

# HOW TO READ CRITICALLY

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## **CURSORY REVIEW OF AN ARTICLE**

Useful after keying in a word search and getting a hit list of 20-30 articles on your search page.

### STEP 1: SURVEY THE TITLE

- Identify the topic/subject being studied. This step is like reading the headlines in a newspaper to decide which articles/issues matter most to you. In the context of a clinical problem, you want a title that has the most relevance to your PICO/PO question. Often times, the articles you want will contain the key words you used to create your PICO/PO question. The more key words or concepts that match your initial question, the more likely that article is worth reading in more depth.

### STEP 2: READ THE ABSTRACT

- This is often the best place to start when you need to screen further. In a well-structured abstract, you should be able to find the following information:

**TABLE 13.4 ■ The Organization of a Structured Abstract**

Heading	Information
Context	Burden of suffering from the disease/illness? Why is the research question important? What is already known?
Objective	What the investigators wished to learn
Setting	The setting to which results can be generalized, such as community, primary-care practices, referral centers, and the like
Participants	What kinds of patients (regarding generalizability)? How many (regarding statistical power/precision)?
Design	How strong is the study? How well is it matched to the research question?
Intervention (if any)	Is the intervention state-of-the-art? Feasible in your setting?
Main outcome measures	Are the outcomes clinically important?
Results	What was found?
Conclusion	Do the authors believe that the results answer their question? How convincingly?

Fletcher and Fletcher *Clinical Epidemiology: The Essentials 4<sup>th</sup> Ed* (2005)

- If the conclusions are interesting, move on to the next step.

### STEP 3: SKIM THE METHODS SECTION (IN THE MAIN BODY OF THE ARTICLE)

- In this section, you can find basic information bearing on whether the conclusions are credible. You should also determine the applicability of the study to your particular clinical question by considering the types of patients and setting used in the study then comparing it to your own patient and setting.

### STEP 4: SKIN THE RESULTS SECTION (IN THE MAIN BODY OF THE ARTICLE)

- Look in this section for detailed description and key figures of what was actually found. Often times there are tables and charts that will tell you the “bottom line” of their findings without having to waste time reading the whole section in detail.

### STEP 5: READ THE ENTIRE ARTICLE

- If after Steps 1-4, you still find the article is pertinent to your clinical question, then the article is probably worth reading in depth.

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## **IN-DEPTH REVIEW OF AN ARTICLE**

Useful once you've identified an article that is relevant to your search and/or for journal club discussion.

### STEP 1: TITLE/INTRODUCTION

✓ *When presenting this portion to a journal club group, your goal is to help orientate the audience to the topic you are about to discuss, the setting and population in which the study occurs, and any other information that will help listeners interpret the study.*

- ⊙ What research has already been done on this topic? What outcomes have been reported?
- ⊙ Is the purpose clearly stated? If not, how does this affect the design?
- ⊙ Does the study add new information?
- ⊙ Could the study be affected by funding sources or disclosures reported by the authors?
- ⊙ What is the defined representative sample of patients?
- ⊙ What is the setting of the study?

### STEP 2: AUTHORS' CONCLUSIONS

✓ *When presenting this portion to a journal club group, your goal is to establish whether the authors think they accomplished what they set out to do. This is different from your assessment of whether you think they achieved their goal or not – this comes later as you present the methods, results and discussion portions.*

- ⊙ Does the conclusion match the introduction and purpose of the study?
- ⊙ Is the hypothesis adequately addressed?

### STEP 3: DESIGN/METHODS

✓ *When presenting this portion to a journal club group, your goal is to present a critical assessment of the study's internal validity. Another words, do the methods provide an appropriate framework to answer the author's question and does it support their stated conclusions?*

- ⊙ What is the study design?
  - Is it appropriate for the stated purpose? Why or why not?
  - Pros and cons inherent to the study type
- ⊙ What are the variables being considered (aka risk factors, prognostic factors, exposure, etc.)?
- ⊙ Are outcome criteria either objective or applied in a "blind" fashion?
  - Is the outcome criteria clearly defined? If not, did they at least assess blindly? If not, how might this affect the results/outcome?
- ⊙ Who are the subjects and how are they chosen?
  - Is the sample of patient's representative of the underlying population of study?
  - Inclusion/exclusion criteria
  - What is the natural exposure time for this disease? Did the study account for this in their recruitment timeline?
  - If a chronic disease, what is the natural latency period for this disease? Did the study account for this in their subject recruitment?
  - What are the usual disease markers? Did the study include these?
  - Was the sampling adequate?
    - Randomly selected from an eligible pool?
    - Is randomization appropriate in this study's setting?

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- If a prospective study, were patient's enrolled at a common point in the course of their disease (i.e. was it an inception cohort)?
- ☉ Is there follow up of subjects?
  - If yes, was follow up sufficiently long and complete enough to detect the outcome of interest?
- ☉ Is there internal validity to their methods?
  - Did they account for ways to control bias (i.e. matching, randomization, blinding, stratification, multivariate analysis, sensitivity analysis, etc.)? If not, how might they affect the results and outcome?
  - Are there confounding factors present? What are they? How might they affect the results and outcome?
  - Are statistical methods outlined and are they appropriate? Do they adjust for potential problems with random chance?
- ☉ How strong is the influence of random chance based on the methods outlined in the study?
  - Was the sample size adequate?
  - What was the null hypothesis?
  - Is this study prone to type I error? Type II error?
  - How do they report statistical significance?
- ☉ Is there reliability in their methods?

## STEP 4: RESULTS

- ✓ *When presenting this portion to a journal club group, your goal is to continue presenting a critical assessment of the study's internal validity. To what degree are the results correct for the sample of patients being studied? Do the results support their stated conclusions?*
- ☉ How are the results expressed?
  - What do the expressed results mean?
  - Is this method of expressing their results appropriate for the type of study design that was chosen?
  - Is there another way data could have been expressed that would've provided a more meaningful result?
- ☉ Is the information reported adequate?
  - Are actual values reported so that the magnitude of difference can be judged by the reader?
  - Did the authors omit data discussed in the methods section that could affect the results?
- ☉ Is there follow up of subjects?
  - Are groups similar on baseline measures? Why or why not?
  - Were groups treated equally?
  - Did the authors report reasons for non-follow ups? If so, who were they?
  - Did the authors compare the demographics and clinical characteristics of patients who were unavailable to those who completed the study? If not, how might this affect the results/conclusions? If yes, how did it affect the results/conclusions?
- ☉ Do the reported findings answer the research question? If yes, to what degree?
- ☉ Is the evidence sufficient to withstand possible threats to the internal validity of the conclusion?
  - Is the evidence vulnerable to another possible alternate explanation? Why or why not?
  - How did they assess the role of chance (i.e. hypothesis testing or estimated intervals)?
    - For treatment studies, how precise was the estimate of effect (aka point estimate and confidence interval)?

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- If hypothesis testing was used, what was the statistical significance? Is the P-value setting appropriate for this study type/disease?
- Were bias and confounding factors addressed?
- How do they report statistical significance and is it appropriate?

### STEP 5: DISCUSSION

- ✓ *When presenting this portion to a journal club group, your goal is to finish presenting your critical assessment of the study's internal validity AND present your assessment of the study's external validity. Did the author(s) interpret their results appropriately? What is the generalizability of the study?*
- ⦿ Does the discussion match the introduction and purpose of the study? Explain.
- ⦿ Is the hypothesis adequately addressed?
- ⦿ Did the author's extrapolate beyond the data analyzed?
- ⦿ Did the author's point out any short comings of the study? If yes, what were they? If not, how might it affect interpretation of their results/outcome?
- ⦿ Can you generalize the results of this study to your patient?
- ⦿ Will the evidence make a clinically important impact on your conclusion about what to offer your patient?