



DEPARTMENT OF CLINICAL NEUROSCIENCE

K8F5254 How to Conduct Systematic Reviews and Meta-Analyses, 3 credits (hec)

Att genomföra systematiska översiktsstudier och meta-analyser, 3 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus is approved by the The Committee for Doctoral Education on 2023-12-07, and is valid from Spring semester 2024.

Responsible department

Department of Clinical Neuroscience, Faculty of Medicine

Prerequisite courses, or equivalent

Students need to have basic knowledge of biostatistics (corresponding to KIs Basic Course in Medical Statistics or Biostatistics I) and it is recommended to have basic knowledge in epidemiology (corresponding to Epidemiology I course).

Purpose & Intended learning outcomes

Purpose

Systematic reviews represent the gold standard approach to identifying, evaluating, summarising, and synthesizing scientific evidence (with meta-analysis as a tool for quantitative synthesis), and they have contributed greatly to the current body of scientific knowledge. This course aims to introduce the concepts and procedures of systematic reviews and meta-analyses and will help applicants to get started with their own study.

Intended learning outcomes

At the end of the course the students should be able to: 1) Understand and demonstrate the value, principles and the different concepts related to systematic reviews and meta-analyses, in particular compared to other types of studies (incl. narrative reviews, original research); 2) Identify the strengths, limitations, and pitfalls of systematic reviews and meta-analysis; 3) Independently formulate study hypotheses, and plan and generate a study protocol to perform a systematic review and meta-analysis, justifying the selection of the eligible studies and statistical

methodology; 4) Apply basic methods of meta-analyses; 5) Critically reflect on other students individual project work and provide feedback in a scientifically constructive way (peer-review); 6) Interpret and critically evaluate scientific studies relevant to the course content.

Course content

1) Basic concepts in systematic reviews and meta-analyses, 2) Strengths, problems and limitations of systematic reviews and meta-analyses, 3) How to write a study protocol for a systematic review, 4) How to perform a systematic literature search (including a practical seminar organised by Karolinska Institutet library), 5) Data-extraction and quality assessment of included studies, 6) Statistical methods used in meta-analyses and interpretation, 7) Examination. This is a hands-on course, covering theoretical concepts and discussion of strengths, limitations and problems of systematic reviews and meta-analyses. We will also discuss publication guidelines, strategies to identify eligible studies, quality assessment of research papers, how to use various tools to facilitate the systematic search and data-management, as well as how to apply different statistical methods and programs.

Forms of teaching and learning

Interactive lectures, seminars, individual article review, group discussions, practical sessions (one on systematic literature search, one on statistical methods) and homework tasks will be used. The course focuses on active learning, i.e. putting knowledge into practice and critically reflecting upon the knowledge, rather than memorising facts. Therefore, much of the focus of the course is on the individual project where students are required to develop a full study protocol including several important aspects covered in the lectures, peer assessment, article reviews and group discussions. Students will also peer-review each other's projects and this will form the basis for the final examination seminar. Throughout the course, the students will work on an individual project and will have to peer-review the project of another student. Further, students will critically review and discuss relevant scientific articles. There will be several group discussions with other students and experienced teachers, with a focus on peer-assessment (discussing each other's projects), and the lectures are interactive allowing for critical discussions.

Language of instruction

The course is given in English.

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

Compulsory attendance includes the scheduled lectures and seminars (i.e. full first week of the course + exam). One is required to come well prepared for each seminar (see reading list). Absence will need to be replaced by individual assignments following discussion with the course

coordinator, e.g. article reviews, with written or oral follow-up. Attendance is also compulsory for the examination, which includes discussion of the study protocol of each student + opposition for another student.

Forms of assessment

1) Individual project work: To develop a written comprehensive yet concise study protocol including several important aspects as discussed during the course; 2) Peer-review of other students' projects followed by an oral presentation of their own project and opposition of other students projects during the group examination; 3) Critically review scientific articles relevant to the course content. To pass the course, the student has to show that all intended learning outcomes have been reached.

Course literature

Recommended literature:

Books:

Systematic Reviews in Health Care: Meta-analysis in context (2nd ed., 2008, Egger et al.): e-book at KI library (<https://kib.ki.se/>)

Introduction to meta-analysis (2009, Borenstein, et al.): e-book at KI library (<https://kib.ki.se/>)

Cochrane handbook (<https://training.cochrane.org/handbook>)

Systematic Reviews. CRD's guidance for undertaking reviews in health care (2009). Centre for Reviews and Dissemination, University of York (<https://www.york.ac.uk/crd/guidance/>)

Articles:

Berlin JA, Golub RM. Meta-analysis as evidence: Building a better pyramid. *JAMA* 2014;312(6):603-606. PubMed PMID: 25117128. <https://doi.org/10.1001/jama.2014.8167>

McGowan J, Sampson M, Salzwedel DM, Cogo E, Foerster V, Lefebvre C. PRESS Peer Review of Electronic Search Strategies: 2015 guideline statement. *J Clin Epidemiol*. 2016 Jul;75:40-6. <https://doi.org/10.1016/j.jclinepi.2016.01.021>

Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. <https://doi.org/10.1136/bmj.n71>

Sanderson S, Tatt ID, Higgins JP. Tools for assessing quality and susceptibility to bias in observational studies in epidemiology: a systematic review and annotated bibliography. *Int J Epidemiol*. 2007 Jun;36(3):666-676. <https://doi.org/10.1093/ije/dym018>

Other resources:

Karolinska Institutet library: Practical information on how to conduct systematic literature searches (<https://kib.ki.se/en/search-evaluate/systematic-reviews>)

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) website (<http://prisma-statement.org/>)