How to read a paper and run a journal club

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There are a myriad of anaesthetic research publications, both in hard copy and on-line. Web-based open access media are continually emerging and compete with the more established journals for contributors and readers. The quality of peer-review, therefore, cannot be guaranteed and the ability to read and appraise research and other articles published in scientific peer-reviewed journals is an important aspect of independent professional medical practice. Indeed, it may be a discriminator that distinguishes anaesthesiologists from anaesthetists, if such distinction is required. The principles of evidence-based medicine are well established and clearly should be followed. In this respect, I would recommend reading a previous refresher course article by my colleague, Andrew Smith, who eloquently guides the reader in a structured fashion through these principles and suggests how these can be incorporated, for example, into anaesthetic training programmes [1]. In this article I do not wish to simply repeat this but to extend this insight in my role as an Editor with the European Journal of Anaesthesiology (EJA) as it is the role of editors and reviewers to regularly and professionally appraise submitted articles for consideration and publication.

Appraisal of a research paper

The ability to critically appraise papers should be part of all professional medical training and professional development. The ability to critically appraise - more specifically - the factual content will of course be dependent on the experience and expertise of the reader or expert reviewer. Readers should not ‘rely’ on editors and expert reviewers getting it right all the time!

Most research reports are in the AIMRAD format: abstract; introduction; methods; results and discussion. When appraising a paper one must understand the aims of the study, which should be stated clearly at the end of the introduction. These may be primary and secondary. It is also useful to state this in terms of a null hypothesis.

The methods must be adequate to address the aims. The design of the study in terms of blinding, randomisation, method of randomisation or other group allocation must be clearly stated. There should be a sample size calculation that defines the minimum difference in the primary outcome that is deemed of importance. The statistical analyses should be described and should be appropriate.

The results should provide information on the study subjects such as demographic and baseline measures. Then the results for the outcomes of interest should be presented. The discussion should deal with strengths and weaknesses of the study and the implication of the findings. Additional comments and analyses can be presented here to address any confounding demographic or baseline characteristics in the samples. A full literature review of the subject is not required, just comments pertaining directly to the data being presented. The final sentence should state the conclusion of the study, but only again in terms of the actual data as presented and not overstate the case. This is one of the most common errors that usually attracts editorial attention!

Details of all the subjects in the trial should be provided including those who were excluded. A flow diagram showing how trial participants progressed through the study can be helpful. It should be stated clearly if the analysis is based on the more robust ‘intention to treat’ principle or whether a ‘per protocol’ or treatment-received analysis was performed. An intention to treat analysis means that all subjects are analysed in the treatment groups that they have been randomised to, irrespective of whether they received the assigned treatment or not. Per protocol analysis means that only the subjects who received the actual treatments are analysed and compared, the remaining subjects are excluded from further analysis. This latter approach is clearly more prone to confounding by biases in the conduct of the study.
The importance or applicability of the report will depend on identifying what new and important information, if any, is being provided by the authors. You need to determine if the subjects or patients in the study are similar to those that you treat. The new treatment may be impractical or very expensive and not readily transferable. Otherwise the findings may simply be helpful in identifying avenues for future research.

Why does a journal publish a paper?

This is a vexed question. The answer to this is essentially similar to the answer to ‘why read published research?’ But this is not necessarily the case! Intuitively one would expect that journals wish to promote articles that add to, and encourage, evidence-based approaches. In practice, of course, this is indeed the case. However, clearly there has to be a forum to publish non-clinical and preclinical studies, such as bench, laboratory, biological, biomarker, cellular, organ, animal and human volunteer (phase 1) and then clinical data from phases 2, 3 and 4. Whilst most preclinical research is unlikely to contribute directly much to evidence-based medicine, it is still clearly essential to propagate theoretical novel findings and interesting observations to encourage further avenues for research so as to eventually add to the evidence base.

Journals: ‘la raison d’etre’

The EJA, for example, is assumed to serve the ‘population’ of anaesthesiologists in Europe, more specifically the membership of the European Society of Anaesthesiology (ESA). However, journal editors have to balance the interests of what appear to be two competing ‘populations’ within this population, namely contributors (authors) and readers. Whether the stake-holder is as a contributor or reader, the same principles of appraising research publications apply to both, it is the motives that may differ!

Journals publish a variety of difference types of articles and I would suggest a simple hierarchy and a weighting of relative importance (7 to 1 descending) of:

7. Original research articles: prospective double-blind randomised controlled trials (PDBRCTs)
6. Original research articles: other RCTs, such as non-blinded
5. Original research articles: studies such as non-randomised, observational and retrospective
4. Meta-analytic review articles (including systematic reviews)
3. Narrative review articles (including editorials)
2. Case reports
1. Letters and correspondence

Clearly there is a correct bias of relative merit to original research which provides new data, with the gold-standard being the PDBRCT. Whilst this may be well and good, journals, for better or worse, tend to be far more interested in their ‘impact factor’ which is derived from citation rates. This can mean that editors are assigning more priority for publication to review articles and editorials, because these are more likely to cite, and more importantly, to be cited, than original research! Likewise, authors tend to submit articles to journals based on impact factor as universities often rank the academic activities of their faculty based on this and similar metrics.

Biostatistics

Many readers try to avoid having to consider the statistical analysis issues in a paper by just reading the abstract or the concluding statement, hence bypassing the methods and results. Failure to appraise the methods section is essentially failing to appraise the entire article. The sample size calculation should clearly define the minimum difference in the primary outcome that is deemed of clinical importance [2]. Analyses and results that are not easily understandable should lead the reader to question why this is so. Clearly there will be articles where more complex analytical issues cannot be considered easily by the casual reader. In this case at least the authors and, if not them, the editors, should ensure that complexity is not allowed to obscure clarity, especially if the findings are of particular importance. The published literature is littered with numerous examples of errors and misuses of statistical methods so the reader should be wary [3].
The Journal Club

The venue should be in the department or in the operating suite and should have suitable audiovisual equipment. Mornings or lunchtimes are better, especially with refreshments, compared with the end of the day, when the temptation to go home after a busy day will be too enticing. If it is difficult to timetable then consideration should be given to allotting protected teaching time and raising the importance of the activity. It should also be seen as a social forum with opportunity to briefly discuss other pertinent issues. A timetable of presenters and supervisors should be available. It is also now much easier to email around in advance ‘pdf’ copies of the papers to be discussed. A senior member should be present to facilitate discussion and a register should be kept of attendees and presenters. As trainees rotate through departments, some of the sessions should have regular themes which will need to be updated for each tranche. It may also be useful for themed presentations to be allied to on-going departmental audit projects of compliance with evidence-based standards. This latter approach can help with the embellishment of a trainee’s CV or training portfolio. This link-up with audit can therefore help drive the implementation of new evidence-based approaches into clinical practice.

Key learning points

- Know the structure of a typical research article in a journal
- Understand the differences between intention-to-treat and per-protocol or treatment-received analyses
- Appreciate the hierarchy of journal publications
- Encourage the use of journal clubs

References