

# Report on the Short Answer Question Paper

September 2014

## The Short Answer Question Paper

The purpose of the Short Answer Question (SAQ) paper is to examine a candidate's knowledge of the Basic and Intermediate sections of the training curriculum specified by the Royal College of Anaesthetists. Because the time available for each question is limited, this paper tests judgment and the ability to prioritise information within the answer, not simply factual recall. This approach will discriminate between candidates with appropriate knowledge and experience of the subject matter and weaker individuals.

Questions are commissioned (principally from members of the SAQ core group of examiners) to reflect the breadth of knowledge required. Questions already in the database are updated or modified in light of new knowledge, current national practice or recommendations from relevant governing authorities before inclusion in an SAQ paper. Candidates should not place their faith in "question spotting"; the breadth of the syllabus means that topics are re-visited infrequently.

## Model answers

The SAQ paper must adhere to a set of rules which govern both its overall structure and the content of the model answer templates. All questions are mapped to a specific section of the Basic or Intermediate syllabus. To facilitate an objective and reproducible marking process, key facts in the answer template are bullet pointed and assigned relevant marks. Questions are subjected to an exhaustive editing and peer review process before use in an examination. The marks available for each section of the question are clearly indicated in the examination paper.

## Structure of SAQ paper

The structure of the SAQ paper has altered a little recently as outlined below. This change has been signaled before via appendix 2 of the examination regulations, and an item was included in the May (and now September) 2014 candidates' newsletter which highlighted the composition of the SAQ paper. Failure to appreciate the importance of mandatory training units will contribute to a poor performance by a candidate and this was emphasised in the SAQ Chair's report for the March 2014 paper.

The structure is as follows:

- Six questions from mandatory units: anaesthetic practice relevant to neurosurgery, neuroradiology and neurocritical care, cardiothoracic surgery, intensive care medicine, obstetrics, paediatrics and pain medicine.
- Four questions from general duties: airway management, day surgery, critical incidents, general / urology / gynaecology surgery, ENT / maxillofacial / dental surgery, management of respiratory and cardiac arrest, non-theatre duties, orthopaedic surgery, regional anesthesia, sedation practice, transfer medicine, trauma and stabilization practice.
- Two questions from optional units: anaesthetic practice relevant to ophthalmic surgery, plastics & burns surgery, vascular surgery and advanced sciences (anatomy, applied clinical pharmacology, applied physiology/biochemistry, physics/clinical measurement and statistical basis of clinical trial management).

Candidates who prepare detailed revision notes for the mandatory subjects outlined above will place themselves at significant advantage when writing the SAQ paper. The Basic and Intermediate sections of the syllabus give the specific topics that should be addressed.

Candidates should not underestimate the importance of the “advanced sciences” or believe that they have left these topics behind at the Primary Examination. This knowledge may be tested in any of the written or oral sections of the Final FRCA examination.

The SAQ paper is written to contain questions with varying levels of difficulty;

- 2 questions adjudged to be hard / difficult (pass mark 10-11 /20)
- 6-8 questions adjudged to be moderately difficult (pass mark 12-13 /20)
- 1-2 questions adjudged to be easy (pass mark 14 /20 or more)

The level of difficulty and pass mark are finalised using a process called Angoff referencing, which takes place during the “Paper Setting” and “Standard Setting” meetings of the board of final examiners. Angoff referencing uses the experience of the examiners to set a reasonable pass mark for each question so that a “typical” trainee with appropriate preparation and adequate knowledge will perform satisfactorily.

## **Quality Control for the September 2014 SAQ paper**

### ***Friday 27<sup>th</sup> June 2014 – Paper Setting Day (PSD)***

- For PSD the board of examiners convened and were divided into six “tables” each led by a member of the SAQ core group. Each “table” was provided with two questions and model answers which were checked for factual accuracy and clarity of language, amended if necessary, and had a provisional pass mark assigned. These pairs of questions are marked by each respective “table” of examiners after the SAQ paper has been written by the candidates. This helps to ensure that a consistent standard is maintained throughout the SAQ process.

### ***Wednesday 10<sup>th</sup> September 2014 – Standard Setting Day (SSD)***

- Four scripts (without candidate or College reference numbers) were marked by each of the six examiner “tables”. These scripts were selected by College officials on the basis of related MCQ scores to represent the spectrum of ability within the candidate cohort and thereby allow Angoff referenced pass marks to be finalised. The MCQ results for these anonymous candidates were not known by the examiners. Subsequent discussions by each “table” of examiners ensured that the scripts were awarded all the marks allowed by the answer template, and that each examiner applied a consistent standard across all four candidates. At the end of SSD a pass mark was confirmed for each question and the boundary for a poor was fail determined.

Ultimately, six different examiners mark two questions for each candidate. This eliminates any risk of bias which may be possible with a single assessor marking all twelve questions. The Examination Department staff scrutinise the submitted scores and clarify any ambiguities within the marked scripts before individual results are ratified.

## **Results - Thursday 2<sup>nd</sup> October 2014**

The overall pass rate for this paper was 30.32%

This compares with recent SAQ papers

- March 2014 – 60.32%
- September 2013 – 78.14%
- March 2013 – 67.36%

## Analysis of Results

Candidates continue to disadvantage themselves in a number of familiar ways;

- Failing to answer the question asked – whether this is because of poor knowledge and preparation, or from rushing the answer due to time constraints, only material relevant to the question asked can score. For example, if the question asks for specific factors or draws attention to the fetus there is no point in writing about unrelated general features in the answer.
- Poor weighting of answers – writing extensively on the low scoring sections of the question to the detriment of other sections where more marks are available. This approach limits the maximum score attainable but might reflect poor knowledge of the subject.
- Illegible handwriting – examiners take great care to extract answers from a candidate's script, but it remains true that only material that can be read will achieve a score. Candidates are encouraged to set out their answers in a "bullet point" or "table" format which will aid legibility and time management, and also serve as an aide memoir to the number of key points required for each section.

Examiners comment in feedback that many candidates seem unaware of the breadth and depth of information required for a "pass" answer in the SAQ paper, offering only a superficial treatment of the questions. To help candidates with future preparation, two of the answer templates for the September 2014 paper will be included in this report (see below). These questions will now be removed from the SAQ database.

### **Results for Individual Questions**

The performance of the candidate cohort in each question is subjected to mathematical analysis before publication of the results, and point biserial correlation coefficients are calculated. Two questions had very strong correlation with candidate performance as judged by their total score, and seven questions had strong correlation. Questions 9 and 11 showed poorer correlation. The reliability and consistency of the September 2014 paper as judged by the Cronbach's alpha statistic of 0.75 is slightly higher than for recent SAQ examinations.

#### **Question 1** Pass Rate 43.7%

Examiners expressed the view at SSD that this question was too easy so it is likely that the poor pass rate reflects limited exposure of candidates to the clinical scenario. Many candidates were unable to suggest how the effectiveness of analgesic interventions could be assessed and few offered regional techniques in their answer. It was surprising that a number suggested codeine / paracetamol compounds in their answer despite the question indicating that these agents had been unhelpful. This emphasises the need to read the question thoroughly.

#### **Question 2** Pass Rate 72.8%

It was anticipated that candidates would find this subject matter to be difficult. Surprisingly the question generated the highest overall pass rate, and the majority of candidates scored in excess of the pass mark. Weak candidates were unable to indicate how a high quality conclusion can be ensured from a meta-analysis or to interpret the data for Mallampati studies in a meaningful way.

#### **Question 3** Pass Rate 33%

The poor pass rate for this important subject is of concern as similar clinical scenarios are commonly encountered. Many candidates wrote principally on the preparation of a pregnant woman for general anaesthesia or on the conduct of a rapid intubation sequence, ignoring the emphasis on the fetus in the

question. Teratogenesis by anaesthetic agents was frequently listed as an important consideration although the patient was in the second trimester of pregnancy. Many candidates failed to consider that a fetus of twenty two weeks gestation is highly unlikely to be viable and concentrated on preparation for an unplanned delivery. A clue to this consideration was given in section (c) where the focus was changed to a scenario in which the fetus is potentially viable, but weak candidates ignored this prompt.

**Question 4** Pass Rate 16.5%

Cardioplegia is an important basic tool in cardiothoracic anaesthesia although not used invariably in current surgical procedures. It was evident from the answers which candidates had undertaken an attachment in this area of practice, or had read an appropriate text book. The importance of considering the mandatory units of training in preparation for the Final FRCA examination has been emphasised above.

**Question 5** Pass Rate 59.1%

Overall this question was answered well and was a very strong discriminator between candidates. Weaker candidates tended to ignore the anaesthetic implications of; 1) diseases which lead to chronic renal failure, 2) the importance of preserving dialysis catheters / fistulae sites, 3) the implications of a prior failed renal transplantation and any associated immunosuppressive therapy, and most surprisingly 4) the need for pre-operative investigations. Inexperience is the most likely cause of these omissions.

**Question 6** Pass Rate 39.1%

This question was poorly answered by many candidates who could not list the history and examination findings in such a patient. Many felt that congenital heart disease only caused left sided cardiac abnormalities and were ignorant of national guidelines on infective endocarditis prophylaxis although the need for the latter must be encountered on a regular basis in adult subjects.

**Question 7** Pass Rate 31.5%

Inexperience probably accounts for the poor pass rate for this question. Weak candidates suggested assessment of a potentially difficult airway as the important pre-operative feature, but ignored the co-morbidities associated with causative factors such as smoking and alcohol consumption. The impacts of major physiological changes that are caused by such prolonged and invasive surgery were ignored. The role of the anaesthetist in influencing free-flap survival was particularly poorly answered.

**Question 8** Pass Rate 35.8%

This question was felt to be hard to answer and was assigned a low pass mark after the Angoff process. It proved to be another very strong discriminator between candidates and was answered poorly in the main. Weak candidates had no real knowledge of the subject and did not appreciate that the cardiovascular consequences of the syndrome predominate. Many referred incorrectly to the precipitation of liver failure. Trainees undertaking a block of intensive care medicine will use propofol sedation for some patients so it is important that they understand any potential complications.

**Question 9** Pass Rate 5.7%

The very poor scores for this question were surprising given the widespread use of ultrasound imaging in current clinical practice. Eight marks were attainable for discussing two types of needling technique, hence this question was deemed to be moderately difficult and not hard. Despite this, many candidates failed to score more than five marks. A "black box" approach was evident in the written answers and examiners questioned whether the candidates had any knowledge of the factors which affect the generation of a good quality ultrasound image. Previous reports from the SAQ Group Chair have emphasised that knowledge acquired in preparation for the Primary FRCA examination can be tested in any element of the Final FRCA process. This advice seems to have been largely ignored. The question was of moderate discriminatory value as ignorance of the topic was widespread within the candidate cohort.

### **Question 10** Pass Rate 41.9%

This question was one of the easiest on the paper. The overall pass rate for this question seems very low given that patients with Rheumatoid Arthritis are regularly encountered in daily practice, particularly for arthroplasty procedures. The answers given by most candidates reveal a poor understanding of important factors in the pre-operative assessment of these patients. Many scripts demonstrated a “medical student” level of appreciation of the topic, e.g. writing “the neck” in response to the first question on joints affected by the disease. A “scattergun approach” was taken by weaker candidates who wrote down all the pre-operative investigations they could recall despite the question asking for specific examples.

### **Question 11** Pass Rate 6.5%

The prevalence of Myotonic Dystrophy is comparatively high, and anaesthetists are much more likely to encounter a patient with this condition than one with Malignant Hyperthermia risk. Poorly applied general anaesthesia causes significant morbidity and mortality in myotonic patients and the disease is rightly considered an “old chestnut” which all clinicians should be able to manage appropriately. Most candidates had very poor knowledge of this subject confusing myotonia with forms of muscular dystrophy whose prevalence is rarer. However strong candidates scored significantly in excess of the pass mark which suggests their preparation for the Final FRCA examination was better. Most weak individuals thought incorrectly that suxamethonium was contraindicated due to a risk of hyperkalaemia, and failed to mention the importance of pre-operative echocardiography in detecting any associated cardiomyopathy. This question was a poor discriminator as so many candidates scored very poorly, and remedial reading on the topic is recommended for the majority of this cohort.

### **Question 12** Pass Rate 65.9%

Common clinical subjects tend to score well in the SAQ paper and discriminate between strong and weak candidates as was the case for this question. Weak candidates had poor anatomical knowledge or failed to list the advantages of this specific block, giving instead the features common to any local anaesthetic technique. Poor candidates tended to describe features of blocks at the popliteal level, perhaps due to failing to read the question thoroughly as ankle level was highlighted. The importance of candidates retaining knowledge of the basic sciences has been highlighted before.

## **Summary**

It is disheartening for candidates and examiners alike that the overall pass rate for the September 2014 paper has been so poor. The board of examiners considers the level of difficulty of each question when determining the pass mark during SSD. Two of the twelve questions were graded as easy to pass, two were hard and the rest were moderately difficult, with the Angoff pass marks reflecting this weighting. During the marking process, the benefit of the doubt is given to any candidate whom the examiner believes has misinterpreted (but not misread) the wording of a question. The pass rates for the individual questions were highly variable despite the efforts to maximise the candidates’ scores. At least eight of the twenty marks available for each question could be attained by the application of basic principles to the answer. The ease with which a significant proportion of the pass mark could be achieved is reflected in the boundary set as a “poor fail”. The high overall rate of “poor fails” observed within this cohort suggests a deficiency in core knowledge and clinical experience.

It is clear from the overall results that many candidates give insufficient weight to the six mandatory subjects in their preparation for the Final FRCA, as these questions tended to be passed by fewer candidates. Trainees may not have rotated through all these clinical areas when presenting for examination and this lack of specialist experience will be exposed by the structure of the paper. The need for detailed revision notes on these mandatory subjects was suggested above. It has been recommended previously that candidates should arrange short “taster” sessions in these mandatory units if their training carousel has not provided the relevant experience and this advice remains pertinent.

Some areas of knowledge deficit in this exam were spread evenly throughout the candidate cohort and have been highlighted above. Similar gaps in knowledge have been observed in previous SAQ papers. It is

of concern that a question on statistical analysis (question 2) generated double the pass rate of a question on an important aspect of obstetric anaesthesia (question 3). Although an understanding of meta-analysis is important, the ability to apply knowledge effectively and safely in a practical situation is vitally important to our specialty. When this knowledge deficit affects the fundamental basics of practice, it is the responsibility of the College to work with Schools of Anaesthesia to fill these gaps and ensure that testing is as rigorous as possible.

Conduct of the SAQ paper would be impossible without the hard work of the Board of Final FRCA examiners and of the Examinations Department staff, and I am extremely grateful for their continued and enduring support.

**Dr David Mulvey**  
**Chair, Short Answer Question Group**



<p>Question 9:</p> <p>a) Outline the basic principles of ultrasound signal and image generation. (6 marks)</p> <p>b) How may physical factors influence the image quality of an ultrasound device? (6 marks)</p> <p>c) Which two needling techniques are commonly used in ultrasound guided nerve blocks and what are the advantages and disadvantages of each? (8 marks)</p>	
<p>(a)</p> <ul style="list-style-type: none"> <li>• Ultrasound is &gt;20 KHz, medical US needs 2.5 to 15 MHz signal</li> <li>• Most transducers are artificial polycrystalline ferroelectric material (ceramics)</li> <li>• Material has piezoelectric properties</li> <li>• When a current is applied across the crystal, it expands and contracts as the polarity of the voltage changes</li> <li>• This produces a series of pressure waves (sound waves)</li> <li>• The wave is reflected by target and returns to crystal</li> <li>• This causes a conformational change which generates a voltage change across its surface which is amplified and forms the receiving signal</li> </ul>	<p>Max 6</p>
<p>(b)</p> <ul style="list-style-type: none"> <li>• Attenuation: loss of signal as medium is traversed - affected by distance, medium and frequency</li> <li>• Reflection: depends on the difference of acoustic impedance of the tissues.</li> <li>• Acoustic Impedance: depends on density and propagation velocity</li> <li>• Refraction: responsible for artefacts, improved with acoustic lenses</li> <li>• Diffraction: US beam spreads with distance.</li> <li>• Resolution: lateral, axial and temporal resolution. The ability to distinguish two objects.</li> </ul>	<p>Max 6</p>
<p>(c)</p> <p>Short-axis/out of plane; the structure being visualised is in cross-section and at right angles to the beam.</p> <ul style="list-style-type: none"> <li>• Advantages: <ul style="list-style-type: none"> <li>○ Short distance from skin to nerve</li> <li>○ Uses normal anatomical entry points, less painful as the needle does not travel through muscle</li> </ul> </li> <li>• Disadvantages: <ul style="list-style-type: none"> <li>○ Poor visualisation of needle tip and proximity to nerve</li> </ul> </li> </ul> <p>Long-axis/in plane; the structure is visualised longitudinally.</p> <ul style="list-style-type: none"> <li>• Advantages: <ul style="list-style-type: none"> <li>○ Good visualisation of needle-nerve proximity</li> </ul> </li> <li>• Disadvantages: <ul style="list-style-type: none"> <li>○ Difficult to keep needle in view</li> <li>○ Longer skin to nerve distance</li> <li>○ Often painful as the needle travels through muscle</li> </ul> </li> </ul>	<p>Max 8</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
<p>Question grade</p>	<p>Moderate</p>
<p>Angoff pass mark</p>	<p>12 /20</p>
<p>Poor fail</p>	<p>&lt; 9</p>