EMQs and How To Write Them

Dr Mark Westwood
Chief Examiner
EACVI CMR Section
EMQs

• Outline
• Background
• Standardisation
• Quality Control
Outline
Educating Doctors is a complex business!
- Remembering large amounts factual material
- Understanding complex mechanisms
- Competence in a range of technical skills
- Understanding/Use of the scientific method
- Developing professionalism, socially responsible attitudes and ethical practice
Educating Doctors is a complex business!

In short a whole pile of different but overlapping attributes!!!!!

The use of a holistic approach

– Personal skills, including self evaluation and reflective practice
The challenge is to use appropriate methods! (Crosby 2002)

- Valid
- Reliable
- Fair
- Feasible
- Defendable
- Well conceived from perspective of impact of learning
EMQs
EMQs

• Written tests
  – Constructive response (candidate formulates)

Hence nearly all the rules about good EMQs and strengths and weaknesses are the same as those for MCQs

• Developed subsequent to MCQs
  – Higher Cognition
  – Complex Diagnostic Reasoning
  – Complex form of MCQ

Case and Swanson 1996
MCQ: Where to start

• Curriculum
  – Must cover all of it!
  – Appropriate exam setting
• Question writers
• Agreed style and lexicon
MCQ: Advantages

• Computer based exam
  – Flexibility
  – Stagger question order between candidates

• MCQ bank
  – Contained costs
  – Needs to be secure

• Predetermined agreed correct answers

• Less dependent on knowledge of English

• No negative marking
MCQ: Good MCQ

• Stem
• Clear question
• 1 correct
• 4 distractors
• Positive question
• Plausible distractors
• Same answer across Europe

This is the only bit that is slightly different!
MCQ: Good MCQ

• Answers same length
• Alphabetical or random
• Must be evidence base for answer
• Avoid
  – All of the above
  – None of the above
• Ensure you cannot work out one question from the information in another one!
MCQ: Good MCQ

- Assessment
- Angoff score
  - How likely a borderline candidate will get this correct?
- Modified Angoff
- Correlation with overall performance
- Range of difficulty
Quality Control

• Question writing
  – Board members write proposed questions
  – Reviewed at face to face meeting
    – Accept, modify, reject
    – Grammar and syntax confirmed
Exam setting
- Board members select questions
- Reviewed and Angoff scored by board
- Duplicates and poor questions removed
- Final questions selected
• Exam analysis
  – Modified Angoff scoring by board
  – Passmark determined
  – Poorly performing questions reviewed
    – Can be removed in badly performing
    – Decision at face to face board meeting
  – Passmark determined
  – Candidates notified
• Relative weighting of questions
  – Blueprint with weightings of topics
    – Mapped to a curriculum
  – Standard house format
    – Lexicon of terms
    – Format: History, Examination, Investigations
  – Always a question
  – Answers listed randomly
Main Differences: MCQ and EMQ
EMQ: Good EMQ

• MCQs turned upside down……
  – Common set of options/responses
  – Fixed set of items/questions

• Each item is scored as a separate entity

• Set of options
  – Common around set theme (treatments etc)
  – All items must be plausible

• Need more options than items
  – Avoid candidates one-one matching
EMQ: Good EMQ

• Often need to state
  –“each option may be used once, more than once or not at all”

• Thought better for testing higher order cognitive knowledge
  –Investigations
  –History taking
  –Diagnosis
  –Management
  –Complications of therapy
EMQ: Good EMQ

- Can be easier once backbone written
  - Several items are grouped around a theme
  - Can keep adding new items
  - Mix/match items over successive exams
- The EMQ must be around a single theme
EMQ: Good EMQ

• Items need to be short
  – 2-4 short sentences
• Options even shorter
  – Single word
  – Single short phrase (2-3 words)
• Option number theoretically limitless!
Potential issues
EMQ: Good EMQ

• Multiple questions on a common theme
  – Smaller areas of curriculum tested
  – Undersampling
  – Reduced Validity

• Despite all the literature
  – There are really hard to write well
  – Much harder than MCQs

• Evidence base (especially if used alone)
  – Equivocal at best
EMQ: Good EMQ

• Has been shown that:
  • EMQs distinguish top performers
  • MCQs better for borderline discrimination
    – Note that most postgraduate examinations are pass/fail......

Hopman et al 2013
For each of the following patients with a myocardial infarction select the most likely complication from the list below. Each option may be used once, more than once or not at all:

- Asystole
- Atrial fibrillation
- Cardiac tamponade
- Complete heart block
- Deep vein thrombosis
- Capillary muscle rupture
- Post myocardial infarction pericarditis
- Pulmonary embolism
- Pulmonary oedema
- Unstable angina
- Ventricular fibrillation
- Ventricular septal rupture
- Ventricular tachycardia
- Viral pericarditis
A 62 year old woman is admitted to the coronary care unit following a myocardial infarction. Three days later she becomes unwell. On examination she is breathing noisily and her ankles are swollen. The apex beat is at the 6th intercostal space, anterior axillary line. There is a pansystolic murmur radiating to the axilla. Examination of the lungs reveals crackles at both bases and midzones. Her pulse is 126/min, BP 105/65mmHg, Temp. 37.3 and respiratory rate 24/min. Her JVP is raised.
Summary of EMQs

- Subset of MCQs
- Can discriminate
- Issues around construction difficulty
- Issues around curriculum coverage
- Issues around discrimination
  - especially at Pass/Fail borderline
EMQs

- Outline
- Background
- Standardisation
- Quality Control