

Critical Appraisal of a Paper

INTRODUCTION

Critical appraisal is the process of carefully and systematically analysing research to determine its quality, value and relevance in a particular context. Critical appraisal is a necessary skill to keep medical knowledge up to date and to ensure optimal patient care. For this activity, a paper is defined as a paper published in a peer-reviewed indexed journal.

Research studies and papers need to be appraised for strength of evidence; checklists should be used as appropriate to assess both the internal validity (how likely the study result is believable) and external validity (how applicable the results are to my practice) of the study and strength of recommendation or guidelines coming from the paper.

The trainee must select the paper in consultation with the Departmental Scholar Role Tutor (DSRT).

EVALUATION

There are three key steps to critical appraisal¹:

- Is the study valid?
- What are the results?
- Are the results useful?

Of overall importance, the trainee should have assessed the paper in a methodical manner and found flaws and strengths especially in relation to the paper's findings and conclusions. The discussion of the flaws and strengths form the body of the work.

When observing the trainee, the DSRT considers each of the items on the form and determines: whether significant improvement is required; whether the item has been addressed, though some improvement is required; or whether the item has been satisfactorily addressed. If multiple items require significant improvement it may be helpful for the trainee to be observed and evaluated again. If there are one or two items that the trainee requires some improvement on, it is recommended that the assessor discuss these with the trainee, including how the trainee might improve when critically appraising a paper in the future.

Once the activity has been completed satisfactorily, the DSRT should confirm completion with the supervisor of training, who confirms the trainee's entry in the training portfolio system.

Consider whether the trainee has appraised the following points (as applicable to the study) outlined in the table below.

Introduction	<ul style="list-style-type: none"> • The research question • Choice of study design – is the study design suited to fulfil the aims of the study? • The study's endpoint and if it is precisely defined
Research methods	<ul style="list-style-type: none"> • Overall description of the method, including a precise description of design and execution, and reliability and validity (reliability of the study in this instance means if it were repeated, how likely it would be that the same result would be attained, and validity refers to whether the measures used are appropriate for the aim and the conclusions) • The setting in which the study was conducted • The population, study period (including duration of follow up) and intervals between investigations • Use of a control group, randomisation and blinding • Description of inclusion and exclusion criteria • Response rate and rate of loss to follow-up • Information on missing values <p><i>Continued next page</i></p>

¹ Refer to the Critical Appraisal Skills Programme (CASP) located at www.casp-uk.net CASP also has a set of eight critical appraisal tools designed to use when reading research, specific to study types.

Research methods continued	<ul style="list-style-type: none"> • How measurements were conducted – are instruments and techniques described in sufficient detail including the scale variables are being measured upon? • The power calculation conducted before the study started <p>Checklists should be used as appropriate to assess the validity and strength of any conclusions, recommendation or guidelines. These are freely available for each type of study (refer to resources). Examples include PRISMA for systemic reviews, STROBE for observational studies and CONSORT for randomised trials. The trainee should state which they have used.</p>
Results	<ul style="list-style-type: none"> • Whether the results directly address the aims of the study • Presentation of data – well structured, readily understandable, consistent. Findings formulated descriptively, stating statistical parameters. • Description of study population and management of any missing data (was the number of missing values too large to permit meaningful analysis?) • Case numbers and statistical power • Description of the relationship between characteristics, if any • Tables or figures and whether they improve clarity • Inclusion of all results, even those that do not attain statistical significance
Discussion and conclusion	<ul style="list-style-type: none"> • How the study has added to the body of knowledge on the topic • Conclusions drawn from the results and whether interpretations follow logically from results • Discussion in relation to earlier studies • Sources of bias and error – whether random or systematic in nature • Whether weaknesses of study were given due consideration • If the results appear to be plausible • Conflicts of interest of authors/sponsors of study
Overall conclusion	<p>The trainee should provide an overall conclusion regarding the study including:</p> <ul style="list-style-type: none"> • Quality of the study • Clinical relevance – important differences between participants in the trial and the patient or population that might change the effectiveness of the intervention; if all important outcomes were considered; potential benefits or adverse consequences; and cost effectiveness • If findings lead to the trainee considering a change in his/her own practice.

RESOURCES

Further information is available in Networks under *Anaesthesia learning* in the *Scholar role support resources* network. Located in the *Critical appraisal* folder, 10 e-learning modules cover the topics below, including links to further resources and reference lists for suggested reading:

- Introduction and basic concepts
- Controls, placebos and placebo effects
- Development of a device or drug
- Reading a journal article
- Critical appraisal of an article
- Literature searching
- Levels of evidence
- Trial types
- Interpreting statistics
- Introduction to research.

When analysing the evidence, checklists should be used as appropriate to assess the validity and strength of any conclusions, recommendation or guidelines. Checklists are freely available for each type of study. Examples include:

- Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) for reporting in systematic reviews and meta-analyses www.prisma-statement.org
- Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) for reporting of observational research (cohort studies, case-control studies and cross-sectional studies) www.strobe-statement.org
- Consolidated Standards of Reporting Trials (CONSORT) for reporting of randomised trials www.consort-statement.org