GENERAL FELLOWSHIP EXAMINATION

Aug/Oct 2007

This report is prepared to provide candidates, tutors and their Supervisors of training with information about the way in which the Examiners assessed the performance of candidates in the Examination. Answers provided are not model answers but guides to what was expected. Candidates should discuss the report with their tutors so that they may prepare appropriately for the future examinations

The exam included two 2.5 hour written papers comprising of 15 ten-minute short answer questions each. Candidates were required to perform at a satisfactory level in the written before being eligible to sit the oral part of the exam. The oral exam comprised six interactive vivas, ten OSCE stations (with four interactive stations, including two cold cases) and two separate hot cases.

Overall statistics

Table 1-Overall performance

a)	**Total number of candidates presenting for the Examination (b+c+d)**	**61**
b)	Total number of candidates appearing for the written exam	43
c)	Number of candidates carrying the written mark from a previous attempt	14
d)	Number of OTS candidates – eligible to appear for the vivas directly	4
	Breakdown of written exam performance	
e)	Number of candidates scoring > 50%	25
f)	Number of candidates scoring 45-50%	14
g)	**Total number invited to the vivas based on written marks (e+f)**	**39**
h)	**Total number invited to the vivas (c+d+e+f)**	**57**

i)	**Total number approved**	**40**
j)	**Pass rate (**as a percentage of those presenting for the written + eligible from previous exam **– (i/a*100)**	**66%**
k)	**Pass rate** (as a percentage of those presenting to the vivas (**i/h*100**)	**70%**
l)	**Pass rate** amongst those who scored >50% in the written paper (21/25)	**84%**
m)	**Pass rate** amongst those who scored 45-50% in the written paper (4/14)	**29%**

Table 2: Analysis of performance in individual sections

a)	**Pass rate** in the written paper (25/41)	**61%**
b)	**Pass rate** in the OSCE section (54/57)	**95%**
c)	**Pass rate** in the vivas (42/57)	**74%**
d)	**Pass rate** in the clinical section (32/57)	**56%**
	Pass rate in the Hot Case Section (33/57	**58%**
	Pass rate in the Cold Case Section (21/57)	**37%**

Detailed statistics for the written paper

1) Highest aggregate mark in the written paper – 70%
2) In no question was there a 100% pass rate.
3) In 9 of the 30 questions, the pass rate was < 50%.

Detailed statistics for the clinical / oral component

Station	Pass rate	Highest individual mark for the station
OSCES		
Haematology	30%	70%
Equipment	100%	100%
Microbiology/Infectious diseases	94%	100%
Monitoring	60%	100%
Chext Xrays	65%	70%
CT	88%	80%
Communication	68%	79%
Procedure	90%	97%
CROSS TABLE VIVAS		
Viva 1- Neurology	88%	95 %
Viva 2 – Surgical abdomen	63%	100%
Viva 3 – Post thoracotomy bleeding	84%	90%
Viva 4 – Hypercalcaemia	68%	87%
Viva 5- Paediatrics	61%	90%
Viva 6- Hypertensive crisis	60%	95%
CLINICALS		
Hot Case 1	58%	90%
Hot Case 2	63%	90%
Cold Case 1	56%	100%
Cold Case 2	36%	90%

The courts of examiners made the following observations with regards to the performance of the candidates and suggest that candidates appearing for the exams in the future take note of these recommendations.

Written section

The pass rate in the written paper was only 58% as compared to 77% in the Apr 07 exam. Candidates appeared to score well in questions related to data interpretation, but scored poorly on other questions particularly in areas which are currently topical but are not discrete chapters or section in textbooks – for eg genetic susceptibility to disease in critical illness, open and closed ICU, dealing with a high SMR, utility of routine daily chest radiographs, etc. It is recommended that candidates prepare for this exam with a broad approach and use not only just a text book as the source, but review articles, and editorials etc from appropriate journals.

Candidates are reminded that as of 2008, the minimum mark required in the written section to secure an invitation to the oral section is 50%, not 45%. Please also refer to notes in the OSCE section.

Clinical Section

2) The performance in the clinical section continues to raise concerns. The pass rate averages between 50-60% in the hot cases and around 40% in the cold cases. Many candidates had failed to adequately prepare for the clinical examination. Under the pressure of the exam, the deficient clinical skills of poorly prepared candidates' become obvious to the examiners. Candidates should take care to listen to the examiners' instruction and focus their examination, at least initially, towards the questions asked. The best candidates were very specific in what they examined and their discussion presentation revolved around the question asked. Some of the reasons for failure in the clinical included
a) missing clinical signs
b) inability to present in a cogent manner
c) Lack of ability to put the fundamental aspects of the case together
d) Inability to put forward a big picture scenario
e) Many candidates repeated non-essential findings in their discussion, and their examination and presentation were often not targeted to the question.
f) Candidates need to be aware of the dangers of confabulation. Manufacturing signs that do not exist is of significant concern.. Candidates should be aware that there may not be many signs to elicit, particularly in hot cases – in fact, the absence of signs may be the most significant finding.
g) Whilst it is important to start with a general observation of the patient, pumps , etc, candidates often took too long to get to the patient.

Future candidates need to focus on practising their clinical approach until it becomes efficient and effective and their clinical examination technique is so well entrenched that it can survive the stress of the Fellowship exam!

Trainees are reminded that from Apr 2008, the clinical section in the exam carries a higher mark (30%) as compared to 26% at the present time and the threshold mark for a severe fail in the clinical section has increased from 30% to 40%. Besides it relative weight in the examination marking scheme, hot cases are integral to our practice and regular practice (at least practising presentation under exam conditions at least once a week and more frequently as the exam approaches) is recommended. Candidates are also reminded of the need to have completed a supervised assessment on 4 hot cases and have it documented prior to application for each examination.

OSCE section

The pass rate in several OSCE sections continue to raise concerns. Of note are the following sections:

a) Hematology section
b) **Chest X Rays**
c) **Respiratory Monitoring**

d) Communication: All the examiners and the observers were concerned by the quality of performance in this station. A station such as this is core ICU business. A pass rate of 68% was disappointing.

An analysis of the performance in the above stations led to the following conclusions:
-Lack of preparedness for these stations
- Ineffective time management
- Failure to address the question specifically put to them.

Whilst the OSCE will not be a separate section in the examination from 2008, candidates are reminded that from next year, the sections originally examined in the OSCEs will now be assessed in the other parts of the exam such as the written and the vivas and therefore adequate preparation is essential.

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4) Vivas: Viva stations traditionally are high scoring sections. It was disappointing that in 4 of the 6 stations, the pass rate was only around 60%.

Reasons for failure in the vivas include

Knowledge deficit
Failure to recognise clinically significant issues

Trainees are reminded that as of 2008, vivas will consist of 8 stations, not 6, and carry 40% of the mark. The procedure and communication stations normally assessed during the OSCEs will now be examined as part of the vivas. Besides vivas may also incorporate a radiology component.

SHORT ANSWER PAPER

GLOSSARY OF TERMS

Critically evaluate: Evaluate the evidence available to support the hypothesis.

Outline: Provide a summary of the important points.

List: Provide a list.

Compare and contrast: Provide a description of similarities and differences, (eg. Table form).

Management: Generic term that implies overall plan. Where appropriate, may include diagnosis as well as treatment.

1. List key features in pathogenesis, clinical presentation and management of staphylococcal toxic shock syndrome.

Pathogenesis
- Due to toxin (TSST-1, 2 or 3) released by Staph and enteroxin
- TSST acts as a superantigen activating T-cells directly with massive elevation of cytokines
- Classically associated with tampon use but also seen with surgical procedures and wound infection, cellulitis, sinusitis, HIV
- Very similar and cause seen with other bacteria (toxic shock like syndrome) such as Streptococci

Presentation
- Initially myalgia, fever
- Vasodilated shock and multiple organ dysfunction
- Marked erythema with desquamation 7-14 days later
- Edema due to capillary leak syndrome
- Blood cultures usually negative

Management
- Resuscitation and support including adequate fluids, inotropes/organ support…
- Search for source which may be covert – drain abscess……remove tampon
- There may be a role for IVIg to bind toxin
- Antibiotics may not alter course but infection should be treated
- Lincomycin/Clindamycin may have a particular role as it inhibits synthesis of bacterial toxins

Pass rate: 65%

2. What is your diagnostic approach to a 62 year old man in respiratory distress with UNILATERAL wheeze?

Monophonic wheeze suggests large airway – ETT malposition, foreign body, blood, secretions, tumour, compression by lymph nodes, aortic aneurysm

Polyphonic wheeze suggests smaller airway and multiple sites – aspiration, unilateral emphysema, contralateral pneumothorax, asthma in a pneumonectomised lung

Diagnostic approach
1. History of depressed conscious state, trauma, previous lung disease
2. Examination for tracheal position, contralateral signs, position ETT, clubbing, lymphadenopathy elsewhere
   a. Consider complications such as intrinsic PEEP, depressed venous return and hypotension, pneumothorax
3. CXR for ETT position, contralateral disease, foreign body
4. Bronchoscopy for luminal pathology such as blood clot, foreign body, tumour, compression
5. CT chest if necessary

3. A 20 year old female in ICU following a diffuse axonal head injury develops a severe exacerbation of intracranial hypertension on day 3. She is mechanically ventilated, paralysed and sedated. Investigations during a subsequent episode of marked polyuria are summarised below.

Variable			Normal range
pH	7.50		
PaCO$_2$	28	mm Hg	
HCO$_3^-$	21	mmol/L	
Standard base excess	-1.5	mmol/L	
Sodium	147	mmol/L	(135 -145)
Potassium	3.2	mmol/L	(3.2 - 4.5)
Chloride	110	mmol/L	(100 -110)
Urea	3.0	mmol/L	(3.0 - 8.0)
Creatinine	65	mol/L	(50- 100)
Glucose	4.0	mmol/L	(3.0 – 6.0)
Measured plasma osmolality	333	mosmol/kg	
Urine osmolality	410	mmol/L	

1) What is the most likely explanation for the polyuria?
2) Give the reasoning behind your answer.
3) What action needs to be taken concerning the polyuria, and why?
4) Describe the acid-base status
5) What action needs to be taken concerning the ventilation, and why?

Answers:
1. Mannitol therapy
2. There is increased measured plasma osmolality with an elevated osmolar gap. The gap is 44 mosmol/kg, if we use a calculated osmolality of $1.86 \times$ ([Na] + [K]) + [urea] + [glucose]. If we use the simple formula of $2 \times$ [Na] + [urea] + [glucose] for calculated osmolality, the gap is 32 mosmol/kg. (There are also other formulae which are more difficult to remember). In the setting of treatment for an exacerbation of intracranial hypertension, the increased osmolar gap is likely to be due to mannitol administration. The high urinary osmolality rules out diabetes insipidus, and supports the diagnosis of mannitol induced polyuria.
3. Mannitol should be ceased until the measured plasma osmolality is < 320 mosmol/kg. There is no benefit and higher death rates in case controlled studies at higher induced osmolality.
4. Acute (uncompensated) respiratory alkalosis.
5. Minute ventilation should be reduced as soon as possible to return the PaCO$_2$ to 35 – 40 mm Hg. Hypocapnia should be reserved for brief intermittent use to buy time

during critical neurological events (eg pupillary dilation, new lateralising signs). Prolonged hypocapnia reduces cerebral blood flow and oxygenation, and eventually becomes ineffective as CSF pH returns towards normal.

Pass rate: 79%

4. Critically evaluate the clinical value of daily routine chest radiographs in the ICU.

Daily "routine" CXR in (usually) intubated patients: controversial-evidence to support or refute practice, hard to study due to investigator bias, blinding problems and outcome assessment.
Generalisability may be an issue from often single specialty North American or European units to the usual multidisciplinary Australasian ICU. The consensus opinion of the Am. College of radiology is that daily routine CXR are indicated in patients who are mechanically ventilated . The evidence to date does not suggest that daily routine CXRs lead to changes in therapeutic decision making. Data suggest that length of stay and duration of mechanical ventilation are not adversely affected by elimination of daily routine CXR.

Benefits:

a) Confirmation of placement of major lines / tubes / pipes / wires
detects expected/unexpected disease progression/complications requiring treatment
b) Reasonable assessment of hypervolaemia/LVF, new infiltrates accompanying fever, pleural complications, endotracheal tube displacement

Problems:
radiation exposure-staff/patients
potential for line/tube displacement
Cost
False positive/false negative findings

Pass rate: 49%

5. A normotensive 39 year old female presents with severe hypokalaemia (1.1 mmol/L) and a four day history of progressive weakness. For two months she has noticed intermittent diarrhoea. She admits to taking no medication .
After 24 hours of potassium replacement at 20 mmol/hr, her strength has improved, and her blood gas and electrolyte analyses are as follows:

pH	7.45		Normal range
$PaCO_2$	25	mm Hg	
HCO_3^-	17	mmol/L	
Standard base excess	-6.0	mmol/L	

Sodium	144	mmol/L	(135 -145)
Potassium	2.9	mmol/L	(3.2 - 4.5)
Chloride	119	mmol/L	(100 -110)
Urea	3.2	mmol/L	(3.0 - 8.0)
Creatinine	60	mol/L	(50 - 100)
Glucose	11.0	mmol/L	(3.0 – 6.0)
Ca^{2+}	0.9	mmol/L	(1.13 – 1.30)
LDH	806	U/L	(100 - 200)
AST	225	U/L	(10 – 45)
ALT	55	U/L	(5 – 45)
ALP	92	U/L	(30 – 100)
Bilirubin total	<2	mol/L	(<20)
Urinary potassium	15	mmol/L	
24 hr urinary potassium excretion	18	mmol	Minimum daily urine loss 10 – 20 mmol

1. Describe her acid-base status.
2. What is the likely cause of the abnormal enzymes, and how can this be verified?
3. Provide a differential diagnosis for her hypokalaemia. Give your reasoning..

Answers:
1. Compensated respiratory alkalosis, or else a respiratory alkalosis superimposed on a normal anion gap metabolic acidosis.
2. Most likely rhabdomyolysis secondary to severe hypokalaemia. We need to examine muscle compartments, and measure the plasma CK.
3. The mild metabolic acidosis may just be compensatory for her respiratory alkalosis. However, it could be a primary process (with a separate superimposed respiratory alkalosis from anxiety for example) in which case it is more consistent with enteric potassium loss, or else a proximal (Type 2) renal tubular acidosis. However urinary potassium loss of 18 mmol / day is low, and close to the obligatory minimum. Therefore bowel loss is more likely, or else transcellular potassium shifts (periodic paralysis). The persistent hypokalaemia after 24 hours of aggressive replacement makes periodic paralysis unlikely, as is the fact that this is the first episode. Apart from that, the absence of metabolic alkalosis and urinary potassium wasting are against Cushing's and Conn's syndromes as well as diuretic abuse, and the absence of hypertension is also against Cushing's and Conn's syndrome. Therefore on balance and with the history of diarrhoea, bowel loss is the most likely.
    Bowel loss (eg villous adenoma, aperient abuse)
    Diuretic abuse
    Conn's syndrome
    Cushing's syndrome
    Periodic paralysis.

Renal tubular acidosis

6. Outline your management of thoracic epidural analgesia in a 56 year old man who has stable angina on a beta blocker who has been involved in a motor vehicle accident causing a left-sided flail chest. What are the most potential complications?

Important considerations include:
a) Other injuries need to be ruled accounted for that may have implications – spinal injury, intra-abdo injury (though abdo pain from intra-abdo injury not likely to be totally masked by epidural local anaesthetic)
b) Coagulopathy is a contraindication
c) Epidural Local anaesthetic/opiate combination at thoracic level likely to be associated with hypotension/bradycardia needing volume and likely inotropic support –relatively contraindicated in a middle aged male on beta blockers.
Infusion vs bolus vs PCEA
d) Other epidural analgesics – opiate alone eg fentanyl, pethidine or epidural clonidine – doses/frequency

Complications:
a) Hypotension, bradycardia
b) Masking of abdominal / evolving neurological signs
c) Inadequate analgesia due to limited / patchy block
d) Increased pain in unblocked areas – relative phenomenon esp with bony injury eg shoulder.
e) Short duration of blockade – catheters usually removed after 3 days.
f) Epidural haematoma / abscess
g) Epidural drug side effects – pruritus, nausea, respiratory depression
h) Hypotension on mobilisation

7. You are asked to review a 48 year old man with a moderate head injury following a bicycle accident 1 hour ago.
a) What do you understand by the term moderate head injury?
b) List the major determinants of prognosis in moderate traumatic brain injury?
c) What additional factors would warrant admission of these patients to an intensive care or a high dependency unit?

A moderate head injury has a presenting coma score in the range 9 to 12 or 13, and is the best score in the absence of sedation and post non-surgical resuscitation.

Prognostic determinants:
a) Age > 60
b) Pupillary abnormalities

c) Presence of hypotension and hypoxia
d) CT scan abnormalities – intracranial collections, presence of traumatic subarachnoid haemorrhage
e) Co-morbidities

Factors warrant admission in intensive care :
    i) Presence of a skull fracture,
    j) convulsions,
    k) influence of any drug including alcohol, anticoagulation,
    l) presence of other injuries

Pass rate: 28%

8. What are the age related factors which adversely affect outcome in the elderly (> 65 years) critically ill patient?

Multisystem issues;

CVS: High prevalence of cardiac disease, CAD, silent ischemia, less responsive to symathetic stimulation and therefore lesser response to catecholamines, greater diastolic dysfunction and conducting system disease, likelihood of being on cardiac drugs. (3 marks)

RS: Swallow dysfunction- risk of aspiration
  Decreased ventilatory response to hypoxia and hypercapnia
  Decreased chest wall complance, muscle strength and increase in closing volume.

Renal: Decrease in renal function, lower muscle mass so a serum creatinine at the upper end of normal may indicate renal failure

Metabolic: Reduced BMR, risk of overfeeding

CNS: Higher incidence of delirium, age related loss of cerebral volume

Drug dosing: Altered pharmacokinetics, reduced renal and hepatic reserve, need dose adjustment, increased sensitivity to sedation and analgesia

Greater operative morbidity and mortality

Pass rate: 23%

9. A 34 year old woman is transferred to your hospital with a history of a prolonged generalized tonic-clonic convulsion. She is intubated and ventilated. Blood samples have been collected for a full blood count, biochemistry and a coagulation profile. Her initial non contrast CT brain shows bilateral intracerebral hemorrhages. Her arterial blood gases and a haematology report are provided below

Parameter	Patient values	Normal range
FiO$_2$	0.5	
pH	7.15	7.35-7.45
PaCO$_2$	35 mmHg (4.6 kPa)	35-45 mmHg (4.7-6.0 kPa)
PaO$_2$	105 mmHg (14 kPa)	75-98 mmHg (10-13 kPa)
Bicarbonate	10.3 mmol/l	22-26 mmol/l

Parameter	Patient values	Normal range
Hb	78 G/L	(130-150)
WCC	14.5 x 10^6/mm^3	(4.0-11.0)
Platelets	43 x 10^6 /mm^3	(150-300)

Blood picture: Thrombocytopaenia, fragmented cells and reticulocytosis

Coagulation profile: Normal

a) List the abnormalities on the blood gases. Give the most likely cause of each abnormality

Metabolic acidosis: Lactic acidosis induced by status epilepticus

Respiratory acidosis (alternatively inappropriate respiratory compensation) - Central hypoventilation (alternative : inappropriate mechanical ventilation)

Increased A-a gradient : Aspiration pneumonitis (alternative : neurogenic pulmonary oedema)

2) Based on the history, CT scan and the hematology report, provide three possible differential diagnoses and give reasons

TTP
Eclampsia
HUS
Vasculitis
? Meningoencephalitis (lower mark)
There is evidence of MAHA with low platelets.

Pass rate: 63%

10. Outline the circulatory changes that occur immediately after birth.

The transfer from the fetal to the neonatal state is complex. There is a close relationship between the simultaneously occurring cardiovascular and respiratory changes. Closure of umbilical vessels results in an increase in peripheral resistance and blood pressure.

Respiratory centre activation (clamping of umbilical vessels, and cold) results in expansion of previously collapsed lungs. The resultant dramatic decrease in pulmonary vascular resistance increases blood flow through the lungs, and increases return to the left atrium. This, plus the reduced return to the right atrium (clamped umbilical vein) and the increased resistance to left ventricular outflow reverse the pressure gradient across the atria (closing the valve over the foramen ovale. The fall in pulmonary artery pressure (decreased PVR) and the increased aortic pressure results in flow reversal through the ductus arteriosus. Constriction and closure of the ductus arteriosus appears to be initiated by the high arterial oxygen tension which is now in the aortic blood. The neonate is still at risk of reversion to a foetal circulation early after birth, especially in the presence of physiological stresses and congenital abnormalities.

Pass rate: 77%

11. You are asked to put in place initiatives to improve hand washing in your intensive care unit. List what initiatives you would institute.

Hand hygiene considered to be most effective measure to prevent health care related infections. However very poor compliance with hand washing in ICUs

Initiatives:

a) Education
       Lectures to medical and nursing staff
       Recognition that compliance amongst medical staff is worse
       Education of relatives/visitors
       Education needs to be ongoing
b) Signage
       Entrance and exit to unit
       Posters
       Labels on ventilators
       Voice prompts by nurses at bedside
c) Introduce best handwashing products
       New emollient soap
       Alcohol hand rub at each bed
       Non-allergenic handwash liquid
d) Sinks
Automated sinks
Adequate number of sinks in the unit.
e) Audit
       Data collection before and after instituting initiatives:
              Hand washing surveys
              Microbiological surveillance
f) Feedback to staff

12. The figure below illustrates a airway pressure waveform of a single breath during volume controlled ventilation, incorporating an end inspiratory pause and an auto-PEEP manoeuvre.
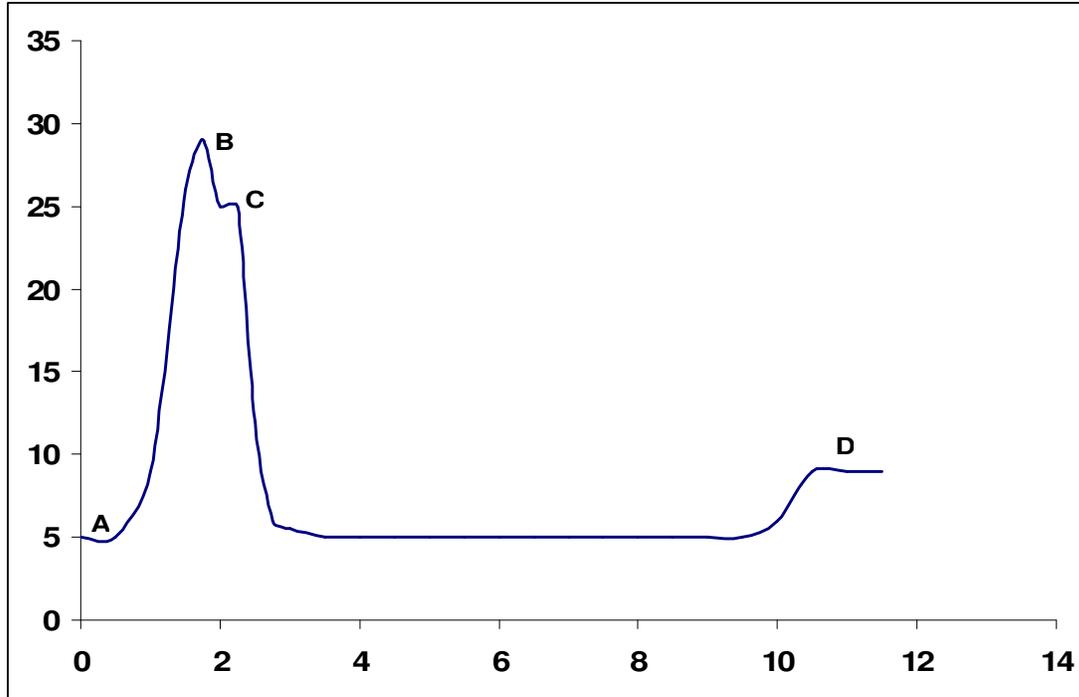
X Axis – Time in seconds
Y axis – Airway pressure in cm water

a) **What do the variables A, B, C & D indicate?**

A- PEEP, B- PIP, C- Plateau pressure, D- Auto PEEP

b) **What will determine the slope of the pressure curve between points A and B?**
Inspiratory flow pattern
Inspiratory flow rate

c) **What are the factors which determine variable B?**

Resistance, compliance, tidal volume, PEEP, insp flow rate and flow pattern

d) **If the delivered tidal volume was 600 ml, what is the calculated static compliance?**
30 ml/cm water   [TV/(Plateau-PEEP)]

e) List 2 adverse consequences of an increase in the value of variable D? .

Decrease in cardiac output, barotrauma

f) List the change(s) you would make to the ventilator settings to treat an increase in the value of variable D.

Increase expiratory time
Decrease I:E ratio, decrease RR, reducing MV

Pass rate: 77%

13. **A 50 year old man presents to hospital with fever and an acute abdomen. He undergoes an emergency laparotomy. The findings at laparotomy include :**
- **a perforated carcinoma in the splenic flexure**
- **generalised faecal soiling of the peritoneum.**

He undergoes a left hemicolectomy with a defunctioinng colostomy. Postoperatively he is transferred to intensive care because of septic shock.

a) What antibiotic regime will you consider and why?

Triple therapy or Timentin or Tazocin – to cover enterococcus, gram negatives and anaerobes. Some may consider adding fluconazole empirically, although this is not common. Vancomycin/gent flagyl if pen allergy

b) Despite a 5 day course of antibiotics, he remains unwell with fever upto 38.5^0C, WCC 16.7 X 10^9/L. He is unable to tolerate oral feeds and is on TPN. List the likely intra-abdominal causes of persistent fever and leukocytosis?

- intra-abd collection / wound infection / abd wall cellulitis/acalculous cholecystitis, pancreatitis, stomal necrosis

c) What investigations will you perform?

- Blood/urine/sputum/wound swab cultures
- CT abdomen
- Consider line change and line tips for c/s
Consider screening for a DVT
-consider a diagnostic relook laparotomy (this will carry a higher mark)

d) Blood cultures grow candida glabrata in one of the 3 bottles. List 4 factors which may have predisposed this patient to develop this infection.

- Malignancy, abdominal soiling, TPN, recent broad spectrum therapy, presence of foreign body -CVL
-

e) What antimicrobial therapy will you commence whilst waiting for sensitivities and why

Voriconazole or amphotericin B, caspofungin. Fluconazole may not cover glabrata.

f) Based on the culture report, list 1 other investigation you will perform the results of which might influence the prognosis and duration of antifungal treatment.

Echocardiography – for vegetation.
ophthalmic examination for retinal absecesses
CT abdominal scan - liver abscess

Pass rate: 80%

14: With respect to continuous renal replacement therapy (CRRT) in the ICU,

   a) **define the terms diffusion and convection and the role they play in solute transport during CRRT**
   b) **define the terms filtration fraction and sieving coefficient and their significance**
.

a) Diffusion: is the movement of solutes from one compartment to another along a concentration gradient. Diffusion is the principal mode of solute clearance during dialysis. Convection is the movement of solute across a semipermeable membrane in conjunction with significant amounts of ultrafiltration of water (solvent drag). Convection is the principal mode of solute clearance during ultrafiltration.

b) Filtration fraction is the fraction of plasma that is removed from blood during hemofiltration. The optimal filtration fraction at a hematocrit of 30% is of the order of 20-25%. A higher filtration fraction can lead to hemoconcentration in the filter increasing the risk of filter clotting. The sieving coefficient is the ratio of the concentration of solutes in the ultrafiltrate to that of plasma. A high sieving coefficient is desirable for middle molecules but undesirable for albumin sized molecules.

Pass rate: 51%

15. Critically evaluate the role of a Clinical Information System (CIS) in intensive care

CIS refers to a computerized system for managing the clinical record often within geographically designated areas within the hospital such as ICU, ED or OR.

Potential benefits of CIS include:

a) Recording of bedside observations – automated, minimal transcription errors
b) Legible record
c) Electronic record of drug prescription
d) Access to additional clinical information at the bedside – pathology, XRays
e) Access to decision support systems – online databases, clinical pathways, algorithms
f) Medicolegal – archiving, good audit trail
g) Ease of collection of data for research.

Limitations of CIS

a) Financial cost
b) Rapidly changing nature of technology
c) Lack of computer literacy amongst clinicians and the need for training prior to commencing work in the ICU
d) No evidence that CIS decreases workloads or save expenditure on salaries
e) Data archiving and storage is a problem.
f) No evidence that implementation of CIS results in improved patient outcomes.
g) Interface with other computer systems
h) Legality of drug prescription
i) Other clinician entry

Pass rate: 42%

16. Outline the important distinguishing clinical features and the site of lesion for the following neurological states (you may tabulate your answer).

        m) Locked in syndrome (de-efferented state)
        n) Persistent vegetative state
        o) Akinetic mutism

Syndrome	Features	Site of lesion
Locked-in syndrome (de-efferented state)	Alert and aware, vertical eye movements present, and able to blink. Quadriplegic, lower cranial nerve palsies, no speech, facial or pharyngeal movements	Bilateral anterior pontine lesion
Persistent vegetative state (PVS) (apallic syndrome, neo-cortical death)	Previously comatose, who now appear to be awake. Spontaneous limb movements, eye movements and yawning seen. However patient inattentive, no speech, no awareness of environment and total inability to respond to commands	Extensive damage to both cerebral hemispheres with relative preservation of the brainstem
Akinetic mutism (coma vigile)	Partially or fully awake patient, immobile and silent	Lesion in bilateral frontal lobes or hydrocephalus or third ventricular masses

17. Outline the advantages and limitations of the A-a gradient and PaO₂/FiO₂ ratio as indices of pulmonary oxygen transfer. (You may tabulate your answer)

	A-a gradient	**PaO2/FiO2 ratio**
Advantages	a) Bedside index, b) easily calculated, c) may allow the distinction between hypoventilation (normal gradient) and V/Q mismatch (raised gradient) as causes of hypoxemia	a) Bedside index b) Easily calculated c) Input variable in lung injury scores
Limitations	FiO2 dependent, Age dependent Varies with lung pathophysiology	a) Cannot distinguish between hypoventilation and V/Q mismatch b) P/F ratio unreliable unless FiO2 > 0.5 or PaO2 < 100 c) Not reliable in COPD because of V/Q mismatch d) Barometric pressure dependent

Pass rate: 16%

18. **This is the haematology report of a 40 year old man who has been ventilated in intensive care 24 hours after a motor vehicle accident. He has suffered head, thoracic, abdominal and orthopaedic injuries.**

Hb	84	g/L	(130-175)*
WCC	8.3	x 10^9/L	(4.0-11.0)
Platelets	240	x 10^9/L	(150-450)
Reticulocytes	220	x 10^9/L	(10-80)*
Neutrophils	5.8	x 10^9/L	(1.8-7.5)
Lymphocytes	1.5	x 10^9/L	(1.5-4.0)
Monocytes	0.4	x 10^9/L	(0.2-0.8)
Eosinophils	0.6	x 10^9/L	(0.0-0.4)
Haematocrit	0.25		(0.4-0.52)*
MCV	88.4	fl	(82-98)
MCH	30.2	pg	(27.0-34.0)
MCHC	341	g/L	(310-360)

a) What is the most likely cause of the abnormalities?

Acute blood loss . Hemolysis is unlikely in this setting.

b) He is due to undergo orthopaedic surgery and a laparotomy on day 2. A coagulation profile performed prior to the procedure reveals the following.

Prothrombin ratio	0.9	INR	(0.8-1.2)
APTT	33	sec	(24-39)
Fibrinogen	6.1	g/L	(1.5-4.0)*

What is the cause of the raised fibrinogen?
Acute phase response

c) On day 10 in intensive care, he develops a new fever, A full blood count and a septic screen are performed. The results of the full blood count are provided below. The septic screen results are awaited.

Hb	76	g/L	(130-175)*
WCC	15.8	x 10^9/L	(4.0-11.0)
Platelets	1211	x 10^9/L	(150-450)
Reticulocytes	220	x 10^9/L	(10-80)*
Neutrophils	10.4	x 10^9/L	(1.8-7.5)
Lymphocytes	2.06	x 10^9/L	(1.5-4.0)
Monocytes	2.54	x 10^9/L	(0.2-0.8)
Eosinophils	0.48	x 10^9/L	(0.0-0.4)
Haematocrit	0.26		(0.4-0.52)*
MCV	92	fl	(82-98)
MCH	29.9	pg	(27.0-34.0)
MCHC	326	g/L	(310-360)

Film review: Moderate anisocytosis. Moderate polychromasia. Moderate number of target cells. Occasional Howell-Jolly bodies. Increased rouleaux formation. Marked thrombocytosis

c). What is the explanation for the blood picture?

Post splenectomy

d)Based on this explanation , what additional therapy will you consider ?
Immunization for HIB. Meningococcus and pneumococcus.
Penicillin or other antibiotic prophylaxis

e) As a consequence of the head injury, he develops a hydrocephalus which requires a ventriculo-peritoneal shunt. He is discharged home 4 weeks later. Six months after discharge, he presents with fever, headache and seizures.

List the 2 most likely differential diagnoses.

  a) Shunt infection / blocked shunt
  b) Meningitis from encapsulated bacteria.
  c) Consideration should be given to other causes such as viral and bacterial meningitis, however they will carry a lesser mark.

Pass rate: 83%

19. Following insertion of a pulmonary artery catheter

  a) **list 3 tests which suggest appropriate Zone 3 positioning**
PAWP < PADP
PAWP alters by < 50% of applied PEEP
PAWP increases by < 50% of changes in alveolar pressure
O2 satn in the wedged position greater than unwedged position
On the CXR, tip of catheter below level of LA.

  b) **list 2 conditions where PAWP will read higher than LVEDP**
  Mitral stenosis
  Atrial myxoma
  Pulm venous obstruction – fibrosis, vasculitis
  MR, non-zone 3 catheter placement , L to R shunt, COPD, IPPV+/-PEEP

  c) **list 3 causes of inaccurate cold thermodilution cardiac output measurements**
  1) catheter malposition,
  2) injection mistakes (volume, injection speed, injectate temperature)
  3) inaccurate thermistor
  4) Tricuspid regurgitation
  5) Intra-cardiac shunts
  6) Wrong computation constant

  d) **Is the pulmonary capillary hydrostatic pressure normally higher or lower than the pulmonary artery wedge pressure ?**

  Higher

Pass rate: 72%

20. Outline the indications, advantages and disadvantages of cerebral perfusion scanning for the certification of brain death.

Indications
1. Any doubt about the primary diagnosis of the cause of coma.
2. Possible drug or metabolic cause of coma.
3. Cranial nerves can not be tested adequately e.g. periorbital oedema, eye injuries, ruptured tympanum
4. Apnoea test can not be performed e.g. cervical cord injury, cardiorespiratory instability.
5. confirmation of brain death in some countries (not ANZ)

Advantages
- Highly specific
- Does not require preconditions as for clinical testing –ie patient can be cold, hypoxic, sedated, undiagnosed, etc
- Can be done at the bedside – if portable gamma camera
- Safe – non-toxic marker (Te99^m HMPAO) can be delivered via peripheral vein
- Quick – answer can be given within 30 minutes
- Provides a hard copy – clear permanent documentation of brain death

Disadvantages
- Requires specialized equipment, marker and staff (nuclear medicine specialist) usually only available in major centres
- Requires patient transport – if no portable camera
- Can show minimal flow (e.g. from meningeal vessels), cannot easily be repeated, and not very soon after first test

Pass rate: 65%

21. **Examine the list of blood or plasma products listed in the table below. Indicate in your answer,**
   a) **whether crossmatch is essential with the use of each of these products**
   b) **one major indication for the use of each of these products.**

	Need for crossmatch	One major indication for use	
Packed red blood cells	Yes	a) Acute blood loss b) Hb < 100 with concomitant IHD, c) severe anaemia, in absence of blood loss (Hb<70	
Platelets	No	Platelets < 20,000 or <50,000 with bleeding, or pending interventional/surgical	

		procedure, bone marrow failure - <10,000 in absence of risk factors, <20,000 in presence of risk factors	
Fresh frozen plasma	No	Warfarin overdose, coagulopathy post transfusion, post bypass bleeding	
Cryo precipitate	No	DIC, coagulopathy post transfusion with low fibrinogen, hereditary hypofibrinogenemia, Hemophilia,Von willebrand's disease	
Prothrombin concentrate	No	Warfarin overdose where FFP may be difficult to administer because of volume considerations	
Granulocyte concentrate	Yes	Neutropenic sepsis	
Intravenous immunoglobulin	No	LGB syndrome, immune thrombocytopenia, vasculitis, myasthenia gravis, ITP	

    c) List one contraindication to the use of

        i)   **Platelet transfusion**
        ii)   **IV immunoglobulin infusion**

i) ITP . immune thrombocytopenia
ii) Hereditary IgA deficiency

    d) Very briefly, outline the role of erythropoietin in the management of anaemia of critical illness?

Anaemia of critical illness is characterised by blunted EPO production and altered iron metabolism. EPO use has been shown to reduce transfusion requirements, but there in no proven benefit in terms of clinical outcome. A potential benefit may exist in patients who are in ICU for > 1 wk, but data are lacking. Potential side effects include red cell aplasia, EPO resistance, thromboembolic complications and hypertension.

22. Your intensive care unit collects APACHE III and mortality data and derives the Standardized Mortality Ratio (SMR) every 3 months as a quality control measure. The SMR for your unit normally ranges between 0.65-0.7. In the latest 3 month figure, the SMR for your unit was noted to be 1.2. Outline, what are the possible reasons for the change in the SMR?

SMR is the ratio of the observed hospital mortality and the actual hospital mortality. A ratio of > 1 implies a mortality higher than expected. Potential explanations:

a) Ensure data entry is correct and accurate and consistent with prior practice (ie comparable)
b) Issues like quantifying GCS accurately will have an impact on APACHE scores and consequently SMR. Quantification of GCS is a major source of inaccuracy. Also source of admission and diagnosis
c) SMR reflects system wide performance rather than ICU performance alone, because based upon hospital mortality, not ICU mortality. Look at pre ICU and post ICU facilities in the hospital

d) SMR affected by case-mix, so changes in case mix may account for increase in SMR and increased other hospital admissions

e) One needs to examine if there has been a deviation from clinical protocols in the ICU
f) Lead time bias (pre ICU care) has been shown to impact on SMR and this neds to be factored into.
g) Are there new inexperienced staff in ICU who might need training?

Pass rate: 60%

23. "The genetic make up of the patient influences severity of sickness and recovery in a variety of disease states" – Outline a few examples in support of this statement in critical illness.

1) Sepsis – It is now believed that genetic predisposition influences the risk of serious infection and outcome from severe injury. These genetic variations are thought to be the result of single nucleotide polymorphisms (SNP). These are thought to influence the severity of injury by controlling the induction of TNF, NF kappa B and toll receptors. Some examples include polymorphisms in TLR 2, 4 and 5 genes, CD14 and mannose binding lectin genes.

2) Acute lung injury The genetic susceptibility to the development of and variable outcomes in acute lung injury/acute respiratory distress syndrome (ALI/ARDS) has become a topic of great interest in the pulmonary and critical care community. Published

studies of variable genetic susceptibility to ALI/ARDS already have identified some important candidate genes and potential gene-environment interactions. Some examples include variant alleles in Mannose binding lectin genes and surfactant protein B gene polumorphism.

3) Head injury – There is now data to suggest that the presence of certain Apo Lipoprotein genes may have an adverse outcome in head injury.

4) Pharmacogenomics: Response to and adverse effects of a drug are thought to have a genetic basis

5) IHD, CVA also have some genetic basis.

Pass rate: 13%

24. **Compare and contrast transthoracic and transoesophageal echocardiography in the evaluation of cardiac disease in the critically ill patient. (You may tabulate your answer)**

	TTE	TOE
Time lag to diagnosis	Instantaneous	A certain degree of delay
Need for sedation	None	May need sedation
Invasive	No	Minimally invasive
Morbidity	None	Minimal
Mortality	None	Minimal
Image quality	Good/excellent in non-vent, reduced in ventilated patients	Excellent in all patients
Infection control		Stricter infectious control procedures
Cost		More expensive probes
Native and prosthetic valve endocarditis		TOE is superior
Aortic dissection		TOE is superior
Aortic trauma		TOE is superior
LA appendage clot		TOE is superior
Pericardial effusion	Good	Good
Localised tamponade (post surgery)	Occasionally useful	Very useful

Pass rate: 60%

25. Tabulate the differences between Acute tubular necrosis and pre-renal failure with respect to the following :

a) **Urea/creatinine ratio**

b) **Urine microscopy**
c) **Urine osmolality**
d) **Urine sodium concentration**

	ATN	Pre-renal	
Urea/plasma creatinine ratio	Normal in ATN	May be greater	
Urine microscopy	Urinalysis in ATN reveals muddy brown granular and epithelial cell casts and free epithelial cells. However, the absence of these urinary findings does not exclude ATN.	Normal or near normal in prerenal disease; hyaline casts may be seen but these are not an abnormal finding.	
Urine sodium concentration	High in ATN (>40 meq/L) due in part to the tubular injury.	Low in prerenal disease (<20 meq/L) in an appropriate attempt to conserve sodium,	
Urine osmolality	Low, because of loss of concentrating ability. Below 450 mosmol/kg in almost all cases and usually being below 350 mosmol/kg	High because of preserved concentrating ability. Osmolality above 500 mosmol/kg is highly suggestive of prerenal disease,	

Pass rate: 97%

26. What do you understand by 'open' and 'closed' Intensive Care Units. Outline the advantages and limitations of each.

 'Closed' ICUs are those managed by dedicated staff intensivists. Potential benefits include:

a) Being physically present allows for early identification and intervention when problems occur in order to help prevent disaster.
b) An intensivist's knowledge of relevant protocols and evidence-based practice will likely benefit patients.
c) Third, intensivists coordinate communication and collaboration with the patient, family members, other ICU clinicians and medical specialists to provide optimum and informed care.
d) Finally, the intensivists in the ICU manager to standardize processes of care, triage patients, effect timely discharges, and evaluate performance.

Published evidence

Intensivists staffing is associated with reduced length of ICU and hospital stay. Daily rounds by an ICU physician were associated with a 3-fold reduction in hospital mortality among abdominal aortic surgery patients, and reduced hospital length of stay and postoperative complications after esophageal resection. In addition, a recent review of ICU team models found that when intensivists actively managed all ICU patients, a further improvement in survival occurred. An estimated 162 000 lives could be saved annually if intensivists staffed all nonrural adult ICUs (data from USA).

However the term closed ICU implies a non collaborative, non inclusive approach, whilst in reality it is a team effort.

Open ICUs

Several specialists involved consult,
Physicians feel less excluded.
No single point of responsibility, patient coordination and communication, responsibility for bed management not clearly spelt out.

Pass rate: 60%

27. With respect to pregnancy,

a) **indicate how the following variables change in the third trimester (either increase or decrease or no change)**

Variable	Direction of change
Systolic blood pressure	Decrease
Diastolic blood pressure	Decrease
Heart rate	Increase
Blood volume	Increase
Haematocrit	Mild decrease
Tidal volume	Increase
pH	No change

PCO2	Decrease
PO2	Increase
Bicarbonate	Decrease

    b) List 4 conditions specific to pregnancy which may result in right or left heart failure or both.

Peripartum cardiomyopathy
Pulmonary thromboembolism
Amniotic fluid embolism
Preclampsia
Tocolytic pulmonary oedema

c) Outline the major differences in approach to cardiopulmonary resuscitation in pregnancy as compared to the non pregnant adult.

1) CPR in left lateral position
2) Consideration of emergency Caesar

Pass rate: 90%

28. With regards to nutrition in the critically ill patient

a) list the methods available to estimate energy expenditure in the critically ill patient

Indirect calorimetry
Fick principle (in patients with a PAFC)
Predictive equations

b) list the metabolic and clinical problems associated with overfeeding

Hepatic steatosis
Hyperglycemia
Hyperlipidemia
Hypercarbia
Hyperosmolarity and hypertonic dehydration (in patients fed excess nitrogen who have impaired urine concentrating ability)
Azotemia (due to excess nitrogen intake)

c) list the clinical and biochemical features of the refeeding syndrome ?

-seen when normal intake is resumed after a period of initial starvation
- Low PO4, Mg and K and thiamine deficiency
- Can presents with weakness, arrythmias and cardio-respiratory failure

29. Compare and contrast albumin and gelatins (Haemaccel and Gelofusin) as volume replacement fluids in the critically ill patient.

	Albumin	**Haemaccel & Gelofusin**
Pharmacology	5% and 20%, naturally occuring	Semisynthetic, Produced from bovine collagen
Shelf life	1 yr shelf life at room temperature	Long shelf lives
Indications for use	Used for treatment of hypovolemia and hypoalbuminemia	Used for hypovolemia
Published data	Proven to be similar to crystalloids in SAFE study	No published data in critical illness, regarded as safe, Haemaccel can't be used with citrated blood
	Tendency for better outcome in sepsis but worse outcome in head injured patients	
Side effects	No risk of anaphylaxis, no effect on clotting	Lower risk of anaphylaxis than haemaccel, no proven effect on clotting other than thro dilution
Complications	Risk of CJ disease	No risk or lesser risk of CJ disease

Pass rate: 58%

30. **a) What is a meta-analysis?**
b) What is the role of meta-analysis in evidence based medicine?
c) What are the features you look for in a meta-analysis to determine if it has been well conducted?

a) A form of systematic review that uses statistical methods to combine the results from different studies
b) roles:
    1. ↑ statistical power by ↑ sample size
    2. Resolve uncertainty when studies disagree
    3. Improve estimates of effect size
    4. Establish questions for future PRCTs
c)
    1. Are the research questions defined clearly?
    2. Are the search strategy and inclusion criteria described?
    3. How did they assess the quality of studies?
    4. Have they plotted the results?
    5. Have they inspected the data for heterogeneity?
    6. How have they calculated a pooled estimate?
    7. Have they looked for publication bias?

Pass rate: 26%

OSCE section

1. Hematology OSCE

Data sets provided for interpretation included
   a) Leukemoid reaction
   b) A raised APTT, INR and low fibrinogen
   c) A macrocytosis with an underlying myelodysplastic syndrome
   d) A raised APTT which corrected with normal plasma

2. Equipment OSCE

The list of equipment included
   a) a transducer with questions relating to phlebostatic axes for hemodynamic and ICP measurements, principles of operation including the electrical circuitry
   b) a flanged tracheostomy set and a Shiley tracheostomy with questions relating to their design features and indications for use.
   c) A rapid infuser set and questions relating to their design features

3. Microbiology OSCE

Data sets provided for interpretation included

   a) a Gram positive bacilli bacteremia with neurological symptoms and signs - Listeriosis
   b) an antibiogram of a multiresistant Gram negative bacillus in a patient on meropenem

4. Monitoring OSCE

 Data sets provided for interpretation included
   a) pulmonary function tests, flow volume loops, and flow time curves in a patient with obstructive lung disease
   b) analysis of venous oxygen saturation data from a patient with septic shock and the samples were drawn from a PAFC, internal jugular and femoral vein cannulae.
   c) Pulse oximetry data in patients with carboxyhemoglobin.

5. Chest X-Rays

The films included
   a) chest trauma,
   b) distally positioned PA catheter with h/o pulmonary hemorrhage
   c) multiple pneumatocoeles in a young patient presenting with fever and sepsis
   d) RUL collapse

6. CT scans

The films included

   a) a brain CT of a patient with head injury post craniotomy and an accompanying four vessel angiogram indicating absence of intracranial blood flow and diagnostic of brain death
   b) a neck CT showing a pharyngeal space infection
   c) an abdominal CT showing a hypodense lesion in the liver, a filling defect in the superior mesenteric vein indicative of a thrombus and an incidental renal cyst
   d) a brain CT with a ring enhancing lesion in the occipital lobe.

7. Communication

The following scenario was given to the candidates.

Mr Horomia, age 76, a bachelor of Maori extraction, was brought by ambulance to the ED today with hypercarbic respiratory failure. He was intubated, and is now sedated and ventilated in your ICU. His problems are:

- Morbid obesity
- Type 2 diabetes mellitus on insulin.
- Advanced diabetic nephropathy, rejected for chronic dialysis.
- Ischaemic cardiomyopathy -LVEF 38%.
- Cor pulmonale - marked RV systolic dysfunction and dilatation, severe TR.
- Anuric renal failure. Plasma creatinine 1360 micromol/L.

His paid carer, (not a relative), tells you that Mr Horomia has been unable to lie flat for months, and sits in a chair all night. Six months ago he ceased all medication, including

insulin, and still smokes cigarettes. He has refused all requests to seek medical attention, stating frequently that he only wants to die at home. The ambulance was called when he was too weak to resist.

His niece Miramia, has now arrived, and wishes to speak to you.

8. **Procedure:** The procedure examined in this station was an intra-aortic balloon pump, focussing on identifying the position, timing, complications, balloon rupture and contra-indications.

Vivas

Viva 1

A 54 year old man was brought into the Accident and Emergency Department after having been found unconscious on the floor of his hostel accommodation. He was lying in vomitus and was noted to be incontinent of urine. His GCS was E2V2M4 at the hostel.

His initial observations were: Temp of 38.2 ℃, PR 96/min, BP 160/90 mm Hg and SaO$_2$ 92% on 6 lpm O$_2$.

The only available history was one of alcohol abuse and epilepsy. He was also known to be a heavy smoker.

1.   **What are your differential diagnoses for his unconsciousness?**

Viva 2

A 69 yr old male is admitted to Emergency Department with 3 day history of central abdominal pain and vomiting. His past surgical history includes a total colectomy four years ago for a perforated sigmoid carcinoma followed by chemotherapy and no evidence of recurrence.

Past medical history: Hypertension, and he has a Body Mass Index (BMI) of 40.

Medications: Perindopril and metoprolol.

Examination: He is confused, has a respiratory rate of 36/min and is receiving 3l O2/min by nasal prongs. His oxygen saturation is 90% and his blood pressure is 90/40 mmHg. He is in atrial fibrillation with a heart rate of 110 BPM.

Take us through your initial priorities for management

Viva 3

A 56 year old gentleman with chronic obstructive pulmonary disease returns to the intensive care unit following a left pneumonectomy for a squamous cell carcinoma. There is no other past medical history.

Examination reveals that he is fully alert, comfortable, with a thoracic epidural catheter in situ, respiratory rate 16 bpm, HR 60 bpm, BP 100/80 mmHg and warm peripheries. Auscultation reveals reduced breath sounds over the left lung field. There is no bubbling and minimal drainage from the left intercostal catheter.

His arterial blood gas on return from theatre reveals:

		Normal Values
FiO_2	0.5	
pH	7.27	7.35-7.45
$Pa\ CO_2$	50 mmHg	25-45mmHg
$Pa\ O_2$	90 mmHg	70-100mmHg
HCO_3^-	22mmol/L	22-26mmol/L
BE	-4.7 mEq/L	-2.0 to 2.0 mEq/L

1. **What explanations would you give for the abnormalities in this arterial blood gas report?**

Viva 4

A 65 year old lady is admitted to your ICU with a 2 week history of weakness, lethargy, confusion, anorexia, vomiting and polyuria

On examination she has a Glasgow coma score of 8 with generally reduced deep tendon reflexes. Pupils are equal and react to light. Her pulse rate is 55 beats/minute and BP 150/80 mm Hg.

What is your initial management of this lady?

Viva 5

As the Intensive Care specialist on call in a regional hospital, you are asked to assist in the management of a 3 week old infant who has presented in extremis to the Emergency Department.
There was a 2 day history of Upper Respiratory Tract Infection (URTI) symptoms, and poor feeding for the last 8 hours.
There were no problems at delivery. There is no family illness other than URTI.

On examination the following vital signs have been recorded:
T 35°C, HR 189, RR 68

Child is pale, cold to touch with a thready pulse. The child is unresponsive to pain. There is no rash.

1.What is your assessment of this child ?

Viva 6

A 38 years old man with recent past history of treated hypertension and depression is transferred to your ICU from operating theatre. He had been undergoing shoulder arthroscopy under general anaesthesia.

His heart rate and blood pressure were stable for the first 45 minutes when he developed a sinus tachycardia (130 bpm) and severe hypertension (265/165 mm Hg). The anaesthetist treated this by increasing depth of anaesthesia, and repeated doses of metoprolol and hydralazine. The problem persisted and an arterial line was inserted. Invasive blood pressure was 305/178 mm Hg. BIS monitoring suggested deep anaesthesia (BIS 25).

Surgery was expedited and he was transferred intubated and sedated to the ICU for ongoing management.

1. **What is your initial management?**

Clinical Section

ICU cases

1) A young man with traumatic head injury – cerebral contusions and traumatic subarachnoid hemorrhage, and persistent fevers,

Discussion – on ICP management, cause of fevers.

2) A young man with traumatic head injury, facial fractures, traumatic mydriasis,

Discussion: on ICP management, interpretation of CT scans, pupillary signs.

3) An 81 yr old lady with acute on chronic failure on peritoneal dialysis with signs of sepsis, abdominal pain and encephalopathy.

Discussion: on sepsis / renal failure and dialysis

4) A 66 year old man with acute pancreatitis and a past history of cardiac transplant.

Discussion: on immunosuppression, ongoing renal dysfunction, sepsis with multi-resistant bugs.

6) 19 yr old man with severe acute respiratory failure following a MVA with long bone fractures. His bedside therapies included IPPV, NO, ECMO.

Discussion: on causes of respiratory failure, management of refractory hypoxemia. *NO and ECMO were considered to be specialized therapies and only were referred to fleetingly in the discussion.*

7) A 59 year old man with infective exacerbation of COPD on adrenaline and an aminophylline infusion.

Discussion: on weaning difficulties, management of bronchospasm, interpretation of flow time curves, blood gases, ECG and critical illness neuropathy

8) A 44 yr old patient admitted with intracranial hemorrhage secondary to an AVM. Currently in ICU, slow wean, and ongoing fevers.

Discussion: on neurological assessment, weaning of sedation, approach to management of temperatures in a neurosurgical patient.

9) 22 yr old male with severe head injury after a fall from a horse. Had bifrontal craniectomies.

Discussion: on ICP management, neurological prognosis.

10) A 63 yr old man with a subdural hemorrhage after a ruptured AVM.
Discussion: on slow neurological recovery, ongoing fevers.

11. 70 year old male with open cholecystectomy 2 weeks prior complicated by acute renal failure, nosocomial pneumonia and failure to wean (because of ischemic heart disease).

Discussion: Candidates asked to examine and determine the cause of failure to wean.

12. 56 year old man with a history of heavy alcohol intake admitted with bilateral leg weakness and community acquired Staph pneumonia. Patient was hypotonic and areflexic with no gag.

Discussion: Candidates asked to determine the cause of his leg weakness and his persistent fever.

13. Male in his 60's with traumatic brain injury who had a craniectomy and ICP monitor in situ and was generally hypertonic and hyperreflexic.

Discussion: Candidates asked to determine his prognosis.

14. 60 year old male admitted with uraemia and sepsis.

Discussion: Candidates asked to examine and determine a plan for his renal replacement therapy.

15. 50 year old female day 10 post-intracranial haemorrhage and EVD insertion.

Discussion: Candidates asked to examine looking for the aetiology of a new onset fever.

Cold cases

There were two cold case stations. The following cases were used.

1. 76 year old man with mitral valve prolapse
2. 42 year old female with cyanotic heart disease (transposition and VSD), tophaceous gout and Marfan's syndrome. *Candidates were told that the examiners recognised that this was a complex case. It was not expected that they should diagnose the specific cardiac lesion* – simply describe the signs (cachexia, central cyanosis, clubbing, tophi and joint abnormalities, pectus carinatum, RV heave, diastolic and systolic bruits.)
3. 70 year old female with mitral and tricuspid regurgitation
4. 70 year old male with mitral regurgitation
5. 73 yr old lady with prosthetic valves
6. 69 yr old lady with mitral stenosis
7. 63 yr old man with polycystic kidney disease with transplant kidney
8. 35 yr old lady with scleroderma, calcinosis, digital ulceration, pulmonary involvement.
9. 36 yr old man with Kartagener's syndrome – situs inversus, bronchiectasis, clubbing. *The focus was on respiratory examination, and that identification of dextrocardia was not essential to pass.*
10. 38 yr old man with chronic liver disease
11. 55 yr old man with aortic regurgitation
12. 69 yr old man with polycystic kidney disease with a peritoneal dialysis catheter.