A systematic approach to multiple choice questions (MCQs)

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ABSTRACT
This paper aims to enable examinees to optimize their performance in multiple choice questions (MCQ) by adopting a simple but systematic approach in solving such questions. Although this approach is based on our experience with candidates for the Membership Examination of the Royal College of General Practitioners (MRCGP) and examples used in this paper are typical of MRCGP questions, the approach is relevant to other similar examinations. Moreover, the presented approach may also help in developing significant cognitive skills relative to clinical practice.


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What do MCQs assess?
If you have an exceptional memory for facts or the opportunity to cram information in a well-defined specialty, the MCQ should hold no fears. Just remember that a high score in a paper of this kind is not a valid predictor of your use of knowledge in clinical situations. While considerable claims have been made for the MCQ as a test of cognition, the reality appears to be that it tests three intellectual attributes of candidates: first, accurate interpretation of the question wording; second, recall of facts; and third the skill of probabilistic guessing. In primary care the range of knowledge which can be assessed by MCQ is very wide; the Royal College of General Practitioners, for example, lists 15 broad areas of assessment for its Membership MCQ Paper. Here, few candidates will be in a position to rely confidently on factual recall and skills of interpretation and selective guesswork become important. This paper presents a simple yet systematic approach to MCQs which may prove effective in raising the scores of examinees.

Format and examinee stereotypes: The MCQ in its usual format comprises an opening statement or stem followed by five related statements, each of which needs to be identified as true or false. The option exists to respond don't know and negative marking is employed in some formats discourage questions. However, it is important to emphasize that negative markings cannot detect or compensate for guesswork provided that it arrives at correct conclusions. Examinees scoring poorly on MCQ papers usually fall into one of two contrasting categories: (A) the reckless have high levels of confidence in their capacity to understand the questions and in their knowledge of the appropriate response. Such candidates complete a high proportion of the question paper in a relatively short time and may leave the examination early. Careful scrutiny of their answers shows that they have: (i) misunderstood a number of questions; (ii) been taken in by plausible distracters (questions which appear true but are false) and above all (iii) have guessed wildly and been heavily penalised by negative marking; (B) The cautious have low levels of confidence in their comprehension of questions (sometimes seeing questions as complex when they are straightforward) and in their factual knowledge. They complete a significantly smaller proportion of the paper at a slow rate and may find that time pressures add to their problems. Typically, analysis of their answer sheet reveals: (i) questions not attempted despite relevant knowledge; (ii) occasional impulsive guessing and (iii) overall few marks lost through guesswork, but few gained either. Both these stereotype candidates score badly (less than 40 percent), the first because negative marking has reduced the score by more than 20 percent; the second because he/she has attempted less than 60 percent of the
questions and despite being so selective is wrong in at least one sixth of the answers. Both types have failed to use the available time well. While preparing for the examination a few minutes (two per question) spent on less than 20 MCQ questions will help you to determine if you conform to either of the above stereotype. If you do, then recognizing the pattern of behavior is important because it is likely to be reinforced under examination conditions. Both reckless and cautious patterns of behavior are helped by the technique presented in this paper. If you are under-performing for other reasons, it can do no harm and may help.

The time management technique This technique aims to optimize the performance of individuals on the MCQ Paper through three basic processes: (i) managing the available time effectively; (ii) identifying those questions which need particular care and (iii) defining the confidence with which a response can be made. The technique is based on three readings of the question paper, each reading having specific objectives and related tasks. Below we indicate the approximate allocation of time for each reading of an MCQ paper with 60 questions in the independent true/false format. (Examples used are typical of MRCGP exam questions).

First Reading (30 minutes) After a few moments devoted to transferring carefully your candidate number and name to the answer sheet you are ready for the first of the three readings. The objective is to classify all questions into one of three categories: (1) Clearly understood and answerable; (2) not clearly understood and (3) clearly understood and not answerable.

The task is to mark the question book with T or F for category (1); ? for category (2) and to leave blank category (3). Two example questions may help to illustrate this process:

Example Q1
If the following drugs are given concurrently, the absorption rate of at least one of the drugs is affected by the presence of the other:

? A tetracycline and oral iron;
? B isoniazid and phenobarbrione;
? C metoprolamid (oxolon) and digoxin;
D pirampicillin and antacids;
? E diazepam and cimetidine.

Example Q2
In cystic fibrosis (mucoviscidosis)

? A inheritance is by autosomal dominamant;
? B pulmonary infection by staphylococci is a recognized hazard;
? C demonstrable exocrine pancreatic dysfunction is unusual;
? D immunisation against pertussis is contraindicated;
E diabetes mellitus is a recognized complication.

It is important to realize that certain question types are inherently more difficult to understand and therefore answer. For example question 1, the stem is complex and item D contains a little known compound (pirampicillin). In contrast, example question 2 has a straightforward stem but only one immediately answerable item (B); item E while clearly understood and plausibly true, is left blank because there is little confidence that it will be answerable. Remember that you have only about half a minute per question for this preliminary sorting. If there is any doubt put a ? against the item. Nothing is transferred to the answer sheet at this stage. You can gain about 30 percent of the marks during the first reading while using only 25 percent of the available time.

Second Reading (60 minutes) There are two objectives for this reading; (i) to classify items previously marked ? (50 mins); (ii) to check that T or F already assigned are correct (10 mins). The task of assigning T, F or DK (don't know) to the items marked ? on the first reading is the key to success and involves three skills: (a) accurate interpretation of the wording; (b) the search for clues and (c) evaluating the confidence of your response.

Accurate interpretation First you must decode the stem if this is complex or obscure. Then read each item individually immediately after reading the stem. You must know what the examiners mean by the following terms: (i) pathognomonic - a feature which is essential to diagnosis of the condition; (ii) characteristic - found in the overwhelming majority of cases but not in all; (iii) typical - found in the majority of cases but often absent and (iv) recognized - while not essential or common, a feature which has been described in the literature. Moreover, be aware of the following points demonstrated in example question 3: (a) loose wording in A; “useful” can be presumed to be for the GP but could be misinterpreted unless
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this item is read with the stem; (b) negatives in B: "non-squinting," “opposite in direction”; and in D: "does not vary," (c) the complexity of B and D; (d) the judgement implicated in E: “effective” no age is given for a “baby.”

Example Q3
In the detection of a congenital squint:

T A asymmetry of the corneal light reflex is a useful sign;
DK B covering the non-squinting eye during fixation will cause movement of the affected eye opposite in direction to that of the squint;
T C a latent squint is more likely to be manifest during fatigue;
DK D the angle of derivation of a squinting eye does not vary with near (0.3m) or distant (6m) fixation;
DK E

On this basis B and D are more specific and represent high risk items for guessing. In contrast, items A and C are worth close scrutiny and common sense suggests they are true. Item E is probably best marked DK.

Searching for clues Rarely the stem or items of one question provide information useful in answering another (for example, consider whether example Q2 helps you to answer item D in example Q4). Much more often the question writer has failed to cover his tracks and left clues about the correct response. The classic (and nowadays rare) example is use of the word always or invariably; on the vast majority of occasions they suggest that the item is false. There are two other markers of the false response which you should search for: (i) the item which is self-evidently false (items A and E example question 4); (ii) the item which if true would have implications of a far-reaching kind (item C example question 4).

Finally remember that in writing MCQs authors tend to enter true statements first. This means that unless the item order is randomized during the process of refining questions, part E of an MCQ has a higher probability of being false than part A.

Evaluating confidence Once you understand exactly what is being asked, its level of difficulty and the presence or absence of clues you should be in a position to evaluate the confidence with which you can respond. Do not be afraid to mark DK those items which are unintelligible, ambiguous or very difficult (for example, Q3, item D) - it could be a very shrewd move since the final scores are often amended by computer to reduce the contribution of questions of this kind, since they are almost always non-discriminatory.1 The golden rule is to guess only where you clearly understand the question and on the basis of clues or half-remembered knowledge you can do so with some confidence. Blind guessing will almost certainly lead to the loss of marks. It should not be your aim to respond with T or F to most items but to identify, on average, three items per question to which you can respond confidently in this way. This should ensure a satisfactory mark overall by minimizing the impact of negative marking.

Towards the end of the second reading check those items marked T or F at the first reading. Here you are on the look-out for simple errors such as marking the wrong item. If your first reading was well directed this task can be completed very quickly.

Example Q4
Whole wheat bran

F A increases intestinal transit time; blood reduces peak glucose when given with oral glucose;
DK B is contraindicated in those with cholelithiasis;
F C is a useful adjunct to therapy in mucoviscidosis;
DK D may be prescribed under the NHS for the dietary management of gluten enteropathy only.
familiarity with the format and level of difficulty of questions. There are a number of books and papers which provide guidance on preparation for examination. We recommend that the technique be tried out in advance both to increase familiarity with it and to generate confidence in its effectiveness. It is encouraging that this approach is similar to that recommended by Fleming for the MCQ paper of MRCP: “better to answer those (questions) that you are sure about, leave those that you have no idea about, and then ‘back your hunches’ with those that you think you might know.”

However, should there be objections that this recommended approach to the MCQ paper is no more than a device to optimize examination technique, we would argue that by encouraging candidates to make best use of their factual knowledge we are, in fact, developing skills with significant validity for clinical practice. Recent evidence suggests that groups as dissimilar in performance at clinical tasks as medical students and consultants have similar levels of factual knowledge. What separates them in clinical practice are cognitive skills, including the capacity to select and interpret data accurately and to evaluate probabilities. Moreover, time management is an important skill which needs to be learned by medical graduates if they are to enhance their operational effectiveness.

References