Readers of the scientific literature will be acutely aware that publication in a peer-reviewed journal is no guarantee of quality of a research paper. The tendency for published research funded by the pharmaceutical industry to favour new therapies is well known.\(^1\,2\) Composite end-points, subgroup analyses and faulty comparators in clinical research reports can mislead the unsuspecting clinician.\(^3\)

Perhaps one of the most famous examples of potentially inappropriate comparators was the use of high-dose conventional antipsychotics in randomised controlled trials of atypical antipsychotics for the treatment of schizophrenia.\(^4\)

Recognising the need to ensure that psychiatrists have the skills to make informed judgements about the validity, importance and applicability of research papers, the Royal College of Psychiatrists was one of the first medical Royal Colleges in the UK to introduce a critical review paper as part of their membership examination.\(^5\)

Initially, this was a 90-minute written examination (short-answer questions) based on published research articles. However, since a critical review paper was first incorporated into the examination, there have been significant changes in postgraduate medical education in the UK, and there has been an increasing recognition of the need for high-stakes examinations to be reliable as well as valid. These changes have resulted in the critical appraisal exam evolving from a short-question format to an electronically marked one (using single-best answer and extended matching item questions) and crystallised the need to have a defined syllabus for exam setters and candidates.

Although there is no longer a separate critical review paper, this topic is covered in the new Membership of the Royal College of Psychiatrists (MRCPsych) Paper 3 exam, where it contributes around a third of the marks for this written paper. For the past 3 years, the panel responsible for setting this component of Paper 3 has been redesigning the examination format and developing a syllabus to explicitly define what is required. The single-best answer questions and extended matching items are mapped to the syllabus.

The shift to electronically marked test mirrors practice in the USA. The American Board of Psychiatry and Neurology’s (ABPN’s) psychiatry part I examination is a 500-item, multiple-choice test administered by computer over 9.5 hours. Evidence-based practice is assessed as part of the epidemiology and public policy section, which accounts for 8% of Part A examination. The ABPN publish a content outline for Parts A and B of this examination but a detailed syllabus is not publicly available.\(^6\)

In this paper, we describe the evidence-based practice syllabus (formerly the critical appraisal paper syllabus) that is assessed as part of the MRCPsych Critical Review Paper Panel.

**Summary** This paper sets out the rationale, process for development and the content of the new evidence-based practice syllabus, which is examined as part of the Membership of the Royal College of Psychiatrists’ Paper 3. The syllabus was developed by the Critical Review Paper Panel of the Royal College of Psychiatrists. Suggestions for learning and teaching evidence-based practice are also put forward.

**Declaration of interest** J.W. is chair and S.C., S.A., G.R. and S.S. are members of the MRCPsych Critical Review Paper Panel.
1. face validity – it must cover the knowledge and skills necessary for evidence-based practice;
2. feasibility – candidates must be able to access training resources to support their learning and it must be possible to formally assess their knowledge and skills;
3. content coverage – the syllabus must describe the breadth and depth of the knowledge and skills required;
4. transparency – the syllabus must be published and both learners and trainers must be able to access it.

In this section, we describe how the Critical Review Paper Panel developed this part of the syllabus. The syllabus is set out in an online supplement to this paper and will also be published on the exams section of the Royal College of Psychiatrists’ website (www.rcpsych.ac.uk/exams.aspx).

The evidence-based practice syllabus aims to cover the knowledge and skills that psychiatrists need to use research data to inform their clinical practice for the benefit of patient care. Therefore, the syllabus has been structured around the five steps of evidence-based practice, as recommended in the ‘Sicily statement’:7

1. translation of uncertainty to an answerable question
2. systematic retrieval of best available evidence
3. critical appraisal of evidence for validity, clinical relevance and applicability
4. application of results in practice
5. evaluation of performance.

These five steps are integral to the General Medical Council’s definition of good clinical care and also to clinical governance.8,9 The Academy of Medical Royal Colleges has incorporated these steps into the evidence and guidelines section of the Common Competences Framework for Doctors (Table 1).10

The Panel reviewed the syllabic content of the Royal College of Psychiatrists’ curriculum and mapped it to the five steps outlined above. Over the past few years, the Panel has discussed additional content at each meeting and blueprinted proposed questions in the critical review paper against the agreed syllabus. This iterative process has taken account of comments from psychiatrists who volunteered to contribute questions to Paper 3. The performance of individual questions has been reviewed following each sitting of Paper 3 and if necessary changes were made to the syllabic content. Whenever the syllabus was reviewed, the Panel considered two key questions: ‘Do psychiatrists require this knowledge and these skills to practise effectively?’ and ‘Can psychiatric trainees realistically acquire and develop this knowledge and these skills as part of their training?’

Fundamental to the process of developing this syllabus has been a commitment to define the limits of what will be examined. The syllabus is necessary to ensure that trainers and trainees are aware of what they should be learning and also for blueprinting assessment. Inevitably, any syllabus is open to interpretation but the Panel believes that this describes the core evidence-based practice knowledge and skills required for satisfactory completion of basic specialty training in psychiatry.

### Table 1 Common Competences Framework for Doctors: evidence and guidelines

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>To make the optimal use of current best evidence in making decisions about the care of patients</td>
<td>Outlines the principles of critical appraisal</td>
</tr>
<tr>
<td>To develop the ability to construct evidence-based guidelines and protocols in relation to medical practice</td>
<td>Knows the advantages and disadvantages of different study methodologies (quantitative and qualitative) for different types of questions</td>
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<table>
<thead>
<tr>
<th>Knowledge</th>
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</thead>
<tbody>
<tr>
<td>Knows how to apply statistics in scientific medical practice</td>
</tr>
<tr>
<td>Understands the use and differences between the basic measures of risk and uncertainty</td>
</tr>
<tr>
<td>Describes the role and limitations of evidence in the development of clinical guidelines and protocols</td>
</tr>
<tr>
<td>Understands the processes that result in nationally applicable guidelines (e.g. those from NICE and SIGN)</td>
</tr>
<tr>
<td>Knows the principles of service development</td>
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</table>

<table>
<thead>
<tr>
<th>Behaviours</th>
<th>Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aims for best clinical practice (clinical effectiveness) at all times, as informed by evidence-based medicine</td>
<td>Able to search the medical literature including use of PubMed, Medline, Cochrane reviews and the internet</td>
</tr>
<tr>
<td>Recognises knowledge gaps and keeps a logbook of clinical questions</td>
<td>Appraises retrieved evidence to address a clinical question</td>
</tr>
<tr>
<td>Keeps up to date with national reviews, key new research and guidelines of practice (e.g. those from NICE and SIGN)</td>
<td>Applies conclusions from critical appraisal into clinical care</td>
</tr>
<tr>
<td>Recognises the common need to practise outside clinical guidelines</td>
<td>Contributes to the construction, review and updating of local (and national) guidelines of good practice using the principles of evidence-based medicine</td>
</tr>
<tr>
<td>Communicates risk information, and risk–benefit trade-offs, in ways appropriate for individual patients</td>
<td></td>
</tr>
<tr>
<td>Encourages discussion among colleagues on evidence-based practice</td>
<td></td>
</tr>
<tr>
<td>Proposes and tests ways to improve patient care</td>
<td></td>
</tr>
</tbody>
</table>

NICE, National Institute for Health and Clinical Excellence; SIGN, Scottish Intercollegiate Guidelines Network.

Source: Academy of Medical Royal Colleges.10

### Teaching, learning and assessing evidence-based practice

Specialty training programmes build upon the knowledge, skills, attitudes and behaviours acquired and developed as an undergraduate and during foundation training. Psychiatric trainees should have access to a range of approaches to continue to develop their competence in evidence-based practice, including:

- workplace-based experiential learning
- independent self-directed learning driven by clinical questions
taught courses, which model evidence-based practice and describe explicitly the evidence upon which assertions are made.

Clinically integrated teaching on evidence-based practice, that is basing teaching sessions on encounters with patients on the ward and in clinics or focused training in clinical ward rounds, has been shown to improve the relevant knowledge, skills, attitudes and behaviours. Stand-alone teaching appears to only improve knowledge. Therefore, the predominant mode of evidence-based practice learning (after initial skills training) should be experiential, that is, the five steps described earlier should be applied in the management of current patient problems. Supervision and feedback provides an important opportunity to help develop these skills in addition to helping doctors in training reflect on their learning needs.

Knowledge and understanding of concepts and principles of evidence-based practice can be reliably assessed using single-best answers and extended matching item questions. The MRCPsych examination now uses these techniques to assess basic epidemiology, basic biostatistics, qualitative methods, health economics, guideline development and critical appraisal, i.e. the knowledge and skills underpinning evidence-based practice.

Although moving away from the short-answer format was initially challenging to the question setters, the College now has an expanding bank of highly reliable questions that discriminate well between good and less able candidates. The evidence-based practice part of Paper 3 comprises 60 questions taking about a third of a 3-hour paper. These questions include 8–10 single-best answer questions linked to a short précis (about one-page long) of a research paper with a data-set or graph, and stand-alone single-best answer and extended matching item questions. Examples of this format are provided below.

Sample single-best answer question
Which of the following is the least adequate method of randomisation?

a. Minimisation ___
b. Odd/even last digit of date of birth —
c. Permuted block randomisation ___
d. Simple randomisation by computer ___
e. Toss of a fair, unbiased coin ___

Sample extended matching item
Theme: calculations in critical appraisal
Options:
A 0
B 1
C 4
D 5
E 20
F 80
G 100

For each of the questions below, select the most appropriate number from the list above.

1. The usual upper limit of risk of type II error (expressed as a percentage) in power calculations for randomised clinical trials. ___
2. The ideal number needed to treat (NNT). ___
3. The sensitivity of a test, expressed as a percentage where 80 people were classified ‘true positive’ and 20 people were classified ‘false negative’. ___

And so on, for six to eight questions per one extended matching item.

Despite the changes to the exam, specialty training programmes must also assess whether specialty registrars are competent in practice. The Royal College of Psychiatrists has identified nine tools for workplace-based assessments in psychiatry training. Only the case presentation tool explicitly asks about ‘interpretation of clinical evidence’, although evidence-based practice skills could be highlighted in a case-based discussion, journal club presentation or the mini-Peer Assessment Tool (mini-PAT) multisource feedback. Requiring psychiatric trainees to produce critically appraised topics could provide another means of assessing skills in evidence-based practice.

Conclusion
It is essential that all psychiatrists use the best available evidence to inform patient care. The knowledge and skills required for evidence-based practice are comprehensively examined as part of MRCPsych Paper 3. The College now has an evidence-based syllabus for this exam and the revised format works well. Psychiatrists should consolidate and develop their evidence-based practice skills and behaviours both throughout their training and career.

About the authors
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References


Evidence-based practice syllabus content

**Outcome:** To make the optimal use of current best evidence in making decisions about the care of patients

1. **Translation of clinical uncertainty into an answerable question**
   1.1. Formulates clinical questions using the PECO(t) formula (Patient, Exposure/intervention, Comparison, Outcome, Time)
   1.2. Recognises and formulates different types of clinical questions:
      1.2.1. therapy
      1.2.2. harm
      1.2.3. aetiology
      1.2.4. prognosis
      1.2.5. diagnosis
      1.2.6. economic
      1.2.7. qualitative

2. **Systematic retrieval of the best available evidence**
   2.1. Knows the different sources of evidence
   2.2. Describes the ‘hierarchy of evidence’ as it applies to different types of questions
   2.3. Describes what is meant by:
      2.3.1. publication bias, and
      2.3.2. language of publication bias
   2.4. Describes the difference between the following electronic databases:
      2.4.1. CINAHL
      2.4.2. Cochrane Library
      2.4.3. EMBASE
      2.4.4. PsycINFO
      2.4.5. Pubmed
      2.4.6. Sigle
   2.5. Knows how research is catalogued and strategies for efficient retrieval
   2.6. Searches efficiently and effectively:
      2.6.1. PubMed (Medline); and
      2.6.2. the Cochrane Library.

3. **Critical appraisal of the evidence**
   3.1. Basic epidemiology
      3.1.1. Describes what is meant by
         3.1.1.1. systematic error (selection and measurement bias)
         3.1.1.2. random error (chance)
         3.1.1.3. internal validity and external validity
      3.1.2. Describes sources of bias and strategies to overcome them
      3.1.3. Describes what is meant by reliability, specifically:
         3.1.3.1. interrater reliability
         3.1.3.2. test–retest reliability
      3.1.4. Describes what is meant by validity, specifically:
         3.1.4.1. construct validity
         3.1.4.2. content validity
         3.1.4.3. face validity
         3.1.4.4. criterion validity (concurrent and predictive validity)
      3.1.5. Describes different approaches to sampling:
         3.1.5.1. simple random
         3.1.5.2. stratified random
         3.1.5.3. systematic
         3.1.5.4. cluster
      3.1.6. Describes confounding and strategies to reduce the risk of confounding:
         3.1.6.1. randomisation
         3.1.6.2. restriction
         3.1.6.3. matching
         3.1.6.4. adjustment using stratification or multivariable regression models.
      3.1.7. Describes allocation concealment and methods of randomisation:
         3.1.7.1. stratification
         3.1.7.2. minimisation
         3.1.7.3. cluster
         3.1.7.4. block
      3.1.8. Knows how masking can reduce measurement bias
      3.1.9. Describes approaches for arguing a cause-and-effect relationship (Koch, Hill, Rothman, Susser)
      3.1.10. Knows the benefits and weaknesses of different quantitative study designs to address different clinical questions:
         3.1.10.1. cross-sectional study design
         3.1.10.2. cohort studies
         3.1.10.3. case–control
         3.1.10.4. randomised controlled trials (parallel, equivalence, cluster)
         3.1.10.5. systematic reviews
         3.1.10.6. ecological survey
         3.1.10.7. NOF1 clinical trials
   3.2. Basic biostatistics
      3.2.1. Knows that there are different types of data:
         3.2.1.1. categorical (ordinal, nominal, dichotomous)
         3.2.1.2. continuous
      3.2.2. Interprets summary measures
         3.2.2.1. proportion
         3.2.2.2. mean
         3.2.2.3. median
         3.2.2.4. mode
         3.2.2.5. range
         3.2.2.6. interquartile range
         3.2.2.7. standard deviation
      3.2.3. Interprets simple tabular presentations:
         3.2.3.1. 2 × 2 table
         3.2.3.2. frequency table
         3.2.3.3. frequency distribution
      3.2.4. Interprets graphical presentations:
         3.2.4.1. bar chart
         3.2.4.2. histogram
         3.2.4.3. pie chart
         3.2.4.4. scatter plot
         3.2.4.5. box plot
      3.2.5. For studies evaluating diagnostic accuracy, estimates the characteristics of a test:
         3.2.5.1. sensitivity
         3.2.5.2. specificity
3.2.5.3. likelihood ratios (positive and negative)

3.2.6. For studies evaluating diagnostic accuracy, estimates the characteristics of a sample
3.2.6.1. prevalence
3.2.6.2. positive predictive value
3.2.6.3. negative predictive value

3.2.7. For studies evaluating diagnostic accuracy, applies the results of a test to another population using likelihood ratios and nomograms

3.2.8. Interprets receiver operating characteristic curves

3.2.9. Describes what is meant by:
3.2.9.1. prevalence
3.2.9.2. cumulative incidence
3.2.9.3. incidence rates

3.2.10. Interprets 'survival' curves
3.2.10.1. median 'survival'
3.2.10.2. relative survival
3.2.10.3. Kaplan–Meier plots

3.2.11. Interprets mortality statistics
3.2.11.1. crude death rate, death rate, mortality rate
3.2.11.2. age-adjusted death rate
3.2.11.3. standardised mortality ratio

3.2.12. Calculates and interprets measures of treatment impact:
3.2.12.1. odds ratios
3.2.12.2. absolute risk reduction
3.2.12.3. absolute benefit increase
3.2.12.4. relative risk reduction
3.2.12.5. relative benefit increase
3.2.12.6. number needed to treat
3.2.12.7. number needed to harm

3.2.13. Knows what is meant by sampling variability and the use of the standard error in statistical inference

3.2.14. Describes what is meant by hypothesis testing (null and alternative hypotheses)

3.2.15. Describes hypothesis testing as applied to parametric and non-parametric data

3.2.16. Describes when to use and is able to interpret (but not calculate) hypothesis tests using:
3.2.16.1. the chi-squared test
3.2.16.2. Fisher's exact test
3.2.16.3. McNemar's test
3.2.16.4. t-test (paired and unpaired)
3.2.16.5. ANOVA
3.2.16.6. ANCOVA
3.2.16.7. Wilcoxon matched pairs signed rank test
3.2.16.8. Mann–Whitney U-test
3.2.16.9. Kruskal–Wallis test

3.2.17. Interprets and explains confidence intervals for:
3.2.17.1. means
3.2.17.2. proportions
3.2.17.3. differences between means
3.2.17.4. differences between proportions

3.2.18. Knows what is meant by:
3.2.18.1. Type I error
3.2.18.2. Type II error
3.2.18.3. power
3.2.18.4. sample size

3.2.19. Describes the advantage of confidence intervals over P values
3.2.20. Interprets correlation coefficients and their significance:
3.2.20.1. Spearman's
3.2.20.2. Pearson's

3.2.21. Interprets the results from regression analysis:
3.2.21.1. simple linear
3.2.21.2. multiple
3.2.21.3. logistic

3.2.22. Knows what is meant by intention-to-treat analysis and understands different ways of handling missing data:
3.2.22.1. last observation carried forward
3.2.22.2. sensitivity analysis
3.2.22.3. multiple imputation
3.2.22.4. best-case analysis
3.2.22.5. worst-case analysis

3.2.23. Describes the role and limitations of meta-analysis to improve power and robustness of research

3.2.24. Describes the difference between fixed and random effect models

3.2.25. Recognises statistical heterogeneity:
3.2.25.1. visual inspection of forest plots
3.2.25.2. chi-squared test
3.2.25.3. Galbraith plot

3.2.26. Describes the role of sensitivity analysis in meta-analysis

3.3. Basic health economics

3.3.1. Describes the basic differences between direct and indirect costs and the ways in which they can be estimated

3.3.2. Knows what is meant by:
3.3.2.1. cost-effectiveness
3.3.2.2. cost-utility analysis
3.3.2.3. cost–benefit analysis
3.3.2.4. cost minimisation

3.3.3. Knows what is meant by a quality- or disability-adjusted life-year and the rationale for using these measures

3.3.4. Describes opportunity cost
3.3.5. Describes different approaches to discounting
3.3.6. Knows what is meant by the term 'sensitivity analysis' in the context of an economic evaluation

3.4. Qualitative methods

3.4.1. Knows when to apply qualitative research methodologies:
3.4.1.1. grounded theory
3.4.1.2. phenomenological
3.4.1.3. ethnographic

3.4.2. Describes additional approaches to sampling in qualitative studies:
3.4.2.1. purposive
3.4.2.2. convenience
3.4.2.3. snowball
3.4.3. Describes different approaches to data gathering in qualitative studies:
3.4.3.1. focus groups
3.4.3.2. interviews
3.4.4. Describes the role of qualitative methodologies in instrument (i.e. screening, diagnostic, outcome measure) development
3.4.5. Describes methods for validating qualitative data:
3.4.5.1. triangulation
3.4.5.2. member checking
3.4.6. Describes methods for minimising bias:
3.4.6.1. reflexivity
3.4.6.2. bracketing
3.4.7. Describes methods of analysing data
3.4.7.1. content analysis
3.4.7.2. constant comparison
3.4.8. Describes data saturation

3.5. Guideline and protocol development
3.5.1. Describes the process for developing NICE and SIGN guidelines
3.5.2. Describes the advantages and limitations of guidelines and protocols

3.6. Critical appraisal
3.6.1. Diagnostic questions
3.6.1.1. Describes the STARD statement for reporting studies of diagnostic accuracy
3.6.1.2. Critically appraises cross-sectional studies as used to address questions of prevalence and diagnostic accuracy
3.6.2. Prognosis questions
3.6.2.1. Critically appraises cohort studies as used to address prognostic questions
3.6.3. Therapy, harm and aetiology questions
3.6.3.1. Describes the CONSORT statement: recommendations for improving the quality of reports of parallel group randomised trials
3.6.3.2. Critically appraises randomised controlled trials, cohort and case-control studies as used to address therapy, harm and aetiology questions
3.6.4. Economic evaluations
3.6.4.1. Critically appraises economic evaluations
3.6.5. Qualitative analysis
3.6.5.1. Critically appraises qualitative research
3.6.5.2. Critically appraises mixed-methods research
3.6.6. Systematic reviews and meta-analysis
3.6.6.1. Describes the QUORUM statement for improving the quality of reports of meta-analyses of randomised controlled trials
3.6.6.2. Critically appraises a systematic review
3.6.7. Guidelines and protocols
3.6.7.1. Critically appraises clinical practice guidelines

4. Application of the results in practice
4.1 Describes strategies for enabling the patient to make an informed decision

5. Evaluation of performance
5.1 Describes audit, change planning, feedback, and other elements of PDSA (Plan, Do, Study, Act) cycles, and their implications for clinical governance