

Summer Training

A course description report on

Introduction to Systematic Review and Meta-Analysis

by (Johns Hopkins University)

By

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Under the guidance of

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MBA HOSPITAL AND HEALTH MANAGEMENT

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MBA- Healthcare Management (2nd Yr.) IIHMR UNIVERSITY, JAIPUR

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Introduction to Systematic Review and Meta-Analysis

by (Johns Hopkins University)

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SECTION-B

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COURSE DESCRIPTION-

-Introduction of methods to perform systematic review and meta-analysis of clinical trials. Systematic reviews are a type of literature review that uses systematic methods to collect secondary data, critically appraise research studies, and synthesize findings qualitatively or quantitatively. Systematic reviews formulate research questions that are broad or narrow in scope, and identify and synthesize studies that directly relate to the systematic review question.

-Formulation of an answerable research question. Choosing a research question is an essential element of both quantitative and qualitative research. Investigation will require data collection and analysis.

-Define inclusion and exclusion criteria. Inclusion criteria are characteristics that the prospective subjects must have if they are to be included in the study, while exclusion criteria are those characteristics that disqualify prospective subjects from inclusion in the study.

-Searching for the evidence. It is important because it aims to provide the most effective care that is available, with the aim of improving patient outcomes. Patients expect to receive the most effective care based on the best available

evidence.

-Extraction of the data. Data extraction is the act or process of retrieving data out of (usually unstructured or poorly structured) data sources for further data processing or data storage (data migration).

-Assessing the risk of bias in the clinical trials. An assessment of the validity of studies included in a Cochrane review should emphasize the risk of bias in their results. It is very important for performing a meta-analysis.

-Performing a meta-analysis. Meta-analysis can be performed when there are multiple scientific studies addressing the same question, with each individual study reporting measurements that are expected to have some degree of error.

LEARNING OBJECTIVES

-This course gave me a greater insight into **the description of the steps in conducting a systematic review.**

STEP 1: FRAMING THE QUESTION ...

STEP 2: IDENTIFYING RELEVANT PUBLICATIONS...

STEP 3: ASSESSING STUDY QUALITY...

STEP 4: SUMMARIZING THE EVIDENCE...

STEP 5: INTERPRETING THE FINDINGS...

RESOLUTION...

CONCLUSION

- Develop an answerable question using the

“Participants Interventions Comparisons Outcomes” (PICO) framework

P (Problem or Patient or Population)

I (intervention/indicator)

C (comparison)

O (outcome of interest)

- **Description of the process used to collect and extract data from reports of clinical trials**
- **Describe methods to critically assess the risk of bias of clinical trials**
- **Describe and interpret the results of meta-analyses.**

Meta-analysis is a systematic method for synthesizing quantitative results of different empirical studies regarding the effect of an independent variable (or determinant, or intervention, or treatment) on a defined outcome (or dependent variable). Mainly developed in medical and psychological research as a tool for synthesizing empirical information about the outcomes of a treatment, meta-analysis is now increasingly used as a tool for hypothesis testing.

CONTENTS OF THE COURSE

6 WEEKS CURRICULUM

week1-Introduction

Video: Lecture 1A: Introduction to Systematic Reviews

Video: Lecture 1B: Introduction to Meta-Analysis

Video: Lecture 1C: Producers and Users of Systematic Reviews

week 2- module 2: Framing the Question

Video: Lecture 2A: Resources for How to Frame Your Question

Video: Lecture 2B: Deciding the Type and Scope of our Question

Video: Lecture 2C: Elements of the Question

Video: Lecture 2D: Refining the Question

Video: Lecture 2E: Some Examples

Video: Lecture 2F: Analytic Frameworks

quiz at the end of every module

week 3 -Module 3: Finding the Evidence - Searching Principles: Claire Twose, MLIS, Guest Lecturer

Video: Lecture Searching Principles and Assessing Bias

Video: Lecture 3A: Finding the Evidence: Searching Principles

Video: Lecture3B: Identifying Key Sources and Techniques for Searching

Video: Lecture 3C: Building a High-Quality Search Strategy

Video: Lecture 3D: Documenting our Search and Conclusions

Quiz: Module 3

Module 4: Assessing the Risk of Bias in Clinical Trials

Video: Lecture 4A: Why Bias in the Individual Study is Important to a Systematic Review and Meta-Analysis

Video: Lecture 4B: Selection Bias

Video: Lecture 4C: Information Bias

Video: Lecture 4D: Bias in the Analysis

Video: Lecture 4E: Displaying Study "Quality" in our Systematic Review

week 4 - **Module 5: Minimizing Meta bias**

Video: Lecture 5A: Standards for Systematic Reviews

Video: Lecture 5B: Selection Bias

Video: Lecture 5C: Information Bias

Video: Lecture 5D: Bias in the Analysis

Video: Lecture 5E: Reporting Transparently

Quiz: Module

Module 6: Qualitative Synthesis and Interpreting Results

Video: Lecture 6A: Qualitative Synthesis and Interpreting Results Section A

Video: Lecture 6B: What is Qualitative Synthesis

Video: Lecture 6C: Some Examples

week 5 - **introduction to Systematic Review and Meta-Analysis**

Module 7: Planning the Meta-Analysis

Video: Lecture Meta-Analysis and Statistical Methods

Video: Lecture 7A: Planning our Meta-Analysis Section A

Video: Lecture 7B: Introduction to Meta-Analysis

Video: Lecture 7C: Why Do a Meta-Analysis?

Video: Lecture 7D: Types of Data and Effect Measures

Module 8: Statistical Methods for Meta-Analysis

Video: Lecture 8A: Fixed Effect Model

Video: Lecture 8B: Random Effects Model

Video: Lecture 8C: Random Effects Model

Module 7: Planning the Meta-Analysis

Video: Lecture Planning Meta-Analysis and Statistical Methods

Video: Lecture 7A: Planning our Meta-Analysis Section A

Video: Lecture 7B: Introduction to Meta-Analysis

Video: Lecture 7C: Why Do a Meta-Analysis?

Video: Lecture 7D: Types of Data and Effect Measures

Module 8: Statistical Methods for Meta-Analysis

Video: Lecture 8A: Fixed Effect Model

Video: Lecture 8B: Random Effects Model

Video: Lecture 8C: Random Effects Model Quiz

week 6 -**Module 9: Wrap Up**

Video: Lecture 9A: Wrap Up

Peer Review Assignment

Learning methodology -

- Videos
- peer review assignments
- quiz at the end of each module
- from the field video (exposure in real life scenario)

key learning from the course-

1- Introduction to the high-level concepts of systematic review and meta-analysis (the procedure and uses)

systematic review uses explicit methods to identify, select, appraise and synthesize results from similar but separate studies. Not all systematic reviews would have a meta-analysis. And meta-analysis is the statistical method of analyzing a large collection of results from individual studies. Information about healthcare is everywhere. To know if one healthcare intervention works better than another or if it will do more harm than good. Therefore, in order to figure that out we need systematic review. Not all review articles are systematic reviews. Only a subset of them uses these three planned scientific methods to summarize information. And the reviews that are not systematic reviews are the traditional narrative reviews. Only a subset of systematic reviews will include meta-analysis, which is statistical methods that people can use to quantify and combine the results from several independent studies. Systematic review is just a way how we summarize evidence. And it is a transparent, reproducible way of summarizing evidence. And the methods could be applied to any field. we probably have heard of evidence-based healthcare, evidence-based medicine, public health policy. It's not simply oriented to clinical trials or clinical practices, but that said, most

methods we're going to learn come from clinical trials. That's where the methods come from. Evidence-based health care emphasize three components. It is integration of best research evidence with clinical expertise and patient values.

Not all systematic reviews would have a meta-analysis, and meta-analysis is really a component of a systematic review where we have enough data to combine them statistically. Meta-analysis is done when more than one study has estimated a treatment effect or association or where the differences in the study characteristics are unlikely to affect the treatment effect or when the treatment effect have been reported and measured in similar way.

2-Framing the question (scope, elements and how to refine the question)

A. Resources for How to Frame our Question-Our very first thing that we need to do, after we form our group, is frame the research question(PICO, P-I-C-O, or P-E-C-O, depending on whether we're looking at an intervention question).The second is to manage the bias and the conflict of interest within our team. And ensure that we have stakeholder input.

B. Deciding the Type and Scope of our Question- It covers deciding the type and scope of the question that you're going to be addressing in our systematic review. But let's start first by just thinking about the different types of questions we might have.

Elements of the Question- So the first step is to frame the question. First we have to have a question. Then we have to find the best evidence that supports the answer to that question. We want to critically appraise it, and then we want to apply that evidence for making a new policy. once you have your well-formulated question, and we aren't quite there yet, but we're starting to narrow it down, then this can be used for your whole systematic review process. It will help you determine which criteria you want to select your studies, your eligibility criteria. It will help you to develop your search strategy when you search bibliographic databases when you do hand searching, and it will tell you what types of data do you need to abstract. Patients or populations. Interventions or exposures are the components of a well-constructed and answerable clinical question.

Refining the Question-The first is what's called the domain. And that's what we call an outcome. So for example, anxiety's an outcome. Heart attack's an outcome. Visual acuity is an outcome. After that there are specific measurements and measurement scales that are used. And you need to specify that, when you specify the outcome in your particular clinical trial and your systematic review.

3-Searching principles and bias assessment

Almost all of the large, bibliographic databases, at least the ones that are subject specific, include something called a Controlled Vocabulary. What this is, is a standardize list of terminology that's used in indexing information to facilitate retrieval.

Use of PubMed and Medline. PubMed is the online access that the national library of medicine provides to the MEDLINE database and additional citations that are ruled into the product. MEDLINE consists of citations and abstracts from over 5,600, journals. And each of those citations has been indexed.

There are two main domains related to documentation. The first is the use of Endnote. This becomes your database of records of all the citations that you collect from the various sources. Endnote is one of the pieces of bibliographic management software that's available to you. The other is QUOSA. Its advantage is that it allows you to do automatic, full text retrieval for at least some of the citations. Any of these sources have fields that you can use to store key information about the search that you've ran, whether you've included or excluded a citation.

assessment bias refers to qualities of an assessment instrument that unfairly penalize a group of students because of students' gender, race, ethnicity, socioeconomic status, religion or other such group defining characteristics.

4-Minimising meta-bias, qualitative synthesis and interpretation of the results

Selection bias is the bias introduced by the selection of individuals, groups or data for analysis in such a way that proper randomization is not achieved, thereby ensuring that the sample obtained is not representative of the population intended to be analyzed. It is sometimes referred to as the selection effect. Information bias refers to bias arising from measurement error. Information bias is also referred to as observational bias and misclassification.

5-Planning the meta-analysis and statistical methods

Meta-analysis is really an optional component of a systematic review. Not every single system systematic review has to have a meta-analysis. And here's a classic definition. Meta-analysis is the statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings. Another alternative definition is a statistical analysis, which combines the results of several independent studies considered by the analyst to be combinable. As a systematic reviewer, or the data analyst, we have to decide whether it makes since to put a bunch of

studies into analysis or into a meta-analysis. Conventional meta-analysis focus on pair-wise comparisons of interventions or exposure in outcome relationships.

References

- www.coursera.org/learn/systematic-review/home/welcome

