Systematic review

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A systematic review is a scientific method that uses clearly defined methods to gather the widest possible range of empirical research (studies) to obtain an answer to a specific question [1][2].

This type of study is often **mistakenly confused with a meta-analysis** – sa systematic review is the basis of a meta-analysis, but not every systematic review must automatically contain a meta-analysis. A systematic overview of the data of individual studies only "showcases" and evaluates them. Meta-analysis further actively statistically processes the collected data and thus creates new, more accurate results. [3]

The importance of systematic reviews

Thanks to the progress in scientific research, a large number of scientific works are produced, in which it may not be easy to find specific answers to specific questions. A systematic review works with clearly defined criteria, **collecting and interpreting data from many studies.** The result of such research is an overview of all data dealing with the given issue. In addition, thanks to this processing, the identification of "blind spots" in knowledge and understanding of the given topic is possible. [4][5]

Basis of creation

1. problem formulation
2. defining the criteria for exclusion/inclusion of the study
3. literature search and selection of suitable studies
4. evaluation of methological bias of selected citations
5. data extraction
6. data analysis
7. interpretation of results

Problem formulation

In order to be able to formulate a clear question, to which it is possible to find an answer with the help of a systematic review, an adequate definition of the issue and clinical questions is necessary. For this purpose, the so-called **PICO system** is used [6].

Eligibility criteria

In order to be able to select only those citations that are the most suitable for a given systematic review after searching the professional literature, we set certain so-called eligibility criteria. It serves to clearly define the reasons for inclusion, or elimination of individual citations [7]. Such opinions are typically applied in order to achieve the selection of the most reliable and up-to-date data [8]. The authors of the systematic review create these criteria based on the given issue. The basic and most used ones include:

- date of publication of the study
- the number of study participants and their selection ("was the selection random or were the participants selected purposefully?")
- type of examination used
- type of imaging method used
- the way the study results were evaluated (e.g. retrospective versus prospective), e.g.

Literature search and selection

Literature searches are primarily conducted on Internet databases that collect an enormous amount of scientific material. These are, for example: Pubmed (MEDLINE) (https://pubmed.ncbi.nlm.nih.gov/), Cochrane (https://www.cochranelibrary.com/) a ScienceDirect (https://www.sciencedirect.com/) etc. It is also important to identify the so-called gray literature (book publications, articles from conferences, etc.), because the databases themselves contain only a fraction of the information that has been published on the given topic.

The first step is the selection of individual citations based on their title and abstract. Meta-analyses and other systematic reviews are typically excluded first, as most systematic reviews work with primary studies (i.e. cohort studies, case studies, etc.) and studies that already provide information in the abstract that does not meet one or more of the criteria. Furthermore, the full-texts of the citations are collected and selected in detail on the basis of established criteria - the reasons for exclusion or the inclusion of a certain study (and their number) in the next steps of creating an overview. The freely available **PRISMA (http://prisma-statement.org/prismastatement/flowdiagram.aspx) diagram** best illustrates the individual steps of literature search and selection.

Methodological bias

Before extracting individual data, it is important to evaluate the so-called **methodological bias**. Possible bias within the analyzed primary studies, which may affect the results of the systematic review itself, is evaluated. Based on the type of systematic review, one chooses among the tools that can be used to assess methodological bias.

### Extraction, interpretation and analysis of the results

Already at the beginning of creating a systematic review, we establish the definition of the problem - we know what data must be extracted (data that is relevant for the given systematic review). The type of data extracted varies and of course depends on the details and goals of the report.

The extracted data is collected and analyzed. Their heterogeneity or homogeneity, the effectiveness of individual treatment modalities, diagnostic tests, etc. will be explained. The output of a systematic review can be a meta-analysis, which further processes the data statistically.

Types of systematic reviews

Let's give a few examples:

1. **intervention reviews** – evaluates the pluses and minuses of health interventions.[9].
2. **diagnostic test reviews** – h evaluates how well diagnostic tests work in detecting a particular disease [10].
3. **prognostic reviews** – discuss the likely or future outcome of a certain treatment. [11].
4. **review of systematic reviews** (so-called *umbrella reviews or meta-reviews*) – a new concept of creating studies, summarize the results of several systematic reviews. [12][13].
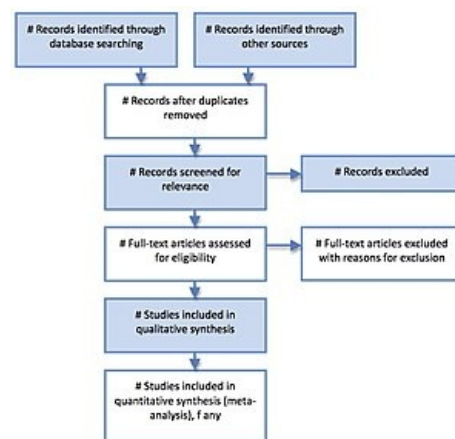
PRISMA flow diagram

Systematic review vs literature review

So-called literature reviews are often found in the search for systematic reviews. However, these are not two identical scientific methods. The primary difference is in the value of the evidence presented in the review - the creation of a literature review, unlike a systematic review, can be influenced by the author's personal preferences (there are no clearly defined procedures for creating such a review, so each author enriches it with their own experience, etc.).[14] Their other differences are summarized in the following table:

	Systematic review	Literature review
Goals	to answer a certain clinical question, to eliminate bias	to create an overview and summary of the given topic
Question	clearly defined clinical question - see PICO systém	defined specific question on a certain topic only
Components	determination of criteria, systematic literature search, selection of studies, data extraction, interpretation of results	doesn't have a clearly defined basis, though the methodology must be stated accurately
Duration	months to years	weeks to months
Requirements	very detailed literature search and identification of citations even outside the database, in the case of meta-analysis, the ability to create statistical analysis	understanding of the topic, identification of studies on one or more databases
Research value	very high level of knowledge	summary of (selected) literature

Links

Related articles

- Meta-analysis
- Evidence based medicine
- Epidemiology

External links

- Systematic review on Wikipedia (https://en.wikipedia.org/wiki/Systematic_review#/)
- Systemic review methodology (http://web.ftvs.cuni.cz/hendl/metodologie/systprehled.htm)
- Eligibility criteria (https://handbook-5-1.cochrane.org/chapter_5/5_1_2_eligibility_criteria.htm)
- Elaboration of the individual steps of creating a systematic review (https://cccrg.cochrane.org/animated-storyb

oard-what-are-systematic-reviews)

References

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