

Writing single best answer questions for Edinburgh Medical Exams

This outlines how exam questions should be constructed for clinical exams, and similar principles apply to MCQs in years 1 and 2 especially where integrated knowledge is being assessed.

A typical single best answer has a clinical scenario (stem), a question (lead in) and a five option answer list (distractors). Some examples are provided below.

Sample questions:

1. **STEM:** A 71 year old woman has a large haematemesis. She was well previously and her only medication was occasional ibuprofen for osteoarthritis.

Her temperature is 35.8°C, pulse 116 bpm, blood pressure 92/59 mmHg and oxygen saturation 95% breathing 40% oxygen via a face mask. She has epigastric tenderness but no rebound or guarding.

LEAD-IN: What is the most appropriate immediate management?

OPTIONS:

- A. 12 lead ECG
- B. Endoscopy
- C. IV fluids
- D. IV opiate analgesia
- E. IV proton pump inhibitor

Answer key C

This question is assessing the candidates' ability to correctly prioritise treatment. The immediate priority is circulatory support with IV fluids. An ECG will be required but not first option. An endoscopy will be performed, but patient will be stabilised first. IV PPI may be started depending on the outcome of the endoscopy. There is no indication currently for IV opiates. These are all relevant options in the emergency management of an upper GI bleed.

2. **STEM:** A 21 year old woman is admitted to the Emergency Department having been found unconscious on the street by the police. The paramedics report she smells of alcohol and there was an empty vodka bottle lying next to her.

Her temperature is 36.1°C, pulse 86 bpm, blood pressure 112/75 mmHg and oxygen saturation 95% breathing air. Her Glasgow Coma Score is 13/15 (Eyes 3 /4, Motor 6/6, verbal 4/5).

LEAD-IN: What is the most appropriate immediate investigation?

OPTIONS:

- A. Arterial blood gas
- B. Blood alcohol level
- C. Blood capillary glucose
- D. Chest X-ray
- E. CT scan head

Answer key C

Excluding hypoglycaemia is the immediate priority. There is no indication for a blood alcohol level or arterial blood gas. A chest X-ray may be required but not immediately. A CT scan head requires further assessment and the exclusion of other causes for her reduced conscious level. Although checking blood capillary glucose is something that is often routinely performed by paramedics and/or nursing staff, it is still important to ensure that the omission of this key part of assessment is recognised by students.

3. **STEM:** A 44 year old woman has sudden onset of shortness of breath. She has rheumatoid arthritis and is taking methotrexate and ibuprofen.

Her temperature is 37.2°C, pulse 102 bpm, blood pressure 121/68 mmHg, respiratory rate 24 breaths per minute and oxygen saturation 93% breathing air. Her chest is clear and heart sounds normal. She has synovitis at her right wrist

Investigations:

Chest X-ray: No abnormality

ECG: Sinus rhythm, rate 105 bpm

LEAD-IN: What investigation is most likely to establish the diagnosis?

OPTIONS:

- A. Blood cultures
- B. CT pulmonary angiogram
- C. Echocardiogram
- D. Serum D-dimer
- E. Serum highly sensitive troponin

Answer key B

The patient has sudden onset of shortness of breath, with tachycardia, hypoxia and a normal chest examination. A pulmonary embolus needs to be confirmed/excluded and a CTPA is the most appropriate test. The other tests have merit but are not the best answer.

The following example is for basic science question.

4. **STEM:** A 65 year old man presents with a 1 day history of a hot painful right knee joint.

His temperature is 38.4°C and pulse 102 bpm.

Turbid fluid is aspirated from the right knee.

LEAD-IN: What cell is most likely to predominate in the right knee aspirate?

OPTIONS:

- A. Chondrocyte
- B. Lymphocyte
- C. Macrophage
- D. Neutrophil
- E. NK cell

Answer key D

This applies knowledge of an acute inflammatory response, typified by a monoarthritis due to infection or gout. The fluid would contain large numbers of polymorphs. This question could be used in year 1 (inflammation), year 4 (rheumatology) and year 6 (finals) with some minor adjustment at each point.

How to construct clinical single best answer MCQs

This section is written primarily for clinical MCQs but the basic rules also should be followed in writing questions for the MBChB course in years 1 and 2. The first section is a brief guide with key rules. There is a more detailed section on house style in the last section.

When writing questions it is best to think about a patient you have seen rather than something vague and abstract. Remember the curriculum – we should be testing students in what they are expected to know and have seen in their placements. The principles of writing MCQs is provided online via Media Hopper.

(<https://media.ed.ac.uk/channel/MBChB%2BCreating%2BMCQs%2Band%2BMCQ%2BExams/47630501>)

1. Aim for a stem of 30-120 words. The language should be clear and concise. Use the present tense. Longer stems should be used sparingly
2. The scenario poses the clinical problem which is to be solved by only one of the suggested answers in the option list. There may be merit in the other options but there should be only one best answer.
3. Where appropriate, make the scenarios patient focused and may include all or some of the following components in this order:
 - age
 - gender
 - ethnicity (where relevant to the case or one of the options)
 - symptoms
 - duration
 - the setting, only where relevant (e.g. GP, Emergency Department, ward etc)
 - relevant past history, family or social historyPresent the examination findings in the following order:
 - Temperature (e.g. 38.0°C)
 - pulse (e.g. 86 bpm)
 - blood pressure (e.g. 142/93 mmHg)
 - respiratory rate (e.g. 24 breaths per minute)
 - oxygen saturation (include breathing air or oxygen percentage, rate and mode of deliver)
 - physical findings (NB positive/abnormal findings first) as much as possible encourage synthesis e.g. do not state “the patient was dehydrated”, but give the signs of dehydration so the candidate has to determine the clinical state.
 - results and investigations presented in a logical, standardised order (see Reference Range document)
4. The scenario should ensure that the candidate is not being assessed on factual recall but on the application of knowledge.
5. Avoid making the scenario overcomplicated and exclude irrelevant information

6. Do not include obvious mismanagement in the clinical scenario unless this is sufficiently common as to be seen in routine clinical practice. Do not exclude key information that the candidate would expect.
7. The lead-in should pass the cover test i.e. the candidates can get the correct answer without seeing the options
8. Ensure there is a list of 5 possible answers to the lead in, identified serially A-E. The list should be in alphabetical order.
9. **The options presented should all be:**
 - plausible – try to avoid obviously redundant answers
 - homogenous – e.g. all diagnoses, all treatments, all equivalent management options. You can mix investigations and treatment in some scenarios.
 - grammatically correct – do not mix tenses. Lead-ins should be written in the present tense.
 - roughly the same length – so the right answer does not stand out.
 - make sure there is only one best answer and that the right answer is in the list
 - the answer should conform to common UK practice and NICE/SIGN guidelines where relevant
 - Avoid grammatical cues: all answers should connect to the question
10. Once you have written the question consider whether it can be cloned. If you wrote a question asking for diagnosis consider whether you can write one on investigation, management, treatment, prognosis etc.

House style for basic science single best answer MCQs

This is to be read in conjunction with the clinical MCQ house style but adds some additional points for writing questions for years 1 and 2.

1. Questions should encourage the application knowledge placed in clinical or pathological context rather than simple factual recall.
2. The questions should assess positive recall of knowledge, rather than identification of false answers. Lead-ins that ask “which of the following is false/least likely etc?” have limited use.
3. Where possible avoid questions that are multiple true/false with one true answer. This means that answers will need to be modified to provide more homogenous options. Where this does not seem feasible ensure the statements are of similar style and length and avoid obvious cueing (e.g. use of “never” or “always” vs. “may” or “could”).

Detailed House Style

Abbreviations

- avoid abbreviations wherever possible. Exceptions include abbreviations that are either widely understood or are very long when spelt out: Units of measurement, such as cm, L, mL and mmHg (but not units of time)

Bacteria

- do not italicise names of bacteria as italic script can be challenging for dyslexic candidates
- the generic name should begin with a capital letter and the specific name with a lowercase letter e.g. *Pneumocystis jirovecii*
- anglicised versions of these names should begin with a lowercase letter (e.g. staphylococcal infection, legionella pneumonia)

Capital/lowercase

- capitalise the first letter of proper names (e.g. Gram positive)
- use lowercase for clinical specialties (e.g. endocrinologist), disorders (e.g. type 2 diabetes mellitus) and hospital departments (e.g. intensive care unit, outpatient clinic), except for the Emergency Department
- results of investigations should begin with a capital letter when appearing in list form

Drug history

- write 's/he is taking', not 's/he is on'
- write 's/he is treated with', not 's/he receives' or 's/he is started on'
- write 's/he dialyses 3 times weekly', not 's/he is dialysed'
- do not use proprietary names unless essential; cite the generic name as used by the British National Formulary (BNF) for all medicines
- when referring to a class of drugs refer to the BNF for the term
- non-proprietary names of medicines are written with a lowercase initial letter
- write 's/he is advised to take' or 's/he is given', not 's/he was prescribed' (people are not prescribed)
- write the frequency in common English ('three times a day' not 'tid' or 'TDS')

Examination

- avoid the phrase 'On examination'
- The recommended format and order for presenting the initial observations is temp, pulse, BP, respiratory rate, and O₂ saturation

'Her temperature is 38°C, pulse rate 84 bpm, BP 120/80 mmHg, respiratory rate 12 breaths per minute and oxygen saturation 96% in air.'

- use man/woman (not male/female/gentleman/lady)

Greek characters

- use α , β , γ , etc. rather than alpha, beta, gamma, etc. For example, TNF- α , (Exceptions: gamma globulin, interferon beta and other drug names)

Hyphens

- do not use hyphens for age e.g. write 'A 40 year old man'
- words beginning with 'non' are hyphenated (e.g. non-proliferative) inpatient/outpatient are not hyphenated
- compound modifiers that precede a noun are hyphenated (long-standing hypertension, first-degree heart block)
- hyphenate '30 pack-year smoking history' without a hyphen between the number and 'pack'
- use a hyphen where the name of the antibody includes an abbreviation (e.g. anti-Ro), or where the name includes more than one word (e.g. anti-neutrophil cytoplasmic antibodies, anti-smooth muscle antibodies, anti-hepatitis C antibodies)
- do not use a hyphen where the antibody is a single word (e.g. anticentromere, antimitochondrial), unless there is a danger of mispronunciation

Investigations

- give the actual value and the reference range in parenthesis and allow students to interpret the clinical data e.g. question should give the haemoglobin result rather than stating 'the patient is anaemic'
- do not withhold information that would normally be available in everyday clinical practice. For example if serum sodium is given, then serum potassium should also be provided. However you can miss out results if it helps shorten the question and does not omit vital information.
- if there is only one result in the stem, it can be included in the paragraph. Otherwise the results should be listed below the clinical vignette under the heading 'Investigations:'
- the test names should be capitalised
- the term 'X-ray' (not x-ray, x ray or X-Ray), although not strictly correct, is widely understood and need not be replaced by 'radiograph'
- write 'CT/MR/ultrasound/isotope scan of'

Job titles

- lowercase is used in a general sense (e.g. 'a consultant neurosurgeon arrived')

Numbers

- numbers from one to nine should be in words, with 10 and over in figures. Exceptions are:
 - a number at the beginning of a sentence should always be spelt out (except in answer options where all numbers should be given in numeric forms) e.g. ▪ A: 1 ▪ B: 2 ▪ C: 4 ▪ D: 12 ▪ E: 16
- use arabic numerals for age (except for 'thirties', 'forties', etc.), names of conditions (e.g. type 2 diabetes mellitus), symbols, all abbreviated forms of units, units of alcohol, units of red cells (for transfusion) and all units of time (minutes, hours, days, weeks, months, years)

Past medical history

- avoid the terms 'known', 'known to be' and 'known to have', 'diagnosed with', 'with a history of', in relation to a condition. Write 'A 40 year old man with diabetes'
- use 'history of' only for temporal separation of the presenting complaint and a past diagnosis e.g. 'A 40 year old man has breathlessness. He has a history of COPD'.

Setting of care

- this should only be given if it influences the decision about the correct answer. In these cases, use of 'presents with' is accepted.

Units

- abbreviate litre as 'L' and millilitre as 'mL'
- units of time are written in full in the stem (years, weeks, hours, minutes)
- units of time are abbreviated in the investigations and answers (h, min, s)
- write the time of day using the 24-h clock notation (e.g. 09.00)
- write '% predicted', not '% of predicted'