

Answer Guide WICM SAQ

Comments For candidates:

This is a tough exam. Some mistakes are inevitable. No one can answer them perfectly. Therefore – sleep well. Be at peace. You did your best!

Trying to mark 36 exam papers in a few short days is quite a challenge, so your marked answers have not been subject to the rigorous double checking and Angoff moderating that your real exam would!

This answer template is a broad guide only. We just wanted to give you the chance to understand roughly where the bar may be and how you may have scored. Please try not to get fixated on the way your exam was marked, and whether you think you deserved an extra half mark or not. The goal is to figure out broadly where you need to improve. It is an opportunity to learn and practice. We hope this broad answer summary is useful.

Question 1

A 62-year-old female with septic shock due to intra-abdominal sepsis develops progressive thrombocytopenia and coagulopathy in the ICU.

- a) Outline the pathophysiological mechanisms of thrombocytopenia and coagulopathy in critically ill patients. (3 Marks)
- b) Outline the Clinical Significance of Thrombocytopenia and Coagulopathy in critically ill patients. (2 Marks)
- c) Explain how these findings influence your approach to investigation and management. (5 Marks)

Question 1 Answer:

This is an 'Outline' / "Explain" style SAQ requiring synthesis of understanding across the three elements: pathophysiology, clinical significance and assessment and management with demonstration of understanding that thrombocytopenia and coagulopathy are inter-related in critical illness, especially sepsis.

A good answer and clear pass outlines the processes that cause thrombocytopenia and those that cause a coagulopathic state and highlights those common to both; identifies the clinical issues as a consequence of T and C; and lists the key investigations and management strategies together with the rationale.

The relative mark allocation is important to take into account and some candidates did not give enough detail to part (c) which carries 50% of the marks

- a)
 - Thrombocytopenia:
 - Sepsis-related bone marrow suppression or megakaryocyte dysfunction
 - Increased peripheral destruction (e.g. DIC, immune thrombocytopenia)
 - Platelet consumption via microvascular thrombosis (DIC, TMA)
 - Splenic sequestration
 - Drug-induced causes (e.g. heparin)
 - Coagulopathy:
 - Sepsis-induced DIC (consumption of clotting factors)
 - Activation of tissue factor and endothelial injury
 - Hyperfibrinolysis
 - Hepatic dysfunction and reduced synthesis of clotting factors
 - Dilutional coagulopathy (from massive transfusion)
- b)
 - Risk of bleeding and/or thrombosis
 - Associated with worse prognosis in ICU

- Impacts on ability to perform procedures safely
- May influence decisions on anticoagulation, transfusion, and immunosuppression

c)

Investigations

- FBC with film: assess morphology, fragmentation, schistocytes
- Coagulation profile: INR, APTT, fibrinogen, D-dimer
- HIT screen if on heparin
- LFTs, renal function (liver/renal contribution)
- Ferritin, LDH, triglycerides (if HLH considered)
- ADAMTS13 (if TTP suspected)
- Bone marrow biopsy (rare; if unexplained cytopenias)

Management

- **Supportive:**
 - Platelet transfusion thresholds (e.g. $<20 \times 10^9/L$ if bleeding risk, <50 if invasive procedure)
 - FFP, cryoprecipitate for active bleeding or high INR + low fibrinogen
- **Treat underlying cause:**
 - Source control and antibiotics
 - Stop causative agents (e.g. heparin in HIT)
- **Specific therapy where indicated:**
 - IVIG, steroids if immune-mediated
 - Plasma exchange for TTP
 - Avoid unnecessary anticoagulation unless thrombotic risk outweighs bleeding risk

Question 2

A 56-year-old male is admitted to the ICU following an emergency laparotomy for a perforated sigmoid diverticulum. Post-operatively, he is intubated and ventilated. Six hours after admission, nursing staff note increasing peak airway pressures and a drop in oxygen saturation from 98% to 88% on FiO₂ 0.5.

- a) List **four** possible differential diagnoses for this scenario. (2 Marks)
- b) Outline your approach to assessing the cause of the patient's respiratory deterioration. In your answer, include information gained from ventilator waveforms or settings (8 Marks)

Question 2 Answer:

A structured approach to troubleshooting high airway pressures and desaturation in the ventilated patient is expected (as in the BASIC manual).

A good answer includes causes covering different categories (not just all tube related) and an algorithmic approach to assessment.

Underlying causes relate to problems with the airway (e.g. blocked, kinked, endobronchial intubation), the lungs (e.g. PTX), the chest wall (e.g. increased muscle tone), outside the chest (e.g. intra-abdominal compartment syndrome), or related to the ventilator (e.g. inappropriate settings, malfunction).

Assessment of the underlying problem is outlined with a step-wise approach checking the ventilator and settings, tube position and patency, patient's lungs, level of sedation, abdominal pressures, etc. and appropriate investigations – e.g. CXR, lung USS,

Assessment of ventilator waveforms and settings should include interpretation of peak and plateau pressures, interpretation of expiratory flow curve, measurement of intrinsic PEEP, analysis of end-tidal CO₂, and assessment of settings for V_t, I:E, inspiratory flow time and flow rate.

Question 3:

You are called to the Emergency Department (ED) in your regional hospital as part of a Major Trauma call. You attend along with an Emergency Medicine specialist and a General Surgical registrar. There is no dedicated Plastic Surgery or Burns service within your hospital. An unidentified male is brought into the resuscitation area. He was extricated from a burning vehicle and noted to have extensive burns involving an estimated total body surface area (TBSA) of 60%, including the face, torso, upper limbs and right thigh.

Paramedics have inserted a peripheral intravenous (IV) line, administered a total of 150mg ketamine and 200mcg of fentanyl for analgesia, and 1500 mL of 0.9% sodium chloride prior to his arrival in the Emergency Department. A pre-sedation GCS was 10 (E3V2M5), and is 7 (E1V2M4) at the time of arrival to the ED. The patient is currently receiving oxygen via a Hudson Mask at 15L/min with an SpO₂ of 100%.

- a) List the key features of assessment of burns (3 Marks)
- b) Outline your management for this patient. (7 Marks)

Answer Question 3:

The key issues in this scenario are:

- Major burn injury
- Compromised airway with decreased GCS (unidentified TBI? Toxic gas inhalation? Drugs/intoxicants? Secondary to sedation from paramedics?)
- Potential for other injuries
- Non-tertiary centre with limited specialist support

It's important to answer this question specific to the case in point and not give a generic response to the assessment and management of a trauma patient. Part (a) just asks for a list so that is all that's needed, although does seem to imply the key features of burns in general not just this patient, and so is a bit ambiguous. As this is not clear from the question, it may be safest to answer as the key features specific to this patient and then additional key features in other burns cases. This part is only 3 marks so not worth agonising over too much – if you have a list of ~ 6 items that should get the marks.

Part (b) is worth the big chunk of the marks and should be an outline of the management specific to major burns in a patient in a non-tertiary centre with no burns specialty service available. The answer should also include reference to management of any other trauma identified although time (and mark allocation) constraints will limit doing this in detail. A-E type structure layout focussing on the points listed below and acknowledging what has already been done in terms of resuscitation by the paramedics. Setting out your structure to start will help you cover the key points without losing track and going down rabbit holes.

The expected answer to part (a) provides a list of the key features in the history and the trauma survey specific to a patient with burns, e.g airway burns, smoke inhalation, circumferential burns, specific areas (face, hands, genitals), consideration of associated

trauma (including blast injuries if not just this patient), and assessment of TBSA affected and burn depth (TBSA given in this case as 60%).

The expected answer to part (b) covers A, B, C of resuscitation including airway management, assessment of sites for IV access and details of fluid management, analgesia and sedation, primary care of burns, wound coverage and temperature management, escharotomies, investigations including CO-Hb, drug screen, management of other injuries as identified from primary and secondary survey, liaison with burns centre, patient disposition/transfer to burns unit, referral to social work/police for ID of patient.

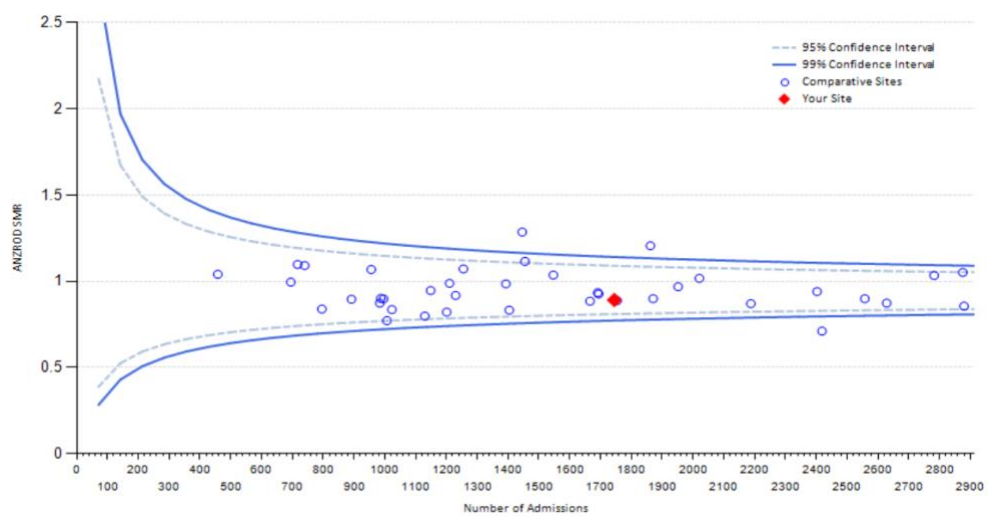
Question 4

You are provided with two funnel plots comparing the Standardized Mortality Ratio (SMR) of two different intensive care units (ICUs).

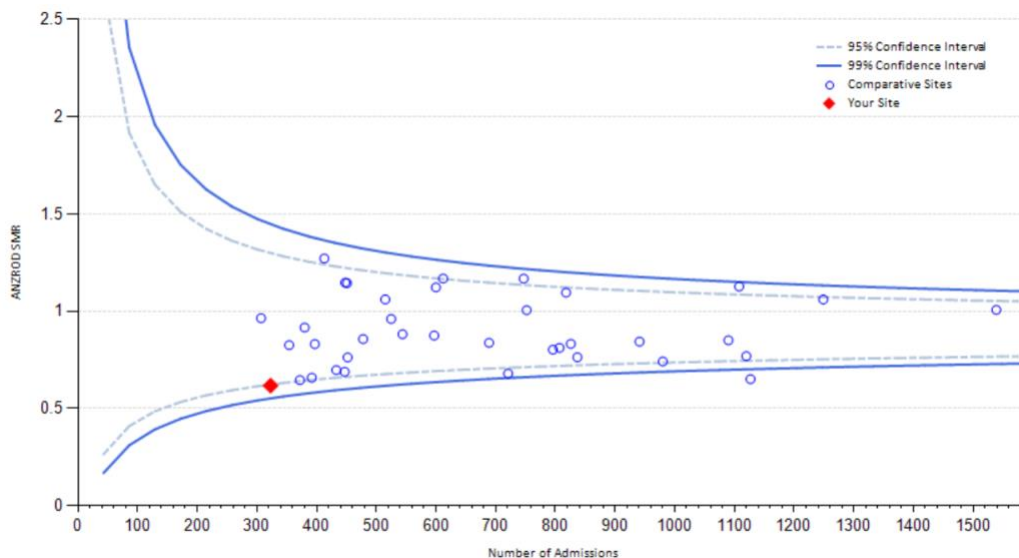
(a) List the key features of Funnel Plot 1 and explain what they indicate about the ICU's performance. (40%)

(b) Outline why the results in Funnel Plot 1 may differ from those in Funnel Plot 2, focusing on methodological and clinical factors. (60%)

Funnel Plot 1



Funnel plot 2



Answer Question 4

Interpretation of funnel plots of SMRs is relatively common in the written exam and candidates are expected to understand their relevance with respect to benchmarking ICU performance.

The expected answer to part (a) covers a description of the funnel plot structure and interpretation, and demonstrates an understanding of ANZROD and SMR, clinical and statistical nuances, and the purpose of SMR tools including benchmarking ICUs, identifying outliers for audit, being transparent with quality improvement. Providing an understanding of ANZROD was not intuitive from the question and a statement that SMR is *Observed or Actual Hospital Mortality/Expected Hospital Mortality* should be enough for the marks.

The expected answer to part (b) outlines the observed differences and the underlying methodological and clinical/systemic factors for these differences. Differences include risk adjustment or calibration differences, different case mixes, ICU resourcing or staffing issues, different admission/discharge practices.

a)

Section	Content Expectations
1. Funnel Plot Structure & Interpretation	<ul style="list-style-type: none"> - X-axis = admissions, Y-axis = SMR - Centre line = SMR of 1 - 95% CI (dashed), 99% CI (solid) - Each dot = one site, red diamond = your ICU - SMR \approx 0.6, within 95% CI \rightarrow not a statistical outlier
2. ANZROD & SMR Understanding	<ul style="list-style-type: none"> - ANZROD = risk prediction model (ANZROD = Australian & New Zealand Risk of Death) - SMR = Observed deaths \div Expected deaths - SMR < 1 = better-than-expected performance
3. Clinical & Statistical Nuances	<ul style="list-style-type: none"> - Small volume \rightarrow wider confidence intervals \rightarrow more chance variation - Differences in HDU vs ICU mix can affect risk
4. Purpose of SMR Tools	<ul style="list-style-type: none"> - Used to benchmark ICUs - Identifies outliers for audit - Drives transparency and quality improvement

b)

Section	Content Expectations
5. Observed Differences	<ul style="list-style-type: none">- Plot 1: smaller site (~330), SMR \approx 0.6- Plot 2: larger site (~1800), SMR \approx 0.9- Both within control limits \rightarrow not significant statistical outliers
6. Methodological Factors	<ul style="list-style-type: none">- Larger N \rightarrow narrower CI \rightarrow less random variation- Risk adjustment or model calibration differences- Examples of data quality / gaming:<ul style="list-style-type: none">• Excluding palliative patients• Upcoding diagnoses/comorbidities• Delaying ICU admission to manipulate inclusion criteria• Incomplete or selective documentation
7. Clinical & System Factors	<ul style="list-style-type: none">- Different admission/discharge practices (e.g., early discharges, ED/ward delays)- Case-mix variation (e.g., trauma, oncology, seasonal variation)- ICU resourcing or staffing differences

QUESTION 5:

A 64 year old patient has presented to hospital with vomiting, abdominal pain and atrial fibrillation. They were taken for exploratory laparotomy and found to have mesenteric ischaemia due to vascular disease with resulting extensive ischaemic bowel.

The surgeons have closed the abdomen without excision as the ischaemic bowel is deemed too widespread for resection. Post operatively they come to ICU intubated and ventilated on vasopressors for distributive shock.

Discuss your approach the palliative management of this patient. (10 Marks).

Question 5 Answer:

This is a sudden and unexpected palliative trajectory which will require careful consideration and management in the ICU. Management of both the patient and their loved ones will be important. The patient is currently supportable so there is time to ensure appropriate communication and family centred care.

Expected answer should reflect consultant level thinking about the broader issues around palliation in the ICU:

Firstly – confirm consensus opinion on inevitable death – discuss directly with surgeon, other ICU colleagues, Palliative Care and the anaesthetist involved. Does case need coronial consideration? Are there other management issues or legal considerations?

– Assess the patient clinically to establish – how stable are they? Are they likely to be stable enough and comfortable enough to extubate and be awake with their family? (Unlikely) Or are they too unstable from a ventilation, acidosis, shock, organ failure and pain perspective to be desedated? Stability will guide likely timeframe for anticipated death. Continue support temporarily to allow time for family meetings.

– Communication – family, breaking devastating news conversation, followed by end-of-life care and support conversation, followed by organ donation conversation once inevitable death has been accepted. After death, should also discuss with family if any concerns requiring coronial investigation.

– Practicalities around palliation should include: (When, where, how)

- Symptom management – analgesia and anxiolysis for patient. Anti-agitation, antiemetics and anti-sialagogues – a good answer would include specific suggestions for each of these including doses and routes.
- Timing of palliative extubation – waiting for family/cultural / spiritual needs
- People who need to be present eg waiting for family to arrive. Other teams to consider eg palliative care referral.

- Location of palliation – Side room? Consideration of going home to die? (this may be more common in some places than others). Hospice? Ward? Open visiting, quiet room.
- Lines and devices to be removed. What therapies should stop vs continue.
- Spiritual support – chaplain etc.
- Organ donation – DBD will not be relevant but DCD and tissue donation should be considered and offered if likely to fit criteria.
- Documentation of change of resus status/goals of care.

Medicolegal considerations - ? Coronal – discuss with surgeon/family.

A good answer considers key steps of communication, legal aspects, socio-cultural aspects, and practical aspects of death and potential donation in the ICU.



Question 6:



You are called to the neurosurgical ward to assess a previously healthy 63 year old patient on day 5 following their admission for subarachnoid haemorrhage from an aneurysm which has been coiled. They have become unconscious with a GCS 8/15.

- a) List 5 common causes for their reduced level of consciousness (2.5 Marks)
- b) Outline the features on assessment which would help differentiate between these causes (7.5 marks)

Question 6 Answer:

The common causes should relate as much as possible to SAH and not just any causes of reduced LOC. The assessment portion of the answer is looking for ASSESSMENT only – with a focus on untangling some of your differentials. Assessment questions should include – History, Clinical examination, Investigations. Investigations should always be thought of as: Bedside, Imaging, Labs, Micro, Special tests.

<p>Expected causes (any 5 of):</p> <ul style="list-style-type: none">• Cerebral vasospasm / delayed cerebral ischaemia• Hydrocephalus (delayed/communicating)• Re-bleeding• Seizure or status epilepticus (incl. non convulsive)• Hyponatraemia (SIADH / cerebral salt wasting)• Raised ICP / cerebral oedema• CNS infection (meningitis, ventriculitis)• Sedation / medication-related <p> <i>Full credit for causes that are accurate, clinically relevant, and common by day 5 post-SAH.</i></p>	<p>2.5 Marks</p>
<p>1. History Features</p> <p>Award up to 0.5 per cause based on distinct, logical history elements that help differentiate each.</p> <ul style="list-style-type: none">• Vasospasm: gradual onset, recent focal symptoms (e.g., limb weakness)• Rebleed: sudden collapse, thunderclap headache• Hydrocephalus: progressive drowsiness, headache• Seizure: witnessed seizure, post-ictal state• Hyponatraemia: fluid balance issues, nausea, confusion prior to LOC• Infection: fever, rigors, recent EVD or central line <p> <i>Credit is given for clear, relevant historical clues that distinguish each cause</i></p>	<p>2.5 Marks</p>

<p>2. Examination Findings</p> <p>Award up to 0.5 marks per cause for specific examination clues.</p> <ul style="list-style-type: none"> • Vasospasm: focal neurological deficit (e.g., hemiparesis) • Rebleed: signs of raised ICP (e.g., Cushing’s triad), fixed pupils • Hydrocephalus: brisk reflexes, upgoing plantar, sixth nerve palsy • Seizure: lateral tongue bite, postictal confusion, incontinence • Hyponatraemia: non-specific signs, possible hypovolaemia • Infection: neck stiffness, fever, photophobia <p> <i>Credit for accurate, distinguishing physical signs</i></p>	<p>2.5 Marks</p>
<p>3. Investigations</p> <p>Award up to 0.5 per cause for investigations that would help confirm or exclude each diagnosis.</p> <ul style="list-style-type: none"> • Vasospasm: CT angiogram, transcranial Doppler (TCD) • Rebleed: repeat non-contrast CT head • Hydrocephalus: CT showing dilated ventricles • Seizure: EEG, CT/MRI to rule out structural cause • Hyponatraemia: serum sodium, osmolality, urinary sodium • Infection: FBC, CRP, blood cultures, CSF (if safe) <p> <i>Credit for investigations that are specific and appropriate to the scenario.</i></p>	<p>2.5 Marks</p>

Question 7:

List for the following conditions the most accurate microbiological diagnostic test in an acute ICU setting, as well as the recommended antibiotic therapy (include standard dosing) (6 Marks)

1. Cerebral malaria
2. Leptospirosis
3. Listeria Meningitis
4. Pneumocystis Jiroveci Pneumonia
5. Group A Streptococci soft tissue infection
6. Prosthetic valve Endocarditis

Outline the indications for antibiotic therapeutic drug monitoring in the ICU. (4 Marks)

Question 7 Answer:

This question is unambiguous. No complicated planning or structure required. You just need to list the BEST test and treatment (there are many) so it wants the MOST ACCURATE test and the recommended antimicrobial.

Cerebral malaria	<ul style="list-style-type: none">- Test: Thick and thin blood films (1 mark for blood film)- Treatment: IV Artesunate (1 mark, dose not needed for mark)<ul style="list-style-type: none">o (superior to IV Quinine, and recommended over oral artemesinin combination therapy in severe malaria, no marks for these options)
Leptospirosis	<ul style="list-style-type: none">- Test: Blood PCR (1 mark)<ul style="list-style-type: none">o (urine result delayed positive so generally not helpful – no marks for this unless they specify if illness >7 days, and serology needs to be paired with convalescent so only helps retrospectively)- Treatment: Acceptable options: IV Benzyl Penicillin (1.2g Q4H or higher), IV Ceftriaxone (2g daily or 1g BD), IV Doxycycline (100mg BD) (1 mark for any of these)
Listeria Meningitis	<ul style="list-style-type: none">- Test: CSF Gram stain for gram positive bacilli or CSF PCR for listeria (1 mark for either)- Treatment: IV Amoxicillin high dose (eg 2g Q4H) or IV Benzyl Penicillin (2.4g Q4H) (1 mark for either – if they just say Amox, ½ mark)

Pneumocystis Jiroveci Pneumonia	<ul style="list-style-type: none"> - Test: Respiratory sample (eg sputum / bronch or induced sputum) PCR – NOT Nasopharyngeal or throat swab (1 mark) <ul style="list-style-type: none"> o Immunofluorescence reduced sensitivity so not ‘most accurate’ - High dose CoTrimoxazole eg 960mg QID (or higher depending on guidelines) (1 mark, if don’t specify a dose of 960mg QID or higher, half a mark)
Group A Streptococci soft tissue infection	<ul style="list-style-type: none"> - Test: Tissue culture or blood culture identification, or Group A Strep PCR (either acceptable for mark) - High dose IV Penicillin (1.2g Q4H or higher) + IV Clindamycin (600mg QID or 900mg TDS) – need to mention both for full mark <ul style="list-style-type: none"> o IVIg not required to be mentioned as not an antibiotic
Prosthetic valve Endocarditis	<ul style="list-style-type: none"> - Test: Blood cultures (several sets) - Treatment: Vancomycin + one of: IV Ceftriaxone 2g daily/IV Cefepime 2g Q8H/IV Gentamicin 5mg/kg daily
Outline the indications for antibiotic therapeutic drug monitoring in the ICU (1 mark each for any of the following)	<ul style="list-style-type: none"> - Defined/narrow therapeutic range (eg Vancomycin) - Risk of toxicity (eg Gentamicin troughs) - Altered pharmacokinetics (eg augmented renal clearance, morbid obesity, AKI, altered protein binding, altered absorption) – if mention these specifically can get up to 2 marks - High burden or critical site infection requiring optimized/maximized dosing (eg CNS penetration) - Concern for treatment failure - Endocarditis/endovascular infection to CNS infection as an indication. <p>If antibiotics are just listed without indications, no marks are given</p>

Question 8

A 15-month-old girl presents to the ED of your regional hospital with a 2-day history of fevers, irritability and decreased oral intake. She has no significant past medical history and takes no regular medications. Her immunisations are up to date. Her exam findings are as follows:

Weight 8.9 kg

Neurologically obtunded, non-responsive to painful stimulus.

Temperature 38.4

Heart Rate 165 (regular), BP 75/40mmHg

Cool peripheries with mottled limbs, Capillary Refill Time 7 seconds

Respiratory Rate 55 breaths per minute

SpO₂ - Difficult to obtain a reliable trace

Non-blanching rash over the limbs and abdomen.

- a) Outline your management priorities. (6 Marks)
- b) You decide to intubate this child.
 - How will you calculate the appropriate cuffed endotracheal tube (ETT) size? (0.5 mark)
 - What size ETT will you use? (0.5 mark)
 - List two methods to determine the depth (oral route) the ETT should be inserted to? (1 mark)
- c) What medications would you use for ongoing sedation of this child, briefly explain rationale for your choice. (2 marks)

Question 8 Answer

The key issues with this question are to identify that this is child with septic shock (potential meningococcal) who has multi-organ dysfunction – shocked, respiratory failure, neurological failure, presumed DIC (non-blanching rash), and who is a non-tertiary centre.

The expected answer to part (a) addresses the priorities in management specific to a critically unwell septic infant in a non-tertiary setting. Answers that did not achieve a pass mark did not clearly state the priorities and/or were too generic and/or lacked detail, e.g. route of vascular access, resuscitation targets, drug doses.

Part (b) was knowledge recall. Formulae quoted were not always correct and some candidate adjusted up by 0.5 size instead of 0.5 size down from an uncuffed tube for a cuffed tube. Any two accepted methods for gauging tube depth were given credit.

The expected answer to part (c) includes doses of chosen drugs and brief discussion of the rationale for their selection or non-selection (as in the case of propofol)

a)

Management priorities:

Resuscitation:

- Resuscitation team activation/call for help - this patient is critically unwell in a rural centre - urgent retrieval/PICU activation. Locally advanced help eg anaesthesia should also be sought.
- High-flow oxygen / bag-valve-mask ventilation as needed - While planning for intubation. Intubate when team and equipment ready or sooner if deteriorating.
- Establish IV or IO access
- Establish monitoring – BP, ECG, SPO2
- 10–20 mL/kg crystalloid bolus, and repeat based on re-evaluation
- URGENT Empiric IV antibiotics (cefotaxime 50-100 mg/kg or ceftriaxone 100mg/kg) ± vancomycin/ampicillin as per local guidelines for correct cephalosporin **AND** dose.
- Consider empiric antiviral therapy with IV aciclovir 10mg/kg
- Maintain BSL > 4.0mmol/L
- Early inotropes if fluid refractory (e.g. adrenaline infusion start at 0.1mcg/kg/min) MAP per Weight /age based targets.
- Paracetamol 15mg/kg for fever/analgesia.
- Consider hydrocortisone
- Notify tertiary centre/retrieval team/prepare for inter-hospital transfer
- Keep family informed

Specific therapies – Antibiotics ASAP as above.

Bigger picture issues

- Shocked child who will need intubating who is in a regional ICU – Need to consult with and arrange transfer to a more appropriate centre. Active retrieval early. Get PICU advice early.

b)

Airway Management

a) Formula for cuffed ETT size: $(\text{age}/4) + 3.5$

b) $\rightarrow (1.25+4)/4 + 3.5 \sim 3.8 \rightarrow$ use size 3.5–4.0

c) Depth of insertion

- Calculate using $3 \times \text{ETT size} \rightarrow \sim 12 \text{ cm}$ at lips for size 4.0
- $\text{Age}/2 + 12$
- Utilise the Broselow paediatric emergency tape
- Tracheal ultrasound after placement

- Black line on ETT aligned with vocal cords

NB: Clinical judgement is essential and formulae may not be accurate

c)

Ongoing Sedation

- Fentanyl infusion (1–4 mcg/kg/hr) or morphine (10-40mcg/kg/hr) (0.5 marks; dose not required)
- Midazolam infusion (30–100 mcg/kg/hr) or other benzodiazepine (0.5 marks; dose not required)
- Justify based on titratability, familiarity in paediatrics, haemodynamic stability (0.5 marks)
- Avoid propofol infusion due to shock and the risk of propofol infusion syndrome
- **Alternatives:** ketamine or dexmedetomidine or clonidine with appropriate rationale