the ED.

ii. Regarding the causes of ED overcrowding, for each category list two (2) examples (6 marks)

Category	Examples
Input	
Throughput	
Output	

Input

Presentations with more urgent and complex care needs [20, 29–31, 108]

Increase in presentations by the elderly [20, 31, 114, 115]

High volume of low-acuity presentations [29, 117]

Access to primary care [29, 109, 117]

Limited access to diagnostic services in community [31]

Throughput

ED nursing staff shortages [30, 31]

Presence of junior medical staff in ED [113]

Delays in receiving test results and delayed disposition decisions [20]

Output

Access block [20, 29–31, 110–112]

ICU and cardiac telemetry census [116]

ICU = Intensive Care Unit

<https://doi.org/10.1371/journal.pone.0203316.t005>

iii. Regarding the adverse consequences of ED overcrowding, for each category list two (2) examples (4 marks)

Category	Examples
Patient Effects	
Staff Effects	

Patient Effects

Poor patient outcomes e.g. for patients with chest pain [29, 30, 75, 92, 107]
 Increased mortality [3, 80, 85, 96, 99–101]
 Delayed assessment and care [29, 30, 76–79, 81, 83, 84, 87, 89–91, 93, 94, 98, 103, 104], including surgery [97]
 Increased IPLOS [82, 88, 95, 99, 101]
 Risk of readmission [3, 74]
 Reduced patient satisfaction [102]
 Exposure to error [17, 18]

Staff Effects

Non-adherence to best practice guidelines [18, 75–79, 90, 91, 93, 94, 98, 103, 104]
 Increased staff stress [29]
 Increased violence towards staff [29, 86]

System Effects

Increased IPLOS [82, 88, 95, 99, 101]
 Increased EDLOS [29, 84, 105, 106]

IPLOS = inpatient length of stay EDLOS = emergency department length of stay

<https://doi.org/10.1371/journal.pone.0203316.t004>

- iv. Regarding potential solutions to ED overcrowding, for each category list two (2) examples (6 marks)

Category	Examples
Input	
Throughput	
Output	

Input

GP-led walk-in centres / Co-located GP [32, 33, 64]
 Extended GP opening hours [37, 43, 58, 72]
 Choice of ED [64]
 Social interventions including: education campaigns, financial disincentives, redirection [32]

Throughput

Split ESI 3 on presentation [34]
 Earlier physician assessment [21, 23, 38, 50, 63, 65, 67, 71], including physician-led/supported triage [25, 40, 45, 47, 56, 60]
 Fast-track / flexible care area [42, 55, 56]
 Shorter turnaround-times for laboratory tests [26, 27, 52, 53, 66]
 ED nurse flow coordinator [35, 44, 69]
 Bedside registration [56, 68]
 Nurse initiated protocols [28]
 Earlier inpatient consultation [49]
 Increased ED bed numbers [57, 69]
 Increased ED staff [69]

Output

Active bed management [20, 36, 39, 46]
 Leadership program/Support [39, 61, 67]
 Implementation of nationally mandated, timed patient disposition targets [48, 54, 59, 62, 67, 69]
 ED staff direct admit rights [63, 67]
 Admitting team prioritise ED admissions [67]
 Alternative admission policies [22, 41, 69, 70, 73]
 Increased inpatient beds and staff [69]

GP = general practitioner ESI = Emergency Severity Index

<https://doi.org/10.1371/journal.pone.0203316.t006>

QUESTION 5 (15 marks)

An obese man is brought to your ED following a rollover MVA. His estimated weight is 210kg. He has head and chest injuries.

i. List four ways in which obesity affects assessment and/or management of the airway and breathing during the primary survey (4 marks)

- ↑upper airway soft tissues: difficult intubation and airway maintenance
- ↑Pulmonary artery occlusion pressure: increased by high intra-abdominal and pleural pressures
- ↑Pulmonary artery pressure: mild to moderate elevations may result from OSA alone
- ↓Total lung capacity
- ↓Vital capacity
- ↓Functional residual capacity: atelectasis and reduced oxygen stores increase propensity for desaturation
- ↑Pleural pressure: reflects chest wall compression
- ↓Respiratory system compliance: stiffer respiratory system likely from lung and chest wall contribution
- ↑Airway resistance: risk of asthma and airway closure
- ↓Hypercapnic ventilatory response: contributes to obesity hypoventilation syndrome
- ↑Upper airway resistance: contributes to difficult airway and sleep apnoea

ii. Complete the table identifying two effects of obesity on each component of pharmacokinetics (8 marks)

Component	Effects of obesity
Absorption	
Distribution	

Metabolism	
Elimination	

ABSORPTION

- increased absorption of oral medications (increased gastric emptying)
- difficult IV access in the obese
- decreased SC absorption due to poor subcutaneous blood supply
- IM administration may fail if needles are too short

DISTRIBUTION

- markedly affected by ratio of adipose tissue to lean body mass if lipid soluble
- increased Vd of lipid soluble drugs
-> dose lipid soluble drugs on actual body weight
(remifentanyl is an exception, although lipophilic Vd does not change – use IBW or LBW)
- no change in Vd of H₂O soluble drugs (but blood, ECF, body organ and connective tissue volume are also increased)
-> dose on ideal or lean body weight
- accumulation of lipophilic drugs in fat stores
- may increase dose required to gain effect
- total body water may be increased by resuscitation volume
- C_{max} reduced
- altered protein binding

METABOLISM

- variable effects
- increases in cytochrome P450 2E1 activity and phase II conjugation activity
- more likely to be affected by critical illness with drug interactions
- reduced hepatic blood flow

ELIMINATION

- T_{1/2} increased of lipid soluble drugs due to accumulation
- obese patients with normal renal function have increased GFRs
-> increased clearance of drugs excreted by the kidneys
- co-existing disease will effect this (e.g. nephropathy associated with diabetes and hypertension)
- calculated and measured creatinine clearance correlate poorly in obesity and in critical illness

- iii. Non-invasive BP measurement is difficult in the obese. Provide a detailed description of the recommended BP cuff bladder width, length and position (3 marks)

The most common error in blood pressure measurement is use of inappropriate cuff size. Considerable overestimation can occur if the cuff is too small. The bladder length recommended by the AHA is 80 percent of the patient's arm circumference, and the ideal width is at least 40 percent. Error is minimized when the cuff width is 46 percent of the arm circumference, although for large adult and thigh cuffs this is not practical. In obese patients, longer, wider cuffs are needed to compress the brachial artery adequately. In children, cuff bladder width should be at least 40 percent of the arm circumference halfway between the olecranon and acromion; the cuff should then cover 80 percent or more of the arm circumference.

For correct cuff placement, the midline of the cuff bladder should be positioned over the arterial pulsation in the patient's upper arm following palpation of the brachial artery in the antecubital fossa. There should be a 2– to 3–cm space for the stethoscope between the lower end of the cuff and the antecubital fossa, unless this would require an undersized cuff. In patients with an arm circumference greater than 50 cm, the cuff should be wrapped around the forearm, supported at heart level, and the radial pulse felt at the wrist

Question 6 (14 marks)

An 85 year old woman is brought to your ED by her daughter who visited her mother at home and found her to be confused.

She has early dementia but lives independently. She has mild hypertension and hypercholesterolaemia but is on no regular medication.

In the ED she appears to be confused and disoriented. HR 80 regular. BP 155/85. Afebrile.

- i. To assess this patient's cognition, one could use a *Mini Mental State Examination* or a *Six Item Screener*. Detail the components of one of these cognitive screening tests (4 marks)

MINI MENTAL STATE EXAMINATION (MMSE)

MINI MENTAL STATE EXAM

Please name the:

Year?
Season?
Date?
Day of Week?
Month?

Orientation to time /5

Where are we?

State?
City?
Suburb?
Hospital?
Floor/Ward?

Orientation to place /5

"I am now going to test your memory"
Name 3 objects. Ask them to repeat all 3.
1 Point for each object remembered. Repeat until learnt all 3 so that recall can be tested.

Registration /3
of trials

Serial 7s
"please count backwards from 100 in sevens"
93, 86, 79, 72, 65

alternatively
Spell WORLD backwards
D L R O W
Attention and Calculation /5

"Please repeat the 3 objects I asked you to remember" Recall /3

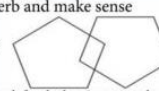
"Please name these objects"
Point to a wristwatch and a pencil Naming /2

"Please repeat the following phrase"
"No ifs, ands or buts" Repetition /1

"Please follow this command"
"Take this paper in your right hand, fold it in half and place it in your lap" Complex command /3

Please read and obey the following command
CLOSE YOUR EYES

"Please write a sentence"
Must have a noun, verb and make sense

"Please copy the following drawing"  1 point each for the last 3 commands /3

TOTAL /30

24-30-normal range
18-23-moderate cognitive impairment
0-17 -marked cognitive impairment

Instructions for the patient: I would like to ask you some questions that ask you to use your memory. I am going to name three objects. Please wait until I say all three words, then repeat them. Remember what they are because I am going to ask you to name them again in a few minutes. Please repeat these words for me: APPLE – TABLE – PENNY. (May repeat names 3 times if necessary, repetition not scored.)

Did the patient correctly repeat all three words? Yes No

1. What year is this? _____ (1)

2. What month is this? _____ (1)

3. What is the day of the week? _____ (1)

What are the three objects I asked you to remember?

4. Apple _____ (1)

5. Table _____ (1)

6. Penny _____ (1)

Total Score: _____ (6)

Fig. 2. Six-item screener. From Callahan CM, Unverzagt FW, Hui SL, et al. Six-item screener to identify cognitive impairment among potential subjects for clinical research. Med Care 2002;40(9):771-81; with permission.

- ii. Define delirium and identify the key characteristics that differentiate delirium from dementia (4 marks)

Delirium is defined as “a transient mental disorder, characterised by impaired cognitive function and reduced ability to focus, sustain or shift attention”. The symptoms include confusion; disorientation; disturbance of the sleep/wake cycle; agitation and aggression or quiet withdrawal or sleepiness; emotional disturbances including seeing, hearing or feeling things that are not there.

Dementia develops over time, with a slow progression of cognitive decline. Delirium occurs abruptly/acutely, and symptoms can fluctuate during the day. The hallmark separating delirium from underlying dementia is inattention.

■ Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV

- A. Disturbance of consciousness (ie, reduced clarity of awareness of the environment) with reduced ability to focus, sustain, or shift attention.
- B. A change in cognition (such as memory deficit, disorientation, language disturbance) or the development of a perceptual disturbance that is not better accounted for by a pre-existing, established, or evolving dementia.
- C. The disturbance develops over a short period of time (usually hours to days) and tends to fluctuate during the course of the day [13].

- iii. During her stay in the ED she becomes increasingly agitated and aggressive towards the nursing staff.

Complete the table detailing one oral and one parenteral medication suitable for use in a behavioural emergency in a delirious elderly patient. Provide an explanatory note identifying cautions, particular indications/contraindications and adverse effects where appropriate (6 marks)

Route	Medication	Initial dose	Explanatory notes
Oral	Risperidone	0.25mg (max 1mg in 24h)	Hypotension, sedation, ataxia, falls. Potential extra-pyr effects so caution in Parkinson's or Dementia with Lewy Bodies (DLB) suggested by parkinsonism, falls, hallucinations...

	Quetiapine	12.5-25mg (max 100mg/24h)	Hypotension, sedation, ataxia. Recommended if Parkinson's/DLB
	Diazepam / Midazolam	2.5-5mg	Only recommended for alcohol/benzo withdrawal. Discouraged as a Tx for agitation. Adverse effects – resp depression, confusion, ataxia, falls
	Olanzapine	2.5mg	Can cause confusion, hypotension, ataxia. Avoid in Parkinsons
	Haloperidol	0.5mg	Hypotension, ataxia, extra-pyr effects
Parenteral	Olanzapine	2.5-5mg IMI	Can cause confusion, hypotension, ataxia. Avoid in PD/DLB
	Haloperidol	0.5mg IMI	Hypotension, ataxia, extra-pyr effects
	Diazepam / Midazolam	1-5 mg IV	Only recommended for alcohol/benzo withdrawal. Discouraged as a Tx for agitation. Adverse effects – resp depression, confusion, ataxia, falls

Could also include droperidol (instead of haloperidol) though with caveats about sedation, extra-pyr effects

QUESTION 7 (16 marks)

You are the senior doctor in charge of a tertiary ED at 3pm when Ambulance Control state that there has been an explosion nearby.

i. What 5 pieces of information are important to obtain from Ambulance Control (5 marks)
(METHANE acronym)

- Confirm that a Major Incident has been declared
- Exact location
- Type of incident
- Hazards
- (Access/egress)
- Number of casualties (total and likely coming to your facility)
- (Emergency services present/required)

ii. List 7 steps that you should perform after receiving this phone call (7 marks)

- Declare a Major Incident as per Major Incident Protocol in your hospital → should cascade to executive/senior management to co-ordinate roles outside ED
- Find/follow major incident role-description cards
- Take role of Medical Co-ordinator or Senior Emergency Physician until/unless another more appropriate person can
- Consider need for decontamination of all patients prior to entering ED
- Close all other entry points to ED except one triage route
- Liaise with senior nursing and senior management to form key roles: triage officer, resuscitation teams, acute patients treating staff, green walking patients treating staff
- Assess current ED staffing and potential staffing (who can be called in)
- Identify areas to see Resus (red), Acute (yellow) and Walking (green) patients.
- Clear the emergency department of as many patients as possible

iii. Patients start arriving rapidly on foot and by ambulance. Using a triage sieve, classify (red, yellow, green) the following patients (4 marks)

- Female 40s, lying on ambulance stretcher, GCS 14, RR 33, BP 105/80, P 110 - Red
- Male 30s, limping up to triage unassisted, GCS 15, RR 26, BP 95/50, P 105 Green
- Female 20s, sitting in a wheelchair, obvious compound tibial fracture, GCS 15, RR 28, P 120 Red
- Male 50s, lying on stretcher, GCS 13, RR 25, BP 105/60, P 110. Yellow

QUESTION 8 (15 marks)

A woman unexpectedly gives birth in your emergency department at 38 weeks gestation. You are tasked with resuscitating the newborn. Immediately after cutting the cord a female infant is placed on the resuscitaire in front of you.

She is floppy with no spontaneous movement and no respiratory effort

She is cyanosed

Heart rate 50 bpm

There is copious meconium stained liquor on the baby

- i. Before addressing the airway, what steps will you undertake? (3 marks)

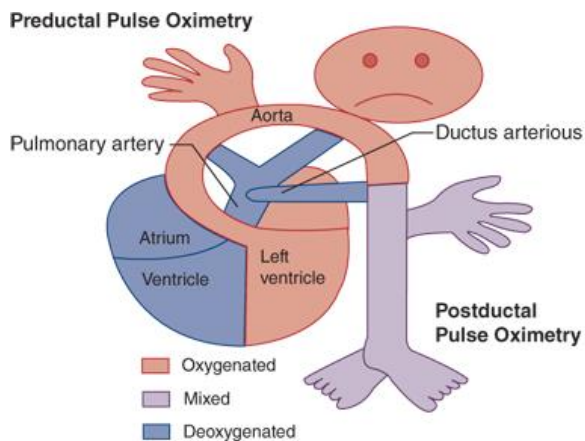
Maintain normal temperature (dry & wrap)

Stimulate

Call for additional help

SpO₂ monitoring

- ii. Explain why oxygen saturations are measured on the right hand (rather than left hand) of a newborn baby (3 marks)



Source: J.E. Tintinalli, J.S. Stapczynski, O.J. Ma, D.M. Yealy, G.D. Meckler, D.M. Cline: Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 8th Edition
 www.accessmedicine.com
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- iii. After ensuring adequate head positioning, airway opening & suctioning of secretions the baby still has inadequate respiratory effort. Outline the

advantages and disadvantages of a T-piece ventilation device compared to a self-inflating bag in neonatal resuscitation (3 marks)

- T-piece system reliably delivers PEEP. Has manometer to measure/display actual PEEP. (self-inflating bag with PEEP valve poor in this regard) Important in recruiting lung volume.
- T-piece systems allow blending of room air & O₂ – generally use FiO₂ 21-30%
- Self-inflating bag will still work if gas supply fails – T-piece will not

iv. List the initial T-piece system settings you would use in this setting (4 marks)

FiO ₂	Start with air – increase > 21% if not reaching target saturations in time
Rate	40-60 breaths/min
PEEP	5-8 cm H ₂ O
Positive Inspiratory Pressure	30 cm H ₂ O (20-12 prem < 32 weeks)

v. Describe how you would identify the umbilical vein (for catheter insertion) in an umbilical cord that has just been cut under the clamp (2 marks)

- Examine the cut end of the cord and identify the two arteries (small, thicker walled and constricted) and the single vein (more gaping and thin walled).
- Grasp the edge of the cord with a suture forceps and use a probe or the fine toothed forceps to tease open the vein. It will usually open up easily.

QUESTION 9 (15 marks)

One of the ED JMOs approaches you for advice about a 45-year-old female who presented with tinnitus and vertigo. You ask if she has any cerebellar signs but the JMO replies 'I forgot to check. What should I look for?'

- i. What are the components of the cerebellar examination? (4 marks)
- *Speech*
 - *Past pointing*
 - *Intention tremor*
 - *Nystagmus*
 - *Dysdiadochokinesis*
 - *Ataxia*
 - *Romberg's negative*
- ii. The patient examines normally except for some decreased hearing in her left ear. What are the 'tuning fork hearing tests' and how do you interpret them? (8 marks)

Name of test	How do you perform it?	How do you interpret it?
Rinne's	Place a (512 Hz) vibrating tuning fork against the patient's mastoid bone on that side and ask the patient to tell you when the sound is no longer heard. Once the patient signals they can't hear it, place the still-vibrating tuning fork 1–2 cm from the auditory canal. Then ask the patient again to indicate when they are no longer able to hear the tuning fork. (NB it's a good idea to then place the fork close to your own ear after the patient indicates that the sound has subsided, to compare to your own	People with normal hearing, and those with sensorineural hearing loss, will hear the tuning fork by air conduction after they can no longer hear it through bone conduction. People with conductive hearing loss will not be able to hear the tuning fork after it is moved from the mastoid to the pinna! That's because their bone conduction is greater than their air conduction. Something is inhibiting the passage of sound waves from the ear canal, through the middle ear apparatus and into the cochlea (i.e., there is a conductive hearing loss)... but the nerves are fine,

	hearing (this will differentiate normal hearing from sensorineural hearing loss)	
Weber's	Place a vibrating tuning fork (256 or 512 Hz) in the middle of the forehead, or on top of the head equi-distant from the patient's ears. Ask the patient in which ear the sound is heard louder.	<ul style="list-style-type: none"> • Normal hearing: sound is heard equally in both sides. • Conductive hearing loss: the defective ear hears the sound better • Sensorineural hearing loss: the normal ear hears the sound better

Your tests confirm that she has sensorineural deafness in the left ear. This patient denies any head injury or other trauma and she is otherwise well.

iii. Please list the atraumatic causes of this presentation (3 marks)

- *Idiopathic- this is the majority of cases*
- *Medications: aspirin, aminoglycosides*
- *Vascular e.g. vasculitis, small vessel disease affecting 8th cranial nerve e.g. in diabetics*
- *Inflammatory eg sarcoidosis*

QUESTION 10 (17 marks)

A 30 year old 90kg lady presents to your emergency department having taken a poly-pharmacy overdose including panadeine forte, carbamazepine and temazepam. You are considering treating her with activated charcoal (AC).

i. List 4 general contraindications for this therapy (4 marks)

- Patient requiring active resuscitation
- OD > 1hr ago (controversial)
- OD of non binding agent – (Metals/Hydrocarbon/Alcohols/Acids/Alkalis)
- Aspiration risk - potential for seizures or decreasing LOC
- Benign agent
- Sub-toxic dose
- Corrosive agent

After a short period, she becomes drowsy, tachycardic (120 bpm) and hypotensive (85/43 mmHg). Further history reveals that she has taken up to 9g of carbamazepine.

ii. List 4 investigations that should be performed in this patient (4 marks)

- ECG
- BSL
- Paracetamol level
- HCG
- Carbamazepine level

iii. List 5 clinical features you would expect from a significant carbamazepine overdose (5 marks)

- CNS - decreased LOC/seizures/ataxia/nystagmus
- CVS - hypotension/tachy-or-brady-arrhythmias, prolonged PR/QRS/QT, pulmonary oedema
- Anti-cholinergic effects - retention/tachycardia/delirium etc

iv. During your management, the patient has a generalized tonic-clonic seizure. List 4 conditions that should be excluded (4 marks)

- Hypoglycaemia
- Hyponatraemia
- Intracranial pathology
- Pregnancy with eclampsia
- Co-ingestant
- Acute withdrawal