

REPORT OF THE GENERAL FELLOWSHIP EXAMINATION

July/September 2006

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

Total number presenting for the written paper	33
Number of candidates scoring 50% or > in the written	19
Number of candidates scoring 45-50% in the written	9
Total number of candidates invited to the vivas based on the written mark	28
Number of candidates eligible for the vivas from previous exam + those exempt from written	3
Final number presenting for the vivas	31
Number of candidates approved	21
Pass rate (as a percentage of those presenting for the written + eligible from previous exam – $[21/(33+3)]$)	59%
Pass rate (as a percentage of those presenting to the vivas 21/31)	68%
Pass rate amongst those who scored 45-50% in the written Paper (3/9)	33%

Detailed statistics for the written paper

- 1) Highest aggregate mark in the written paper 62%
- 2) In only 1 out of 30 questions was there a 100% pass rate
- 3) In 11 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		
Chest X Ray	74%	73%
CT	87%	92%
Equipment	32%	68%
Paediatric case history	80%	95%
ID- Case history	88%	80%
Neuro-monitoring	58%	82%
Procedure	88%	90%
Communication	68%	95%
CROSS TABLE VIVAS		
Viva 1- steroids in critical illness	45%	90%
Viva 2 - Lactic acidosis	61%	95%
Viva 3 - Neutropenic sepsis	88%	100%
Viva 4 - NM weakness	71%	90%
Viva 5- Mesenteric ischemia	58%	85%
Viva 6- ARDS ventilation	81%	90%
CLINICALS		
Hot Case 1	54%	93%
Hot Case 2	65%	90%
Cold Case 1	65%	90%
Cold Case 2	51%	83%

WRITTEN 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 an overall plan. Where appropriate, may include diagnosis as well as treatment.

Question 1:

A 60 year old woman has a right hemi-hepatectomy for invasive cholangiocarcinoma. She has been admitted to the Intensive Care Unit for postoperative care.

List the problems she may develop in the first 48 hours.

Key Features

The perioperative complications could be classified into (1) that of any major upper abdominal surgery and (2) specifically that of a hemi-hepatectomy for cholangiocarcinoma; or divided into various systems, i.e.

- | | |
|-------------------------|---|
| (1) Respiratory: | Inadequate or excessive analgesia, pulmonary oedema from fluid overload, R. haemothorax, R. pneumothorax, R diaphragmatic dysfunction, V/Q mismatch from hepatic failure, aspiration and possibly early pulmonary infection or thromboembolism. Very rarely, intraoperative air embolism @ARDS. |
| (2) Cardiovascular: | Hypotension from bleeding, epidural block, perioperative myocardial ischaemia / infarction, Arrhythmias associated with electrolyte abnormalities. |
| (3) GI failure: | Prolonged ileus, pseudo-obstruction, ascites, G I haemorrhage. |
| (4) Renal: | Hepatorenal syndrome, acute tubular necrosis, oliguria. |
| (5) Hepatic: | Cholangitis, hepatic failure, encephalopathy, coagulopathy, |
| (6) CNS: | Encephalopathy. |
| (7) Metabolic: | hyperlactataemia, ↑Na+, ↓K+, hypoglycaemia. |
| (8) Premorbid condition | possible ulcerative colitis/primary sclerosing cholangitis: Therefore, medication issues i.e. steroids, immune state, nutritional status etc. |

Eight candidates (24%) passed this question

Question 2:

Outline the principles of management of a patient with life threatening haemoptysis.

Key Features

IMMEDIATE MEASURES

- a) Protection of airway
- b) ETT & Adequate ventilation, consider double lumen tube if site of bleeding known
- c) Positioning of patient: Trendelenburg position may allow clearance of blood from airway or if the site of bleeding is known, rt or lt lateral position to keep the bleeding lung dependant

SEARCH FOR CAUSES –

Infections, Tumours, Mitral valve disease, Trauma, pulm vasc disorders, vasculitis, bleeding diatheses

INVESTIGATIONS

H/o and Clinical examination – upper and lower respiratory

CXR/CT

Infection

Bleeding and coagulation profiles

Auto-antibody screen

Echo

SPECIFIC TREATMENT

- 1) Volume replacement
- 2) Bronchoscopy - ablation of lesions
- 3) arterial embolisation
- 4) Surgery

Twenty five candidates (75%) passed this question

Question 3:

Compare and contrast the pharmacology of ceftriaxone, gentamicin and meropenem.

Ceftriaxone: vial with yellow water soluble powder for reconstitution; only administered parenterally, 33-66% excreted unchanged in urine, no active metabolites, 85-95% protein bound, elimination half life 6-9 hours (> 36 hours with severely impaired renal function), usual dosage 0.5 to 2g IV 12 or 24 hourly; 3rd generation cephalosporin antibiotic, inhibits cell wall synthesis, covers most gram negative rods (except Pseudomonas), and Gram positive cocci (except Methicillin Resistant, and group D streptococci); adverse reactions uncommon, but include overgrowth of non-susceptible organisms, and occasional haematologic, renal and hepatic adverse effects.

Gentamicin: ampoule with 80 mg/2 mL; only administered parenterally, excreted almost entirely by glomerular filtration, elimination half life 2-3 hours, no active metabolites, usual dosage 1 mg/kg tds or up to 5 mg/kg as daily dose, careful monitoring of blood levels required, especially if renal impairment (trough level not > 2 mcg/mL); aminoglycoside antibiotic, inhibits protein synthesis, covers most gram negative rods (including pseudomonas, but variability from hospital to hospital); serious adverse reactions include oto- and renal toxicity, potentiated by other oto- and nephro-toxins, prolongation of neuromuscular blockade may occur, other reactions uncommon.

Meropenem: vial with water soluble powder for reconstitution; only administered parenterally, 70% excreted unchanged in urine (requiring reduction of dosage if significant renal impairment), plasma binding 2%, elimination half life 1 hour, no active metabolites, usual dosage 500mg to 2g every 8 hours; carbapenem antibiotic, inhibits cell wall synthesis, active against a broad spectrum of aerobic and anaerobic bacteria (including Gram positive cocci and Gram negative rods, but excluding MRSA, Enterococcus faecium, Stenotrophomonas and many Pseudomonas); serious adverse reactions are rare, but include overgrowth of non-susceptible organisms, and occasional haematologic, gastrointestinal and hepatic adverse effects.

Twenty candidates (60%) passed this question

Question 4:

The following arterial blood gas and biochemistry results are from a patient with chronic cardiac and respiratory disease and recent profuse vomiting.

FiO₂	0.4		
pH	7.5		
P_aO₂	58.0	mmHg	
P_aCO₂	47.0	mmHg	
HCO₃⁻	34.8	mmol/L	(22 - 27)
BE	10.2	mmol/L	(-2.0 to +2.0)
Na⁺	137	mmol/L	(135 - 145)
K⁺	2.5	mmol/L	(3.5 - 5.0)
Cl⁻	92	mmol/L	(95 - 105)

- Describe the acid-base and the metabolic disturbance.**
- List the potential causes of these abnormalities in this patient.**
- Outline the management of the metabolic and acid-base disturbance**

The major abnormalities are:

- Metabolic alkalosis with respiratory compensation
- Hypokalemia and hypochloremia
- Normal anion gap
- An increased apparent strong ion difference $[(Na + K) - Cl] = 47$

Possible causes in this patient include

- Diuretic therapy
- Steroid therapy

- c) Vomiting from gastric outlet obstruction
- d) Post hypercapnic alkalosis

Outline the management of the metabolic and acid-base disturbance.

- 1) Normal saline administration
- 2) K supplements
- 3) Acetazolamide

15 candidates (45%) passed this question

Question 5:

Compare and contrast the information generated by and the usefulness of mixed venous oxygen saturation (SvO₂) and central venous oxygen saturation (ScvO₂) monitors.

	SvO ₂	ScvO ₂
Measurement	Pulmonary artery	Superior vena cava
Invasiveness	Invasive	Less invasive than SvO ₂
Physiology	SvO ₂ is > than ScvO ₂ as it contains blood from both SVC and IVC	ScvO ₂ is < SvO ₂ because it contains predominantly SVC blood which is lower than IVC blood saturation
Situations where SCVO ₂ > SvO ₂	a) Anaesthesia – because of increase in CBF & depression of metabolism b) Patients with head injury where cerebral metab is depressed c) Shock: because of diversion of blood from splanchnic circulation, there is increased O ₂ extraction and therefore IVC saturation decreases. *** Both track each other well during shock states	
Other data generated from monitoring devices	Qt, PA pressures, derived indices and body temperature measurements may be obtained	CVP,
Evidence from clinical trials	Study by Gattinoni – only RCT as far as SvO ₂ is concerned showed no benefit from SVO ₂ monitoring	Study by Rivers- early goal directed therapy improved outcome in septic shock
Other data	In general no benefit from PACs.	
Complications:	More risk from PACs	Less invasive and therefore fewer complications.

6 candidates (18%) passed this question

Question 6:

Outline the potential role of interventional radiology in the management of the critically ill patient. Briefly outline the risks involved.

- a) Interventional techniques may be prophylactic (IVC filter to prevent PE) or therapeutic (Eg)
- 1) Coiling of an aneurysm
 - 2) Abscess drainage
 - 3) Embolisation of a bleeding vessel
 - 4) TIPS procedure for portal HT
 - 5) Angioplasty for vasospasm
 - 6) Coronary intervention
- b) May be as effective as surgery, but carry lower morbidity or mortality
Should be considered in ICU patients when the risk of more invasive procedures is greater

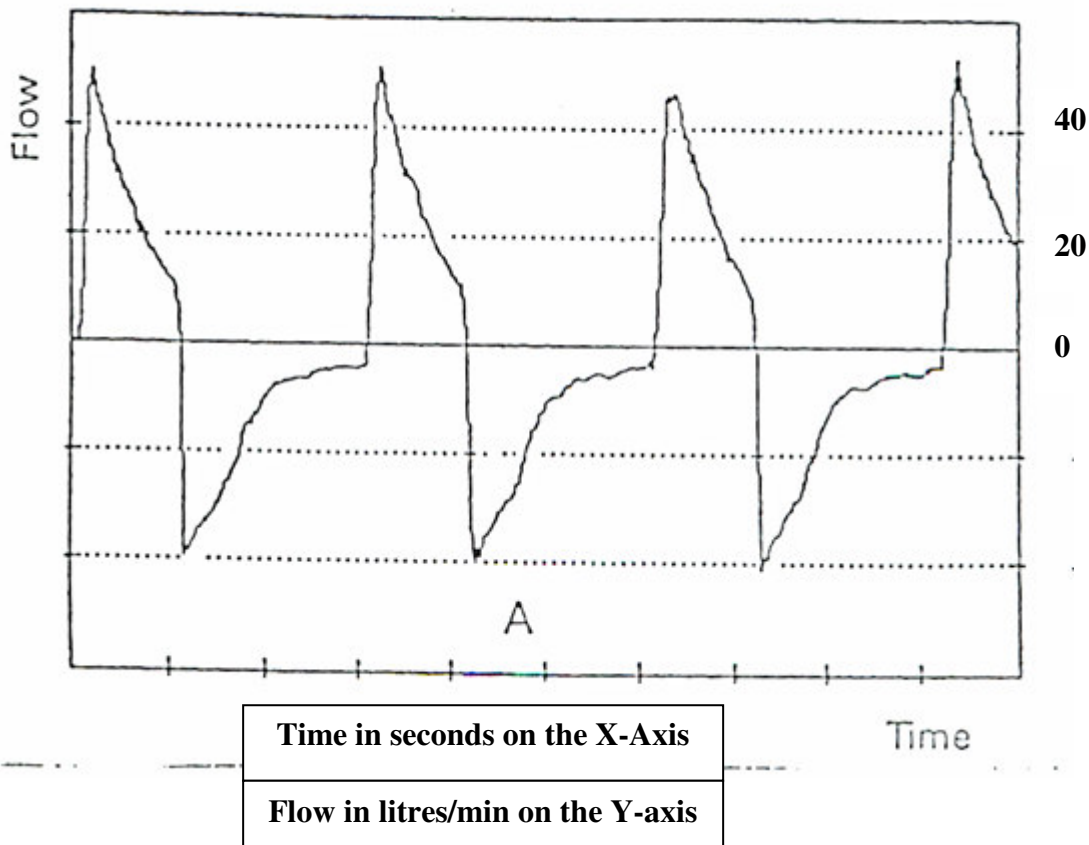
Limitations:

- 1) Need to be performed in a radiology suite with all its limitations
- 2) Might still need surgical back up if there is failure or if there is a complication
- 3) Risk of contrast induced nephrotoxicity
- 4) Complication specific for each interventional procedure

12 candidates (36%) passed this question

Question 7:

Examine this flow time curve generated from a mechanically ventilated patient.



What pathological process is revealed by this flow time trace?

- The trace reveals the commencement of inspiration before expiratory flow returns to zero, thus setting the scene for dynamic hyperinflation/ small airway obstruction. (Importantly, the trace does not reveal Auto-PEEP as that is a pressure measurement performed after an expiratory pause)

b) List 4 other features (both clinical and adjunctive tests) may support the diagnosis of this pathological process?

- a) Clinical: On auscultation, commencement of inspiration before end of expiration
- b) Evidence of obstructive lung disease, the typical scenario in which this happens
- c) Increased Auto PEEP
- d) Increased Plateau pressure
- e) Ventilator settings such as short exp time
- f) $V_{EI} > 20 \text{ ml /Kg}$

c) List 2 therapeutic measures you will undertake on observing this phenomenon.

- a) Bronchodilators
- b) Increase exp time

22 candidates (66%) passed this question

Question 8:

Critically evaluate the interpretation of plasma troponin measurement in critically ill patients.

Key features

- Troponin I, T and C form a 3 unit complex with tropomyosin in cardiac actin filament, CTnI and cTnT used as cardiac specific markers, small amount in cytoplasm but a large actin pool, slowly released, and slowly degraded with small elevation in renal failure
- Greater sensitivity to cardiac damage than CK-MB which can also be found in skeletal muscle (increased in myopathies), gut, uterus, and IgG complexes CK-MB, rises 4-6 h after onset symptoms for myocardial infarction, useful prognostic marker in acute coronary syndromes (higher level = worse prognosis)
- Elevated level also seen with PE, sepsis, myocarditis, pericarditis, cardiac trauma, drug-induced myocardial injury, cardioversion

27 candidates (82%) passed this question

Question 9:

- a) **Define base excess.**
- b) **List 2 conditions in which there is a negative base excess without any changes in the anion gap.**
- c) **List 1 condition in which there is an increase in the anion gap without a negative base excess.**

a) Base excess is defined as the amount of strong acid or base required to titrate pH of an in vitro sample of blood back to 7.40 at 37C at a PCO₂ of 40 mm Hg.

b) Negative base excess without anion gap elevation

- 1) Dilutional acidosis from saline resuscitation
- 2) Renal tubular acidosis
- 3) Ureterosigmoidostomy
- 4) Acetazolamide therapy

c) Lactic acidosis in a patient with pre-existing metabolic alkalosis

13 candidates (39%) passed this question

Question 10:

In the context of a clinical trial, define and explain the significance of the following terms:

- a) **Intention to treat analysis.**
- b) **Randomization.**

ITT is the process by which the patients are analysed in the group to which they are randomised.

There are four major lines of justification for intention-to-treat analysis.

1. Intention-to-treat simplifies the task of dealing with suspicious outcomes, that is, it guards against conscious or unconscious attempts to influence the results of the study by excluding odd outcomes.
2. Intention-to-treat guards against bias introduced when dropping out is related to the outcome.
3. Intention-to-treat preserves the baseline comparability between treatment groups achieved by randomization.
4. Intention-to-treat reflects the way treatments will perform in the population by ignoring adherence when the data are analyzed.

RANDOMISATION is the process of assigning clinical trial participants to treatment groups. Randomisation gives each participant a known (usually equal) chance of being assigned to any of the groups. Successful randomisation requires that group assignment cannot be predicted in advance.

Randomisation aims to obviate the possibility that there is a systematic difference (or bias) between the groups due to factors other than the intervention. Allocation of participants to specific treatment groups in a random fashion ensures that each group is, on average, as alike as possible to the other group(s). The process of randomisation aims to ensure similar levels of all risk factors in each group; not only known, but also unknown, characteristics are rendered comparable, resulting in similar numbers or levels of outcomes in each group, except for either the play of chance or a real effect of the intervention(s). Concealment of randomisation is vital.

10 candidates (30%) passed this question.

Question 11:

A 6 year old girl develops respiratory distress post extubation following a neurosurgical procedure. She does not respond to nebulized adrenaline and intravenous dexamethasone. She deteriorates rapidly and a decision is made to secure her airway. It is difficult to support her breathing with bag-mask ventilation. Laryngoscopy is performed and it is impossible to visualise her vocal cords and blind attempts at intubation are unsuccessful. Outline your approach to this problem.

Suggested answer

- Call for help (Intensive care/Anaesthesia/ENT colleagues)
- Examine reasons for difficult laryngoscopy –
 - a) was she a difficult intubation in the 1st instance
 - b) Poor positioning of head
 - c) Faulty suction, wrong laryngoscope blade
 - d) Use of wrong sized ETT through a swollen cords
- Important to recognise that people die from failed intubation because of failure to oxygenate, not failure to intubate
- Ensure ongoing bag-mask ventilation
- Use of LMA as an airway or as a conduit for fiberoptic intubation.
- If LMA not successful, try reintubation with bougie + laryngeal pressure to improve visualisation -
- If despite all of these, still cannot ventilate, consider cricothyroidotomy / tracheostomy

Additional points that may score marks

- a) Attempt at intubation to be made with gaseous induction, two anaesthetists and full range of difficult intubation options, if it is safe to move to OT, but most PICUs can do this.
- b) Mentioning that cricothyroidotomy is difficult in child
- c) As nature of neurosurgery not known, mention of worsening ICP because of hypercarbia adds to the emergent nature of the situation

21 candidates (64%) passed this question

Question 12:

List the likely causes of sudden respiratory distress in a woman in labour, who has no previous history of cardiac or respiratory disease. List 2 cardinal clinical features for each of these conditions.

- a) Venous thromboembolism with PE: (Signs of DVT, Rt. Heart failure, ECG, CTPA)
- b) Amniotic fluid embolus: Hemodynamic collapse with seizures, DIC
- c) Pulm oedema secondary to pre-eclampsia: HT, proteinuria
- d) Tocolytic pulmonary oedema: Tocolytic administration, rapid improvement
- e) Aspiration pneumonitis – classic features
- f) Peripartum cardiomyopathy: cardiomegaly, S3
- g) Air embolism: Hypotension, cardiac mill wheel murmur
- h) Pneumomediastinum: occurs during delivery
- i) Other causes as in the non-pregnant patient

15 candidates (45%) passed this question

Question 13:

Outline the pathophysiology and clinical features of a smoke inhalation injury in a patient with major burns.

Key Features

- a) CO/CN toxicity – Lactic acidosis, high SvO₂, mental confusion, hypotension
- b) Upper airway obstruction from airway oedema – soot in the pharynx, singed hair, stridor, hoarseness, oropharyngeal erythema, oedema and blistering
- c) Chemical burns to the lungs which result in mucosal damage, bronchitis, mucous plugging and pulmonary oedema – Bronchospasm, bronchorrhoea, raised a-a gradient

20 candidates (61%) passed this question

Question 14:

Compare and contrast the clinical features and management of a patient following beta blocker overdose with those of a patient following calcium-channel blocker overdose.

	Beta-blockers	Ca channel blockers
General	Clinical features depend on type of drug and amount ingested. Most symptoms within 4 hrs of ingestion	Varying CVS effects
CVS	Hypotension, bradycardia, AV block,	Hypotension, bradycardia

Q waves in leads II, III and aVF - indicative of old inferior myocardial infarction.
 >2mm ST segment elevation in leads V2 and V3 . There is also ST elevation leads V4 & V5.
 This is STEMI (ST elevated myocardial infarction) in a man with ECG evidence of previous myocardial infarction.

Management issues

1) This man should already have had aspirin, GTN, oxygen and morphine –this needs to be checked with the referring doctor.

2) Since he is <12 hrs from presentation and is in a remote hospital, then interhospital transfer to receive Percutaneous Coronary Intervention (PCI) should be considered, but would be impossible within the required 90 minutes from symptom onset. Therefore he needs urgent thrombolysis.

3) Can the hospital administer thrombolysis? What have they got, do they know how to administer it. Do they recognise the urgency of administration?

4) After administration he will need anti-thrombotic treatment (heparin infusion) and needs urgent transfer to a centre able to perform PCI and/or surgery (particularly if he has evidence of cardiac failure). How he will be transferred and who will escort him must be considered. The receiving cardiologists need to be informed

19 candidates (58%) passed this section

Question 16:

Outline the methods available to estimate fluid balance in the critically ill patient and briefly discuss their advantages and limitations. (You may tabulate your answer)

Method	Advantages	Limitations
Clinical – oedema, JVP, skin turgor, hydration of tongue	Simple, easily done by the bedside, not time consuming	Lack specificity
Intake–output chart	Simple method, reasonably accurate in most patients	Labour intensive, Insensible water losses not factored in, Losses through leaks in bed, drain disconnections and in the case of burns patients, severe evaporative water losses not taken into account
Body-weight	May be useful in uncomplicated critically ill patients	Not routinely used in all ICUs, time consuming, labour intensive, difficult in the ventilated patient, (zeroing has to be done properly with sheets and pillows), addition of

		moisture from perspiration and spills can change baseline weight Correlation with I-O charts not high.
CVP and PCWP	Used to predict intravascular status	Significant limitations
EVLW	Shown to be of value in a trial comparing it with PAC	Invasive technique
Research methods include Bioelectrical impedance, determination of total body water and plasma volume using radionuclide techniques		Research tools, do not lend themselves to serial measurements

18 candidates (54%) passed this question

Question 17:

A nine year old boy developed severe bronchospasm with hypotension and a rash 30 minutes following induction of anaesthesia with Propofol, Cisatracurium and Fentanyl for facial reconstructive surgery. There was no known history of allergy, and prior anaesthetic procedures have been uneventful. The anaesthetist calls for help. Outline the advice you would give and your subsequent management of this patient.

Suggested answer

History suggestive of anaphylaxis, although diagnosis not certain. Other differentials for bronchospasm such as asthma / foreign body may be considered, however will not cause rash and hypotension. The focus should be on anaphylaxis.

- Immediate management;
- a) Given that it is 30 min after relaxant, the patient should be intubated. Maintain endotracheal intubation
- b) 100% Oxygen
- c) IV adrenaline: bolus and an infusion may be required. Mention of adrenaline is vital.
- d) Stop all current anaesthetic agents. Maintain with volatile agents (eg. sevoflurane) as they have bronchodilator properties. Do not attempt to extubate until bronchospasm is under control.
- e) Treat hypotension with fluids, colloids preferable although no hard data against crystalloids
- f) If colloids, use albumin rather than synthetic ones to minimize further risk
- g) cease/abandon surgical procedure as soon as practicable' -
- h) Arrange transfer to ICU
- i) Bronchodilators
- j) Steroids

- k) Anti-histamines
- l) Extubation after resolution of signs of anaphylaxis

Once clinically safe, proceed to establish diagnosis

- a) other clinical features – angio oedema
- b) detailed drug history - ? egg allergy
- c) mast cell tryptase
- d) Consultation with allergy specialist before next procedure

26 candidates (79%) passed this question

Question 18:

A 63 year old male smoker undergoes routine coronary artery bypass surgery. He remains ventilated on 10 cmH₂O PEEP and FiO₂ 60% the following morning with a PaO₂ of 63 mmHg. Outline your diagnostic and therapeutic approach.

3 - 4 key features

- Hypoxaemia post-cardiac surgery is common, most commonly due to basal atelectasis, but need to consider other possibilities such as pneumothorax, haemothorax, acute lung injury, airflow obstruction, pneumonia. Intra-cardiac shunt and PE unlikely unless specific history.
- Diagnosis by history (?smoker, chronic lung disease), examination (asymmetry of movement, air entry), search for posterior basal bronchial breath sounds (common) and chest radiograph (basal atelectasis may not be obvious on CXR – but can be on clinical exam), CT scan shows much more atelectasis but rarely justified
- Drain pneumothorax/haemothorax, bronchodilators for airflow obstruction, may need antibiotics for infection, consider ‘marginal’ extubation – often well tolerated in CABG patients but this patient probably too hypoxaemic. Basal atelectasis need time and try recruitment with specific manoeuvres and or higher level PEEP if tolerated (likely to depress BP so need careful supervision)

16 candidates (48%) passed this question

Question 19:

Outline the strengths and weaknesses surrounding the Surviving Sepsis Campaign Guidelines of 2003 (which have been endorsed by the various National Societies of Critical Care Medicine).

Strengths include

- 1) A major document summarizing a large body of evidence towards the management of a common clinical problem akin to the BTF guidelines for neurotrauma

- 2) Also provided access to a major literature review on the subject

Criticisms include

- a) Strength of evidence: More than 50% of recommendations are Level E (case reports, expert opinions, non-randomised historical controls)
- b) Only 5 had a Level A recommendation (based on RCTs – which included avoiding supranormal DO₂, avoiding high dose steroids etc)
- c) Extrapolation of evidence from non-septic studies
- d) Significant omissions : - Eg SDD
- e) Perception that the sepsis bundles suggested by the campaign may be an over interpretation
- f) That there was industry sponsorship in the development of this process

7 candidates (21%) passed this question

Question 20:

Critically evaluate the role of therapeutic hypothermia in the critically ill patient.

Proven role:

- 1) cardiac arrest – out of hospital VF arrest improved neurological outcome and survival 32-34C
- 2) Control of intracranial hypertension – Improves ICP, but no reduction in mortality

Areas under investigation

- 1) Stroke patients
- 2) Perinatal asphyxia

Practical issues:

- a) difficulty in achieving hypothermia rapidly
- b) shivering and the need for relaxants which can delay neurological assessment
- c) Not proven for non-vf arrests
- d) Not proven for in-hospital arrests
- e) Hypothermia can cause diuresis with attendant electrolyte disorders
- f) Risk of arrhythmias
- g) Risk of infection

19 candidates (58%) passed this question

Question 21:

Outline the causes, consequences and the management of abdominal compartment syndrome.

Causes:

Abdominal trauma
 Massive retroperitoneal hematomas
 Major burns following fluid resuscitation
 Massive intra-abdominal hemorrhage

Major Consequences:

- a) Decrease in Qt because of a decrease in venous return
- b) Decreased renal perfusion
- c) Impaired thoracic compliance
- d) Bowel ischemia

Management

- a) Monitoring intra-abdominal pressure
- b) Abdominal decompression
- c) Adequate decompression of GI tract
- d) Avoiding excess fluid resuscitation

All 33 candidates passed this question

Question 22:

Define the term “Transfusion Associated Lung Injury (TRALI)”. Briefly outline its pathophysiology and clinical features.

TRALI is defined as:

- a) occurrence of acute respiratory distress during or within 6 hrs of transfusion
- b) presence of arterial desaturation on a pulse oximeter
- c) absence of other causes of acute lung injury

The clinical features include: dyspnoea, fever, hypotension or hypertension, and documented hypoxemia

The pathophysiology of TRALI is due to the presence of leukoagglutinins in the donor plasma, which promotes neutrophil aggregation and sequestration in the pulmonary vasculature. It is now recognized that there is a broader spectrum of TRALI than purely leukoagglutinin mediated.

21 candidates (64%) passed this question.

Question 23:

A previously fit 36-year-old patient has been admitted to your Intensive Care Unit with an isolated severe head injury. 18 hrs after admission he develops polyuria. Outline the way in which you would evaluate this polyuria.

The causes of polyuria in this patient include

- a) Diabetes insipidus

- b) Mannitol or other diuretics
- c) Use of hypertonic saline
- d) Cerebral salt wasting syndrome
- e) Effects of ingested alcohol prior to the trauma

Evaluation and treatment

- a) DI : Serum and urine osmolality and Na measurements,
- b) If mannitol: check serum osmolar gap, and ensure it is < 320 mOsm/kg to prevent renal toxicity
- c) Hypertonic saline: Large urine outputs are a feature of hypertonic saline therapy and this can be confirmed by high serum and high urine Na.
- d) CSW: Low intravasc volume, low serum Na, high urine Na.
- e) Residual alcohol: based on index of suspicion, check serum osmolar gap and ethanol levels.

21 candidates (64%) passed this question.

Question 24:

Define cerebral perfusion pressure (CPP). List the advantages and limitations of using CPP as a therapeutic target in the management of traumatic brain injury

Definition : $CPP = MAP - ICP$

Advantages: Easily monitored

- Can be monitored continuously

- Nursing staff familiar

- BTF guidelines endorse use of CPP at 60

Limitations: Used as a surrogate for CBF

- CVR is variable and therefore changes in CBF not detected by CPP

- Does not allow for differential autoregulation in the normal and injured brain.

- Therapy to maintain CPP can result in lung injury

- No Class I data to support use

- Poor correlation between CPP and indices of brain oxygenation

24 candidates (73%) passed this question

Question 25:

List 5 major causes and 3 important clinical manifestations of hypocalcaemia in the critically ill patient.

Aetiology

- Calcium chelation (eg. alkalosis, citrate toxicity, tumour lysis, rhabdomyolysis)

- Drug induced (eg. phenytoin, diphosphonates)

- Hypoparathyroidism (eg. hypo and hypermagnesemia, sepsis, surgical removal)

- Hypovitaminosis D (eg. inadequate intake, malabsorption, liver disease)

- Reduced bone turnover (eg. osteoporosis, elderly, cachexia)

Clinical manifestations

Central nervous system (eg. circumoral and peripheral paraesthesia, muscle cramps, tetany, seizures, psychosis)

Cardiovascular (eg. arrhythmias, hypotension, inotrope unresponsiveness, prolonged QT intervals)

Respiratory (eg. apnoea, laryngospasm, bronchospasm)

28 candidates (85%) passed this question

Question 26:

You are asked to admit a 76-year-old man with a past history of ischaemic heart disease and paroxysmal atrial fibrillation who has just been intubated in Accident and Emergency after collapsing from a brain stem stroke (diagnosed clinically). He had a Glasgow Coma Score of 6 before being intubated. Outline your management strategy for him for the first 24 hours.

Key Features

Obvious attention to ABC.

- a) Urgency is required for the best results here.
- b) Investigation: CTA scan of brainstem to exclude a bleed (Although not the best investigation compared to a MRI, but quickest and easiest to arrange) and to elucidate the vascular supply. Plus exclusion of an embolic cause ie TOE should be done.
- c) Therapy: Discussion with neurologist/interventional neuroradiologist re urgent regional thrombolysis/ angioplasty / platelet antagonists.
- d) Discussion with family re therapy and outlook.

19 candidates (58%) passed this question

Question 27:

You are called urgently to the bedside of an endotracheally intubated and ventilated 45 year old man, day 7 in ICU with respiratory failure secondary to community acquired pneumonia who has suddenly become impossible to ventilate. Outline your management of this emergency situation.

Key Features :

Overview: Is it machine, tubing or patient?

- a) Use 100% O₂ with manual bag ventilation to exclude ventilator problem. If he ventilates, it's a Ventilator problem. Change/fix ventilator.
- b) Put a suction catheter down the endotracheal tube. If it passes easily, it is not a tube problem (kinked in mouth, bitten, blocked with blood/secretions from poor humidification). Ability to pass a suction catheter does not exclude a cuff prolapse or ball valve obstruction. If the catheter can't be passed, quickly change it. If in doubt, consider a bronchoscopy
- c) If it is not the ventilator or the tube, it's the patient! Look for causes (pneumothorax, bronchospasm) and treat appropriately.

29 candidates (88%) passed this question

Question 28:

Outline how you would initiate a regime for Total Parenteral Nutrition in a critically ill septic malnourished 60kg man.

Key Features:

Central venous access;

Mixture of Protein, Fat and Carbohydrate, low amounts and **slowly building up** as tolerated;

electrolytes **supplementation** (especially at the start to **prevent refeeding syndrome**); supplemental vitamins, trace elements;

monitoring of clinical state, electrolytes, LFTs, BSL,

18 candidates (54%) passed this question

Question 29:

List the symptoms, signs, causes and treatment of Fat Embolism Syndrome.

Key Features

Symptoms ie dyspnoea, confusion,

Signs Respiratory, CNS, cutaneous,

Causes Long Bone #s, smaller bones, sickle cell, compression liposuction etc

Treatment: Supportive ie O2, CPAP, Ventilation.

27 candidates (81%) passed this question

Question 30:

What is Standardised Mortality Ratio? Outline the limitations of using this ratio to compare the performance of Intensive Care Units.

Standardised Mortality Ratio is defined as the observed mortality rate/expected mortality rate. Need to estimate expected mortality rate using a scoring system (eg. APACHE II or III, SAPS II or MPM). Better than comparison of non-adjusted mortality data.

The potential limitations of the system are multiple including: inconsistencies and inaccuracies associated with collection of data and scoring (eg. GCS, recording of parameters); problems of missing data limiting inclusion of all patients; problems of patient mix not adequately accounted for by the original population used for calculation of formulae (eg. transferred patients or delays before admission); small numbers of patients (increasing the error of the SMR estimate); accuracy of the prediction model; relying on mortality as a surrogate marker for quality of care; cost of use of proprietary system; etc.

11 candidates (33%) passed this question

OSCEs

Communication Station

Joanne, 60 years old, was admitted to intensive care with severe community acquired pneumonia. After several days of instability, she began to improve. Her only daughter, Mary kept a vigil at her side, sleeping in the waiting room overnight. On day 5, Joanne woke up and communicated with daughter. Mary decided to go home for a rest. While she was gone, during a dose change in noradrenaline, from 6.0 to 5.0 mcg/min, an error was made. The decimal point was omitted and Joanne was commenced on 50 mcg/min of noradrenaline. Soon after, she went into ventricular fibrillation and was not able to be resuscitated. The dose error was discovered late in the cardiac arrest.

Mary has been rung by the nursing staff and asked to come back urgently to the hospital. She **does not know** that her mother has died. Please explain what has occurred and answer her questions as best you can.

21 candidates (68%) passed this section

Chest X-Rays:

XRays included those with findings suggestive of hyperinflation and COPD, massive pleural effusion, hilar mass with upper lobe collapse and those featuring a number of artefacts (CV catheter, PA catheter, IABP etc)

CT scans

CTs included those with free gas in the abdomen in the setting of trauma, pancreatic syst and pancreatic calcification, subdural hematoma with midline shift in the setting of trauma and a reconstruction of a neck CT showing C6 displacement on C5

Equipment station

Displayed pieces of equipment included Medical Air pressure regulator, Ayre's T-piece, PF 95 duck billed mask and a temperature probe.

Procedure Station

The procedure which was examined was insertion of a transvenous pacemaker. The indications for, principles of pacemaker insertion and testing for sensitivity and thresholds and complications were examined.

Cold Cases

Two cold case stations were included.

Cold case 1:

This 72 year old man has presented with shortness of breath. Please examine the respiratory system.

Findings: Features of interstitial lung disease

Cold case 2:

This 60 year old man has recently been vomiting blood. Please examine the abdomen.

Findings: Hepatosplenomegaly

Monitoring station

This focussed on ICP monitoring. A scenario of traumatic brain injury (TBI) was provided. Candidates were expected to identify an EVD, discuss indications for ICP monitoring in TBI, discuss principles of measurement of ICP (zeroing, reference level etc) . The scenario also went into discussion of a blocked drain (because of ventricular collapse – CT provided) and its management.

Clinical Case history 1

This focussed on principles of antibiotic management of staph aureus bacteremia and Gram negative sepsis.

Clinical Case history 2

This focussed on a paediatric trauma scenario and involved interpretation of CT abdomen (hepatic and renal laceration) and abnormal biochemistry and blood gases.

Vivas

Question 1:

A previously well 27 year old woman has been admitted to ICU following an appendectomy for a perforated appendix. Her Pulse is 130/min, BP 65/30 despite six litres of crystalloid resuscitation. Her SpO₂ is 90% on FIO₂ of 0.7, PEEP 10 cm H₂O, SIMV. A noradrenaline infusion is being drawn up.

Would you give steroids to this patient?

Focus of discussion: Evidence base for using steroids in sepsis and other critical care illnesses – ARDS, TBI, Spinal injury

Question 2:

A 45 year old previously healthy man was transferred to your ICU 5 days ago after a motor vehicle accident with chest and abdominal injuries. He has been difficult to ventilate on 100% oxygen and 10cm H₂O of PEEP. He is deeply sedated and on noradrenaline and adrenaline infusions at 10mcg/min each. He has become oliguric.

His blood biochemistry and blood gases are as follows:

Sodium	138 mmol/L	(135-145)
Potassium	7.1 mmol/L	(3.5 – 5.0)
Chloride	104 mmol/L	(95-105)
Urea	27 mmol/L	(4-6)
Creatinine	0.26 mmol/L	(0.04-0.12)
Glucose	7.5 mmol/L	(4-6)
pH	7.01	
PCO ₂	45 mm Hg	
PO ₂	70 mm Hg	
Bicarbonate	11 mmol/L	(24-27)

Summarise the findings of the first blood tests

Focus of discussion: Evaluation and management of metabolic and raised anion gap acidosis

Question 3:

An 18-year-old man presents to hospital two days following completion of induction chemotherapy for acute myeloid leukaemia. His main complaint is central abdominal pain. He is tachycardic at 120/min and his systolic blood pressure is 70mmHg. His temperature is 38.7 C. His serum creatinine is noted to be 300 (40-110) micromoles/l. You have agreed to admit the patient to ICU.

What will you do in the first thirty minutes?

Focus of discussion: - Neutropenic sepsis, causes of renal dysfunction in this setting (chemotherapy, sepsis, tumour lysis)

Question 4:

You are asked to assess a 54 year old man scheduled for an urgent laparotomy for a suspected perforated duodenal ulcer. He has recently developed symptoms of double vision, ptosis, dysarthria and generalised muscle weakness. He was due to be reviewed by a neurologist next week. The anaesthetist asks for a post-op bed in ICU. The patient has a 25-pack year history of smoking but ceased smoking 3 months ago.

What are your differential diagnoses for his weakness?

Focus of discussion- Approach to neuromuscular weakness, clinical and lab testing, assessment of suitability for extubation

Question 5:

A 65 year old female is admitted to the Intensive Care Unit with generalised abdominal pain, tachycardia, hypotension and tachypnoea. She has a past medical history of Type I diabetes mellitus, ischaemic heart disease, atrial fibrillation and peripheral vascular disease.

Describe your initial approach to the resuscitation of the patient.

Focus of discussion: Resuscitation of patient, evaluation and management of gut ischemia

Question 6:

A previously well 36 year old man was found with a GCS of 6 (E1,V1, M4) having not been seen for some hours previously. There is circumstantial evidence of a drug overdose. There is a suicide note.

He is intubated and ventilated in the emergency department because of coma, poor oxygen saturations, tachypnoea, hypotension and is transferred to the ICU. His chest X-ray reveals extensive bilateral pulmonary infiltrates.

Over the next 12 hours his course is characterised by worsening oxygenation, high airway pressures and slowly rising inotrope requirement. His renal function remains normal.

Why has he developed respiratory failure?

Focus of discussion: - Ventilatory modes in ARDS, evaluation of recent trials – ARDSnet, Steroids etc, role of therapies- NO, ECMO, HFOV etc.

HOT CASES

The Clinical Section (comprising 2 hot cases) was conducted at the Royal Melbourne Hospital, Melbourne.

Candidates should listen carefully to the introduction given by the examiners and direct their examination accordingly. Patients were usually presented as problem solving exercises. For maximal marks, candidates should demonstrate a **systematic approach to examination**, **clinical signs should be demonstrated**, and a **reasonable discussion** regarding their findings should follow. The twenty minutes available for each case provides ample opportunity to discuss **related investigations and plans of management**.

The hot cases represented those commonly encountered in day to day intensive care practice These included:

- 1) A 79 year old man admitted post VF-arrest – Assessment of neurology
- 2) 87 year old male with multitrauma- assessment of suitability for extubation
- 3) A 68 year old lady with GI bleed, abdominal mass and a compromised airway
- 4) A 44 year old man with severe chest injuries –assessment of suitability for extubation
- 5) Assessment of a young lady with Grade 5 SAH
- 6) A 73 year old man following multitrauma, ongoing MODs, STEMI, cardiac dysfunction, pericardial rub,
- 7) 77 year old man with MODS following AAA repair

REASONS FOR FAILURE

Written paper

The high failure rate (> 50%) questions were in areas of statistics, interpretation of biochemical data and in those questions where candidates had to apply themselves to provide a critique (for eg surviving sepsis campaign question). Disappointingly, there was also a high failure rate in questions which examined core ICU issues such as base excess, management of hypoxemia post op and problems post hepatic surgery and discussion of SMR.

Significant weaknesses in core ICU areas

Organise the answer in a way that demonstrates a broader knowledge

Lack of additional relevant detail

Vivas

Knowledge deficit

Failure to recognise clinically significant issues

OSCEs

Knowledge deficit particularly in equipment and monitoring areas

Failure to recognise clinically significant issues

Clinical Examination

Comments documented at the time of the Assessment suggested that common problems encountered related to poor examination technique (eg. slow to actually start examining the patient), and poor discussion.

**Dr. B. Venkatesh
Chairman, Court of Examiners,
General Fellowship Examination**

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