

## Examiners' Report

### Master of Medicine (Anaesthesiology) Part B SAQ Examination

#### - 11 to 12 September 2023

#### General Comments

This report summarises the areas examined in the 2023 Master of Medicine (Anaesthesiology) [MMed(Anaes)] Part B Short Answer Question (SAQ) Examination conducted on 11 & 12 September 2023. The report is designed to aid residents and faculty in preparing for future examinations.

Candidates should note that all aspects of the syllabus are examinable. The examination syllabus is available from the Division of Graduate Medical Studies (DGMS) [website](#). Candidates are advised to use the document to guide them and cover the breadth of the syllabus to maximise their chance of success at the examination.

The 16 SAQ are divided into Paper One and Two, each 8 questions to be completed over 2 hours, held on 2 different days.

Candidates should note that the weightage of all the questions is equal, and all the questions need to be answered. Some questions have multiple parts with allocated percentages (%). The percentages serve to guide the candidates with time allocation and may not reflect the exact mark allocation. Candidates are advised to plan and manage their time accordingly.

Candidates are reminded to read the questions carefully. The SAQ examination is designed to examine the candidates' ability to apply their knowledge in specific clinical situations. If a specific clinical situation with history or physical findings is provided, the candidates are expected to tailor their answers to that situation. Generic answers that are not specific to the clinical scenario tend to be awarded lower marks leading to poor performance overall.

#### Marking and Passing Criteria

All the SAQs are reviewed and criteria for passing each question are determined by the examination committee prior to the examinations. The answer for each question is marked by 2 examiners.

<u>Score</u>	<u>Interpretation of Score</u>
8	An excellent performance with both examiners
7	A performance significantly better than a pass
6	A definite pass
5	A reasonable performance but not up to a pass
4	A poor performance but not an absolute failure
3	An absolute failure which cannot be compensated

Note that a score of 6 is a pass, while a score of 5 is considered a "borderline fail".

The sum of the scores for all 16 questions is added for each candidate. The candidate passes the examination if the total score is greater than or equal to 90. This score is an approximative equivalent to having a clear pass in 10 out of the 16 questions and a borderline performance in the remaining 6 questions.

## Results for the 2023 September MMed(Anaes) Part B SAQ Examination:

Total number of candidates who registered: 26  
Number of candidates who withdrew or were absent: 2  
Number of candidates who completed the examination: 24  
Number of candidates who passed the examination: 9 (38%)

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### **Questions:**

#### Paper One, Question One:

A 12-year-old boy with history of asthma, sustained a left supracondylar fracture from a fall one hour after dinner and is scheduled for an emergency open reduction and internal fixation (ORIF) procedure 6 hours after his dinner.

His last asthmatic attack was 2 months ago, and he is currently on fluticasone inhaler. He has just recovered from an upper respiratory tract infection (URTI) 2 days ago.

He expresses anxiety regarding injections.

A) What are your considerations regarding the timing of his surgery? How would you induce anaesthesia for this child? (50%)

B) Ten minutes after induction and placement of the endotracheal tube, you notice that his end-tidal CO<sub>2</sub> reading is 55 mmHg. List the likely causes, and for three of these causes explain why they might have occurred. (50%)

#### Pass Rate: 58%

In this question, candidates were expected to consider the multiple conflicting issues of a child who needs an emergent surgery.

Candidates who did well considered that dinner being a heavy meal, may require more than 6 hours for gastric emptying and this may be further delayed due to the effect of trauma. Supracondylar fractures may be opened or associated with vascular compromise and patients may not have time to be adequately fasted, in which case RSI is management of choice, and the issues of anxiety with vascular access and his history of asthma and recent URTI has to be addressed (premedication with salbutamol etc).

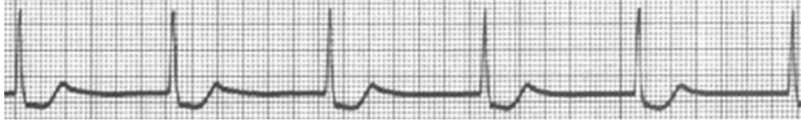
The second part of the question is not an uncommon situation, and most candidates had no issues listing the likely causes and explaining them.

Some candidates recognised the need for RSI but decided to give sedating premedication before induction and airway management which might not be consistent with the original aim of RSI.

Candidates who described preoperative use of gastric ultrasound to estimate gastric volume or gave premedication for the management of asthma were given extra credits.

Paper One, Question Two:

A 60-year-old man undergoes coronary artery bypass graft surgery. On complete rewarming, this is the electrocardiogram (ECG) tracing seen.



- A) Identify the ECG rhythm and explain the morphology. (30%)
- B) Initiation of epicardial pacing is suggested for this patient. What are the modes of pacing appropriate for this patient? Explain your preferred choice. (50%)
- C) What are the common problems associated with epicardial pacing? (20%)

Pass Rate: 13%

Most candidates answered Part A and Part C of this question well but did poorly for Part B.

Some candidates might have misinterpreted or misunderstood Part B leading them to either not answer the question or answer off point.

Part B requires candidates to make use of the clinical context (rewarming phase of coronary artery bypass graft surgery) and ECG (slow junctional rhythm) in Part A to list the various modes of pacing possible for this patient and explain their choice. Candidates were expected to explain if atrial or ventricular chambers need to be paced, as well as if sensing and the response are useful in this context. Based on these considerations they have to make and explain their choice for pacing.

The relatively poor performance in Part B may indicate a knowledge gap in this area in many candidates.

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Paper One, Question Three:

A 71-year-old woman with a newly diagnosed invasive papillary thyroid cancer is scheduled for elective total thyroidectomy, trachea-oesophageal groove clearance, tracheal resection and reconstruction. Her initial clinical presentation was haemoptysis. She is a non-smoker and has no other medical history.

- A) How would you assess her airway pre-operatively? (30%)
- B) Outline the intraoperative and postoperative anaesthetic considerations for this patient. (70%)

Pass Rate: 54%

Candidates were expected to cover aspects in the history, physical examination and investigations specific to this patient's airway for Part A. The considerations expected in the second part include airway issues, recurrent nerve preservation, length of surgery, potential blood loss, pain, postoperative issues and disposition.

Better candidates besides giving more comprehensive answers and also emphasized the information gained from scans and ENT nasoscopy reports as well as consideration specific to airway management. Candidates who did poorer generally did not cover sufficient points.

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Paper One, Question Four:

A 60-year-old patient with ischaemic heart disease, diabetes mellitus, end stage renal failure and peripheral vascular disease is admitted for acute right lower limb pain.

Discuss the principles of assessment and management of the acute pain in this patient.

Pass Rate: 38%

This is a relatively common clinical scenario. Most candidates do have content and practical approach to assess and manage this situation. The better candidates discussed the need for assessment of social support as a factor triggering the condition presenting as a pain crisis and for subsequent management of this condition, role of peripheral nerve block, and the dose adjustment and titration in view of end-stage renal failure (ESRF). Some candidates have poor understanding of the pharmacology of opioids in relation to ESRF which contributed to a poorer performance.

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Paper One, Question Five:

A 65-year-old man with idiopathic pulmonary hypertension presents for transurethral resection of a bladder tumour.

A) How will you assess the severity of his pulmonary hypertension? (50%)

B) What are the options for anaesthesia management available for this patient? Give reasons for your preferred option. (50%)

Pass Rate: 83%

This topic has been examined in previous examinations. Most candidates are able to give sufficient details in the history, physical examination and investigations, required to stratify the severity of pulmonary hypertension as well as pros and cons for the option of anaesthesia management to gain a pass.

Candidates who emphasized specific details such as numbers for classification of mild, moderate and severe or additional features such as Ortner's syndrome gained extra credit.

Those who lacked details in the assessment or failed to cover the pros and cons in the second part of the questions had poorer scores.

Only a handful appreciated the risk of obturator jerk in this surgery, but the candidates were not penalised for that.

Paper One, Question Six:

A 70-year-old male chronic smoker with chronic obstructive pulmonary disease is scheduled for elective surgery. In the induction room, he is observed to be short of breath with a pulse oximetry reading of 85%. Oxygen supplementation is ordered.

- A) Explain the working principles of a venturi mask and how it is able to ensure a predictable inspired oxygen concentration. (40%)
- B) Explain why the inspired oxygen concentration may be variable when using a simple oxygen (Hudson's) face mask. (30%)
- C) Describe the pathophysiological basis for choosing a venturi mask to provide oxygen supplementation for this patient. (30%)

(You may use annotated diagrams to support your answer)

Pass Rate: 13%

This question examines the principles of the performance of common oxygen supplementation devices we use in hospitals.

Many candidates were unable to explain how the venturi mask is able to deliver a predictable inspired oxygen concentration (principles such as Venturi or Bernoulli effect, the process of entrainment via the aperture leading to sufficient flow for fixed  $FiO_2$ ) and why the Hudson's mask (which is commonly used on a daily basis) is unable to do so, leading to a poor performance in Part A and B.

Although most candidates were able to appreciate the importance of hypoxic drive in chronic hypercarbia and hence the need for fixed performance device to maintain  $SpO_2$  at a certain level to prevent respiratory depression for Part C, it is not sufficient to result in a pass performance overall.

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Paper One, Question Seven:

You have been requested to provide general anaesthesia for a 23-year-old man with moderate intellectual disability requiring magnetic resonance imaging (MRI) of the brain. He has no other medical or airway concerns.

- A) List the challenges of providing anaesthesia and monitoring in the MRI suite (50%)
- B) Outline your preparations to safely provide general anaesthesia for this patient undergoing the MRI scan. (50%)

Pass Rate: 38%

This is a fairly standard question regarding the challenges of remote anaesthesia in particular the MRI suite and how one might prepare for such a case when it involves an adult patient who may not be able to give consent or cooperate with routine adult induction techniques. Candidates were expected to be very familiar with the multiple issues of remote anaesthesia, either in the MRI suite, interventional radiology suite, interventional cardiology suite, endoscopy centre or even in a clinical setting as it is increasingly common. An adult patient who is not cooperative and requires anaesthesia is not an uncommon situation presenting for MRI scans, dental procedures, endoscopy or any invasive or diagnostic procedures.

Candidates who did poorly either did not complete the question, did not cover sufficient factual content or details expected for a pass.

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Paper One, Question Eight:

A 90-year-old woman is admitted with a fractured right hip following a fall in the toilet. She is referred for the possibility of a regional block to better manage her pain while she is being worked up for surgery.

A) Describe the innervation of the hip relevant to the management of her pain. (40%)

B) List the possible regional blocks (except central neuraxial blocks) that may be useful in managing her pain. (20%)

C) What is your preferred choice of a regional block for this patient? Justify your choice. Describe the technique of performing the regional block of your choice. (40%)

(You may use annotated diagrams to support your answer)

Pass Rate: 63%

This is a common scenario in many hospitals now. Many candidates could list various techniques and describe a technique of choice (most chose the fascia iliaca compartment block) with adequate details for a pass. Candidates, though not many, who provided correctly drawn diagrams got extra credit. Innervation of the hip joint is poorly appreciated by most candidates and so leads to poorer performance in Part A of this question.

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Paper Two, Question One:

A 5-year-old boy is rescued from a fire in an HDB flat. You are activated to the emergency department to help.

A) Describe your initial assessment and management of the airway and ventilation of this child. (50%)

The plastic surgeon has listed the patient for burns wound debridement and application of burns dressings in the emergency operating theatre.

B) Outline your anaesthetic management in the operating theatre. (50%)

Pass Rate: 42%

Part A of this question requires candidates to focus on the airway and ventilation.

Some candidates misinterpreted the question and answers as for “initial assessment of burns” and wasted time elaborating on burns and trauma assessment and ended up with insufficient or minimal description of their intended airway or ventilation strategies.

Most candidates who interpreted the question correctly were able to identify inhalational injury and poor GCS as an indication for early intubation and use of RSI. Few candidates failed to consider C spine protection or described placement of towel under the shoulder for intubation (which is not indicated as this is not an infant with large occiput). Most tend to forget about carbon monoxide as a cause for poor oxygenation and its diagnosis and management. The better candidates mentioned downsizing the endotracheal tube as appropriate, the use of bronchoscope post-intubation to evaluate airway and to assess for circumferential burns and the need for escharotomy to facilitate ventilation.

Part B of this question requires an outline of the management in OT. Most candidates were able to identify the importance to temperature monitoring and multi-modal analgesia. Some of the points that were commonly missed and may contribute to a better score includes pre-op huddle with the surgeon to discuss positioning and approach and use of string tie if there are facial burns, steroids to reduce airway oedema, antibiotics, challenges with monitoring, urine output targets, use of Parkland formula to guide fluid replacement, point-of-care testing and risk of tube or lines dislodgement during wound debridement and dressing.

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Paper Two, Question Two:

A 27-year-old primigravida is admitted to the Labour Ward for induction of labour at 34 weeks of amenorrhoea for severe pre-eclampsia. She requests for labour analgesia.

A) Describe the nociceptive pathways involved in the different stages of labour, including the source of nociception. (50%)

B) Describe the anatomy of the lumbar epidural space and how pregnancy related changes at the third trimester affect your conduct and management of a lumbar epidural regional block. (50%)

Pass Rate: 0%

The question deals with a very common clinical scenario, pregnant woman have severe pain due to active labour requesting for labour epidural. The expected answer derives from standard basic science and is widely available in most textbooks or online resources.

Most candidates were not able to enunciate the minimal points required to pass. Some candidates did mention sufficient points for one part of the question but did too poorly for the other part to achieve a pass overall.

The candidates' performance in Part A suggests a huge knowledge gap in the source of labour pain and nociceptive pathways involved.

For Part B, some candidates misinterpreted the question and described the anatomy for performing an epidural block, e.g., skin, subcutaneous fat superior spinous ligament etc., instead of the anatomy of the lumbar epidural space itself. Many candidates listed factual errors including cauda equine as a content of lumbar epidural space and spinous process being the posterior boundary of the lumbar epidural space.

There was also a poor understanding of how the physiological changes of term pregnancy would affect the conduct and management of the lumbar epidural block.

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### Paper Two, Question Three:

A 25-year-old man sustains an acute left subdural hematoma (SDH) following a road traffic accident. His Glasgow Coma Scale (GCS) on arrival in the Emergency Department is E1V1M5. He is intubated and ventilated and sent to the operating theatre for emergency evacuation of the acute SDH.

A) Outline the expected intracranial pathophysiological changes following such a head injury. (40%)

B) When the bone flap is raised, the brain is noted to be very swollen. The surgeon asks that you do something to reduce the swelling. What intraoperative measures would you undertake to help reduce the cerebral swelling? (60%)

Pass Rate: 58%

This question examines the pathophysiology of traumatic brain injury and its management. Most candidates demonstrated a good understanding of Monroe-Kellie doctrine. Some of the other concepts such as how cerebral ischaemia develops were less well covered. The second part was generally well answered.

Candidates who did poorly covered too few points (in either Part A, B or both) to merit a pass.

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### Paper Two, Question Four:

A 50-year-old man presents with viral pneumonia. His condition deteriorates rapidly and is admitted to the ICU for initiation of mechanical ventilation.

A) Outline your strategy for mechanical ventilation in this patient with acute respiratory distress syndrome (ARDS). (50%)



B) Describe the physiological effects of prone positioning on oxygenation and ventilation in this patient. (50%)

Pass Rate: 46%

This is an important critical care topic covering core concepts of oxygenation and ventilation.

Part A requires an outline of how protective lung ventilation can be used in this patient including the use of sedation to allow coordination with mechanical ventilation and target tidal volumes and ventilatory pressures involved. Mentioning the “open lung concept” to ventilation will lead to a better score but is not required for a pass.

Part B requires the understanding of how prone positioning improves oxygenation and ventilation, specifically the overall ventilation/perfusion matching. Candidates are also expected to explain through the changes in perfusion and ventilation in a prone position improves oxygenation and CO<sub>2</sub> elimination.

Some candidates were able to list the target numbers for Part A but were unable to demonstrate an understanding of the principles behind ventilation or prone positioning.

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Paper Two, Question Five:

A 65-year-old man presents with a 5-day history of poor intake, vomiting and abdominal distension. Abdominal x-rays and CT-scan imaging reveal intestinal obstruction likely secondary to adhesions. He is scheduled for emergency laparoscopic adhesiolysis surgery. He has history of long-standing Parkinson’s disease (PD) and has been on nasogastric feeding for the last 6 months. His current medications include Selegiline and Madopar (Levodopa/ Benserazide).

A) Briefly describe your pre-operative evaluation of this patient. (50%)

B) Briefly outline the perioperative drug management, including the use of Selegiline and Madopar in the perioperative period. (50%)

Pass Rate: 33%

This question requires the candidate to consider the issues of a patient with Parkinson’s disease (PD) who needs an emergent abdominal surgery. Some of the expected points pertinent to Part A include the airway and swallowing issues (airway dysfunction, dysphagia and risk of aspiration), autonomic dysfunction, specific medications required for the management of PD as well as the impact of the surgical conditions such as intestinal obstruction (IO) with possible dehydration and its end-organ effects.

Part B expects the candidates to concentrate specifically on the medication which includes both the medications for the management of PD as well as medications that potentially may be used perioperative with comments on what can be safely used and what should be avoided.

Candidates who gave a structured answer with pertinent points instead of a generic answer were awarded better scores. Candidates who did poorly missed features specific to PD (such as aspiration risk, autonomic dysfunction mentioned above) or specific to the IO.

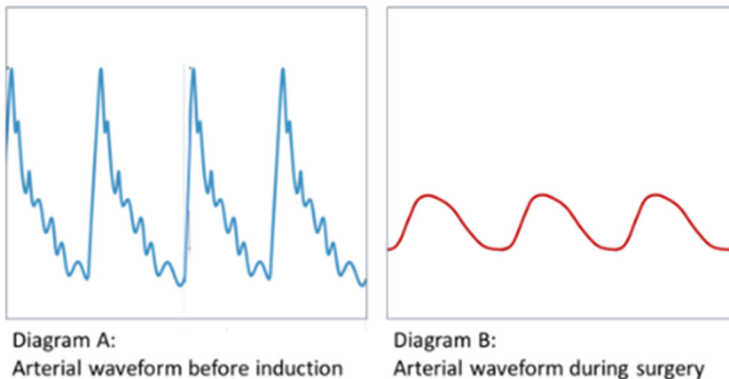
Majority of the candidates mentioned to continue PD drugs perioperatively, and alternative formulation if unable to take orally. But some missed out on drugs to avoid.

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Paper Two, Question Six:

A 75-year-old woman requires an emergency laparotomy for bowel perforation secondary to a stenotic adenocarcinoma of the transverse colon. An intra-arterial cannula is inserted before induction. Thirty minutes into the surgery, the morphology of the arterial waveform is noted to have changed. The scales have not been changed.

Diagram A shows the waveform transduced from the intra-arterial cannula before induction. Diagram B shows the changed arterial waveform during surgery.



- A) What are the possible causes for the change in appearance of the waveform from diagram A to B? (50%)
- B) Outline your management following the change in waveform from diagram A to B. (50%)

Pass Rate: 58%

This question requires the candidate to consider both equipment causes and patient factors that may lead to changes in waveform of an intra-arterial line.

Most candidates were able to identify that the second waveform is an overdamped waveform and were able to give common equipment causes. Candidates who missed out on clinical conditions as a possible cause and did not perform clinical assessment for possible aetiologies did poorly for this question.

Candidates are reminded to always consider clinical aspects even for questions centred around equipment since equipment is used to enhance patient monitoring, patient care and safety. In addition, do consider the clinical context provided in the question stem as that is often expected in the answers.

Some candidates mixed up underdamped and overdamped waveforms, but they were not penalised as it is not part of the expected answers.

Paper Two, Question Seven:

A 60-year-old woman with cervical myelopathy from rheumatoid arthritis is scheduled for cervical spine surgery in the prone position. She is on long-term steroids.

A) Briefly describe the considerations related to patient positioning for the operation. (50%)

B) The patient is turned prone. While the surgeons are cleaning and draping the patient, the CO<sub>2</sub> monitor displays a flat line at 0 mmHg. What are the possible causes? Describe your next steps in management. (50%)

Pass Rate: 67%

Part A of this question requires the candidates to focus on the issues of patient positioning for the operation taking into account the background history of cervical myelopathy from RA (possible risks of atlanto-axial subluxation), steroid usage and cervical surgery.

Some candidates either misread the question or answered off-topic into considerations of RA for surgery rather than positioning itself. Some only focused on the C-spine and airway management and missed out on other issues with positioning such as monitors, potential for pressure or neurological injuries, optimisation for ventilation and the process of turning itself. Both situations lead to a poorer performance in Part A of this question.

Part B was generally answered well and almost all candidates managed to identify the common and dangerous causes of sudden loss of etCO<sub>2</sub>, and its subsequent management. Candidates who did not perform as well for Part B appeared disorganized in their thought process and answer thus failing to prioritize the management. A few also missed out on important causes such as cardiac arrest as a rare but potential cause.

Candidates are reminded that the percentages (50% each) are included to help guide time allocation. Some candidates spent too much time on one part of the question and ended up with insufficient points in the other part to do well overall.

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Paper Two, Question Eight:

A 54-year-old male smoker, with no other medical history, is scheduled for elective endoscopic laryngeal microscopic surgery (ELMS) to remove a polyp at his right vocal cord.

A) What are your anaesthetic considerations and how would you address them? (50%)

B) On the day of surgery, the surgeon informs you that he is going to use a carbon dioxide laser to excise the polyp.

How might this affect your choice of endotracheal tube? (20%)

C) Intraoperatively, the surgeon suddenly announces the possibility of an airway fire, and you detect a burning smell.

Outline your immediate next steps in management. (30%)

Pass Rate: 50%

Majority of candidates were able to cover most of the points expected for Part A, with better answers going into detail on how these concerns could be mitigated and addressed. The poorer answers presented a list without explanation. Candidates who failed to mention airway assessment to exclude potential difficult airway were awarded much lower scores. Candidates who mentioned measures to reduce airway oedema, obtund airway reflexes or sympathetic haemodynamic response to suspension laryngoscopy or considered advanced techniques such as tubeless oxygenation or jet ventilation were given extra credits.

Most candidates did well in Part C.

Part B was answered most poorly among the 3 parts. Many candidates just stated which tube they would use without justifying their choice beyond vague statements that laser-resistant tubes were less likely to catch fire. Many did not seem to appreciate that laserflex tubes had a double-balloon cuff.

Prepared by:

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Master of Medicine (Anaesthesiology) Examination Committee

18 October 2023