

# Screening Your References (Study Selection)

After running your search through one or more databases, the next step is to screen through the results to decide which studies you want to include.

## Selecting Exclusion Criteria

Exclusion criteria should be determined before screening begins. Common exclusion criteria include publication prior to a specific date, articles not written in English, the wrong type of article (meta-analysis/systematic review, editorial, correspondence, letter to the editor), the wrong type of study (in vitro, in vivo, randomized controlled trial, prospective, retrospective, case study), and too few patients (e.g., fewer than 10).

Additional exclusion criteria often relate to PICO. Examples include the following: incorrect target population for the study, an intervention of interest that was not performed at the time of interest (e.g. drug administered prior to surgery instead of after), single-arm (no comparator), and no reporting of the outcomes of interest.

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## Screening Steps

1. Before going through each study, begin by removing any duplicates. The NK software does this automatically.
2. When reading the title and abstract to determine whether a study should be included, check each of the inclusion and exclusion criteria and the elements of PICO. If there are not enough details in the abstract, mark this study for full-text review. For studies that don't meet the inclusion criteria, mark them as excluded and note the reason they were excluded. Be sure to note any recurring exclusion reasons that were not determined beforehand.
3. After the initial round of screening is complete, go back through the remaining included studies and locate the full text for each. A great resource for finding full text is [Sci-Hub](#).
4. When looking through a PDF of a study, using "Ctrl F" to find specific words or phrases to quickly locate the elements of PICO can speed up the process of locating the essential information in the study. If you find that the study does not meet the inclusion criteria, exclude it and note the reason it is excluded. The remaining included studies will go on to have their data extracted for analysis.

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## Should You Exclude Follow-up (or Post-Hoc) Studies?

It is generally better to include the primary study over post-hoc and follow-up studies. However, there are times when the post-hoc study is more relevant than the primary study. As long as you are only collecting data on each patient once, the post-hoc study may be included.

## Dual Screening

Dual screening is a process where two reviewers independently screen the search results making decisions about whether to include or exclude articles. Discrepancies are usually discussed before a final decision is made. Although this may take more time, the advantage is greater accuracy.

The choice of whether to dual-screen or not should be discussed by the team. One study showed that single-reviewer abstract screening missed 13% of relevant studies, while dual-reviewer screening missed 3%.<sup>1</sup> Another analysis found a total reviewer error rate (false inclusion and false exclusion) of 10.76%.<sup>2</sup>

The level of experience of the reviewer can help determine whether dual screening is necessary. A study by Waffenschmidt et al. found that the median proportion of missed studies that would have been included by two independent reviewers reaching consensus was 3% (range: 0 to 21%) for experienced reviewers and 13% for less experienced reviewers (range: 0 to 58%). A clearly defined research question is helpful in reducing the number of missed studies.<sup>3</sup> [This article provides some alternatives to dual screening.](#)

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### References

1. Gartlehner G, Affengruber L, Titscher V, Noel-Storr A, Dooley G, Ballarini N, König F. Single-reviewer abstract screening missed 13 percent of relevant studies: a crowd-based, randomized controlled trial. *J Clin Epidemiol*. 2020 May;121:20-28. doi: 10.1016/j.jclinepi.2020.01.005. Epub 2020 Jan 21. PMID: 31972274.
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3. Waffenschmidt S, Knelangen M, Sieben W, Bühn S, Pieper D. Single screening versus conventional double screening for study selection in systematic reviews: a methodological systematic review. *BMC Med Res Methodol*. 2019 Jun 28;19(1):132. doi: 10.1186/s12874-019-0782-0. PMID: 31253092; PMCID: PMC6599339.

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