Outline

What constitutes a Systematic Review?

PRISMA Checklist – Focusing on the literature, not so much the analysis

Tools that you can use to help along the way

• My NCBI
• EndNote
• Librarian
What constitutes a Systematic Review?

It’s a **Review** of articles on a topic that is **Systematic**

Not a literature review because the researchers:

- Has **Hypothesis** – Research Question
- Have **Reproducible Methodology**
- Have **Inclusion/Exclusion Criteria**
- Intend to find **ALL** relevant studies
- Assess the studies for **Validity**
- **Synthesize** the studies’ characteristics and findings
You might have a Meta-Analysis if…

*Synthesis of the studies’ characteristics and findings* goes from Qualitative to **Quantitative**

Statistical techniques are used to integrate and summarize the results of included studies.

- Forrest Plot
## Forest Plot

**Exercise and Life Role Participation in Older Adults**

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Weight</th>
<th>Std. Mean Difference IV, Random, 95% CI</th>
<th>Std. Mean Difference IV, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ada 2013</td>
<td>4.9%</td>
<td>-0.27 [-0.75, 0.21]</td>
<td></td>
</tr>
<tr>
<td>Chumiller 2012</td>
<td>3.5%</td>
<td>0.48 [-0.14, 1.09]</td>
<td></td>
</tr>
<tr>
<td>Clemson 2012</td>
<td>8.0%</td>
<td>0.24 [-0.07, 0.55]</td>
<td></td>
</tr>
<tr>
<td>Day 2012</td>
<td>11.0%</td>
<td>-0.10 [-0.30, 0.10]</td>
<td></td>
</tr>
<tr>
<td>Fairhall 2012</td>
<td>9.1%</td>
<td>0.06 [-0.21, 0.33]</td>
<td></td>
</tr>
<tr>
<td>Foster 2013</td>
<td>4.1%</td>
<td>0.18 [-0.36, 0.73]</td>
<td></td>
</tr>
<tr>
<td>Green 2002</td>
<td>8.0%</td>
<td>-0.35 [-0.66, -0.04]</td>
<td></td>
</tr>
<tr>
<td>Haines 2009</td>
<td>3.7%</td>
<td>0.27 [-0.32, 0.85]</td>
<td></td>
</tr>
<tr>
<td>Harrington 2010</td>
<td>9.2%</td>
<td>-0.32 [-0.59, -0.06]</td>
<td></td>
</tr>
<tr>
<td>Mayo 2015</td>
<td>8.6%</td>
<td>-0.03 [-0.32, 0.26]</td>
<td></td>
</tr>
<tr>
<td>Morey 2012</td>
<td>10.8%</td>
<td>0.22 [0.01, 0.42]</td>
<td></td>
</tr>
<tr>
<td>O'Shea 2007</td>
<td>3.1%</td>
<td>0.38 [-0.27, 1.03]</td>
<td></td>
</tr>
<tr>
<td>Ouelle 2004</td>
<td>3.1%</td>
<td>0.13 [-0.52, 0.79]</td>
<td></td>
</tr>
<tr>
<td>Roaldsen 2014</td>
<td>4.0%</td>
<td>0.52 [-0.04, 1.07]</td>
<td></td>
</tr>
<tr>
<td>Winters-Stone 2012</td>
<td>4.9%</td>
<td>-0.18 [-0.66, 0.30]</td>
<td></td>
</tr>
<tr>
<td>Winters-Stone 2015</td>
<td>4.0%</td>
<td>0.18 [-0.37, 0.74]</td>
<td></td>
</tr>
</tbody>
</table>

**Total (95% CI):** 100.0% 0.03 [-0.10, 0.16]

Heterogeneity: Tau^2 = 0.03; Chi^2 = 28.66, df = 15 (P = 0.02); I^2 = 48%

Test for overall effect: Z = 0.48 (P = 0.63)

**Figure 2.** Overall effect of exercise interventions on participation. Squares represent the point estimate. The size of a square is determined by how much weight the study contributes to the pooled effect estimate (diamond).
Potential outcomes of a systematic review:

Resolve (or add to) controversy

- Electronic cigarette, effective or harmful for quitting smoking and respiratory health: A quantitative review papers. - “…Evidence to suggest that ECs may be effective and advisable for quitting smoking or a safe alternative for smoking is lacking and [they] may instead harm the respiratory system…”

A new focus from previously reported data

- A systematic review of possible serious adverse health effects of nicotine replacement therapy. - “Attention was restricted to epidemiological studies and clinical trials of NRT describing results relating to serious adverse health effects

Highlight areas of needed research

- Tobacco smoking and the risk of sudden cardiac death: a systematic review and meta-analysis of prospective studies. – “…further studies should investigate the effects of duration of smoking, number of cigarettes per day, pack-years, and time since quitting smoking and sudden cardiac death.”

Conclude that the research is complete

- Cigarette smoking and colorectal cancer incidence and mortality: Systematic review and meta-analysis. – “Our findings provide strong evidence that smoking is associated with an increased risk of CRC”
### Other Types of Reviews?

<table>
<thead>
<tr>
<th>Critical review</th>
<th>Rapid review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature review</td>
<td>Scoping review</td>
</tr>
<tr>
<td>Mapping review/systematic map</td>
<td>State-of-the-art review</td>
</tr>
<tr>
<td>Meta-analysis</td>
<td><strong>Systematic review</strong></td>
</tr>
<tr>
<td>Mixed studies review/mixed methods review</td>
<td>Systematic search and review</td>
</tr>
<tr>
<td>Overview</td>
<td>Systematized review</td>
</tr>
<tr>
<td>Qualitative systematic review/qualitative evidence synthesis</td>
<td>Umbrella review</td>
</tr>
</tbody>
</table>
Checklists to guide & tools to help
PRISMA: Preferred Reporting Items for Systematic reviews and Meta-Analyses

Research on the quality of Systematic Review and Meta Analysis indicated the need for a standard.

The PRISMA Statement consists of a 27-item checklist and a four-phase flow diagram deemed essential for transparent reporting of a systematic review.

http://www.prisma-statement.org/
PRISMA Checklist

- TITLE: Identify the report as a systematic review, meta-analysis, or both.
- ABSTRACT: Structured summary
- INTRODUCTION- Must include:
  - Rationale: Why you are doing this
  - Objectives: What you hope to find out
  - **Explicit statement of questions being addressed (PICO).**
  - **This is your Hypothesis that you are ...**
<table>
<thead>
<tr>
<th>Patient</th>
<th>Intervention</th>
<th>Comparison (optional)</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td>In patients with acute bronchitis,</td>
<td>do antibiotics</td>
<td>none</td>
</tr>
<tr>
<td>Example</td>
<td>In children with cancer</td>
<td>what are the current treatments</td>
<td></td>
</tr>
<tr>
<td>Example</td>
<td>Among family-members of patients undergoing diagnostic procedures</td>
<td>does standard care, listening to tranquil music, or audiotaped comedy routines</td>
<td></td>
</tr>
</tbody>
</table>
Methods - Information sources

You have to search a least 3 databases. There is no magic to 3, and there is no need to stop at 3, if there are other relevant databases.

- PubMed includes all of MEDLINE. So searching PubMed & Ovid MEDLINE shouldn’t be considered 2 databases.
- Embase covers more non US journals.
- Cochrane CENTRAL database of clinical trials would be useful.
  - Not Cochrane Database of Systematic Reviews.
Methods - Search

Start with a handful representational articles

• Log in to your MYNCBI account

• Put them into PubMed and see how they are described

• Use the Related Citations link to find others see how they are described

• Down the Road – they will act as litmus tests for your search
Example
**Question:** Is Cognitive Behavioral Therapy more effective than health education for tobacco cessation?

<table>
<thead>
<tr>
<th>P</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
<tr>
<td>O</td>
<td></td>
</tr>
</tbody>
</table>
A Randomized Pilot Study of Cognitive-Behavioral Therapy Versus Basic Health Education for Smoking Cessation Among Cancer Patients

Robert A. Schnoll, Ph.D., Randi L. Rothman, B.A., and Dustin B. Wiel, M.A.
Fox Chase Cancer Center
Philadelphia, Pennsylvania

Caryn Lerman, Ph.D.
Abramson Cancer Center
University of Pennsylvania

Holly Pedri, M.S., Hao Wang, M.S., James Babb, Ph.D., Suzanne M. Miller, Ph.D., Benjamin Moyal, M.D., Eric Sherman, M.D., John A. Ridge, M.D., Ph.D., Michael Unger, M.D., Corey Langer, M.D., Melvin Goldberg, M.D., Walter Scott, M.D., and Jonathan Cheng, M.D.
Fox Chase Cancer Center
Philadelphia, Pennsylvania

ABSTRACT

Background: Previously, we have linked theoretically based cognitive and emotional variables to the ability of cancer patients to quit smoking. Purpose: In this study, we evaluated the impact of cognitive-behavioral therapy (CBT), which addressed these theoretically derived cognitive and emotional variables linked to tobacco use in this population, for promoting smoking cessation in a sample of cancer patients and assessed longitudinal predictors of smoking cessation. Methods: Cancer patients were randomly assigned to either CBT or basic health education intervention, which consisted of basic health education alone. Results: Compared to those in the basic health education group, significantly more patients in the CBT group were smoke-free at week 12 (p < 0.05). Conclusion: Cognitive-behavioral therapy is effective in promoting smoking cessation among cancer patients.
A randomized pilot study of cognitive-behavioral therapy versus basic health education on smoking cessation among cancer patients.


Abstract

BACKGROUND: Previously, we have linked theoretically based cognitive and emotional variables to the ability of cancer patients to change smoking.

PURPOSE: In this study, we evaluated the impact of cognitive-behavioral therapy (CBT), which addressed these theoretically based cognitive and emotional variables linked to tobacco use in this population, for promoting smoking cessation in a sample of 109 cancer patients and assessed longitudinal predictors of smoking cessation.

METHODS: Cancer patients (N=109) were randomized to either the theoretically based CBT intervention or to a general health education (GHE) condition, and all patients received nicotine replacement therapy.

RESULTS: Contrary to our expectation, no significant difference in 30-day point-prevalence abstinence between the CBT and GHE conditions was detected at either a 1-month (44.9% vs. 47.3%, respectively) or 3-month (43.2% vs. 39.2%, respectively) follow-up. Within-group analyses showed that changes in motivation and lower costs of quitting were related to smoking cessation.

CONCLUSIONS: Implications for the implementation of smoking cessation behavioral treatments in the oncologic context and directions for future research in this area.

PMID: 16097900 DOI: 10.1207/s15324796abm3001_1

Indexed for MEDLINE

Cognitive Therapy*

Head and Neck Neoplasms/complications

Humans

Motivation

Patient Education as Topic*

Smoking Cessation/methods*

Tobacco Use Disorder/psychology

Tobacco Use Disorder/therapy*

Treatment Outcome

Grant support

CA88610/CA/NCI NIH HHS/United States

CA95678/CA/NCI NIH HHS/United States

LinkOut - more resources
Make a working list of search terms by concept

<table>
<thead>
<tr>
<th>Concept</th>
<th>Search Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBT</td>
<td>CBT, Cognitive Behavioral Therapy, Cognitive Behavioural Therapy, Cognitive Therapy</td>
</tr>
<tr>
<td>Patient Ed.</td>
<td>Patient Education as Topic, Health Education, Health Literacy</td>
</tr>
<tr>
<td>Tobacco Cessation</td>
<td>Tobacco Cessation, Quitting Smoking, Tobacco Use Disorder/therapy, Smoking/therapy</td>
</tr>
</tbody>
</table>
Use the Advanced Screen to put together main concepts -- Keep your AND’s / OR’s straight
Use the Advanced Screen to put together main concepts -- Keep your AND’s / OR’s straight.
Boolean

Wine OR Cheese
Wine AND Cheese
Each article in PubMed is described with specific words from the **Medical Subject Heading (MeSH)** list. If your term is linked to a MeSH term, PubMed will include that term in your search. In this case, *e-cigarettes* is linked to the MeSH term "**electronic nicotine delivery systems**"[MeSH Terms]

PubMed will also automatically search your term and the MeSH term as keywords anywhere in the article.

*Usually this is helpful, but it can lead to your search having many irrelevant results. There are ways to limit this using advanced techniques.*
Completing your Search Strategy
Criteria for Inclusion / Exclusion

Who is your Patient/Population

- Male/Female, Age, Comorbidity, Human, Cadaver

Reporting of care

- How long F/U, Report Complications, Detail of Reporting

Publication itself

- English Only, Publication Dates, Other Review Articles
Sensitivity vs. Specificity

- How many irrelevant articles do you need to retrieve in order to be sure you have all of the relevant articles?
- This is where the *Litmus Test* articles are important.
  - You can test to be sure your search is not too specific by being sure that all your Litmus test articles are included.
Translating your search to other databases

The way things are described varies from database to database.

PubMed does some things automatically that you will need to do manually in other databases.

- E.G. PubMed Automatically **explodes** a subject heading
- If you search on a broad term like *Physical Fitness* the more specific term *Cardiorespiratory Fitness* is automatically included in your search.
Write Down

• Your Final Search Strategy – including the translation from PubMed or other databases
• The date you search each database
• The number of records from each database
• Any other way you found articles – “citation tracking” “manually searched”
<table>
<thead>
<tr>
<th>Database</th>
<th>Strategy</th>
<th>Date</th>
</tr>
</thead>
</table>
| Medline Database searched through the Ovid Interface | (knee prosthesis.mp or knee replacement.mp. or Arthroplasty, Replacement, knee/ or knee arthroplasty.mp. or hip replacement.mp. or hip prosthesis.mp. or Arthroplasty, Replacement, Hip/ or hip prosthesis/ or knee prosthesis/ or hip arthroplasty.mp.)  
AND  
(exp Thrombosis.pc [Prevention & Control] or exp Thromboembolism.pc [Prevention & Control] or thromboprophylaxis.mp. or exp Anticoagulants/tu [Therapeutic Use])  
AND  
exp Mortality/ or mortality.fs. or death$.mp. or fatal$.mp. or mortalit$.mp.) | October 23, 2016 |
| Cochrane Central Register of Controlled Trials searched through the Ovid Interface | (knee prosthesis or knee replacement).mp. or Arthroplasty, Replacement, knee/ or knee arthroplasty.mp. or hip replacement.mp. or hip prosthesis.mp. or Arthroplasty, Replacement, Hip/ or hip prosthesis/ or knee prosthesis/ or hip arthroplasty.mp.  
AND  
exp Thrombosis.pc or exp Thromboembolism.pc or thromboprophylaxis.mp. or anticoagulants/tu  
AND  
exp Mortality/ or mortality.fs. or death$.mp. or fatal$.mp or mortalit$.mp | October 23, 2016 |
| Embase Database searched through the Ovid Interface | (exp hip arthroplasty/ or hip arthroplasty.mp or hip replacement or hip prosthesis.mp. or exp knee arthroplasty/ or knee arthroplasty.mp or knee replacement.mp or knee prosthesis.mp. "total knee replacement"/ or knee joint replacement.mp. or joint replacement.mp.)  
AND  
(thromboprophylaxis.mp. or exp thrombosis prevention/ or exp anticoagulant agent/ or anticoagulant$.mp.)  
AND  
(exp mortality/ or death$.mp. or fatal$.mp. or mortalit$.mp.) | October 27, 2016 |
Back To the PRISMA Checklist
Methods – Selecting Studies

Take an Incremental approach to screening out articles that do not meet your inclusion criteria

- Abstract, then Full text

Is the eligibility criteria you chose still working for you?

- If you modify eligibility criteria will it effect your search?

Who is deciding what meets the criteria?

- Need multiple reviewers
Results – Flow Diagram

**Identification**
- # of records identified through database searching
- # of additional records identified through other sources
- # of records after duplicates removed

**Screening**
- # 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)
Records Screened – might need to add layers
Methods – Selecting Studies

Take an Incremental approach to screening out articles that do not meet your inclusion criteria

- Abstract, then Full text

Is the eligibility criteria you chose still working for you?

- If you modify eligibility criteria will it effect your search?

Who is deciding what meets the criteria?

- Need multiple reviewers
Screening Tool - Covidence

Review Summary

Import references

Title and abstract screening

Team progress

- Completed: 20
- In partial progress: 36
- Conflicts: 4
- No votes: 7

Timothy, you can still

Resolve

- Resolved: 4

Screen

- Screened: 40

You've screened 24 studies so far

Full text screening

- Excluded: 1
- Remaining: 12

Extraction

- Extracted: 0
- Remaining: 6

NYU Langone Medical Center
Records Screened – might need to add layers
Working With Your Studies

EndNote is really important here

Allows you to bring records from different sources into one tool

• Remove Duplicates
• Share Citations with Colleagues
• Attach PDF’s
• Format your paper
http://hslguides.med.nyu.edu/citationmanagement
Covidence

Web-based tool that allows multiple reviewers to work more efficiently through the steps of a systematic review.

- **Import & Export citations**: supports tools like PubMed, EndNote & RefWorks

- **Easier Collaboration**: multiple reviewers can screen titles/abstracts/full text. Easy to upload PDF’s

- **Document**: reasons for exclusion and any notes so you can resolve any disagreements quickly, with a click of a button.

- **Extract**: data using customizable forms
Discussion - Limitations

Was the literature there that you needed?
Were the studies valid?
Was the data comparable?
Did you limit to English Language only?
Conclusion - Summarize the main findings including the strength of evidence for each main outcome

Conclusions

This systematic review found a gap in the evidence base relating to whether restrictions on e-cigarettes in public places are likely to reduce the likelihood of smokers switching to e-cigarettes for harm reduction purposes. The findings do suggest that restrictions on smoking in public places may play a role in smokers’ use of e-cigarettes and that the size of that role varies between populations. However, we cannot be sure whether restrictions on e-cigarettes in public places would have prevented these smokers from using e-cigarettes, as many may have had multiple reasons for use. The included studies report that former smokers reported more
Reasons an editor may reject your Systematic Review

— Did not include all key studies
— Did not search enough (3+) databases
— Did not report full search strategy
— Did not include a PRISMA flow chart
— Did not register the systematic review protocol
— Did not check for existing systematic reviews on the same topic

You need to do these from the beginning of your review!!
Beyond PubMed: Other Domains

**PyscInfo:** psychology and the psychological aspects of related disciplines, such as medicine, psychiatry, nursing, sociology, education, pharmacology, anthropology.

**CINAHL:** Nursing and Allied Health Database, includes literature not in PubMed

**Embase:** Covers Non US publications not in PubMed. Stronger than PubMed for Pharma esp. Pipeline Drugs

**BIOSIS:** Biology, Life Science
Beyond PubMed:

The Cochrane Library:

• YES - Cochrane Central Register Of Controlled Trials: 40% of the info on trials is not in PubMed

• NO - The Cochrane Database of Systematic Reviews – they are *Systematic Reviews*

• *UpToDate, Micromedex, Access Medicine* – probably not
Beyond PubMed: Citation Databases

Indexes articles based on the articles they cite & by which are cited

A lot of the same content as PubMed, the advantage here is the different approach to getting at it

- **Web of Science** (deeper coverage) and **Scopus** (wider subject area) – Pretty comparable

- **Google Scholar** – Weak coverage of Medical citations particularly when they are older. Free and Easy though
Beyond PubMed:

Grey Literature

- "That which is produced on all levels of government, academics, business and industry in print and electronic formats, but which is not controlled by commercial publishers."

- http://www.greylit.org/ - No Longer Updated

Conference Proceedings: The only real way to do this is by hand. You are only going to end up with an abstract, which may not provide sufficient details and data to meet your inclusion criteria

Hand Searching and Citation String Searches

Unpublished Studies – mixed bag
PROSPERO: International prospective register of systematic reviews

Includes protocol details for systematic reviews relevant to health and social care, welfare, public health, education, crime, justice, and international development, where there is a health related outcome.

**Search:** Is someone already doing a Systematic Review on your topic?

**Register:** Provides transparency in the review process and helps counter publication bias.

[https://www.crd.york.ac.uk/PROSPERO/](https://www.crd.york.ac.uk/PROSPERO/)
Take Home Points

If you aren’t using My NCBI & EndNote – it would probably be worthwhile to start. *(even if you aren’t doing a Systematic Review)*

• If you use these tools from the beginning you will be happy in the end

Your search needs to be reproducible and you need to look in at least 3 databases.

Think about finding studies in as many ways possible.

Included multiple reviewers.

At the very least consult with me (or another librarian) on your search strategy.
THANK YOU

Tim Roberts, MLS, MPH
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Health Sciences Library/
NYU Langone Medical Center
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