



COLLEGE OF INTENSIVE CARE MEDICINE OF AUSTRALIA AND NEW ZEALAND

SECOND PART PAEDIATRIC EXAMINATION

EXAM REPORT

AUGUST / NOVEMBER 2025

This report is prepared to provide candidates, tutors and their Supervisors of Training with information regarding the assessment of candidates' performance in the CICM Second Part Paediatric Examination. This report is for use as an educational resource and includes a guide as to expected content of the answers for the written section. Candidates should discuss the report with their supervisors so that they may prepare appropriately for future examinations.

The exam comprises a written section and an oral section. The written section consists of two papers, comprised of 15 short answer questions each. The pass mark for the written section is derived by the Angoff method and for this sitting was set at 52.59%. The oral section consists of eight interactive vivas and two separate clinical hot cases. The vivas were completed in Brisbane over one day (Thursday 12th November) and the hot cases were completed at Queensland Children's Hospital (Friday 13th November).

The tables below provide an overall summary, as well as information regarding performance in the individual sections. A comparison with the previous five examinations is also provided.

STATISTICAL REPORT

Overall performance	2025	2024	2023	2022	2021	2020*
Number presenting for written	12	13	14	18	10	8
Successful in the written section	6 (50%)	10 (77%)	14 (100%)	11 (61%)	8 (80%)	4 (50%)
Carrying a written pass or exempt from written	2	0	1	5	1	1
Total number invited to the oral section	8	10	15	16	9	5
Total number successful at orals	6 (75%)	8 (80%)	15 (100%)	15 (94%)	8 (89%)	5 (100%)
Total number presenting to Exam	14	13	15	23	11	9
Overall pass rate	6/14 43%	8/13 62%	15/15 100%	15/23 65%	8/11 72%	5/9 56%

**Oral component postponed until 2021 due to COVID.*

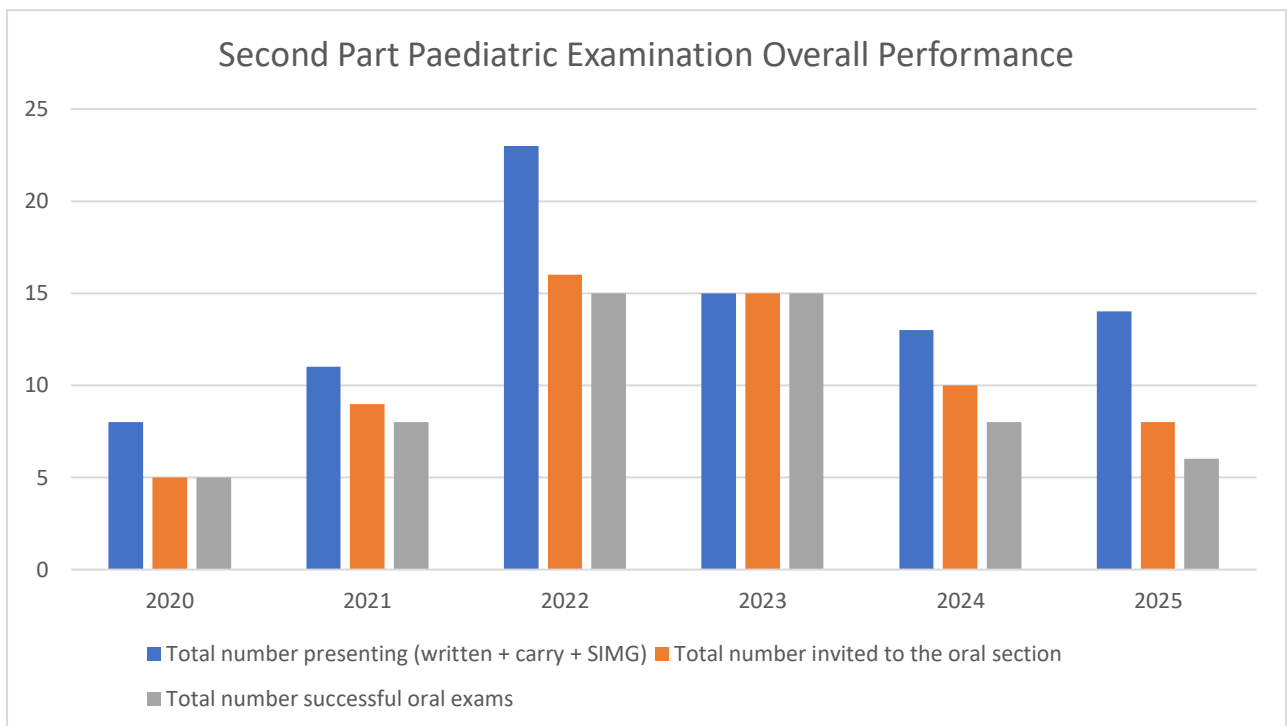
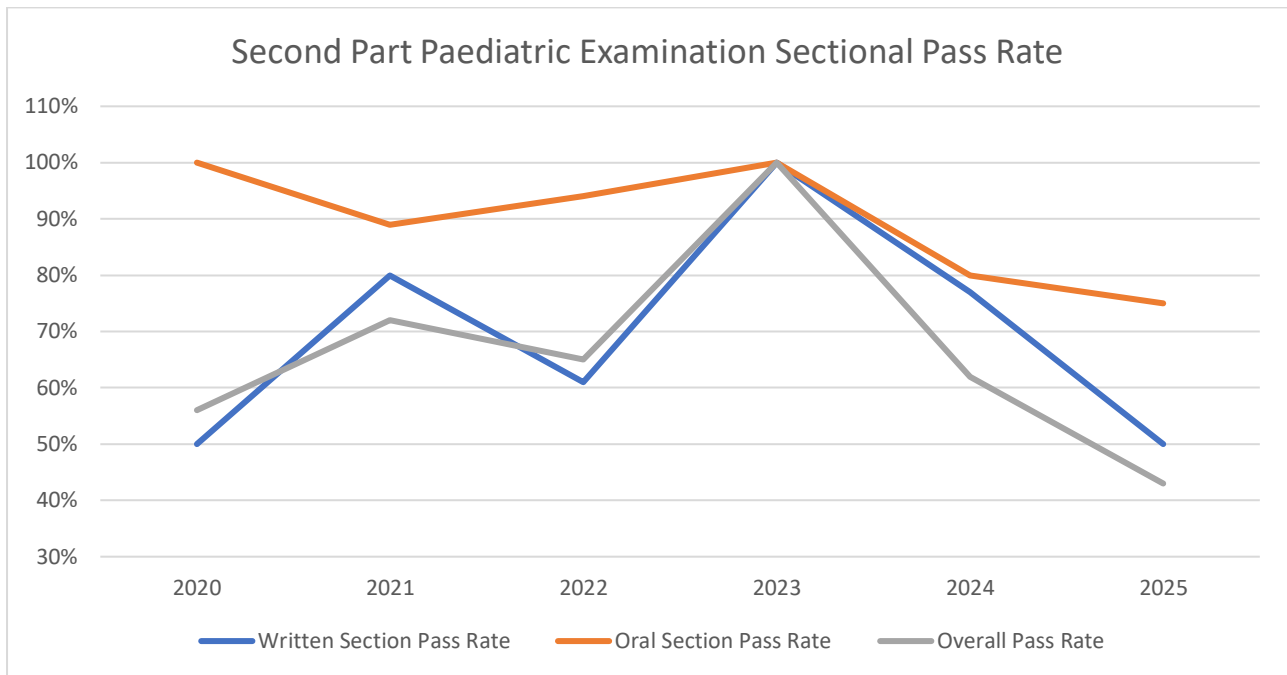
Clinical Pass Rates	2025		2024		2023		2022		2021		2020*	
	Pass rate	Highest individual mark	Pass rate	Highest individual mark	Pass rate	Highest individual mark	Pass rate	Highest individual mark	Pass rate	Highest individual mark	Pass rate	Highest individual mark
Hot Case 1	75%	75%	60%	80%	73%	78%	85%	75%	89%	78%	60%	70%
Hot Case 2	50%	65%	80%	83%	87%	90%	88%	81%	67%	95%	60%	70%
Total number successful in the Hot Case section	4/8		7/10		14/15		14/16		6/9		3/5	
Overall Hot Case pass rate	50%		70%		93%		88%		67%		60%	

*Oral component postponed until 2021 due to COVID.

Viva Pass Rates	2025		2024		2023		2022		2021		2020*	
	Pass rate	Highest individual mark	Pass rate	Highest individual mark	Pass rate	Highest individual mark	Pass rate	Highest individual mark	Pass rate	Highest individual mark	Pass rate	Highest individual mark
Viva 1	88%	83%	90%	90%	53%	80%	88%	90%	88%	80%	100%	74%
Viva 2	75%	88%	70%	85%	47%	88%	88%	100%	45%	70%	100%	90%
Viva 3	50%	70%	80%	81%	60%	100%	56%	76%	45%	75%	100%	80%
Viva 4	75%	85%	70%	76%	73%	83%	100%	95%	100%	74%	100%	80%
Viva 5	75%	100%	40%	66%	80%	88%	88%	100%	88%	94%	60%	86%
Radiology Viva	100%	80%	60%	73%	73%	72%	44%	72%	67%	60%	80%	71%
Communication Viva	75%	90%	50%	70%	87%	100%	38%	68%	34%	56%	100%	73%
Procedure Viva	38%	90%	90%	83%	80%	83%	56%	85%	78%	70%	80%	60%
Total number successful in the Viva section	10/10		8/10		13/15		13/16		8/9		5/5	
Overall Viva pass rate	100%		80%		87%		81%		89%		100%	

*Oral component postponed until 2021 due to COVID.

Overall Performance



SECOND PART PAEDIATRIC WRITTEN EXAMINER REPORT

50% of the Second Part Paediatric examination candidates who sat the 2025 written section were invited to the oral section. Candidates who did not qualify for an invitation did so for one or more of the following reasons:

- Demonstrated limited knowledge of the topic
- Provided insufficient detail, resulting in incomplete answers.
- Failure to address the question directly
- Lacked clear structure or depth.
- Included content that was inappropriate or unsafe.
- Omitted essential information or contained factual inaccuracies.

The level of detail required to perform well in this examination is at the level expected of a transitional fellow. This requires more than just the provision of medical facts, with demonstration of an appreciation of the logistics and nuances in how to deliver excellent care which is targeted to specific patients. Candidates are reminded to read the questions carefully and thoroughly, and to include in their answer only information that is relevant to the question. The allocation of marks in multipart questions is shown to allow candidates to organise their answers appropriately. The glossary of terms is provided to help candidates to understand the type of information and structure required in the answer.

The examination report is now referenced to the syllabus to aid the candidate in directing their study more effectively. A selection of marking rubrics has been included in this report to complement the SAQ discussion and help guide trainees in the requirements of the assessment process and the standard of written content expected of the transitional fellow.

WRITTEN EXAMINATION REPORT

Instructions to Candidates

- (A) Write your answers in the blue books provided. **Each** question should be answered in a separate booklet. Please **DO NOT** write two short answer questions in the same booklet.
- (B) Start each answer on a **new booklet** and indicate the **question number**. It is not necessary to rewrite the question in your answer book.
- (C) You should aim to answer each question in **ten** minutes.
- (D) **All** questions are worth ten marks each in total.
- (E) Record your **candidate number** and each **question number** on the cover of each book, page, and hand in all books.

Glossary of Terms

Critically evaluate:	Provide and explain the evidence available relating to a topic.
Outline:	Provide a summary of the important points.
List:	Provide a list.
Compare and contrast:	Provide a description of similarities and differences.
Assessment	Generic term that implies determining an underlying diagnosis, encompassing history, clinical examination, and relevant investigations.
Management:	Generic term that implies determining an overall management plan, encompassing resuscitation, definitive treatment, initial and ongoing monitoring with supportive treatment.
Discuss:	Explain the underlying key principles. Where appropriate, this may include controversies and/or advantages and disadvantages.
Explain:	Make plain or known in detail.

Notes

Where laboratory values are provided, abnormal values are marked with an asterisk (*).

Question 1

A 12-year-old child with a known nut allergy presents to the emergency department with presumed anaphylaxis. The child received two doses of intramuscular adrenaline (EpiPen®) at home and one intramuscular 10 microgram/kg adrenaline in ED. The child has a widespread urticarial rash, stridor and increased work of breathing.

The patient's vital signs are:

- Heart Rate 150 beats per min,
- Blood Pressure 76/40 mmHg,
- Respiratory Rate 30/min,
- Saturations 88% on 10 L/min via non-rebreather mask.

- a) Describe the pathophysiology of anaphylaxis (2 marks)
- b) Outline the management of this patient (6 marks)
- c) Describe the role of measuring tryptase in your clinical practice (2 marks)

Syllabus Topic/section	2.1.10 Immunological and Rheumatological Intensive Care L1 Anaphylaxis 2.1.20 Applied Pharmacology in Intensive Care
Angoff Score for this SAQ	5.83
Highest candidate score achieved	8
Angoff Pass Rate	83%

Examiners' comments:

This question focused on refractory anaphylaxis and required candidates to think beyond the standard anaphylaxis management algorithm.

Candidates who performed well were able to highlight their priorities for management, discuss the need for advanced airway support, and formulate a safe plan for managing a potentially difficult airway in the setting of concurrent haemodynamic instability. It was noted that some candidates chose inappropriately low doses of salbutamol and adrenaline for a 12yr old patient who had already failed to respond to 3 doses of IM adrenaline. Candidates need to take care that they focus on the patient and clinical situation in the question when prescribing medications or therapeutic monitoring targets rather than just applying generic starting doses.

Reference(s):

- Pouessel, Guillaume, et al. "Refractory anaphylaxis: a new entity for severe anaphylaxis." *The Journal of Allergy and Clinical Immunology: In Practice* 11.7 (2023): 2043-2048.
- Dodd, Amy, Anna Hughes, Nicholas Sargant, Andrew F. Whyte, Jasmeet Soar, and Paul J. Turner. Evidence update for the treatment of anaphylaxis." *Resuscitation* 163 (2021): 86-96.
- ASCIA_HP_Guidelines_Acute_Management_Anaphylaxis_2024.pdf

Question 2

Outline the key principles for reducing antimicrobial resistance in the ICU.

(10 Marks)

Syllabus Topic/section	2.1.3 Sepsis and Infections L1 Antimicrobial use in PICU
Angoff Score for this SAQ	5.13
Highest candidate score achieved	7.5
Angoff Pass Rate	83%

Examiners' comments:

This question focused on reducing antimicrobial resistance in the ICU.

This question was generally answered well. Candidates who performed well demonstrated a good understanding of antimicrobial stewardship and discussed a broad range of strategies to reduce the use of antibiotics in the ICU and prevent ICU acquired infection. Better answers demonstrated an appreciation of the responsibility ICU's have to prevent antimicrobial resistance, incorporating strategies from within the unit (limiting antibiotic use, guidelines for targeted antibiotic therapy, diagnostic stewardship, biomarker use to guide therapy, prevention of HAI's, deescalation etc) and the contribution from the wider organization (eg infection control policy, governance of broad spectrum antibiotics).

Reference(s):

- Micek et al. Optimal antibiotic use in the intensive care unit. Critical Care 2025 Oct 14;29:434

Question 3

In a pre-operative neonate with hypoplastic left heart syndrome, currently breathing spontaneously in low flow oxygen, outline the potential causes and your approach to management if:

- a. SpO₂ 87% and Lactate 1.7mmol/L (2 marks)
- b. SpO₂ 91% and Lactate 4mmol/L (4 marks)
- c. SpO₂ 55% and Lactate 4mmol/L (4 marks)

Syllabus Topic/section	2.1.4 Cardiovascular Intensive care L1 Congenital Heart Disease
Angoff Score for this SAQ	5.73
Highest candidate score achieved	7.83
Angoff Pass Rate	92%

Examiners' comments:

This question focussed on balancing the circulation in a baby with hypoplastic left heart syndrome. Most candidates demonstrated a good understanding of the basics of managing balanced circulations and comfortably passed this question.

Candidates who did well were able to give examples of specific causes rather than just generically discussing with reference to Qp:Qs. Some candidates missed the reference to the baby breathing low flow oxygen and did not discuss removing it in part A. Part B was answered well with most candidates recognising excessive pulmonary blood flow and describing a sensible approach to balancing and improving systemic blood flow. Part C required the recognition that there were multiple potential causes that might result in this pattern – most candidates focused on 'pump failure' and did not discuss reduced pulmonary blood flow due to high PVR, closing ductus or restrictive ASD as potential causes.

Reference(s):

- Kritzmire SM et al. Hypoplastic left heart syndrome. StatPearls 2023
- Wernovsky G et al. Hypoplasia of the left heart. Chapter 29 p625-45. Anderson's Pediatric Cardiology

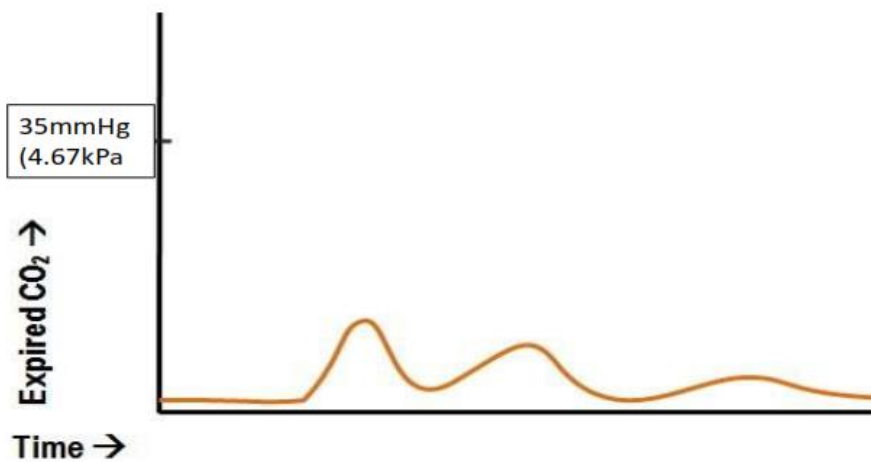
Question 4

a) Outline the principles of capnometry, including sensor types. (2 marks)

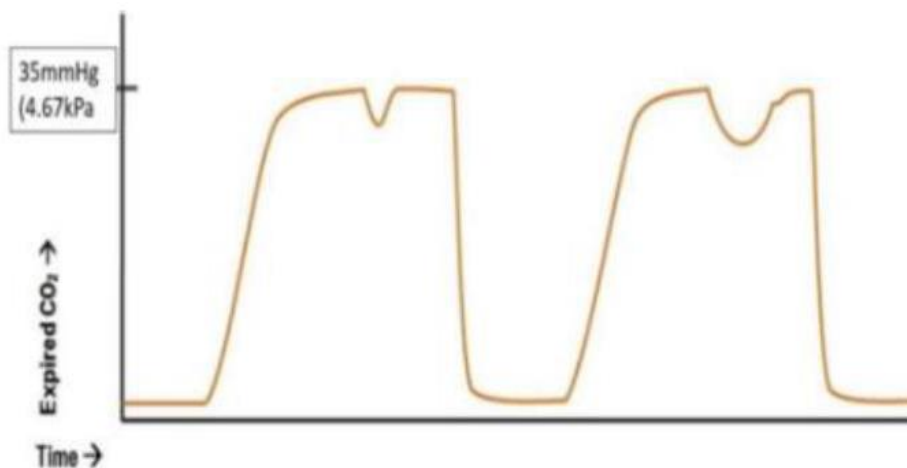
b) In a patient with severe ARDS, discuss potential causes of an increasing gradient between PaCO₂ and EtCO₂(end tidal CO₂) measurements and your approach to managing this issue. (6 marks)

c) In the following capnographs, state the aetiology of the abnormality and one clinical response you could take (2 marks)

i) In a ventilated patient Immediately Post Intubation:



ii) In a patient on controlled ventilation:



Syllabus Topic/section	2.1.5 Respiratory Intensive Care L1 Respiratory Monitoring
Angoff Score for this SAQ	4.97
Highest candidate score achieved	8
Angoff Pass Rate	58%

Examiners' comments:

This question focussed on principles of capnography and the physiological differences between end tidal CO₂ and measured arterial PaCO₂.

Some candidates confused colorimetric CO₂ detection with capnography (the qualitative measure of expired CO₂). To score well a discussion that included the principles of infrared spectroscopy and CO₂ absorption of light was expected.

Part B required discussion on alveolar dead space and how this is affected in severe ARDS. Very few candidates were able to provide a structured approach to this question. Those who scored well structured their discussion to causes of reduced pulmonary perfusion, V/Q mismatch and shunt and provided sensible management strategies to mitigate these. Some candidates omitted discussion of management which reduced marks available to them.

Part C required recognition of two specific capnography patterns and providing an immediate management plan which was done well by most candidates.

Reference(s):

- "Principles and Practice of Mechanical Ventilation" by Tobins et al –2nd edition.
- Jaffe, M. B., et al. "Carbon dioxide measurement." Capnography. Cambridge University Press, 2011. 381-396

Question 5

A 2-year-old is admitted with presumed septic shock, requiring intubation and ventilation for respiratory failure and inotropic support for hypotension.

Management has included:

- 50ml/kg fluid bolus
- Adrenaline, noradrenaline and vasopressin infusions
- Broad-spectrum antibiotics, which include Ceftriaxone, Vancomycin, and Clindamycin

Urine output is currently 1ml/kg/hr.

Blood results taken after the above treatment are below:

Parameter	Patient value	Reference
pH	7.26*	7.35 – 7.45
pCO ₂	49 mmHg (7.5 kPa)*	35 – 45 (4.7 – 6.0)
pO ₂	92 mmHg (12.3 kPa)	75 – 105 (10.7 – 14.0)
BE	-4.5 mmol/L*	-2.0 – +2.0
HCO ₃	10.0 mmol/L*	25.0 – 27.0
Na	149 mmol/L*	134 – 145
K	4.8 mmol/L	3.3 – 4.9
Cl	108 mmol/L*	97 – 106
Glucose	6.8 mmol/L*	3.5 – 5.4
Lactate	7.0 mmol/L*	< 2.0
Creatinine	90 umol/L*	11-36
Urea	12 mmol/L*	1.0-6.0

- a) List risk factors for Acute Kidney Injury (AKI) in this patient. (3 marks)
- b) Outline your management of AKI in this patient (5 marks)
- c) What are the outcomes of sepsis-associated AKI? (2 marks)

Syllabus Topic/section	2.1.7 Renal Intensive Care L1 Renal Failure
Angoff Score for this SAQ	5.53
Highest candidate score achieved	7.25
Angoff Pass Rate	42%

Examiners' comments:

This question focussed on acute kidney injury in a young patient with severe septic shock.

Candidates who did well focussed their discussion to the clinical scenario rather than providing more generic causes and management of AKI. Management required a broad discussion that encompassed fluid and electrolyte management in an unstable septic patient, consideration of timing/choice of renal replacement therapy, consequences of reduced urine output and prevention of iatrogenic kidney injury. Few candidates were able to discuss outcomes of AKI beyond stating that 'most get better.' To score well in this section discussion needed to include the impact on ICU stay, mortality and morbidity and risk of chronic kidney disease.

Reference(s):

NA

Question 6

A 5-year-old boy (weight 20kg) is currently intubated, ventilated and sedated in PICU. You have decided to initiate Total Parenteral Nutrition (TPN) to meet his full nutritional requirements. Write a TPN prescription for the next 24 hours assuming a fluid allowance of 100% Maintenance.

(10marks)

Syllabus Topic/section	2.1.6 Gastrointestinal (GI) and Metabolic Intensive Care L1 Enteral and parenteral nutrition
Angoff Score for this SAQ	4.77
Highest candidate score achieved	7.5
Angoff Pass Rate	33%

Examiners' comments:

This question assessed knowledge of the daily nutritional requirements for critically unwell children.

This question was not well answered with most candidates commenting on the need for a dietician to prescribe TPN. Whilst it may be common practice in some PICU's for the dietician to take responsibility for the TPN prescription, candidates should have a basic knowledge of the daily requirements for total calorie intake, carbohydrate, protein, fat and electrolytes and how this might need to be modified in specific circumstances. This question required demonstration of the main components of TPN and the daily requirements for these. Most candidate prescriptions contained omissions of one or more key components.

The marking rubric is included:

RUBRIC

	Below standard	At standard	Above standard
a) (10 marks)	<p>Incorrect fluid allowance calculation</p> <p>Does not mention all 3 macronutrients or mentions all 3 macronutrients but has no idea of daily requirements</p> <p>0-4 marks</p>	<p>Correct fluid allowance calculation</p> <p>Lists all 3 'macronutrients' and has some idea of daily requirements</p> <p>Mentions 2-3 'micronutrients' but must include sodium and potassium and has a vague idea of daily requirements</p> <p>5 - 7 marks</p>	<p>At standard plus</p> <p>Lists 3 macronutrients and knows daily requirements</p> <p>Lists 3-5 micronutrients and knows or has a good idea of daily requirements</p> <p>Mentions trace elements and or vitamins</p> <p>8-10 marks</p>

Reference(s):

NA

Question 7

Discuss the challenges associated with invasive ventilation in a previously well 3-month-old infant with bronchiolitis, and your approach to managing these challenges.

(10 marks)

Syllabus Topic/section	2.1.5 Respiratory L1 Respiratory Failure L1 Mechanical ventilatory support
Angoff Score for this SAQ	5.4
Highest candidate score achieved	7
Angoff Pass Rate	50%

Examiners' comments:

This question asked candidates to focus on the specific challenges encountered when ventilating babies with bronchiolitis.

Candidates who did well highlighted the high threshold required to intubate these children given the associated difficulties with ventilation and focused their discussion on bronchiolitis specific issues such as the heterogenous nature of the disease with mixed restrictive/obstructive physiology, risk of gas trapping, high secretion load and ventilator dyssynchrony. They were then able to discuss specific management strategies to mitigate these issues. Less successful candidates focused their answers on more generic principles of ventilation such as lung protective strategies which although they provided quite detailed answers, they were not specific for bronchiolitis and missed the bulk of the marks.

Reference(s):

- Invasive Mechanical Ventilation for Acute Viral Bronchiolitis: Retrospective Multicenter Cohort Study Pediatric Critical Care Medicine 2021.
- Respiratory Support Practices for Bronchiolitis in the Pediatric Intensive Care Unit 2024.
- Trends in Bronchiolitis ICU Admissions and Ventilation Practices: 2010–2019 2021.
- Pathophysiology of Acute Respiratory Failure in Children with Bronchiolitis and Effect of CPAP 2013.

Question 8

A 4-year-old boy presents with progressive ataxia, vomiting, and 'drunken' behaviour after exposure to open containers of methylated spirits (methanol) and radiator coolant (ethylene glycol) in his grandfather's shed.

a. Describe how you would assess the severity of intoxication and determine whether one or both agents are involved. Include key clinical signs, relevant investigations, and thresholds for initiating treatment.

(6 marks)

b. Severe ethylene glycol intoxication is confirmed. Outline your management plan.

(4 marks)

Syllabus Topic/section	2.1.15 Environmental Injuries and Toxicology in ICU L1 Poisoning 2.1.7 Renal Intensive Care L1 Acid-Base and Electrolyte disorders
Angoff Score for this SAQ	4.23
Highest candidate score achieved	4.75
Angoff Pass Rate	17%

Examiners' comments:

This question tested the knowledge of two specific toxidromes – methanol toxicity and ethylene glycol poisoning.

This question was not answered well with most candidates unable to demonstrate enough specific knowledge of either intoxication to allow differentiation between the two or guide specific management. Most candidates were able to discuss looking for a high anion gap metabolic acidosis (HAGMA) and increased osmolar gap but did as part of a generic approach to diagnosing and managing intoxication, rather than targeting what might be expected to be seen in these individual intoxications, which was insufficient to address the question asked. This question required candidates to contrast expected blood gas results to help differentiate between these two intoxications. Most candidates did not demonstrate an approach to assessing severity or priorities of management. Generic management of toxidromes was not sufficient to pass this question.

Reference(s):

- Life in the Fast Lane (toxic alcohols in general, ethylene glycol specifically)
- Don't Forget the Bubbles (methanol intoxication)
- Toxic Alcohol Poisoning, Cross J, Borek H, et al. Emergency Medicine Clinics of North America 2022, v40, 2, 327-341 (extensive review)
- Toxic Alcohols, Kraut J, Mullins M. N Engl J Med 2018;378:270-80. (review incl blood gases)

Question 9

A paediatric patient has been admitted to the intensive care unit after a submersion injury. They received cardiopulmonary resuscitation (CPR) prior to admission.

Outline the predictors of poor neurological outcome at the following time points.

- a) At the scene (3 marks)
- b) On presentation to hospital (3 marks)
- c) 72 hours after PICU admission (4 marks)

Syllabus Topic/section	2.1.13 Environmental and Toxicology in Intensive care L1 Submersion/Immersion
Angoff Score for this SAQ	5.37
Highest candidate score achieved	6.87
Angoff Pass Rate	33%

Examiners' comments:

This question focused on prognostication following submersion, a subset of patients with hypoxic ischaemic encephalopathy (HIE) who have well defined and specific prognostic factors.

Candidates scored well if they demonstrated precision in reporting prognostic factors, with many recognised prognostic factors requiring knowledge of specific times/values (eg duration of submersion \geq 6mins, number of adrenaline doses > 3 , time to ROSC > 25 -30mins all associated with poorer outcome). Some candidates described prognostic features that were not specific to submersion and focused more on generic CPR quality. Few were able to describe prognostic factors at all three of the defined timepoints. In general candidates were able to write more for part C than parts A & B, likely reflecting clinical experience.

The marking rubric is included:

RUBRIC

	Below standard	At standard	Above standard
a) Predictors of poor outcome at the scene (3 marks)	<2 factors listed Omits the most critical predictor of poor outcome: duration of submersion Describes factors without values (eg. Long duration of submersion, low GCS) 0-1 marks	2-3 factors listed with relevant values Must include duration of submersion 1.5-2 marks	All factors listed with relevant values 2.5-3 marks
b) Predictors of poor outcome on presentation to hospital (3 marks)	<2 factors listed Omits time to ROSC Describes factors without values (eg. Long ROSC, low pH) 0-1 marks	2-3 factors listed with relevant values Must include time to ROSC >25 min 1.5-2 marks	Majority of factors listed with relevant values 2.5-3 marks
c) Predictors of poor outcome 72 hours after PICU admission (4 marks)	2 or less factors listed Omits absence of purposeful movements / GCS <5 with no sedation Incomplete explanation of each factor 0-1.5 marks	3-4 factors listed with relevant descriptions Must include absence of purposeful movements (or GCS <5) when off sedation 2-3 marks	Majority of factors listed with relevant descriptions 3.5-4 marks

Reference(s):

- Kieboom JK et al. Outcome after resuscitation beyond 30minutes in drowned children with cardiac arrest and hypothermia: dutch nationwide retrospective cohort study. BMJ 2015; 350: h418. doi: 10.1136/bmj.h418
- Pellegrino F et al. Epidemiology, clinical aspects, and management of pediatric drowning. Ital J Pediatr. 2023 Jun 14;49:74. Doi : 10.1186/s13052-023-01464-1
- Quan L et al. Predicting outcome of drowning at the scene: a systematic review and meta-analyses. Resuscitation; 2016 Jul; 104:63-75.
- Drowning – Emergency Management in children – Queensland paediatric clinical guideline (found on QPEC website)
- Life in the Fast Lane – Drowning 2014
- UpToDate: Drowning (submersion injury). April 2025.

Question 10

a. List two causes of acute paralytic syndrome for each of the following anatomical sites.

- Spinal cord
- Anterior horn cell
- Neuromuscular junction
- Muscle

(4 marks)

b. With regards to Transverse Myelitis and Guillian Barre syndrome, compare and contrast

- Clinical features

(2 marks)

- Management

(3 marks)

- Prognosis

(1 mark)

Syllabus Topic/section	2.1.8 Neurological Intensive Care L1 Acute Paralytic syndromes
Angoff Score for this SAQ	5.9
Highest candidate score achieved	7
Angoff Pass Rate	50%

Examiners' comments:

This question focused on causes of acute paralysis in children, with a more focused look at the clinical features, management and prognosis of two specific causes.

Part A required a list of causes and was answered well by most candidates. For part B most candidates knew the significant differences between TM and GBS but lacked discussion on important features such as autonomic dysfunction, bowel/bladder involvement and supportive care which was required to score well. Many candidates were unable to provide prognostic detail regarding risk of chronic residual neurological deficit.

Reference(s):

- Baalaji, Muli; Jayashree, Muralidharan. Acute Flaccid Paralysis. Journal of Pediatric Critical Care 2(3):p 49-57, Jul-Sep 2015. | DOI: 10.21304/2015.0203.00079
- Yiu E, Yum SW. Guillain-Barré syndrome in children: Treatment and prognosis. UpToDate 2024. Greenberg B. Transverse myelitis: Treatment and prognosis. UpToDate 2024
- Krishnan C, Kaplin AI, Deshpande DM, Pardo CA, Kerr DA. Transverse Myelitis: pathogenesis, diagnosis and treatment. Front Biosci. 2004 May 1;9:1483-99. doi: 10.2741/1351. PMID: 14977560.

Question 11

Regarding mechanical ventilation in children with severe hypoxic respiratory failure due to Paediatric Acute Respiratory Distress Syndrome (PARDS):

a) Outline the approach to titration of invasive mechanical ventilation settings in PARDS. Include the physiologic rationale for these settings.

(7 marks)

b) Outline how the respiratory management should be modified in the setting of severe hypoxia due to unilateral consolidation of the lung.

(3 marks)

Syllabus Topic/section	2.1.5 Respiratory Intensive Care L1 Acute respiratory distress syndrome L1 Mechanical ventilation
Angoff Score for this SAQ	5.23
Highest candidate score achieved	6.5
Angoff Pass Rate	58%

Examiners' comments:

This question focused on mechanical ventilation in PARDS. Candidates were expected to comment on how they manage mechanical ventilation in typical PARDS and then contrast how they would change their management in cases of unilateral lung disease.

Most candidates were able to discuss lung protective strategies to limit ventilator induced lung injury, but some candidates only listed target values and omitted discussion of the physiological rationale for these settings. Part B required candidates to consider how they protect the 'good lung' which may become injured whilst applying generic lung protective strategies. To score well candidates needed to discuss how they titrate their PIP and PEEP to avoid overdistention of the non-diseased lung whilst still maintaining adequate overall ventilation. Most candidates focused solely on patient positioning rather than how they monitor and modify the effects of ventilation in this setting.

Reference(s):

- PALICC-2: <https://pmc.ncbi.nlm.nih.gov/articles/pmc9848214/#sec8>
- Unilateral Lung disease and Differential Lung Ventilation https://link.springer.com/chapter/10.1007/978-3-031-14138-6_22
- [Chest wall loading in the ICU: pushes, weights, and positions - PMC](#)

Question 12

- a. Outline the impact of morbid obesity on respiratory function (2 marks)
- b. In the setting of emergency intubation for hypoxic respiratory failure, describe the specific risks associated with morbid obesity and how you would mitigate these risks. (8 marks)

Syllabus Topic/section	2.1.15 The obese child 2.1.5 Respiratory intensive care L2 Respiratory function tests
Angoff Score for this SAQ	4.87
Highest candidate score achieved	7.375
Angoff Pass Rate	42%

Examiners' comments:

This question focused on the specific respiratory implications of morbid obesity and the clinical impact of these in the setting of emergency intubation.

In part A most candidates focused discussion on chest wall mechanics and omitted discussion of the effects of obesity on respiratory function tests (eg Total lung capacity, FRC etc.). This may have had a flow on effect to part B with many candidates focusing their discussion on the planning and intubation phases but not discussing the difficulties with oxygenation and ventilation pre and post intubation.

Most candidates demonstrated a sensible logistical approach to intubating a patient with obesity but their responses lacked discussion on the challenges of oxygenation in the peri-intubation and immediately post intubation and how they would manage the impact of poor lung compliance and atelectasis after induction.

Reference(s):

- Effect of obesity on lung function review 2018
- Influence of morbid obesity on respiratory function | Deranged Physiology
- Anaesthesia for an obese patient BMJ 2020
- UK Guideline for perioperative Mx of obese pts 2015.

Question 13

With respect to the surgical repair of Coarctation of Aorta:

- a) Outline the pathophysiological mechanisms contributing to hypertension following coarctation repair (2 marks)
- b) Discuss the management of hypertension in the immediate postoperative period (5 marks)
- c) Excluding hypertension, list six potential early complications specific to this operation (3 marks).

Syllabus Topic/section	2.1.17 Peri-operative Issues in Intensive Care L1 Cardiac Surgery 2.1.4 Cardiovascular intensive care L1 Congenital heart disease
Angoff Score for this SAQ	5.53
Highest candidate score achieved	7.75
Angoff Pass Rate	58%

Examiners' comments:

This question focused on the common management problem of hypertension post-surgical repair of coarctation.

To score well this answer required broad consideration of the causes of hypertension including post operative pain, residual lesions as well as the underlying neuro-endocrine mechanisms driving hypertension. Better answers demonstrated an appreciation of the importance of BP control post operatively, the need to exclude residual lesions, included reference to drug doses and intended therapeutic goals and how they would titrate the drug to achieve this. Complications post cardiac surgery is a common exam question and candidates are reminded to tailor their answer to complications specific to the lesion involved rather than stating more generic complications such as bleeding, SIRS and tamponade as these will not attract marks.

The marking rubric is included:

RUBRIC

	Below standard	At standard	Above standard
a) pathophysiological mechanisms (2 marks)	<ul style="list-style-type: none"> Unable to describe pathophysiological mechanisms Can only mention one mechanism e.g. post op pain. <p>0-0.5 marks</p>	Mentions 2 mechanisms in detail: <ul style="list-style-type: none"> sympathetic overactivity, baroreceptor resetting, renin-angiotensin activation Residual lesions Post operative pain/agitation contributing to sympathetic surge <p>1-1.5marks</p>	At standard plus describes all the mechanisms and mentions role of residual lesions and post operative pain. <p>2 marks</p>

<p>a) Mx of HTN</p> <p>(5 marks)</p>	<ul style="list-style-type: none"> • Does not mention excluding residual lesions • Does not manage pain/sedation as first line • Superficial answer or gives generic post op cardiac management and not link to specifics <p style="text-align: center;">0-2 marks</p>	<ul style="list-style-type: none"> • Discuss monitoring requirements • Mentions need to control hypertension to prevent disruption of repair site and discuss bleeding risk • Mentions excluding residual lesions • Discuss pain and sedation management • Mentions titratable antihypertensive agent. • Discuss reasonable targets to BP. <p style="text-align: center;">2.5-3.5 marks</p>	<p>At standard plus</p> <ul style="list-style-type: none"> • identifies the need for aggressive control early on; • All pharmacological interventions mentioned. <p style="text-align: center;">4-5 marks</p>
<p>b) Six specific complications</p> <p>(3 marks)</p>	<p>Marks not awarded for general complications of cardiac surgery.</p> <p style="text-align: center;">0-1 marks</p>	<p>Must have at least 4 specific complications. Must have chylothorax, RLN palsy and diaphragm palsy.</p> <p style="text-align: center;">1.5-2 marks</p>	<p>Six specific complications.</p> <p style="text-align: center;">2.5-3 marks</p>

Reference(s):

- Nelson JS, Stone ML, Gangemi JJ. Coarctation of the aorta. In: Moller JH, Hoffman JIE, eds. Critical Heart Disease in Infants and Children. 3rd ed. Elsevier; 2019:551–564.

Question 14

There is a perception that failed extubations are occurring more frequently in your PICU.

- a) Describe how you would confirm whether this is a real issue (2 marks).
- b) Outline the steps you would take to design and implement a quality improvement project to reduce the rate of failed extubations (8 marks).

Syllabus Topic/section	2.3.1 Intensive Care Administration Quality Improvement
Angoff Score for this SAQ	5.43
Highest candidate score achieved	6.75
Angoff Pass Rate	50%

Examiners' comments:

This question assessed knowledge of the quality improvement cycle and how this might be applied to a specific problem in the ICU.

This form of management question is commonly asked in this examination. Candidates are expected to demonstrate knowledge of the components of a quality improvement cycle and highlight these with specific examples related to the scenario given in the question (in this case reducing failed extubations). To score well, candidates needed to describe the components of a QI cycle and illustrate each one with sensible strategies that addressed failed extubations. Presenting a generic QI cycle did not score high marks. It was notable that no candidate referred to the ANZICS database which is used for benchmarking all units in NZ and Australia for this specific problem. Attendance and participation in unit quality meetings is a useful way to improve knowledge in this area.

Reference(s):

NA

Question 15

Regarding coronary artery involvement in Kawasaki Disease

- a) Identify 4 risk factors (2 marks)
- b) List 4 echocardiogram findings (4 marks)
- c) Outline specific short term management strategies (2 marks)
- d) List 4 complications (2 marks)

Syllabus Topic/section	2.1.10 Immunological and Rheumatological Intensive Care L1 Kawasaki Disease
Angoff Score for this SAQ	5.47
Highest candidate score achieved	6.75
Angoff Pass Rate	58%

Examiners' comments:

This question focused on the topical issue of coronary complications in severe Kawasaki disease, which has a rising incidence worldwide.

Most candidates demonstrated good knowledge of risk factors and first line Kawasaki pharmacological treatment but did not demonstrate sufficient understanding of expected echo findings and complications related to the abnormal coronaries to score high marks.

Reference(s):

NA

Question 16

A 14-year-old girl has met criteria for neurological determination of death (brain death) following a severe isolated brain injury. Her family has consented to organ donation but request that the process be delayed until her brother returns from overseas in 3–4 days.

Outline your approach to her physiological and medical care in order to optimise the chances of successful organ and tissue donation

(10 marks).

(DO NOT discuss the diagnosis of brain death, or the details of predonation screening tests.)

Syllabus Topic/section	2.1.14 Organ and Tissue Donation in Intensive Care L1 Care of the Potential organ donor
Angoff Score for this SAQ	5.6
Highest candidate score achieved	7.25
Angoff Pass Rate	75%

Examiners' comments:

This question required the candidate to demonstrate a holistic approach to managing a child following neurological determination of death to increase the chances of becoming a donor.

Most candidates demonstrated a good understanding of the physiological changes that occur and gave sensible plans for maintaining homeostasis. To meet standard for this question required in depth discussion of the cardiovascular, respiratory and endocrine management. Better answers included discussion around supporting the family and ensuring they were aware that their request may entail the need for ongoing medical procedures and that it may not be possible to support the child for this long.

Reference(s):

- Intensive Care Med (2024) 50:964-967, <https://doi.org/10.1007/s00134-024-07409-4>
- The ANZICS Statement on Death and Organ Donation [section 2.3.1 and Appendix 3 (checklist)], as recommended in the Paediatric Syllabus.

Question 17

- a) List 4 risk factors for acute upper gastrointestinal bleeding in PICU patients (2 marks)
- b) List 4 classes of medications used for gastrointestinal stress ulcer prophylaxis in PICU (1 mark)
- c) Outline potential complications associated with the use of gastrointestinal stress ulcer prophylaxis (2 marks)
- d) Discuss the evidence for the use of stress ulcer prophylaxis in PICU (5 marks)

Syllabus Topic/section	2.1.6 GI and Metabolic Intensive Care L1 Acute Gastrointestinal bleeding 2.1.20 Applied Pharmacology in Intensive Care Gastrointestinal
Angoff Score for this SAQ	5.09
Highest candidate score achieved	6.25
Angoff Pass Rate	33%

Examiners' comments:

This question was focused on the risks of upper GI bleeding and the use of stress ulcer prophylaxis to prevent upper GI bleeding.

Many candidates struggled with this question. Some may have misread the question and continued to answer all parts of the question with reference to upper GI bleeding rather than stress ulcer prophylaxis. Many missed important risk factors such as steroid use and coagulopathy – candidates will receive better marks when listing the most common and most important risk factors when there are multiple marks available. Few were able to discuss the literature or evidence for use of stress ulcer prophylaxis.

Reference(s):

- Stress Ulcer Prophylaxis during Invasive Mechanical Ventilation. N Engl J Med. 2024;391(1):9. Epub 2024 Jun 14.
- Proton-Pump Inhibitors to Prevent Gastrointestinal Bleeding - An Updated Meta-Analysis. NEJM Evid. 2024;3(7):EVIDoA2400134. Epub 2024 Jun 14.

Question 18

Critically evaluate the role of corticosteroids in Acute Respiratory Distress Syndrome (ARDS). Your answer should include:

- a) Pathophysiology and mechanism of action (2 marks)
- b) Disadvantages of corticosteroids (2 marks)
- c) Evidence for corticosteroids (5 marks)
- d) My practice statement (1 mark)

Syllabus Topic/section	2.1.20 Applied Pharmacology in Intensive Care Corticosteroids
Angoff Score for this SAQ	5.27
Highest candidate score achieved	7.5
Angoff Pass Rate	33%

Examiners' comments:

This question focused on the use of steroids in ARDS. This is considered core PICU knowledge and candidates were expected to have a good understanding of the evidence that underpins the use of steroids.

Those who scored well were able to highlight the controversies in the use of steroids in ARDS and support their discussion with evidence from the literature by quoting the results of some well known trials (see reference list below). Some candidates misread the question and discussed generic use of steroids in PICU rather than specifically in ARDS so were unable to score well. Most candidates were able to state that the evidence in paediatrics is scant and extrapolated from adults but were then unable to quote the adult literature so their answers lacked detail.

References:

- Villar, J.; Ferrando, C.; Martínez, D.; Ambrós, A.; Muñoz, T.; Soler, J.A.; Aguilar, G.; Alba, F.; GonzálezHiguera, E.; Conesa, L.A.; et al. Dexamethasone treatment for the acute respiratory distress syndrome: A multicentre, randomised controlled trial. *Lancet Respir. Med.* 2020, 8, 267–276.
- Steinberg KP, Hudson LD, Goodman RB, et al: National Heart, Lung, and Blood Institute Acute Respiratory Distress Syndrome (ARDS) Clinical Trials Network: "Efficacy and safety of corticosteroids for persistent acute respiratory distress syndrome." *N Engl J Med* 2006; 354:1671-1684.
- Villar et al. Dexamethasone treatment for the acute respiratory distress syndrome: a multicentre, randomised controlled trial (DEXA-ARDS) *Lancet Respir Med*
- . 2020 Mar;8(3):267-276. doi: 10.1016/S2213-2600(19)30417-5. Epub 2020 Feb 7.
- The Pediatric Acute Lung Injury Consensus Conference Group, Pediatric Acute Respiratory Distress Syndrome: Consensus Recommendations From the Pediatric Acute Lung Injury Consensus Conference (PALICC) *Pediatr Crit Care Med.* 2015 Jun;16(5):428–439. doi: 10.1097/PCC.0000000000000350
- Executive Summary of the Second International Guidelines for the Diagnosis and Management of Pediatric Acute Respiratory Distress Syndrome (PALICC-2) *Pediatr Crit Care Med* 2023 Feb 1;24(2):143-168. doi: 10.1097/PCC.0000000000003147. Epub 2023 Jan 20.
- Meduri et al. Methylprednisolone infusion in early severe ARDS: results of a randomized controlled trial *Chest* 2007 Apr;131(4):954-63. doi: 10.1378/chest.06-2100.

Question 19

A previously healthy 14-year-old boy is transferred to your PICU following a mountain biking accident. He has been intubated and ventilated for 48 hours at a regional hospital. His only documented injury is a traumatic cervical spinal cord injury, with a sensory level around C5.

Discuss your approach to his ongoing management.

(10 marks)

Syllabus Topic/section	2.1.12 Trauma Intensive Care L1 Spinal Trauma
Angoff Score for this SAQ	5.3
Highest candidate score achieved	5.75
Angoff Pass Rate	25%

Examiners' comments:

This question focussed on a child with a c-spine injury who had already received emergency stabilisation and was now being transferred for more definitive care. There was reference to a specific level of spinal injury and candidates were expected to focus their discussion on the particular challenges that might be encountered in a patient with an injury to C5 – particularly the need for attention to respiratory management to give this patient the best chance to self-ventilate without support.

This is a big topic and those who answered well were able to prioritise discussion of big picture topics such as spinal stabilisation, respiratory management to improve the likelihood of independent self ventilation, and the importance of bowel and bladder care to prevent the risk of autonomic dysreflexia. Better answers also addressed the need for psychosocial support for the child and the family - it was notable that that most candidates omitted this. Several candidates misread the question and focussed on the immediate emergency management of a c-spine injury rather than formulating a plan for ongoing management of a patient who was 48hrs into their injury. Some candidates wrote what seemed like an admission note that did not give any indication of the expected challenges that would need to be navigated over the coming days. Some candidates gave headings of issues (eg "analgesia" or "bowel care") but did not elaborate on what this might entail so could not score well. In a big question like this, focussing attention to the 'bigger picture' topics is more likely to score well rather than superficially covering more generic supportive care.

Reference(s):

- Konovalov, N., et al. (2020). Pediatric Cervical Spine Injuries and SCIWORA: WFNS Spine Committee Recommendations. *Neurospine*, 17(4), 797–808.
- Cervical cord injury and critical care Michelle Denton, MBChB FRCA, Justin McKinlay, MA (Oxon) BM BCh FRCA Continuing Education in Anaesthesia Critical Care & Pain, Volume 9, Issue 3, June 2009, Pages 82–86, <https://doi.org/10.1093/bjaceaccp/mkp013>
- Ch.78 from Oh's Manual (Spinal injuries by Sumesh Arora and Oliver J Flower)
- Management of Acute Traumatic Spinal Cord Injury, *Critical Care Neurology* (K Sheth, Section Editor), Published: 29 January 2015, Volume 17, article number 6, (2015)

Question 20

Discuss your approach to red blood cell transfusion in a previously well patient with isolated severe traumatic brain injury (TBI).

Your answer should address the following:

- Physiological rationale (1 mark)
- Risks and disadvantages of transfusion (3 marks)
- Relevant evidence and recommendations (6 marks)

Syllabus Topic/section	2.1.11 Haematological and Oncological Intensive Care L1 Blood product transfusion
Angoff Score for this SAQ	4.27
Highest candidate score achieved	6.5
Angoff Pass Rate	42%

Examiners' comments:

This question was focused on the evidence for transfusion in a specific group of patients – those with TBI. Answers were expected to be focused specifically on the use in TBI. This is a topic with emerging new evidence and candidates might want to go back and read about this.

Most candidates did not demonstrate sufficient knowledge of this topic to score well. Very few candidates were able to outline 2-3 disadvantages for red cells in the context of TBI (with most discussing more general risks for transfusions) and very few were able to quote any evidence related to TBI from transfusion trials. When there is an introductory stem to a question that states a specific disease/topic, the questions below are expected to be specific to the topic asked rather than a more generalized discussion of ICU problems.

Reference(s):

- Lacroix J, Hébert PC, Hutchison JS, Hume HA, Tucci M, Ducruet T, Gauvin F, Collet JP, Toledano BJ, Robillard P, Joffe A, Biarent D, Meert K, Peters MJ; TRIPICU Investigators; Canadian Critical Care Trials Group; Pediatric Acute Lung Injury and Sepsis Investigators Network. Transfusion strategies for patients in pediatric intensive care units. *N Engl J Med.* 2007 Apr 19;356(16):1609-19. doi:10.1056/NEJMoa066240. PMID: 17442904.
- Tasker, Robert C., Alexis F. Turgeon, and Philip C. Spinella. "Recommendations on RBC transfusion in critically ill children with acute brain injury from the pediatric critical care transfusion and anemia expertise initiative." *Pediatric Critical Care Medicine* 19.9S (2018): S133-S136.
- Taccone, Fabio Silvio, et al. "Restrictive vs liberal transfusion strategy in patients with acute brain injury: the TRAIN randomized clinical trial." *Jama* 332.19 (2024): 1623-1633.
- Turgeon, Alexis F., et al. "Liberal or restrictive transfusion strategy in patients with traumatic brain injury." *New England Journal of Medicine* 391.8 (2024): 722-735.

Question 21

You have admitted a previously well 6yr old child who has had an out of hospital cardiac arrest. They received CPR for 35mins before return of spontaneous circulation (ROSC).

- a) What features in the history would suggest a primary cardiac cause for the cardiac arrest?
(2 marks)
- b) Outline the haemodynamic management priorities and specific haemodynamic challenges during the first 6hrs.
(6 marks)
- c) The ECG taken immediately post ROSC shows a prolonged corrected QT interval (QTc). Explain the significance of this finding.
(2 marks)

Syllabus Topic/section	2.1.4 Cardiovascular Intensive Care Post-Resuscitation Care
Angoff Score for this SAQ	5.08
Highest candidate score achieved	6.75
Angoff Pass Rate	25%

Examiners' comments:

This question was focused on the subgroup of patients with out of hospital cardiac arrest (OHCA) that are from primary cardiac causes. Management of OHCA is core PICU knowledge and a detailed discussion of the management challenges was expected.

Those who scored well discussed the challenges of balancing a failing heart with maintaining adequate cerebral perfusion for a good neurological outcome. To do this well required consideration of optimizing cardiac output (eg arrhythmia management, inotropic support with therapeutic targets) and considering how a potentially failing heart may impact neuroprotection goals (eg avoiding hypotension, consequences of a high CVP, increasing afterload to maintain CPP). A surprising number of candidates did not know that a prolonged QTc interval is a common incidental finding immediately post CPR and that whilst it is reasonable to avoid QT prolonging medications, it is not possible to diagnose long QT syndrome at this time point.

The marking rubric is included:

RUBRIC

	Below standard	At standard	Above standard
a) Features in the history (2 marks)	Does not include shockable first rhythm Or Only able to list 1-3 features 0-0.5 marks	Answer must include: -shockable first rhythm List includes at least 4 distinguishing features 1-1.5 marks	In addition to 'at standard', comprehensive list of features 2 marks
b) Management (6 marks)	No discussion of assessment of current haemodynamic state and adequacy of cardiac output Or	Answer addresses assessment of current haemodynamic state and therapeutic targets for ensuring good brain perfusion <u>Must include:</u>	In addition to 'at standard' Answer includes discussion of complexity of balancing arrhythmia/myocardial dysfunction with maintaining neuroprotective goals

	<p>Gives generic HIE treatment algorithm (doesn't answer the question asked)</p> <p>Or</p> <p>Does not mention all 4 essential points listed in "at standard"</p> <p>0-2.5 marks</p>	<p>-Assessment of and optimization of current haemodynamic state</p> <p>-Discussion of ideal MAP target (does not have to give specific number – ie centile range ok)</p> <p>-Avoidance of hypotension</p> <p>-Assessment and management of any ongoing arrhythmia</p> <p>3-4 marks</p>	<p><u>For example:</u></p> <p>mentions potential for decreased cardiac output with antiarrhythmics/vasopressors</p> <p>or</p> <p>potential precipitation of arrhythmia with inotropic agents</p> <p>or</p> <p>challenges balancing high after load to achieve brain perfusion vs myocardial dysfunction</p> <p>or</p> <p>Challenge of managing RH failure with high CVP and reduced brain perfusion</p> <p>Or</p> <p>Other other demonstration of higher level thinking</p> <p>4.5-6 marks</p>
<p>c) Significance of finding (2 marks)</p>	<p>Makes immediate diagnosis of long QT syndrome as cause for the cardiac arrest</p> <p>0-0.5 marks</p>	<p>Significance discussion must include:</p> <p>-Unable to diagnose long QTc on ECG taken immediately post CPR</p> <p>-Consideration of avoidance of QT prolonging medications</p> <p>1-1.5 marks</p>	<p>In addition to 'at standard'</p> <p>Discussion of factors during/post cardiac arrest that may prolong the QTc (hypothermia, electrolyte imbalance, medications)</p> <p>2 marks</p>

Reference(s):

- AAP Policy Statement Pediatric Sudden Cardiac Arrest. Pediatrics 2012;129:e1094-e1102
- AHA Scientific Statement Pediatric Post-Cardiac Arrest Care. Circulation 2019; 140:e194-e233
- QTc interval in survivors of out of hospital cardiac arrest. International Journal of Cardiology 2021. 323:118123

Question 22

In regards to best evidence based research:

a) Rank the major study designs in order of level of evidence, from highest to lowest, according to standard hierarchies in evidence-based medicine.

(2 marks)

b) You are designing a study to evaluate an intervention in the PICU. Identify the study design that would provide the highest level of evidence and outline its strengths and limitations.

(4 marks)

c) You are designing a study to evaluate prognosis in the PICU. Identify the study design that would provide the highest level of evidence and outline its strengths and limitations.

(4 marks)

Syllabus Topic/section	2.5.1 Research and Evidence Based Practice in Intensive Care Different levels of evidence
Angoff Score for this SAQ	5.07
Highest candidate score achieved	8
Angoff Pass Rate	83%

Examiners' comments:

This was a question looking at levels of evidence and how to choose the best evidence to answer a clinical question. In general it was answered well by most candidates.

Many candidates missed one or more important study designs but managed to place the ones they choose into a reasonable order of evidence. Most candidates correctly identified that a randomised controlled trial was the best answer for part b, a prospective cohort study was the best answer for part c and were able to discuss strengths and limitations of these study designs when used in the setting of a PICU.

Reference(s):

NA

Question 23

- a) What are the determinants of arterial oxygen saturation in a patient on veno-venous extracorporeal membrane oxygenation (VV ECMO)? (2 marks)
- b) With respect to the following issues on ECMO, please outline the mechanism, and the management of:
- i) Recirculation in VV ECMO (4 marks)
 - ii) Differential hypoxemia in veno arterial (VA) ECMO (4 marks)

Syllabus Topic/section	2.1.5 Respiratory Intensive care L1 ECMO support for respiratory failure
Angoff Score for this SAQ	5.3
Highest candidate score achieved	8
Angoff Pass Rate	67%

Examiners' comments:

This question focused on the issue of desaturation whilst on ECMO and explored two common problems that may be responsible for desaturation.

Most candidates demonstrated good knowledge of the determinates of oxygenation on VV-ECMO. Better answers used a structure that separated the discussion into patient and circuit related factors. Most candidates could describe recirculation and differential hypoxia but their management discussion was focused on changing ECMO configuration rather than a broader discussion of management including changing ECMO flows, ventilation strategy and inotrope management. Some candidates confused aspects of management, particularly regarding when to increase and when to decrease flows to mitigate the above problems.

Reference(s):

- Furfaro, D. , Supady, A. & Abrams, D. (9900). Oxygen delivery and carbon dioxide removal on venovenous extracorporeal membrane oxygenation. Current Opinion in Critical Care, Publish Ahead of Print , doi: 10.1097/MCC.0000000000001259.
- Gagliardi V, Gagliardi G. Recirculation in Veno-Venous Extracorporeal Membrane Oxygenation. Medicina 2024;60(12):1936.
- Xie A, Yan TD, Forrest P. Recirculation in venovenous extracorporeal membrane oxygenation. J Crit Care. 2016 Dec;36:107-110. doi: 10.1016/j.jcrc.2016.05.027. Epub 2016 Jun 6. PMID: 27546757.
- Falk L, Sallisalimi M, Lindholm JA, Lindfors M, Frenckner B, Broomé M, Broman LM. Differential hypoxemia during venoarterial extracorporeal membrane oxygenation. Perfusion. 2019 Apr;34(1_suppl):22-29. doi: 10.1177/0267659119830513. PMID: 30966908.

Question 24

a) In a table, show the changes in thyroid stimulating hormone (TSH) and tri-iodothyronine (T3) levels expected in:

- hypothyroidism;
- subclinical hypothyroidism;
- sick euthyroid syndrome.

(2 marks)

b) Outline the pathophysiology in “sick euthyroid syndrome”.

(4 marks)

c) Discuss the role of tri-iodothyronine (T3) replacement/supplementation in critically ill children.

(4 marks)

Syllabus Topic/section	2.1.9 Endocrine Intensive Care L2 Other thyroid disorders
Angoff Score for this SAQ	4.67
Highest candidate score achieved	7
Angoff Pass Rate	25%

Examiners' comments:

This question examined thyroid function testing and supplementation in PICU. This is a topic that has been asked previously and was not answered well by most candidates.

Most candidates were able to complete part a correctly. Most candidates demonstrated a poor understanding of sick euthyroid syndrome and were unable to provide sufficient detail to score well. For a four mark answer candidates were expected to discuss the changes in the other thyroid hormone levels expected in sick euthyroid syndrome (rT3, T4, and free T4), and provide some discussion on the possible pathophysiology behind these changes, including adaption to critical illness and the more recent cytokine suppression theory. Very few candidates discussed evidence for T3 supplementation in critically ill children beyond a vague statement that it is not done or no longer recommended. Discussion of the evidence (or lack there of) in specific patient groups such as cardiac surgery, brain death, sepsis and burns was expected to score well.

Reference(s):

- Lee S, Farwell AP. Euthyroid sick syndrome. *Comprehensive Physiology*. 2016 Apr 17;6(2):1071-80.
- Nistal-Nuño B. Euthyroid sick syndrome in paediatric and adult patients requiring extracorporeal circulatory support and the role of thyroid hormone supplementation: a review. *Perfusion*. 2021 Jan;36(1):21-33.
- Portman MA, Slee A, Olson AK, Cohen G, Karl T, Tong E, Hastings L, Patel H, Reinhartz O, Mott AR, Mainwaring R. Triiodothyronine supplementation in infants and children undergoing cardiopulmonary bypass (TRICC) a multicenter placebo-controlled randomized trial: age analysis. *Circulation*. 2010 Sep 14;122(11_suppl_1):S224-33.
- Portman MA, Slee AE, Roth SJ, Radman M, Olson AK, Mainwaring RD, Kamekar A, Nuri M, Hastings L, TRICC Investigators. Triiodothyronine supplementation in infants undergoing cardiopulmonary bypass: a randomized controlled trial. *In Seminars in Thoracic and Cardiovascular Surgery* 2023 Mar 1 (Vol. 35, No. 1, pp. 105-112). WB Saunders.
- Radman M, Portman MA. Thyroid hormone in the pediatric intensive care unit. *Journal of Pediatric Intensive Care*. 2016 Dec;5(04):154-61.
- Ross O, Petros A. The sick euthyroid syndrome in paediatric cardiac surgery patients. *Intensive care medicine*. 2001 Jul 1;27(7):1124.
- Soto-Rivera, Carmen L. MD; Agus, Michael S. D. MD; Sawyer, Jaclyn E. PharmD; Macrae, Duncan J. MB, ChB, sFRCA, FRCPC. Pediatric Cardiac Intensive Care Society 2014 Consensus Statement: Pharmacotherapies in Cardiac Critical Care Hormone Replacement Therapy. *Pediatric Critical Care Medicine* 17(3_suppl):p S59-S68, March 2016. |

Question 25

In table form, compare and contrast early onset neonatal sepsis with late onset neonatal sepsis using the following headings:

- definition (2 marks)
- pathogenesis (2 marks)
- causative organisms (2.5 marks)
- risk factors (2.5 marks)
- antimicrobial therapy (1 mark).

Syllabus Topic/section	2.1.16 Neonatal Intensive Care L1 Neonatal Sepsis
Angoff Score for this SAQ	6.1
Highest candidate score achieved	7.75
Angoff Pass Rate	33%

Examiners' comments:

This question focussed on neonatal sepsis, contrasting the differences between early and late onset forms which have their own distinct pathogenesis and risk factors.

Candidates who did well demonstrated the important differences between early and late onset sepsis, including discussion that there is inconsistency in the literature in defining these two groups. They were able to provide a reasonable time frame to differentiate the two; were able to describe the difference between vertical and horizontal transmission and chose antimicrobial regimes that covered the organisms they had listed as causative. This was a relatively simple question but it was easy to miss important marks by not being specific enough – eg stating late onset sepsis occurs at > than 7 days but not defining an upper limit of age, missing key organisms or only discussing bacterial causes and omitting acyclovir.

Reference(s):

NA

Question 26

A 2-year-old boy is admitted following clot retrieval for a right middle cerebral artery (MCA) infarct. He is intubated and ventilated. His endotracheal tube, arterial and central venous lines are well placed. On arrival, his heart rate is 60 beats per minute and his blood pressure is 180/100mmHg.

- a. Outline the immediate priorities of management for this patient (5 marks)
- b. Outline your approach to blood pressure management over the next 12 hours. Justify your decision making including any antihypertensive agents used (5 marks)

Syllabus Topic/section	2.1.8 Neurological Intensive care L1 Acute Cerebrovascular Injury 2.1.20 Applied Pharmacology in intensive care Antihypertensives
Angoff Score for this SAQ	5.33
Highest candidate score achieved	7.5
Angoff Pass Rate	67%

Examiners' comments:

This question focused on the post operative management of children following clot retrieval for stroke. Specific knowledge regarding clot retrieval was not required. Candidates were required to demonstrate a safe approach to managing a post operative patient with an injured brain.

The first part of this question described a patient returning from theatre with physiology concerning for a cushing reflex. Candidates were expected to recognize this pattern and prioritise investigation to exclude raised ICP that may require additional intervention before focusing on managing the BP. Those who did not prioritise imaging and discussion with the interventional team were unable to score sufficient marks to pass this question. Candidates who answered part B well were able to describe a stepwise approach to safely reducing BP in the setting of brain injury with reference to specific BP targets/goals, justification of antihypertensive agent use and how they would titrate different antihypertensives. Better answers discussed initial titration with short acting agents then transition to longer acting agents when target BP was achieved.

Reference(s):

- Ferrerio d et al, management of stroke in neonates and children: a scientific Statement from the american3535 heart association/35hips35it stroke association Stroke 2019 volume 50, number 3, <https://www.ahajournals.org/doi/full/10.1161/str.000000000000183>
- Sporns, peter b et al.current treatment for childhood arterial ischaemic stroke. The lancet child & adolescent health, volume 5, issue 11, 825 – 836
- Klučka j et al, pediatric patient with ischemic stroke: initial approach and early management. Children (basel). 2021 jul 28;8(8):649. Doi: 10.3390/children8080649.
- Webb tn, shatat if, miyashita3535 y. Therapy of acute hypertension in hospitalized children and adolescents. Curr hypertens rep. 2014 apr;16(4):425. Doi: 10.1007/s11906-014-0425-0.
- Controlling hypertension and hypotension immediately post-stroke (chhips35): a randomised, Placebo-controlled, double-blind pilot trial, potter, john f et al., the lancet neurology, Volume 8, issue 1, 48 – 56
- Ghozy s, mortezaei a, elfil m, et al. Intensive vs conventional blood pressure control after Thrombectomy in acute ischemic stroke: a systematic review and meta-analysis. Jama netw Open. 2024;7(2):e240179. Doi:10.1001/jamanetworkopen.2024.0179
- Antihypertensive drugs for secondary prevention after ischemic stroke or Transient ischemic attack: a systematic review and meta-analysis Giorgio B. Boncoraglio, md, stroke, volume 52, number 6

Question 27

A 6-week-old male weighing 3.8 kg is admitted following a complete repair of Tetralogy of Fallot with Subpulmonary Stenosis (TOF-PS). Shortly after arriving to the PICU, he develops Low Cardiac Output syndrome.

In table form, outline the most likely causes of Low Cardiac Output in this patient, how you would make the diagnosis and the specific management for each cause

(10 marks).

Syllabus Topic/section	2.1.4 Cardiovascular Intensive Care L1 Congenital heart disease
Angoff Score for this SAQ	5.47
Highest candidate score achieved	7.75
Angoff Pass Rate	50%

Examiners' comments:

This question described a small baby with LCOS following an early TOF repair.

Candidates who did well recognised that this was early for a full repair and included neonatal causes such as high PVR and LV failure secondary to ventricular interdependence as well as TOF specific causes of LCOS. Candidates who missed key TOF related causes, did not discuss the impact of residual lesions or spent too much time discussing generalized post operative causes of LCOS such as SIRS, tamponade and bleeding did not score well. Candidates are reminded to target their answers to the patient in the question rather than giving generic post operative answers.

The marking rubric is included:

RUBRIC

	Below standard	At standard	Above standard
(10 marks)	<p>Poor understanding of the risk factors for LCO in TOF post early repair.</p> <p>Can mention only general post op issues:</p> <ul style="list-style-type: none"> - post bypass/inflammation - mentions "arrhythmias" (not specifying junctional/CHB) - tamponade - bleed/hypovolemia <p>Or less than 3 specific issues (see "at standard")</p> <p>0-4.5 marks</p>	<p>Identifies at least 3 specific post TOF repair issues (in addition to "post bypass"):</p> <ul style="list-style-type: none"> - Restrictive RV physiology - Residual lesion (eg SP obstruction/VSD) - Specific arrhythmias (junctional/JET/CHB) <p>Can provide diagnosis and management discussion</p> <p>Organised discussion.</p> <p>5-7.5 marks</p>	<p>As per "At Standard" plus: Comprehensive understanding of the <u>age related complexity</u>:</p> <ul style="list-style-type: none"> - mentions LV failure (due to interventricular interdependence, not just as part of generalised LCOS/post bypass) - or mentions high PVR risk <p>Organised and detailed discussion</p> <p>8-10 marks</p>

Reference(s):

- Robert H Anderson, Edward J Beker et al (2010). Paediatric Cardiology (3rd edition). Elsevier, chapter 37
- Carlos M Mery, Daniel J Penny et al (2020). Texas Children's Hospital Handbook of Congenital Heart Disease, Texas Children's Hospital, chapters 13,71,74

Question 28

Regarding hospital-based Rapid Response Systems (RRS):

- a) Provide a definition and discuss the key elements of a RRS (4 marks)
- b) List the advantages and challenges of a Paediatric RRS (6 marks)

Syllabus Topic/section	2.1.1 Structure and Process L1 Rapid Response Systems
Angoff Score for this SAQ	4.87
Highest candidate score achieved	6.83
Angoff Pass Rate	58%

Examiners' comments:

This question explored candidates knowledge of rapid response systems.

To score well, candidates needed to demonstrate an appreciation of how the RRS fits within the organisation. Many candidates focussed on the ICU component rather than thinking about the system in its entirety and this limited their ability to score well. Those who scored well demonstrated an understanding of the literature regarding paediatric RRS outcomes and focussed their discussion of the challenges of providing a service specifically in paediatric populations with diverse physiology and pathology. Many candidates appeared to misread the question and focussed their discussion on disadvantages (or negatives) for providing a RRS which was not what was asked. Candidates are reminded that professionalism is a component of the PICU syllabus. Some answers conveyed a negative opinion of ICU registrar participation as a member of the rapid response team which does not reflect the intended culture of these systems or that expected of a representative of the PICU.

Reference(s):

- Minimum standards for intensive care unit-based rapid response systems (IC-26 2022)
- Joint position statement on rapid response systems in australia³⁷ and new zealand³⁷ And the roles of intensive care (IC-25 2016)
- Kolovos, nikoleta s., et al. "reduction in mortality following pediatric rapid response team implementation." *Pediatric critical care medicine* 19.5 (2018): 477-482.
- Maharaj r, raffaele³⁷ i, wendon j. Rapid response systems: a systematic review and meta-analysis. *Critical Care*. 2015 dec;19:1-5.

Question 29

With regard to Central Line Associated Blood Stream Infections (CLABSI):

- a. Define CLABSI (2 Marks)
- b. Outline how the risk of CLABSI could be reduced (6 Marks)
- c. What factors do you consider when deciding whether to remove a central venous line with a suspected CLABSI? (2 Marks)

Syllabus Topic/section	2.1.3 Sepsis and Infections L1 Health Care Associated infections
Angoff Score for this SAQ	5.83
Highest candidate score achieved	8
Angoff Pass Rate	50%

Examiners' comments:

This question focused on a very common ICU issue and candidates were expected to have a good understanding of how to diagnose, prevent and manage suspected CLABSI.

Most candidates could not provide a correct definition of CLABSI. Many did not include the time that the line was in place or that infection from elsewhere needed to be excluded. Answers regarding preventing CLABSI generally only focused on insertion and some aspects of maintenance. Good answers included patient factors, line factors and comprehensive discussion of insertion and maintenance bundle. Part c required a nuanced discussion regarding the pros/cons for removing the line reflecting that this is often a difficult decision in paediatrics.

The marking rubric is included:

RUBRIC

	Below standard	At standard	Above standard
a) Definition (2 marks)	<p>Only discusses positive blood culture from a CVL Or Does not mention timing of culture in relation to placement of line Or Does not relate the blood culture result to the patient status/underlying pathology</p> <p>0-0.5 marks</p>	<p>Answer must include following definition -positive blood culture in patient with CVL in place for 48hrs or more AND -Not related to infection at another site/clinical correlation required</p> <p>1-1.5 marks</p>	<p>In addition to 'at standard' adds detail to definition such as paired cultures (CVL vs PIV) with faster growth in the CVL Quantifiably larger colony count from CVL culture Growth from CVL tip Same organism cultured from 2 or more sets blood cultures drawn on separate occasions within 24hrs May be diagnosed in patient who has had their line removed if the line was in for 48hrs or more and removed the day before the positive culture</p> <p>2 marks</p>

<p>b) Reduce risk (6 marks)</p>	<p>Omits discussion of CVL insertion or maintenance bundles in answer Or Narrow focus to answer Discussion only focuses insertion and maintenance +/- one other aspect of care</p> <p>0-2.5 marks</p>	<p>Discusses multiple strategies to reduce infection risk</p> <p>Answer must include discussion of CVL insertion and maintenance factors/bundles</p> <p>And include examples from at least 2 other categories: 1.Patient factors 2.Catheter related factors Insertion factors incl operator experience & sterility 3.Limiting Line duration 4.Line access factors 5.High risk infusions</p> <p>3-4.5 marks</p>	<p>In addition to 'at standard'</p> <p>Provides additional examples from 3 or more of the categories listed in standard</p> <p>5-6 marks</p>
<p>c) Removal of venous line (2 marks)</p>	<p>Indiscriminate removal of all CVL's with a positive blood culture Or Does not identify any situation where consideration of leaving line in may be appropriate Or Does not consider removing any CVL in with suspected CLABSI</p> <p>0-0.5 marks</p>	<p>Answer discusses balance of risk of infection vs risk to patient of removing line And Identifies 1 or 2 factors that might change the risk/benefit ratio</p> <p>1-1.5 marks</p>	<p>In addition to 'at standard'</p> <p>Answer includes 3 or more factors that might change the risk/benefit ratio</p> <p>2 marks</p>

Reference(s):

- ANZICS Statement: Central Line Associated Blood Stream Infection (CLABSI) Prevention <https://www.anzics.org/clabsi/>

Question 30

A 14-year-old boy with Sickle Cell Anaemia is admitted to your PICU from theatre following an elective operation.

Outline the factors that will increase the risk of sickling in the post operate period. Provide examples and outline how to mitigate the risk.

(10 marks)

Syllabus Topic/section	2.1.11 Heamtological and Oncological Intensive care Anaemia
Angoff Score for this SAQ	5.13
Highest candidate score achieved	8
Angoff Pass Rate	75%

Examiners' comments:

This question focused on the important aspects of providing safe care for a patient with sickle cell anaemia.

Most candidates demonstrated a good understanding of the risks in sickle cell patients with good management suggestions. The better answers were structured around the physiological risk, with examples and management. Good answers needed to include discussion regarding pain management, hydration and hypoxia. Better answers covered more risks and included thresholds for transfusions.

The marking rubric is included:

RUBRIC

	Below standard	At standard	Above standard
(10 marks)	<p>Poor understanding of the SCA risks and physiology. Does not identify the main issues with post op care of those patients.</p> <p>General post op management, not related to SCA.</p> <p>Identifies less than 3 principles</p> <p>0-4.5 marks</p>	<p>Identifies at least 3 principles and can provide examples/specifics</p> <p><u>Must discuss:</u></p> <ol style="list-style-type: none"> 1. prevention of hypoxia and 2. good pain management. <p>Organised discussion.</p> <p>5-7.5 marks</p>	<p>As per "At Standard" plus:</p> <ul style="list-style-type: none"> - Comprehensive understanding of the pathophysiology of SCD complications and management - Organised and detailed discussion - Mentions Hb/HbS parameters <p>8-10 marks</p>

Reference(s):

- Rogers' Textbook of Pediatric Intensive Care, Sixth edition, Chapter 120 p 2072-2081
- Schyrr F, Dolci M, Nydegger M, Canellini G, Andreu-Ullrich H, Joseph JM, Diezi M, Cachat F, Rizzi M, Renella R. Perioperative care of children with sickle cell disease: A systematic review and clinical recommendations. Am J Hematol. 2020 Jan;95(1):78-96. doi: 10.1002/ajh.25626. Epub 2019 Oct 2. PMID: 31456233.
- Howard J. Sickle cell disease: when and how to transfuse. Hematology Am Soc Hematol Educ Program. 2016 Dec 2;2016(1):625-631. doi: 10.1182/asheducation-2016.1.625. PMID: 27913538; PMCID: PMC6142434.
- Brandow AM, Carroll CP, Creary S, Edwards-Elliott R, Glassberg J, Hurley RW, Kutlar A, Seisa M, Stinson J, Strouse JJ, Yusuf F, Zempsky W, Lang E. American Society of Hematology 2020 guidelines for sickle cell disease: management of acute and chronic pain. Blood Adv. 2020 Jun 23;4(12):2656-2701.

SECOND PART PAEDIATRIC ORAL EXAMINATION REPORT

Clinical “Hot Cases” Section

The Clinical Section was conducted in the Paediatric Intensive Care Unit at the Queensland Children’s Hospital, Brisbane, Australia. Each hot case runs for twenty minutes, with an additional two minutes at the start of each case for the candidate to receive both a verbal and a written introduction to the case in question. This is to give the candidates more opportunity to plan a focused approach to the case. 30% of the overall marks are allocated to the two clinical cases.

Cases are usually presented as problem-solving exercises. For maximum marks, candidates should demonstrate a systematic approach to examination, clinical signs should be demonstrated, and a reasonable discussion regarding their findings should follow.

Some candidates waste valuable time at the start of the case by spending more than a couple of minutes around the bedside before examining the patient. Exposing the patient should be limited to those areas that are necessary for that component of the examination. Candidates must show appropriate courtesy and respect to patients and their families if present during the examination.

The twenty minutes available for each case provides ample opportunity to discuss investigations and plans of management. Candidates are reminded that a large proportion of the marks are allocated to coherent presentation and synthesis, discussion and reasoning. Candidates should approach the case discussion in a consultant-like manner.

Candidates are advised that they should not attempt the Second Part Paediatrics Examination until they can confidently examine patients, present the relevant clinical findings, synthesise all the information and discuss management issues at the appropriate level, **which is a trainee who is ready to enter the transition year of the CICM training program**. Candidates who have not yet attained this level of experience are strongly encouraged to defer their attempt at the exam. Candidates should practise hot cases from the commencement of their exam preparation.

To this end, candidates are encouraged to do the following in their daily clinical practice as preparation for the hot cases:

- Seek the opportunity to take charge of the unit and be responsible for management decisions.
- Practise examination of individual systems.
- Treat every case to be assessed at work as a hot case, i.e., pose a relevant question (e.g., ‘Why is this patient not progressing?’ ‘What is the cause of the new fever?’ ‘Is this patient ready for extubation?’), perform a focussed exam and then present your findings to a colleague.

Standards for Performance:

Candidates are expected to:

- Address and answer the question asked in the introduction.
- **Interpret and synthesise information**, rather than just describing the clinical findings.
- Seek information relevant to the case. In some cases they may be asked what they would expect a test to show based on their clinical examination before receiving the actual result.
- Provide a sensible differential diagnosis and management plan.
- Avoid template answers or key phrases but answer questions in the specific context of the case
- Justify their own practice for specific management issues.

Characteristics of Strong Performance:

- Professional approach, showing respect for the patient and family.
- Competent, efficient and structured examination technique and an ability to appropriately adapt the examination to suit the case.
- Pursuit of information relevant to the case.
- Accurate interpretation and synthesis of findings.
- Concise, systematic presentation of conclusions.

- Relevant differential diagnosis.
- Mature discussion of management, displaying confident and competent decision-making.
- Overall performance at the expected level (transition fellow / junior consultant).

Characteristics of Weak Performance:

- Missing or misinterpreting key clinical signs.
- Incomplete or poor examination technique.
- Poor synthesis of findings with limited differential diagnosis.
- Poor interpretation of imaging and data or omitting to request important tests.
- Inability to construct an appropriate management plan.
- Limited time for discussion as a consequence of taking too long to present the clinical findings or to interpret basic data.
- Inability to convey the impression that he/she could safely take charge of the unit.
- Inability to maintain global overview and answering within a narrow focus.
- Failing to address the question asked.

Cases encountered in the clinical component of this examination included:

- *A 5 day old baby with an unbalanced AVSD who was day 1 post PA band and aortic arch repair. The baby was in a low cardiac output state, muscle relaxed with an open chest. Candidates were asked to assess the cardiac output.*
- *A 15yr old boy with a background rheumatic heart disease requiring aortic valve repair who presented with cardiogenic shock secondary to presumed infective endocarditis. This boy was ventilated, on inotropes. Candidates were asked to assess for the cause of cardiac decompensation.*
- *An 8yr old girl with a mitochondrial disorder with abnormal neurology, who was intubated for seizures. Candidates were asked to assess readiness for extubation.*
- *A 4wk old (corrected gestational age) ex prem 26/40 with respiratory failure post laparotomy with partial bowel resection and high output ileostomy. Candidates were asked to assess suitability for extubation.*

Viva Section

The viva component consists of 8 stations, each lasting 10 minutes. Candidates are given 2 minutes outside the room to read an introductory scenario, which includes the initial question. The same information is also available inside the viva room.

Expectations

- Demonstrate a systematic approach to the assessment and management of common clinical problems.
- Provide a reasonable management strategy for conditions that may be unfamiliar.
- Display professionalism, empathy, and appropriate manner throughout.
- Tailor responses to the specifics of the question, with clear justification and expansion where required.

Common Reasons for Failure

- Significant knowledge gaps.
- Poorly structured answers.
- Inability to provide the rationale behind responses.

Preparation

Candidates are encouraged to:

- Practise viva technique regularly.
- Engage in discussions of patient management with senior colleagues.
- Focus on articulating not only decisions but also the reasoning behind them.

VIVA STEMS over page

Viva 1

A 5 year old with acute severe asthma has been admitted to your PICU.

Over the past 90 minutes, management has included continuous salbutamol nebulisation, ipratropium bromide, IV hydrocortisone, IV magnesium sulphate and an IV aminophylline load, all at appropriate doses.

They were commenced on non-invasive BIPAP ventilation 30 minutes ago for failure to adequately respond to initial treatments.

Current BIPAP settings are 18/8 and she is currently in FiO₂ of 100%

Current Assessment

- SpO₂ 80%
- Respiratory rate 25 breaths/min, moderate work-of-breathing
- Heart rate 120/minute
- Blood pressure 90/55mmHg
- Drowsy

Arterial Blood Gas	Result	Normal Range
pH	7.03 *	7.35 – 7.45
PaCO ₂	80 mmHg * 10.7 kPa *	32 – 42 mmHg 4.6-6.1 kPa
PaO ₂	65mmHg * 8.7 kPa *	85 – 110 mmHg 11 – 14.6 kPa
Bicarbonate	22	18 – 27 mmol/L
Lactate	0.7	< 2 mmol/L

(Candidates also received a CXR that showed typical asthma hyperinflation with no other pathology to explain the hypoxia)

Describe your immediate management plan for this patient

Syllabus topic	2.1.5: L1 Acute Severe Asthma, L1 Respiratory monitoring, L1 Mechanical Ventilatory support, 2.1.18: L1 intubation
Maximum Score	8.25
Percentage Passed	87.5%

Candidates did well if they:

This viva required recognition that this child had refractory asthma despite receiving appropriate treatment and required intubation. Candidates who did well acknowledged that intubation is usually avoided in asthmatics due to the high risk nature of this procedure and then discussed a plan to safely intubate the child taking into account potential risks and how they would monitor for and mitigate those risks. Subsequent parts of this viva assessed the potential complications of intubation, knowledge of how to ventilate a patient with severe bronchospasm, how to troubleshoot common ventilation problems, and adjunct bronchospasm/hypoxia management strategies when first line medical management has failed. Candidates who did well demonstrated a good understanding of principles of asthma ventilation, including measurement of plateau pressure and intrinsic PEEP and the importance of these measurements in delivering safe ventilation.

Candidates achieved less marks if they:

Candidates who did not appreciate the need for intubation or who avoided intubation and spent time trying to optimise medical management in the setting of significant hypoxia lost time and were unable to score high marks. All candidates were prompted to discuss a strategy for intubation if they did not offer this spontaneously, with some candidates still hesitant to do so despite multiple prompts. Some candidates confused plateau pressure and end expiratory holds which resulted in confusion in justifying their ventilation management plan. Those who spent too long at the beginning of the viva missed the opportunity to pick up marks at the end for alternate asthma management strategies.

Viva 2

An 8-year-old girl is brought to your Emergency Department following a pedestrian versus car collision. A CT scan confirms a large left-sided subdural haematoma with associated midline shift and a complex pelvic fracture, with active haemorrhage (contrast blush during arterial phase). No other injuries have been identified.

On initial assessment

- Glasgow Coma Score is 7 (E2 V1 M4).
- Respiratory Rate 35 breaths/min, breathing spontaneously.
- Oxygen Saturations 92% on room air
- Heart Rate 140 beats per minute
- Blood Pressure 67/35mmHg (mean 44mmHg)
- Pale, cool peripheries, capillary refill time 6 seconds

The ED team leader asks you:

What blood pressure target should be used during resuscitation given the traumatic brain injury (TBI) and pelvic bleeding, and your rationale?

Syllabus topic/section	2.1.12: L1 Traumatic brain injury, L1 abdominal and pelvic trauma, L2 Trauma Surgery 2.1.8: L1 cerebral protection strategies 2.1.18 L1 Intubation
Maximum Score	8.75
Percentage Passed	75%

Candidates did well if they:

This viva required recognition that there are multiple competing priorities in the management of severe trauma. A nuanced discussion of the challenges of managing haemorrhagic shock whilst still maintaining adequate cerebral perfusion pressure was required in the first part of this viva. Subsequent parts of the viva included discussion of how to safely intubate this child, management of pelvic bleeding, fluid resuscitation and team management in the setting of competing surgical priorities. Candidates who did well were able to acknowledge the competing priorities and discuss a sensible management plan that balanced the risks to the patient.

Candidates achieved less marks if they:

Candidates who could not choose a BP target or discuss the potential trade-offs of specific BP strategies did not score well. Candidates often required significant prompting to demonstrate their knowledge which does result in a reduction of marks in the viva section. It was noted that many candidates took a long time to make their point and would benefit from more cross-viva practice to become efficient at getting their point across.

Viva 3

A paramedic team is enroute to your hospital with a previously missing 3-year-old who has been found unconscious outside. You are called to assist. The child's temperature has been measured at 28 degrees on scene, and this is in keeping with the environmental exposure.

The child is previously well and has no medical history of note. You are in ED awaiting his arrival.

To ensure a shared mental model amongst the assembled team - Outline key clinical signs due to hypothermia (temp 28°C) that you might anticipate on arrival of the child.

Syllabus topic/section	2.1.4: L1 Cardiac Arrest, Cardiopulmonary Resuscitation, post-resuscitation care 2.1.13: L1 thermal injuries heat and cold 2.1.5: L1 interpretation of arterial blood gases
Maximum Score	7.5
Percentage Passed	50%

Candidates did well if they:

This viva focused on the effects of severe hypothermia, with specific focus on the management of hypothermia in the setting of cardiac arrest. The viva explored clinical signs of hypothermia, how to rewarm the patient, how to modify the ALS algorithm in hypothermia and interpretation of blood gases, including discussion of alpha-stat vs pH stat.

Candidates achieved less marks if they:

This viva highlighted a topic where few candidates were able to demonstrate specific knowledge of how to manage children with severe hypothermia. Most candidates were unable to demonstrate awareness of the effects of hypothermia on medication effectiveness/metabolism or the effects of hypothermia on defibrillation and required significant prompting to discuss how they might modify their resuscitation in this setting. It is suggested that candidates revise resuscitation in special circumstances.

Viva 4

A 2-year old boy is undergoing urgent barium reduction for intussusception.

During the procedure, the Anaesthetist contacts you to request a PICU bed, and to ask your advice. The child has become hypothermic (temperature 34.6 C) with increasing oxygen requirements (FiO₂ 50%) and they do not feel it is safe to extubate him.

A venous blood gas reveals a metabolic acidosis with a lactate > 6 mmol/L.

		RANGE (arterial)
pH	7.19*	7.35-7.45
PCO ₂	53 mmHg*	35-45
	7.07 kPa*	4.7-6.0
HCO ₃	19 mmol/L*	22-27
Base Excess	-5.5 mmol/L*	± 2
Lactate	6.6 mmol/L*	<2.5
Na+	134 mmol/L*	135-145
K+	5.4 mmol/L*	3.8-5.1
Hb	89 g/L*	110-150

Outline your assessment of the situation, and any advice you would give the Anaesthetist.

Syllabus topic/section	2.1.6: L1 Acute abdomen, Abdominal compartment syndromes 2.1.17: L1 Perioperative topics 2.1.5: Interpretation of arterial blood gases
Maximum Score	8.5
Percentage Passed	75%

Candidates did well if they:

This viva followed a clinical case of a child with evolving intraabdominal sepsis and abdominal compartment syndrome. Candidates who performed well demonstrated a systematic approach to assessment, resuscitation and ongoing management as the case unfolded. The conclusion of the viva required candidates to advocate for the patient when their management plan did not align with the surgical plan. Successful candidates were able to form a definite opinion and advocate for that on behalf of the patient to advance care.

Candidates achieved less marks if they:

Candidates who were less successful became task focused and did not demonstrate a broad appreciation of the important issues. ECMO was suggested as a solution by less successful candidates, which missed the point that this child needed his abdomen opened to improve his cardiac output.

Viva 5

You are called to review an 18-month-old girl in your emergency department with stridor, work of breathing and oxygen requirements that are currently at 8 L/min to maintain saturations around 92%. She has had nebulised adrenaline twice in the last 30 minutes.

Outline your differential diagnosis and approach to assessment of this child?

Syllabus topic/section	2.1.5: L1 Airway Obstruction, L1 airway management 2.1.18 L1 Intubation
Maximum Score	10
Percentage Passed	75%

Candidates did well if they:

This viva assessed management of an evolving airway emergency in a child with severe croup and required candidates to coordinate care to safely manage the airway, consider the pros and cons of RSI vs gas induction, discuss PICU management around extubation and consider how management might be different in alternative causes of acute airway obstruction. Candidates who did well recognised the critical airway aspect of this scenario early and were able to clearly articulate their concerns. Their discussion was focused and included a structured approach to assessment and management, a balanced discussion of the different induction techniques and they were able to adapt their management plan as new information was received. They demonstrated they were in control of the situation and work collaboratively with interdisciplinary team members rather than purely outsourcing the airway management to ENT/Anaesthesia.

Candidates achieved less marks if they:

Candidates who were less successful did not demonstrate an awareness that 8L of oxygen in a child with an acute airway obstruction is significant, particularly in the setting of failure to improve with nebulised adrenaline and borderline sats. This led to an underappreciation of how time critical this airway emergency was. Candidates who were anchored to inhalational induction as the sole solution and were unable to discuss the downsides of this treatment or consider the pros/cons of RSI did not score as well.

Viva 6 Radiology Viva

Candidates were shown a series of radiological investigations and asked to describe the important findings in each.

Instructions given to candidates on the first slide included:

- Please describe the salient features on each of the following radiographs and scans indicated by the stem.
- Clinical management and technical aspects of the images are NOT required.

Syllabus topic/section	2.1.19: L1 Radiology in ICU 2.1.5: L1 Chest imaging
Maximum Score	8
Percentage Passed	100%

Candidates did well if they:

Images presented included 6 CXRs, 1 abdominal xray, 1 lateral neck xray, one CT brain and one MRI brain (diffusion weighted images). Candidates received a brief clinical vignette with each image – eg “19mth old involved in motor vehicle accident” to help guide their discussion.

Candidates were expected to comment on hardware positioning and both positive and clinically relevant negative findings (e.g. the absence of free air under the diaphragm in a patient with bowel obstruction). In general candidates performed well in this viva, demonstrating a good pace in reviewing and describing the images.

Candidates achieved less marks if they:

This assessment calls for candidates to be specific and definite. Candidates could improve by practicing reporting out loud to improve their fluency and precision. Many candidates said more than was needed to get their point across which eats into time and makes it difficult to score high marks. Some candidates missed the c-spine injury on the lateral neck x-ray.

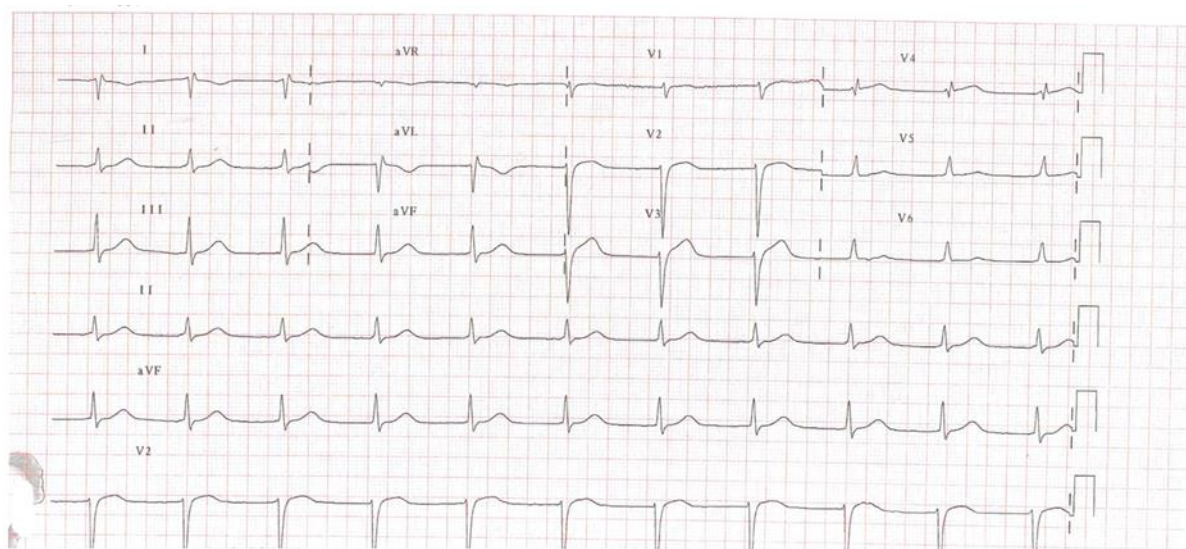
Viva 7 – Procedure Viva – ECGs and Temporary Pacing

The station involves the use of a dual-chamber temporary pacing box.

A 3-month-old infant, day 1 post-operative following an AVSD repair, develops the rhythm shown below.

Describe the key findings on the ECG.

Discuss the potential impact of this rhythm on the patient's haemodynamic state.



Syllabus topic/section	2.1.18: L1 Temporary Cardiac Pacing 2.1.4: Interpretation of ECG
Maximum Score	7.25
Percentage Passed	37.5%

Candidates did well if they:

Candidates were given the option to choose between two different pacing boxes to use in this viva so that they could pick the one they were most familiar with. Advice was sought from all PICU's to ensure that the pacing boxes were representative of what is being currently used clinically.

This viva required interpretation of abnormal ECG rhythms that required pacing or represented pacing problems and then setting the pacing box to deliver an appropriate mode of pacing to resolve the problem. Candidates who performed well demonstrated familiarity with the pacing equipment and were able to confidently choose pacing options and operate the box as the scenario unfolded.

Candidates achieved less marks if they:

This viva tested specific knowledge and pacing skills. Candidates who did less well either were unable to interpret the ECG's or were unfamiliar with pacing and struggled to set the pacing box. This is a skill that requires practice at the bedside to master, and candidates are advised to ensure they dedicate time to this during their training.

Viva 8 – Communication Viva

Matthew, a 18-month-old boy, was admitted following an out-of-hospital cardiac arrest secondary to drowning. He was found at the bottom of the family pool after being unsupervised for 15 minutes during his brother's David 7th birthday party. He received 35 minutes of CPR by the paramedic team on the scene before return of spontaneous circulation.

Matthew had no signs of neurological function since admission 5 days ago, and has undergone formal death by neurological criteria testing by two independent consultants.

Your colleague has had conversations with the family about neurological determination of death.

You are one the Consultants who performed the tests and are now meeting with Matthew's parents to communicate the diagnosis of neurological determination of death.

Mother: Karen

Father: Mark

Syllabus topic/section	2.2.1 L1 Challenging conversations
Maximum Score	8.75
Percentage Passed	75%

Candidates did well if they:

This viva was generally performed well. Candidates who did well conveyed this news in an empathetic manner and took time to respectfully answer parents' questions and ensure that they understood that their child had died. They also demonstrated a holistic approach to caring for the family, offering advice on what to say and how to involve the older brother in the next steps of care.

Candidates achieved less marks if they:

Candidates needed to clearly state that brain death is death to pass this viva. Those who were less definite or left the parents feeling confused were unable to pass this viva. Rapport with the parents was assessed with both parents being asked how they felt during the conversation. The mother reported that she felt her concerns were dismissed by some candidates. It was observed that some candidates failed to make eye contact with both parents or directed all of their discussion to the father. These candidates were unable to score well.