A REPORT ON THE SYSTEMATIC REVIEW AND META DATA ANALYSIS TRAINING

HELD AT

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES (MUHAS), DAR ES SALAAM, TANZANIA, February 2018

ORGANISED BY

THE DIRECTORATE OF LIBRARY SERVICES

SUBMITTED TO THE EXECUTIVE COMMITTEE OF AHILA

By

Winifred Nantambi,

BLIS 3rd year student, Makerere University, Uganda.
Email: nantambiwinfred@gmail.com
Table of Contents
ACKNOWLEDGMENT ........................................................................................................... 2
My Biography ............................................................................................................................ 2
Introduction ............................................................................................................................... 3
Course summary ....................................................................................................................... 4
  Training method .................................................................................................................... 4
Benefits ..................................................................................................................................... 4
Day1 ......................................................................................................................................... 6
  What makes good evidence about the effectiveness of treatments? .................................. 6
Defining Evidence-Based health care ....................................................................................... 7
Why do we need to use evidence efficiently? ........................................................................ 8
How do practitioners/providers stay up to date? ................................................................. 9
How do practitioners find time to keep up with the research? ........................................... 9
Seeking the best Healthcare Evidence ..................................................................................10
Day.2 .......................................................................................................................................11
  Performing systematic Reviews .........................................................................................11
Day 3 and Day 4 ......................................................................................................................14
  During the searching there are step by step followed? .....................................................15
  Putting together a search strategy ......................................................................................15
  Getting started with Covidence .........................................................................................23
Day 5 .......................................................................................................................................27
  Meta Data Analysis ............................................................................................................27
Findings of PubMed search for "meta-analysis" .....................................................................28
Steps in a Meta-Analysis .......................................................................................................28
Research Question ................................................................................................................29
Selection of Studies ...............................................................................................................29
Assessing Risk of Bias ..........................................................................................................31
Data Collection ......................................................................................................................31
Analysis: Outcome Measures ..............................................................................................33
Dichotomous Outcomes .........................................................................................................33
Dichotomous Outcomes: Risk ...............................................................................................33
Lessons from workshop training .......................................................................................... 4
How to Apply what I learnt from the workshop training? .................................................. 5
ACKNOWLEDGMENT

I wish to extend my sincere gratitude to the AHILA Executive Committee for selecting me to attend the training and providing the financial support, SMH for providing the grant to AHILA, my Professor at Makerere university Prof. Maria .Musoke for the guidance and support, Mrs Shane Godbolt who paid my AHILA membership that made me eligible for competition, MUHAS for the support, hospitality and organizing a good training.

My Biography

Winfred Nantambi comes from Nakaseke district, Uganda, and was born on March 16th 1995. She belongs to the elephant clan. My mother was Sarah Nalukwago Mukasa and my father is Mr. James Mukasa Ntambi. When I was 3years old, my mother passed on in 1998 (RIP).

I attended primary level at Ssaza primary school where I was from nursery to Primary six Masaka in Central Uganda, I later joined Grand Maria Primary School where I sat my Primary Leaving Education and where I completed from my primary level

I went on to Our Lady of Pilgrims Secondary School Bukulula were I completed my Ordinary level from. I then had my Advanced level at St. Theresa Secondary School Bwanda were I completed from.

I began studies for a Bachelor’s degree in library and information science at Makerere University under the College of computing and information science, East African School of Library and Information Science in Kampala Central region.

In 2015/16, I did a research project that I submitted to IFLA Health Section and my abstract was selected but I was not able to attend because of lack of funds. When the opportunity to submit a request to AHILA came, I was happy to be selected. I like health information and I wish to pursue a career in that area if I get an opportunity.
Introduction

I was granted and sponsored to attend a Systematic Review and Meta data Analysis Training course at MUHAS, Dar es salaam, Tanzania. The program ran for five days from 5th Feb to 9th Feb 2018.

Initially I had requested to attend a course by ITOCA in Pretoria that was scheduled to take place in October 2017, but due to some issues the process delayed in the announcing of the grant winner. Later at the end of 2017, AHILA announced the winner and I was delighted to be one. I informed my Head of Department, Dr Joyce Bukirwa who shared the news with our College of Computing and IT and Makerere University.

Given its many years of the existence and offering of the training programs in the LIS professional, MUHAS has acquired a vast experience in the field of Library and information science.

MUHAS trains people from various educational and professional background all over the world. MUHAS in addition provides consultancy services for NGO’s government and private. MUHAS trainings are broad and very refreshing. They cover a wide range of Systematic Review and Analysis to help people improve their skills and expertise in their routine activities and strategic research management of the organization.
Course summary

The course covered Systematic Review and Metadata Analysis which is a vital area for research.

Training method

The training sessions were conducted along workshop principles with formal lectures, case studies and interactive worked examples. We were actively involved in the analysis of the case studies simulation and discussions based on the real-world examples in health.

We received handouts and examples of various experiences in the soft copies in drop box to enables us review topics covered at a later date. In addition we were taken around to see various places of the university.

Benefits

The training sessions and the interaction with the facilitators and colleagues really increased our awareness of the right way of doing research and which databases to use and when.

The training sessions improved the assessment of the validity and quality of evidence since it’s free and transparent.

As an individual, I gained a lot from the training session which will further improve my professional skill.

Lessons from workshop training

We need evidence more efficiently today because of the epidemic so I learnt that we need to keep up with evidence and cannot do this without new skills.

Doing things that have not been tested can cause more harm even if our intentions are good so we need evidence.
People tend to have different theories without evidence and this simply leads to unjustified conclusions so in case of research or before making decisions we need evidence.

I also learnt working with systematic review in collaboration with PubMed search and MeSH terms during my research, however PubMed search provides only health-based information but provides all relevant information regarding the research questions. This will also show or give all the results of the research terms.

I learnt that during research we must develop protocols which protocols have to be registered after six months so as the research question is published to avoid time wastage as it might be already someone’s research.

I also learnt working with PICO questions to easily find the relevant information during research according to the population, intervention, comparison and outcome which makes the research flexible.

I also learnt working with different database or repositories when searching literature for example Cochrane collaboration for health.

**How to apply what I learnt from the workshop training?**

I plan on using the different databases in my today life research so as I get my self familiar with the different research terms.

I plan on using the PubMed and MeSH terms in collaboration with the Boolean combination for my research project in the field of health information.
Day 1

What makes good evidence about the effectiveness of treatments?
What we need

- Reliable, objective, high-quality information
- Tools for critical evaluation of evidence

Defining Evidence-Based health care

“"The integration of best research evidence with clinical expertise and patient values.”"
(Sackett et al., 2000)

The following are the other terminologies with Evidence Based Health Care

- Evidence-Based Medicine (EBM)
- Evidence-Based Practice (EBP)
- Evidence-Based Practice in xxx (EBPx)
- Evidence-Based Veterinary Medicine (EBVM)
- Evidence-Based Nursing (EBN)
• Evidence-Based Public Health (EBPH)
• Evidence Based Library and Information Practice (EBLIP)
• Research Based Evidence (RBE)

**What the Public Believes about Research**

• Research funding and efforts are coordinated and prioritized
• The progress of research is steady and upward
• The results of ongoing research are systematically applied to clinical practice
• Clinical practice is evidence-based.

**Why do we need to use evidence efficiently?**

![Graph showing medical articles per year by category]
How do practitioners/providers stay up to date?

- Clinical experience with patients
- Pharmaceutical company promotion and marketing
- Literature
  - Multiple journals
  - Textbooks
  - Databases
  - Guidelines
- Articles by specialty “thought leaders”
- Continuing medical education (CME) courses
- Conference presentations
- Systematic reviews and meta-analyses

How do practitioners find time to keep up with the research?

- Doctors spend 15–60 minutes a day reading
  - But up to 30% spend no time at all (Sackett et al., 1998)
- To stay current, an internist would have to read:
  - 17 articles per day, 365 days per year (Davidoff et al., 1995)

This is the reality about Evidence Based Health Care:

- “Clinical decisions are only rarely based on the best available evidence” (Greenhalgh, 2001)
- **21% of National Institute of Health -US** recommendations about new health technologies were evidence-based (Dubinsky & Ferguson, 1990)
- Other studies estimate **60–90% evidence-based decisions**, based on sequential cases of world experts in major hospitals (Greenhalgh, 2001)
- Patterns of practice can be **slow to change**
Seeking the best Healthcare Evidence

Evidence Based Healthcare:

- **Ask:** classifying and formulating effective research question asking the right questions
- **Align:** learning healthcare research design, observational and experimental study design, and sources of bias in trial designs
- **Acquire:** practicing effective search techniques, assessing harms and benefits
- **Appraise:** understanding basic statistics that express risk and benefit looking consequences of early adoption of interventions
- **Apply:** incorporating critical appraisal of research, making better decisions for evidence-based healthcare
Performing systematic Reviews
Under this we looked a developing systematic review Question during research to ease the process using the illustrations below

When developing a systematic Review Question, What would you do? In this you have to do the following;

- Search the literature to see what is out there--also known as scoping and an important step in the early stages and under the search we used the Cochrane collaboration [http://www.cochrane library.com/](http://www.cochrane library.com/) and the Campbell collaboration [http://www.campbell collaboration.org/library.html](http://www.campbell collaboration.org/library.html). These are the most important databases/repositories for systematic review.

However, we tried and used some other databases for search like Prospero [http://www.crd.york.ac.uk/prospero/](http://www.crd.york.ac.uk/prospero/). All this can be helpful in case the systematic review exist on the topic

- Think about who, what, when, where, why and how
• Under this phase we developed the PICO questions these are very useful and important during the search so when you think of who, what, when, where, why and how it helps you develop a research question.

**PICO**

- Population
- Intervention
- Comparison
- Outcome

PICO (M) which stands for Methodology, PICO(T) which stands for the time, PIO standing for the population it covers, PICO(C) which stands for context

However, there are other acronyms for social science

Pico (Population, Intervention, Context)

SPICE (Setting, Perspective, Intervention, Comparison, Evaluation)

SPIDER (Sample, Phenomenon of interest, Design, Evaluation, Research type)

Working and developing PICO question has helped me find out the easiest way of finding out research and where to find the relevant information depending on Pico.

• Define what you will include and exclude

• During the process of developing systematic review questions I learnt that there are somethings to include and exclude to make the search valid

• These are the samples of the inclusions and exclusions
Inclusion criteria

- Types of studies: empirical studies
- Types of participants: “Students” (high school or college/university, through grad) (loosely, ages 15-30). Global representation, as long as we can read the paper
- Types of intervention: Outdoor exposure/treatment
- Types of outcome measures: improved mental health (reduced depression, anxiety, improved resiliency/ability to ’bounce back’)
- Other criteria:
  - Language: English, French

Exclusion criteria

Those studies that do not meet any one of the above inclusion criteria will be excluded from the review. Discrepancies during the selection process will be resolved by a third, independent reviewer. The number of excluded studies will be recorded at each stage. For those excluded upon review of the full text, reasons for their exclusion will be provided.
Day 3 and 4

We looked at systematic reviews working with pubmed search and development of protocols.

A protocol is just an ordinary version or way of doing things so when collecting research there must be a formal way of doing and because of some reasons like saving time, reducing bias, reviewing and promoting transparency. However, protocols must be registered after six months so that your research question is already published to avoid time wastage and this is where protocols are registered according and Use these resources to find and register protocols:

Cochrane Collaboration – for health care interventions

- [http://www.cochrane.org/](http://www.cochrane.org/)

Campbell Collaboration – for effects of social interventions

- [https://www.campbellcollaboration.org/](https://www.campbellcollaboration.org/)

PROSPERO – anything that has a health related outcome in the broadest sense

- [https://www.crd.york.ac.uk/prospero](https://www.crd.york.ac.uk/prospero)

- These are other protocol registries

- Animal research

CAMARADES

- [http://www.dcn.ed.ac.uk/camarades/research.html#protocols](http://www.dcn.ed.ac.uk/camarades/research.html#protocols)

Environment management research

- [www.environmentalevidencejournal.org](http://www.environmentalevidencejournal.org)

Agricultural and environmental sciences

- [CADIMA](http://www.dcn.ed.ac.uk/camarades/research.html#protocols)
Multidisciplinary

- Systematic Reviews Data repository
- https://srdr.ahrq.gov/

Animal research

- CAMARADES
- http://www.dcn.ed.ac.uk/camarades/research.html#protocols

During the searching there are step by step followed?
Find the existing related reviews

Start with well-structured database of published studies; move on less structured database and free resources.

Search grey literature and conduct hand searching.

Citation searching including which database to search, which subject area covered

Putting together a search strategy
1. Start with a well-defined question (PICO(S))

<table>
<thead>
<tr>
<th>P</th>
<th>I</th>
<th>C</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population/Problem</td>
<td>Intervention/Exposure</td>
<td>Comparison</td>
<td>Outcome</td>
</tr>
<tr>
<td>Population characteristics or health issue of interest</td>
<td>Drug, surgery, policy, community program, etc.</td>
<td>No intervention, common practice, control group</td>
<td>Health outcomes of interest</td>
</tr>
</tbody>
</table>
To find out whether vitamin C reduces the incidence, the duration or severity of the common cold when used either as a continuous regular supplementation every day or as a therapy at the onset of cold symptoms

Example from:


1. Broadly define the key concepts related to your question

To find out whether vitamin C reduces the incidence, the duration or severity of the common cold when used either as a continuous regular supplementation every day or as a therapy at the onset of cold symptoms. The search terms vs. screening criteria these help us test our research. The key terms are different colors some search term and these are vitamin C and the other common cold, the rest of the colored words are screening criteria

**Based on your eligibility criteria**

Start with the 2 or 3 most important concepts

Focus on those most likely to be found in title & abstract

P participants

I intervention

C comparison

o outcomes

S study design
2. Find all appropriate MeSH terms for your key concepts

May be one, may be more—pay attention to hierarchy

Examples:

- Vitamin B12[MeSH] OR Vitamin B12 Deficiency[MeSH]
- HIV[MeSH] OR HIV Infection[MeSH]

3. Identify free text terms for each key concept (term harvesting)

Entry terms for MeSH terms (including narrower MeSH terms if appropriate)

Terms from MeSH term definitions

Titles and abstracts of key articles

Use a word document to construct searches for copying and pasting

For example: Hand washing

Assessment of the efficacy of a patient hand wipe; development of a test method.


© Author information

Abstract

BACKGROUND: Much attention has focused on hand decontamination for healthcare workers; little has been paid to patient hand hygiene. Patients confined to bed are often unable to access hand washing facilities. They could use an alcohol hand rub but these are not advised for soiled hands or social hand hygiene. One alternative is the use of a hand wipe. However, it is important to ascertain how effective they are at removing transient micro-organisms from the hands.

AIM: To develop a method to assess the antimicrobial efficacy of hand wipes compared with hand washing, and so determine if a hand wipe can be acceptable for patient hand hygiene.

METHODS: The methodology was based on the European standards EN 1499 (2013) and EN 1500 (2013) as there is no standard for hand wipes. The hands of 20 healthy volunteers were artificially contaminated by immersion in Escherichia coli and then sampled before and after using a reference soft soap or hand wipes for 60 seconds. The counts obtained were expressed as log10, and the log10 reductions calculated.

FINDINGS: The patient hand wipe with no antimicrobial agent was inferior to the soft soap. However, the antimicrobial wipe was statistically non-inferior to the soft soap. A log10 reduction of 3.54 was obtained for the reference, 2.46 for the control patient wipe, and 3.67 for the antimicrobial patient wipe.

CONCLUSION: The evidence suggests that the antimicrobial patient wipe, when applied for 60 seconds, is at least as good as soap and water, representing an acceptable alternative to handwashing from a bactericidal perspective.

Hand washing search

Construct a comprehensive search strategy for Vitamin C

Hint:

- Start by identifying MeSH terms
- Add related free text terms
- Use PubMed syntax

PubMed search syntax that can also be used during the search

- Example

<table>
<thead>
<tr>
<th>Text Words [TW]</th>
<th>Title [TI]</th>
<th>Title/Abstract [TIAB]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MeSH Terms [MH]</td>
<td>MeSH Subheadings [SH]</td>
<td></td>
</tr>
<tr>
<td>Publication Type [PT]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="https://www.ncbi.nlm.nih.gov/books/NBK3827/">https://www.ncbi.nlm.nih.gov/books/NBK3827/</a></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Putting it all together
To find out whether **vitamin C** reduces the incidence, the duration or severity of the common cold when used either as a continuous regular supplementation every day or as a therapy at the onset of cold symptoms.

PubMed Advanced Search

**Vitamin C**

<table>
<thead>
<tr>
<th></th>
<th>Ascorbic Acid[MeSH]</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Ascorb*[tiab]</td>
</tr>
<tr>
<td>8</td>
<td>Vitamin C[tiab]</td>
</tr>
<tr>
<td>9</td>
<td>6 OR 7 OR 8</td>
</tr>
</tbody>
</table>

**Common Cold**

<table>
<thead>
<tr>
<th></th>
<th>Common cold[MeSH]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Common cold[tiab]</td>
</tr>
<tr>
<td>3</td>
<td>Rhinovirus[MeSH]</td>
</tr>
<tr>
<td>4</td>
<td>Rhinovir*[tiab]</td>
</tr>
<tr>
<td>5</td>
<td>1 OR 2 OR 3 OR 4</td>
</tr>
</tbody>
</table>
Type of study: RCT

Documenting your search

MEDLINE (PubMed) searched on 7/25/2016

<table>
<thead>
<tr>
<th></th>
<th>Search</th>
<th>08:00:32</th>
<th>2417318</th>
</tr>
</thead>
</table>

4. Consolidate text words using truncation

5. Combine subject headings, text words and concepts using appropriate database syntax
6. Translate the search to other databases

Additional file 1

Search strategy: PubMed

Search terms used:

**Population:** Caregivers [MeSH Terms] OR caregivers [All Fields] OR parents [MeSH Terms] OR parents [All Fields]

OR

Health personnel [MeSH Terms] OR (health [All Fields] AND personnel [All Fields]) OR health personnel [All Fields]

**Intervention:** nutritional status [MeSH Terms] OR (nutritional [All Fields] AND status [All Fields]) OR nutritional status [All Fields] OR nutrition [All Fields] OR nutritional sciences [MeSH Terms] OR (nutritional [All Fields] AND sciences [All Fields]) OR nutritional sciences [All Fields]

AND


**Outcome:** Nutritional sciences [MeSH Terms] OR (nutritional [All Fields] AND sciences [All Fields]) OR nutritional sciences [All Fields] OR (nutrition [All Fields] AND sciences [All Fields]) OR nutrition sciences [All Fields]

OR

Feeding behavior [All Fields] OR feeding behavior [MeSH Terms] OR (feeding [All Fields] AND behavior [All Fields]) OR feeding behavior [All Fields]
OR

OR
Feeding [All Fields] AND (frequency [All Fields] OR epidemiology [MeSH Terms] OR frequency [All Fields])

AND

Dates of publication between 1997/11/01 to 2012/10/30

The combination was made as follows:

Population terms AND Intervention terms AND Outcome terms AND dates of publication

The resulted Boolean combination for PubMed was therefore:

(((("caregivers"[MeSH Terms] OR "caregivers"[All Fields] OR "caregiver"[All Fields]) OR ("parents"[MeSH Terms] OR "parents"[All Fields])) OR ("health personnel"[MeSH Terms] OR ("health"[All Fields] AND "personnel"[All Fields]) OR "health personnel"[All Fields])) AND ((("nutritional status"[MeSH Terms] OR ("nutritional"[All Fields] AND "status"[All Fields]) OR "nutritional status"[All Fields] OR "nutrition"[All Fields] OR "nutritional sciences"[MeSH Terms] OR ("nutritional"[All Fields] AND "sciences"[All Fields]) OR "nutritional sciences"[All Fields]) AND ("education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields])) OR ("inservice training"[MeSH Terms] OR ("inservice"[All Fields] AND "training"[All Fields]) OR "inservice training"[All Fields]))) OR ("nutritional status"[MeSH Terms] OR ("nutritional"[All Fields] AND "status"[All Fields]) OR "nutritional status"[All Fields] OR "nutrition"[All Fields] OR "nutritional sciences"[MeSH Terms] OR ("nutritional"[All Fields] AND "sciences"[All Fields]) OR "nutritional sciences"[All Fields]) AND ("inservice training"[MeSH Terms] OR ("inservice"[All Fields] AND "training"[All Fields]) OR "inservice training"[All Fields]))) OR ((("nutritional status"[MeSH Terms] OR ("nutritional"[All Fields] AND "status"[All Fields]) OR "nutritional status"[All Fields] OR "nutrition"[All Fields] OR "nutritional sciences"[MeSH Terms] OR ("nutritional"[All Fields] AND "sciences"[All Fields]) OR "nutritional sciences"[All Fields]) AND ("inservice training"[MeSH Terms] OR ("inservice"[All Fields] AND "training"[All Fields]) OR "inservice training"[All Fields]))))
Getting started with Covidence

1. **Setting up your account**
   - **To create a free trial project:** go to [https://www.covidence.org](https://www.covidence.org), click the green button that says "Start free trial" and enter your name, email and create a password.
   - **To request an additional project after this workshop:** email [hello@covidence.org](mailto:hello@covidence.org) indicating that you took part in this training and your academic affiliation (i.e., MUHAS). Covidence offers free accounts to researchers from certain countries.

2. **Creating a new review project (how-to video: [https://goo.gl/xVtdHG](https://goo.gl/xVtdHG))**
• Log in to Covidence. Click on “Create New Review” (it’s fine to use your one free trial for this demo, because you can request additional accounts for free later on)
• You’ll be asked if you’re creating a Cochrane review, select NO
• Give your review a title (can be changed at any time)
• Click ‘Create Review’
• After creating a review, you will be asked if you would like to invite a co-reviewer. You can try this now, or invite co-reviewers at any time using the “settings” tab.

3. **Importing a PubMed XML file into a Covidence review**
   *(how-to video: [https://goo.gl/4R5XoV](https://goo.gl/4R5XoV))*
   • Run your search in PubMed
   • Click “send to” on the top right of the page
   • Select “File”, “Format: XML”, and click “Create file”
   • Save the .xml file to your desktop
   • Go back to Covidence to your “Review Summary.”
   • Click the “Import” button
   • Click “Import in to” and select “Screen.” You can import citations into any stage of the screening process.
   • Click “Choose file,” select your saved .xml file, and click “Import”
   • To view your import history and check for duplicates, click “Manage imports”

4. **Navigating the “Settings” area**
   • Review settings:
     o Change your review name
     o Enter the date that you last ran your search strategy
     o Add a citation for a review update
     o Set the number of reviewers who will screen each article in title/abstract and full text screening phases.
   • Add/remove reviewers:
• Invite co-reviewers. Free trials reviews only accommodate two reviewers.

• Team settings:
  o Assign responsibilities to specific team members

• Criteria & exclusion reasons:
  o Enter your inclusion/exclusion criteria. As you screen articles, you’ll be able to view what you enter here for reference.
  o Manage exclusion reasons for full text review. Add your exclusion criteria again here, so that you can apply them to articles you exclude later on. Delete pre-set exclusion reasons if they don’t apply to your review.
  o Manage Highlights. Add key words here to highlight them as you screen.

• Study tags
  o Add tags that you may want to apply to particular studies. As you’re screening, make sure the study is selected in order to add a tag.

5. Article screening workflow

• Title/abstract screening (how-to video: https://goo.gl/y4VmkH)
  o On “Review Summary” click “Continue” under title and abstract screening.
  o Click “Show criteria“ to show your inclusion/exclusion criteria.
  o Make your decision by voting on the Yes, Maybe or No buttons for each reference.
  o Voting is blinded, and you will not know how your co-reviewer voted until you cast your own vote.
  o If you are the first person casting your vote, then the citation will move to your 'Awaiting other reviewer' list. You can filter this list by vote type.
  o If you and your co-reviewer both vote “no” then the citation will move to your “irrelevant list”
o View the voting history by clicking “view history”

o When you and your co-reviewer cast conflicting votes then the citation moves to your “resolve conflict” list.

- Full text screening (how-to video: https://goo.gl/h9NPJX)
  o At the “Review Summary” page, click “Full text screening” and then “continue.”
  o Click “Bulk upload PDFs” to import a batch of many PDFs in Endnote XML format, or import PDFs one by one by clicking “add full text”
  o Filter by “title” or “most recent”
  o Each citation requires two votes to move forward. If both reviewers vote “yes” the citation moves forward to “data extraction”

6. Exporting screened articles
- Click “export” at the top right of the “review summary” page
- Select from the dropdown which category you’d like to export
- Select a reference manager, and click “export” (or export a CSV file)
- Under “recent exports” you’ll see an option to download your exported references
- You can now import this downloaded file into your reference manager (Mendeley, Zotero, Endnote, etc.)

7. Quality assessment and data extraction
- Click “Extraction” at the top of the “review summary” page. Here you will see a list of included citations, with the option to start quality assessment and data extraction.
- How to do quality assessment in Covidence: https://goo.gl/hhZXcQ
- How to do data extraction in Covidence: https://goo.gl/Gv5VPU
Day 5

Meta Data Analysis
Meta-analysis is a statistical analysis that combines the results from multiple research studies in an effort to synthesize their findings.

• The theory being that there is a common “truth” behind a collection of similar research studies that has been measured with error in each individual study.

• Statistical methods can be used to derive a better estimate of this “truth” by combining the results of the studies.

• Potential benefits: increased power, improved precision, the ability to answer questions not addressed by the individual studies, the ability to settle controversies arising from conflicting claims.

Roots of meta-analysis can be traced back to a 1904 paper by Karl Pearson which aggregated results from several studies about typhoid inoculation.

• Term “meta-analysis” was coined in 1976 by Gene Glass, an educational psychology researcher.

• Meta-analysis was treated with a fair amount of skepticism through the mid-1980’s (still much criticism!).

• Cochrane Collaboration was founded in 1993 with the goal of producing quality systematic reviews of RCT’s.

• Now common in practically all areas of research: medicine, nutrition, psychology, sociology, ecology, agriculture …
Steps in a Meta-Analysis

• Define a research question

• Develop inclusion/exclusion criteria and select studies

• Assess of risk of bias in selected studies

• Collect (extract) data from studies

• Perform analysis

• Estimate pooled effect and perform inference

• Fixed versus random effects

• Examine heterogeneity

• Present and interpret results (forest plots)
**Research Question**

- A well-formed research question should come first!

- The question should clearly specify the population of interest, the treatments and comparison(s) of interest, and the outcomes of interest.

- **PICO** – Population, Interventions, Comparisons, Outcomes (Cochrane abbreviation)

- Must be specific!

- Example: Do high doses of vitamin C improve recovery from the common cold?

- What is the population of interest? How is a cold diagnosed? What is a high dose? How is recovery measured? Improve compared to what?

May be multiple outcomes of interest.

- Should be prioritized as primary and secondary.

- Consider adverse outcomes – side effects, undesirable outcomes.

- Economic data such as resource use, costs, and cost-effectiveness may also be an important outcome.

- Research question will likely involve a trade-off between a broad scope question and a narrow scope question.

**Selection of Studies**

- A systematic search that attempts to identify all studies that meet the eligibility criteria should be performed.

- Ideally, at least two independent reviewers should review the potential studies and a comprehensive list of why a study was included or excluded would be maintained.

- Process should be reproducible.

- Flow chart for study selection can be created and may be required for publication.

- **PRISMA flow diagram** – Preferred Reporting Items for Systematic reviews and Meta-Analysis

- Cornell Library Systematic Review Service:
selection of studies

Identification
- # of records identified through database searching
- # of additional records identified through other sources

Screening
- # of records after duplicates removed
  - # of records screened
  - # of records excluded

Eligibility
- # of full-text articles assessed for eligibility
  - # of full-text articles excluded, with reasons

Included
- # of studies included in qualitative synthesis
  - # of studies included in quantitative synthesis (meta-analysis)
Assessing Risk of Bias
• Must consider risk of bias (systematic error) in study selection.

• Types of bias:
  • Publication bias – studies with significant effects are more likely to be published and included in meta-analysis
  • Multiple publication bias – studies resulting in multiple papers
  • Language bias – studies written in English are more likely to be published and included in meta-analysis
  • Coder bias – error in data collection
  • Small-study bias – published small studies tend to have more dramatic effects
  • Outcome reporting bias – results for outcomes may be selective depending on the nature and direction of the results

Data Collection
• What data should be collected from the individual studies?

• Study characteristics:
  • Publication information: date, peer-reviewed or not
  • Study design: RCT, observational, single-blind or double-blind
  • Study implementation: treatment details (dosage), length of follow-up, study population details
  • Information related to the outcomes:
    • Outcome measures and effect sizes
    • Sample sizes
    • Confidence intervals, p-values
  • Information is important for analysis and publication
Example: Effect of Aspirin on Risk of Stroke

### Table 1. Randomized, Placebo-Controlled Trials of Aspirin in Patients With Previous Transient Ischemic Attack or Stroke

<table>
<thead>
<tr>
<th>Study No.</th>
<th>Source, y</th>
<th>Aspirin Dose, mg/d</th>
<th>No. of Subjects</th>
<th>Age, y (Mean)</th>
<th>Male, %</th>
<th>Follow-up, Mean, mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diener et al (ESP2)</td>
<td>50</td>
<td>1646</td>
<td>66.7</td>
<td>57.8</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>SALT, 1991</td>
<td>75</td>
<td>676</td>
<td>66.9</td>
<td>65.8</td>
<td>32</td>
</tr>
<tr>
<td>3</td>
<td>EAFT, 1993</td>
<td>300</td>
<td>815</td>
<td>73.0</td>
<td>56.0</td>
<td>28</td>
</tr>
<tr>
<td>4</td>
<td>UK-TIA trial, 1988, 1991</td>
<td>300</td>
<td>815</td>
<td>90.3</td>
<td>73.1</td>
<td>48</td>
</tr>
<tr>
<td>5</td>
<td>Fiebls et al (AATIA), 1977; Lenak et al, 1985 (surgical group)</td>
<td>650</td>
<td>65</td>
<td>60.3</td>
<td>74.4</td>
<td>Unknown</td>
</tr>
<tr>
<td>6</td>
<td>Bousser et al (AICLA), 1983</td>
<td>990</td>
<td>198</td>
<td>63.5</td>
<td>68.2</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>Soenssen et al (Danish Cooperative Study), 1983</td>
<td>1000</td>
<td>100</td>
<td>59.0</td>
<td>72.9</td>
<td>25</td>
</tr>
<tr>
<td>8</td>
<td>Fiebls et al (AATIA), 1977; Lenak et al, 1986 (medical group)</td>
<td>1300</td>
<td>102</td>
<td>50.2</td>
<td>66.3</td>
<td>37</td>
</tr>
<tr>
<td>9</td>
<td>Canadian Cooperative Study, 1978; Gent et al, 1980</td>
<td>1300</td>
<td>102</td>
<td>50.2</td>
<td>66.3</td>
<td>37</td>
</tr>
<tr>
<td>10</td>
<td>Resther and Dornhor, 1973</td>
<td>1500</td>
<td>102</td>
<td>59.0</td>
<td>65.5</td>
<td>24</td>
</tr>
<tr>
<td>11</td>
<td>Britton et al (Swedish Cooperative Study), 1987</td>
<td>1500</td>
<td>102</td>
<td>59.0</td>
<td>65.5</td>
<td>24</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td>6629</td>
<td>6629</td>
<td>63.1</td>
<td>63.3</td>
<td>32</td>
</tr>
</tbody>
</table>

*ESPS-2 indicates European Stroke Prevention Study 2; SALT, Swedish Aspirin Low-Dose Trial; EAFT, European Atrial Fibrillation Trial; UK-TIA, United Kingdom Transient Ischemic Attack; AATIA, Aspirin in Transient Ischemic Attacks; and AICLA, Accidents, Ischemiques Crebraux Lésés à L'Atherosclerose.

### Table 2. Risk Ratio Estimates and 95% Confidence Intervals for Stroke by Study and Aspirin Dose

<table>
<thead>
<tr>
<th>Study No.</th>
<th>Aspirin Dose, mg/d</th>
<th>Risk Ratio</th>
<th>95% Confidence Interval</th>
<th>% Risk Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>0.82</td>
<td>0.69-0.98</td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>75</td>
<td>0.84</td>
<td>0.65-1.08</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>300</td>
<td>0.91</td>
<td>0.71-1.18</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>300</td>
<td>0.85</td>
<td>0.66-1.09</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>650</td>
<td>0.21</td>
<td>0.05-0.91</td>
<td>79</td>
</tr>
<tr>
<td>6</td>
<td>990</td>
<td>0.59</td>
<td>0.35-1.01</td>
<td>41</td>
</tr>
<tr>
<td>7</td>
<td>1000</td>
<td>1.77</td>
<td>0.92-3.40</td>
<td>−77</td>
</tr>
<tr>
<td>8</td>
<td>1200</td>
<td>0.85</td>
<td>0.66-1.08</td>
<td>15</td>
</tr>
<tr>
<td>9</td>
<td>1300</td>
<td>0.80</td>
<td>0.59-1.67</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>1300</td>
<td>0.10</td>
<td>0.01-1.86</td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td>1500</td>
<td>0.25</td>
<td>0.03-2.10</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>1500</td>
<td>1.00</td>
<td>0.03-1.57</td>
<td>0</td>
</tr>
</tbody>
</table>

*See Table 1 for identification of studies by number.
†Negative value indicates an increase in risk (i.e., [1 − risk ratio] × 100).
Data Collection
• Individual studies are the unit of observation.
• Data will typically be arranged with a single row for each study and with the study characteristics and outcome measures in separate columns.
• Ideally, data will be collected or reviewed by at least two independent coders.
• Data entry forms can be very valuable.
• May be necessary to contact authors to obtain the necessary data for the meta-analysis (e.g., standard errors).

Analysis: Outcome Measures
• Exactly what quantitative outcome data should be collected from the selected studies?
• Most meta-analyses focus on the comparison of two groups: experimental versus control, between two treatments, etc.
• Each study measures the outcome(s) on the observational units which is summarized for each group.
• The comparison of the two groups is then made in terms of an “effect size” at the study level which can be used in meta-analysis.
• Type of effect size depends on type of outcome measured.

Dichotomous Outcomes
Examples:
• Survival/mortality
• Clinical events (stroke, heart attack, infection)
• Presence of a species, microbe, biomarker, DE gene
• Divorce, child birth, passing a standardized test

Dichotomous Outcomes: Risk
For the experimental group (i.e. a single group):
• Risk: probability that an event will occur:
\[ \text{risk} = \frac{\text{# of events}}{\text{total}} = \frac{AN}{E} \]

- Can be expressed as:
  - a decimal between 0 and 1
  - a percentage %
  - a number per N subjects
- Example:

\[ \text{risk} = 0.10 \]
10% of people will experience the event
100 people out of every 1000 will experience the event

### Accountability of the how i spent the Grant

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air ticket</td>
<td>450</td>
</tr>
<tr>
<td>Accommodation</td>
<td>300</td>
</tr>
<tr>
<td>Registration Fee</td>
<td>200</td>
</tr>
<tr>
<td>Transport from Julius Nyerere airport to hotel</td>
<td>20</td>
</tr>
<tr>
<td>Transport from hotel to Julius Nyerere airport</td>
<td>20</td>
</tr>
<tr>
<td>Transport from home to Entebbe</td>
<td>20</td>
</tr>
<tr>
<td>Transport from Entebbe to home</td>
<td>25</td>
</tr>
<tr>
<td>Feeding</td>
<td>70</td>
</tr>
<tr>
<td>Other necessities</td>
<td>95</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1200</strong></td>
</tr>
</tbody>
</table>