Poll Everywhere intro: Enter a few words to describe your research interests
Evidence Synthesis
Topics to be introduced

1. Importance of evidence syntheses
2. What are some types of evidence syntheses?
3. Tools and resources for evidence syntheses
What we ARE NOT covering today:

• Statistics – how to do a meta-analysis
• In-depth training for creating comprehensive search strategies
• Basics covered in the earlier Literature Review sessions in the Bootcamp series
• ALL of the content on these slides! They are for your reference, but we won’t have time for all the details included here.
Did you attend any research bootcamp sessions last week or another year?

Core Skills, Part 1 (Research process and Getting Started)

Core Skills, Part 2 (Researching and Writing the Lit Review)

Core Skills, Part 3 (citation management and copyright)

Core Skills + other sessions

Other research bootcamp session(s)

No, this is my first session
Evidence Informed Decision-Making

Use of current best evidence
  – Health care policy
  – Clinical practice

Importance
  – Quality care
  – Limited resources
Evidence for Decision-making

The LD<sub>50</sub> of toxicity data is 2 kilograms per kilogram.

http://xkcd.com/1260/
Evidence Synthesis

- **Single studies**
  - Original journal articles and studies
  - Ex: RCTs

- **Synopses of studies**
  - Very brief descriptions of single articles, like a literature review
  - Ex: critically-appraised topics

- **Syntheses**
  - Provide an overview and analysis of multiple studies
  - Ex: systematic reviews, meta-analyses

- **Summaries**
  - Very brief descriptions of original reviews, often with recommendations for best practice
  - Ex: Cochrane Summaries

- **Systems**
  - Integrate best evidence addressing all management options for a health problem
  - Ex: evidence-based textbooks

- **Evidence Synthesis**
  - Often patient-specific, linking between patient’s condition and current best practices; not yet very common

Date: May 22, 2019
Author: Robin Parker
Knowledge Syntheses

- Evolving science
- Varying terminology
- **Basic types reflect objectives and methods**
- Scoping reviews: Map the literature to clarify boundaries & identify gaps
- Research syntheses: Studies are analyzed and summarized

### Types of Literature Reviews

<table>
<thead>
<tr>
<th></th>
<th>Conventional</th>
<th>Systematic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Question</strong></td>
<td>Often broad in scope</td>
<td>Often a focused clinical question</td>
</tr>
<tr>
<td><strong>Sources &amp; Searches</strong></td>
<td>Not usually specified</td>
<td>Comprehensive source and strategy explicitly stated</td>
</tr>
<tr>
<td><strong>Selection</strong></td>
<td>Not usually specified</td>
<td>Criterion-based uniformly applied</td>
</tr>
<tr>
<td><strong>Appraisal</strong></td>
<td>Variable</td>
<td>Rigorous critical appraisal</td>
</tr>
<tr>
<td><strong>Synthesis</strong></td>
<td>Qualitative summary common</td>
<td>Qualitative summary +/- Meta Analysis</td>
</tr>
<tr>
<td><strong>Inferences</strong></td>
<td>Sometimes evidence-based</td>
<td>Evidence-based</td>
</tr>
</tbody>
</table>
Poll: Types of reviews
### Types of Reviews

Systematic reviews, while common in the health sciences field, are not the only type of review that exist. In their widely cited article entitled “A Typology of Reviews: An Analysis of 14 Review Types and Associated Methodologies,” Grant and Booth (2009) outline several major types of reviews, including the following (adapted from pages 94-95 in their article - see link below):

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical review</td>
<td>Aims to demonstrate writer has extensively researched literature and critically evaluated its quality. Goes beyond more descriptive to include degree of analysis and conceptual innovation. Typically results in hypothesis or model.</td>
</tr>
<tr>
<td>Literature review</td>
<td>Generic term: published materials that provide examination of recent or current literature. Can cover wide range of subjects at various levels of completeness and comprehensiveness. May include research findings.</td>
</tr>
<tr>
<td>Mapping review/ systematic map</td>
<td>Map out and categorize existing literature from which to commission further reviews and/or primary research by identifying gaps in research literature.</td>
</tr>
<tr>
<td>Meta-analysis</td>
<td>Technique that statistically combines the results of quantitative studies.</td>
</tr>
</tbody>
</table>

**Is a systematic review the right choice for my research team?**

- **I Want to Do a Systematic Review**
  This blog post by the Mayo Clinic Libraries outlines what makes a systematic review different from a traditional literature review. It also suggests some questions for your research team that can help you decide whether or not to embark on a systematic review.

- **Quiz: What kind of review**

**Types of Reviews: More Resources**

**Websites**

- The RAMSES Project
  A guide to producing realist and...
A few methods...

http://libguides.utoledo.edu/litreview/types

https://knowledgetranslation.net/knowledgesyntheses/ks-research/

Types of reviews with distinctions
Systematic Reviews
Meta-analysis
Network Meta-analysis
Scoping Reviews
Overview of Reviews
Rapid Reviews
Diagnostic Reviews
Health Economic Reviews
Emerging Knowledge Synthesis Reviews

https://knowledgetranslation.net/knowledge-syntheses/ks-research/
25 Unique methods:

**Analysis methods**
- Content analysis
- Grounded theory
- Thematic analysis
- Case survey method
- Aggregate analysis
- Qualitative synthesis
- Framework analysis
- Ecological triangulation
- Inductive analysis
- Integral meta-theory
- Philosophic analysis
- Pragmatic utility
- Hermeneutic phenomenology

**Full review methods**
- Integrative review
- Meta-synthesis
- Mixed studies review
- Meta-interpretation
- Concept synthesis
- Critical interpretive synthesis
- Meta-ethnography
- Meta-narrative review
- Meta-study
- Meta-summary
- Narrative synthesis
- Realist review

[https://knowledgetranslation.net/knowledge-syntheses/ks-research/emerging-and-additional-review-types/](https://knowledgetranslation.net/knowledge-syntheses/ks-research/emerging-and-additional-review-types/)
Example: “Traditional” Review

Treatment of toxic epidermal necrolysis by a multidisciplinary team. A review of literature and treatment results

[Link to article](https://www.sciencedirect.com/science/article/pii/S0305417917305909)

Abstract

**Background**

Stevens–Johnson Syndrome (SJS) and Toxic Epidermal Necrolysis (TEN) are mucocutaneous hypersensitivity reactions, usually to drugs or their metabolites. TEN is the most severe involving greater than 30% of the total body surface area (TBSA). Management of these patients usually benefits from a large multidisciplinary team for both wound and medical management. Treatment of these patients varies between centers and physicians and there is lack of a standardized treatment protocol in the medical literature.

**Objectives**

To review the literature and complete a retrospective review of patients treated at Vancouver General Hospital over a 11-year period.

**Methods**

A retrospective chart review of all patients diagnosed with SJS/TEN and treated at Vancouver General Hospital from 2001 to 2011 was completed. Data collected include patient demographics, time to transfer to a burn center, SCORTEN calculation, suspected cause of TEN, %TBSA involved, length of stay in hospital and ICU, medications, dressings, infections/cultures, fluids, mucosal involvement, teams involved, associated complications, morbidity and mortality. Data is reported quantitatively.

Evidence Synthesis
Example: Systematic Review

How does tillage intensity affect soil organic carbon? A systematic review

Several reviews and meta-analyses have shown both beneficial and null effects on SOC due to no tillage relative to conventional tillage, hence there is a need for a comprehensive systematic review to answer the question: what is the impact of reduced tillage intensity on SOC?

Methods

We systematically reviewed relevant research in boreo-temperate regions using, as a basis, evidence identified within a recently completed systematic map on the impacts of farming on SOC. We performed an update of the original searches to include studies published since the map search. We screened all evidence for relevance according to predetermined inclusion criteria. Studies were appraised and subject to data extraction. Meta-analyses were performed to investigate the impact of reducing tillage [from high (HT) to intermediate intensity (IT), HT to NT, and from IT to NT] for SOC concentration and SOC stock in the upper soil and at lower depths.
Example: Scoping Review

The state of the science on sensory factors and their impact on daily life for children: A scoping review

The objective of this study was to identify and synthesize research about how sensory factors affect daily life of children. We designed a conceptual model to guide a scoping review of research published from 2005 to October 2014 (10 years). We searched MEDLINE, CINAHL, and PsycINFO and included studies about sensory perception/processing; children, adolescents/young adults; and participation.
Example: Rapid Review

The value of the use of participatory arts activities in residential care settings to enhance the well-being and quality of life of older people: A rapid review of the literature

This rapid review of the literature explores the value of using participatory arts activities in residential care settings to enhance the health and well-being of older people. A rapid review of the literature published between 2000 and 2013 was undertaken and focused on participants aged 65 years and over living in residential care settings participating in arts activities such as music, dance, singing and the visual arts.
Example: Rapid Review

Due to time constraints, a rapid review was undertaken; this is a systematic literature review conducted within a limited time period (Petticrew & Roberts, 2006). The database search adopted a strategy similar to that followed by Daykin et al. (2008), but encompassed a wider range of participatory arts activities and focused on those aged 65 years and over living in residential care settings. The literature search took place during July–August 2013 and was conducted systematically. It was limited to English language publications from 2000 onwards. Google and Google Scholar were also used to track any grey literature. The Boolean search keyword groupings are shown in Table 1, and the searches were conducted on 26 different databases, as shown in Table 2…
Social Work Practices for Young People with Complex Needs: An Integrative Review

The aim of this integrative review is to investigate research of social work practices for adolescents and young adults with complex needs. The research questions are: What are the major themes in studies of practices for young people with complex needs? How do studies suggest that complex needs can be met in ways that are beneficial for young people? A young person with complex needs is in this review defined as an adolescent or young adult who, due to mental ill-health in combination with different types of social vulnerabilities, is receiving assistance from multiple welfare services. Searches were conducted in seven databases. These searches resulted in a sample of 1677 records, published 2007–2016, which in the screening process were reduced to 24 publications, all peer-reviewed articles.
Example: Integrative Review, cont’d

**Social Work Practices for Young People with Complex Needs: An Integrative**

...The articles were analyzed with *qualitative summative content analysis*. Three *empirically generated themes* were found in studies of work practices targeting young people with complex needs: collaboration-, relationship- and empowerment-oriented practices. In conclusion, the practices contain a wide variety of features, but with the joint aim of acknowledging young people’s needs. The results can be used by practitioners and policymakers to further the development of services for youth with mental ill-health and social vulnerabilities, who use multiple welfare services.
TABLE I: Four Forms of Synthesis from Integrative Literature Reviews

| A research agenda that flows logically from the critical analysis of the literature. The research agenda should pose provocative questions (or propositions) that give direction for future research. |
| A taxonomy or other conceptual classification of constructs is often developed as a means to classify previous research. They, in turn, lay the foundation for new theorizing (Doty & Glick, 1994). |
| Alternative models or conceptual frameworks—new ways of thinking about the topic addressed by the integrative review. Alternative models or conceptions proposed by the author should be derived directly from the critical analysis and synthesis provided. |
| Metatheory—The integration and synthesis of a literature review can provide the basis for developing metatheory across theoretical domains through future research. |

Example: Realist Review

Experiences with integrative Indigenous and Western knowledge in water research and management: A systematic realist review of literature from Canada, Australia, New Zealand, and the United States

The implementation of Indigenous and Western knowledge systems in integrative water research and management is gaining prominence in the realm of academia, particularly in four countries with a shared, albeit different, history of British colonialism: Canada, Australia, New Zealand, and the United States. While integrative water research in particular is gaining popularity, currently there is a gap in our understanding regarding where, when, why, how, and for whom this type of research has been successful. …
Example: Realist Review, cont’d

Experiences with integrative Indigenous and Western knowledge in water research and management: A systematic realist review of literature from Canada, Australia, New Zealand, and the United States

...A systematic review method was used to identify peer-reviewed literature from each of the four countries and to understand where and when integrative water research projects were taking place. Then, we used a realist review method to synthesize and analyze the included peer-reviewed literature to determine why, how, and for whom this type of research has been successful, or not.
Marijuana and College Students: A Critical Review of the Literature

Background: Marijuana represents the most widely used illicit drug on college campuses. Repeated use can impair students’ academic, emotional, and physical success and can lead to chronic diseases.

Purpose: The purpose of this study was to evaluate existing literature on the associated effects of marijuana use on U.S. college students’ academic success, including conduct/legal issues, negative outcomes, normative perceptions, and physical/mental health.
Example: Critical Review

Marijuana and College Students: A Critical Review of the Literature

Method: A critical review was conducted in January 2015 using the PubMed, Academic Search Complete, Electronic Journal Center, ProQuest, and Google Scholar databases. Studies were included if they focused on epidemiological outcomes of marijuana use on U.S. undergraduate college students aged 17–24. Results: Overall, studies lacked scientific rigor. In several studies, researchers relied on convenience samples, used small sample sizes, did not report response rates, or did not report the psychometrics of the instrument. The majority of the studies were conducted at single institutions, limiting external validity.
Examples in other disciplines:

Review #1 Question

**Question:** What makes community programmes for children and youth with disabilities work?

**PURPOSE:**
To synthesise research literature describing elements of community recreation and leisure activities that create meaningful participation experiences for children and youth with disabilities.
What kind of review? Review #1

**METHOD:** Database searches of Medline, Embase, PsycINFO, ERIC, SportDiscus, CINAHL, Scopus and Web of Science were conducted. Studies describing the experience of participating in a community-based programme or activity from the perspectives of children and youth with a disability aged 0-21 or their parents, and published in English were included. Meta-ethnography was used to synthesise qualitative data, and resulting themes were conceptualised in the International Classification of Functioning, Disability and Health-Child and Youth version. Consultation with stakeholders occurred throughout the review process.
The aim of this study was to examine how nurse-led interventions that support self-management of outpatients with chronic conditions work and in what contexts they work successfully.
What kind of review? Review #2

**Review Methods:** For each study, we described how the intervention was supposed to improve self-management and compared this with the empirical evidence. Next, we described the context-mechanism-outcome strings for each separate study, explored patterns and integrated the findings.
What approach would you propose to address the following:

The purpose of this review was to critically examine the construct of compassion fatigue and to determine if it is an accurate descriptor of work-related stress in healthcare providers and a valid target variable for intervention.
REVIEW METHODS: Seminal articles and theoretical and empirical studies on compassion fatigue in the healthcare literature were identified and appraised for their validity and relevance to our review. Sources were mapped according to the following criteria: 1) definitions; 2) conceptual analyses; 3) signs and symptoms; 4) measures; 5) prevalence and associated risk factors; and 6) interventions. A narrative account of included studies that critically examines the concept of compassion fatigue in healthcare was employed, and recommendations for practice, policy and further research were made.
Objective: To evaluate the effect of omega-3 nutritional supplementation on clinical outcomes of adult critically ill patients with sepsis or septic shock
We searched the Cochrane Library, MEDLINE, and EMBASE through December 2016 for RCTs on parenteral or enteral omega-3 supplementation in adult critically ill patients diagnosed with sepsis or septic shock. We analysed the included studies for mortality, intensive care unit (ICU) length of stay, and duration of mechanical ventilation, and used the Grading of Recommendations Assessment, Development and Evaluation approach to assess the quality of the evidence for each outcome.
Review #5

The objective of this review was to identify, synthesize, and report the findings of evaluated breech birth training strategies.
Review #5

METHODS: A systematic search of the following on-line databases: Medline, CINAHL Plus, PsychINFO, EBM Reviews/Cochrane Library, EMBASE, Maternity and Infant Care, and Pubmed, using a structured search strategy. Studies were included in the review if they evaluated the efficacy of a breech birth training program or particular strategies, including obstetric emergency training evaluations that reported differentiated outcomes for breech. Out of 1040 original citings, 303 full-text articles were assessed for eligibility, and 17 methodologically diverse studies met the inclusion criteria. A data collection form was used to extract relevant information. Data were synthesized, using an evaluation levels framework, including reaction, learning (subjective and objective assessment), and behavioral change.
Are some methods better than others?


Systematic Reviews

Pre-defined, explicit methods:

– Clearly formulated research question
– Comprehensive search to identify studies
– Selection criteria for inclusion
– Data collection & critical appraisal
– Synthesis & reporting

Minimize potential biases at each step
Advantages of Systematic Reviews

• Reduced likelihood of being misled
• Increased confidence about expected outcomes
• Decision-makers can focus on local applicability
• Allows stakeholders to constructively contest research evidence
Most Research Reviews

Pre-defined, explicit methods:
– Clearly formulated research question
– Comprehensive search to identify studies
– Selection criteria for *inclusion*
– Data collection & *critical appraisal*
– Synthesis & reporting

Minimize potential biases at each step – or discuss limitations and context in which conclusions apply
Where to find evidence syntheses?

Who has read a systematic review?
  – Where was it published?

Another type of research synthesis?
Publication
Where do systematic reviews get published?

General medical/health profession journals: *BMJ*, *CMAJ*, *Annals of Internal Medicine*, *Nursing Research*, etc.

Specialty topic journals: *Cancer*, *Circulation*, etc.

Cochrane Database of Systematic Reviews
Where to find systematic reviews, cont’d
Where to find systematic reviews, cont’d

Pubmed Clinical Queries

Results of searches on this page are limited to specific clinical research areas. For comprehensive searches, use Pubmed directly.

Search

Clinical Study Categories

Category: Therapy
Scope: Broad

Results: 5 of 24006
Cardiovascular Benefits of Exogenous Insulin.
Chaudhuri A, Dandona P, Fonseca V.

HDL and CETP Inhibition: Will This DEFINE the Future?
Davidson NH.

Hemostatic Effects of Metformin in Simvastatin-Treated Volunteers with Impaired Fasting Glucose.
Krysiak R, Okopien B.

Recent clinical studies of the effects of lipid-modifying therapies.

Systematic Reviews

Results: 5 of 1175

Internet based vascular risk factor management for patients with clinically manifest vascular disease: randomised controlled trial.

Helicobacter pylori infection contributes to high risk of ischemic stroke: evidence from a meta-analysis.

Medical Genetics

Topic: All

Results: 5 of 15097
Mice, men and the relatives: T-cell-innate immunity.
Bryant CE, Monie TP.

Impaired LDL Receptor-Related Protein 1 Correlates with Improved Dyslipidemia in apoE-Deficient Mice.
Gordts PL, Bartelt A, Nilsson SK, Anna-Helene Heeren J, Roebroeck AJ.

A Genome-Wide Association Study Identifies a Genetic Determinant of Plasma Lipid Levels: Partial Thromboplastin Time.
Quality Appraisal of Systematic Reviews

PRISMA 2009 Checklist

Systematic Review Appraisal Sheet

Choosing Evidence Worksheet

1. Summarizing the Evidence

Users' Guides to the Medical Literature

Are the results valid?

Did the review explicitly address a sensible clinical question?

Was the search for relevant studies detailed and exhaustive?

Logic quality?
Quality Appraisal of Systematic Reviews

- CEBM Systematic Review Appraisal Sheet
- CASP Systematic Review Checklist
- AMSTAR 2: A MeaSurement Tool to Assess systematic Reviews


Protocol: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3434042/
Reporting Guidelines

- PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses checklist
- Equator Network (Reporting and transparency)
Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents

Cochrane Database of Systematic Reviews
DOI: 10.1002/14651858.CD005506.pub5
Evidence Synthesis

1.8.1 Required IV rehydration

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Antiemetic Events</th>
<th>Placebo Events</th>
<th>Total</th>
<th>Weight</th>
<th>Risk Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freedman_2006</td>
<td>15</td>
<td>107</td>
<td>33</td>
<td>107</td>
<td>31.5% 0.45 [0.26, 0.79]</td>
</tr>
<tr>
<td>Gouin_2012</td>
<td>7</td>
<td>74</td>
<td>9</td>
<td>70</td>
<td>15.5% 0.74 [0.29, 1.87]</td>
</tr>
<tr>
<td>Qazi_2014</td>
<td>0</td>
<td>83</td>
<td>9</td>
<td>73</td>
<td>2.1% 0.05 [0.00, 0.78]</td>
</tr>
<tr>
<td>Ramsook_2002</td>
<td>7</td>
<td>62</td>
<td>23</td>
<td>51</td>
<td>21.0% 0.25 [0.12, 0.54]</td>
</tr>
<tr>
<td>Roslund_2008</td>
<td>11</td>
<td>51</td>
<td>30</td>
<td>55</td>
<td>29.8% 0.40 [0.22, 0.70]</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>377</strong></td>
<td><strong>356</strong></td>
<td><strong>100%</strong></td>
<td></td>
<td><strong>40% [0.26, 0.60]</strong></td>
</tr>
</tbody>
</table>

Total events: 40104

Heterogeneity: Tau² = 0.07; Chi² = 5.69, df = 4 (P = 0.22); I² = 30%
Test for overall effect: Z = 4.36 (P < 0.0001)

1.8.2 Required admission

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Antiemetic Events</th>
<th>Placebo Events</th>
<th>Total</th>
<th>Weight</th>
<th>Risk Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freedman_2006</td>
<td>4</td>
<td>107</td>
<td>5</td>
<td>107</td>
<td>16.6% 0.80 [0.22, 2.90]</td>
</tr>
<tr>
<td>Gouin_2012</td>
<td>1</td>
<td>74</td>
<td>1</td>
<td>70</td>
<td>4.8% 0.95 [0.06, 14.83]</td>
</tr>
<tr>
<td>Qazi_2014</td>
<td>1</td>
<td>82</td>
<td>0</td>
<td>83</td>
<td>3.6% 3.04 [0.13, 73.46]</td>
</tr>
<tr>
<td>Ramsook_2002</td>
<td>3</td>
<td>62</td>
<td>16</td>
<td>51</td>
<td>18.7% 0.15 [0.05, 0.50]</td>
</tr>
<tr>
<td>Stork_2006</td>
<td>2</td>
<td>46</td>
<td>9</td>
<td>44</td>
<td>13.6% 0.21 [0.05, 0.93]</td>
</tr>
<tr>
<td>Stork_2006</td>
<td>2</td>
<td>46</td>
<td>7</td>
<td>47</td>
<td>13.1% 0.29 [0.06, 1.33]</td>
</tr>
<tr>
<td>Uhlig_2009</td>
<td>10</td>
<td>117</td>
<td>13</td>
<td>107</td>
<td>29.6% 0.70 [0.32, 1.54]</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>534</strong></td>
<td><strong>509</strong></td>
<td><strong>100%</strong></td>
<td></td>
<td><strong>44% [0.23, 0.82]</strong></td>
</tr>
</tbody>
</table>

Total events: 2351

Heterogeneity: Tau² = 0.19; Chi² = 8.26, df = 6 (P = 0.22); I² = 27%
Test for overall effect: Z = 2.57 (P = 0.01)

1.8.3 Return to ED

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Antiemetic Events</th>
<th>Placebo Events</th>
<th>Total</th>
<th>Weight</th>
<th>Risk Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freedman_2006</td>
<td>20</td>
<td>105</td>
<td>22</td>
<td>101</td>
<td>23.0% 0.87 [0.51, 1.50]</td>
</tr>
<tr>
<td>Gouin_2012</td>
<td>11</td>
<td>74</td>
<td>18</td>
<td>70</td>
<td>20.7% 0.58 [0.29, 1.14]</td>
</tr>
<tr>
<td>Qazi_2014</td>
<td>14</td>
<td>58</td>
<td>5</td>
<td>64</td>
<td>16.1% 3.09 [1.19, 8.05]</td>
</tr>
<tr>
<td>Ramsook_2002</td>
<td>4</td>
<td>74</td>
<td>0</td>
<td>71</td>
<td>3.5% 8.64 [0.47, 157.62]</td>
</tr>
<tr>
<td>Reeves_2002</td>
<td>4</td>
<td>54</td>
<td>3</td>
<td>53</td>
<td>10.3% 1.31 [0.31, 5.57]</td>
</tr>
<tr>
<td>Roslund_2008</td>
<td>3</td>
<td>48</td>
<td>2</td>
<td>55</td>
<td>8.0% 1.72 [0.30, 9.86]</td>
</tr>
<tr>
<td>Stork_2006</td>
<td>8</td>
<td>27</td>
<td>1</td>
<td>21</td>
<td>6.5% 6.22 [0.84, 45.94]</td>
</tr>
<tr>
<td>Uhlig_2009</td>
<td>4</td>
<td>102</td>
<td>5</td>
<td>97</td>
<td>11.9% 0.76 [0.21, 2.75]</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>542</strong></td>
<td><strong>532</strong></td>
<td><strong>100%</strong></td>
<td></td>
<td><strong>1.31 [0.73, 2.35]</strong></td>
</tr>
</tbody>
</table>

Total events: 6856

Heterogeneity: Tau² = 0.31; Chi² = 14.44, df = 7 (P = 0.04); I² = 52%
Test for overall effect: Z = 0.91 (P = 0.36)

Test for subgroup differences: Chi² = 11.50, df = 2 (P = 0.003), I² = 82.6%
Exploring heterogeneity
From CEBM Systematic Review Appraisal Sheet

Heterogeneity can be assessed using the “eyeball” test or more formally with statistical tests, such as the Cochran Q test. With the “eyeball” test one looks for overlap of the confidence intervals of the trials with the summary estimate. In the example above note that the dotted line running vertically through the combined odds ratio crosses the horizontal lines of all the individual studies indicating that the studies are homogenous. Heterogeneity can also be assessed using the Cochran chi-square (Cochran Q). If Cochran Q is statistically significant there is definite heterogeneity. If Cochran Q is not statistically significant but the ratio of Cochran Q and the degrees of freedom (Q/df) is > 1 there is possible heterogeneity. If Cochran Q is not statistically significant and Q/df is < 1 then heterogeneity is very unlikely. In the example above Q/df is <1 (0.92/4= 0.23) and the p-value is not significant (0.92) indicating no heterogeneity.

Note: The level of significance for Cochran Q is often set at 0.1 due to the low power of the test to detect heterogeneity.
Steps to a systematic review:

a) Developing the protocol
b) Defining the review question
c) Literature searching
d) Study selection
e) Risk of bias assessment
f) Data collection
g) Analysis & Reporting
Why would YOU conduct an evidence synthesis?

Justification for research project (often prerequisite to grant proposal)

Project for a research block or thesis
  – Good chance of publication

Your supervisor tells you to do one!
Conducting a research synthesis will also...

Give you an excellent grasp of the state of research on a topic of interest to you

- Helps identify gaps in the existing research
- Highlights best practices

Increases your understanding of how research is conducted and reported

- The critical appraisal and assessment of bias (if applicable, or critical reading) will increase your ability to conduct rigorous, well-reported research
Many meta-analysis studies include the phrase “we searched Medline, Embase, and Cochrane for studies...”

This has led to meta-meta-analyses comparing meta-analysis methods.


We performed a meta-meta-meta-analysis of these meta-meta-analyses.

Methods: we searched Medline, Embase, and Cochrane for the phrase “we searched Medline, Embase, and Cochrane for the phrase "we searched Medline Embase and

Life goal #28: get a paper rejected with the comment "too meta"
Important resource for conducting a SR

http://dal.ca.libguides.com/systematicreviews

May 22, 2019 – Robin Parker
Evidence Synthesis
Instructional resources for conducting systematic reviews:

**Cochrane Training** Learn how to conduct, edit, and read systematic reviews from various training resources. Some restricted to Cochrane Authors.

**Joanna Briggs Institute** Includes information on short courses, online courses. Fees apply.

**John Hopkins MOOC** Free MOOC offered with flexible deadlines and start times.
Steps to a systematic review:

a) **Developing the protocol**
   - b) Defining the review question **Done**
   - c) Literature searching
   - d) Study selection
   - e) Risk of bias assessment
   - f) Data collection
   - g) Analysis & Reporting **Planned**
Prospective Register of Systematic Reviews: PROSPERO

http://www.crd.york.ac.uk/PROSPERO/
Example Timeline - Systematic Review

- **Protocol**: 3-6 months
- **Search**: 1-2 months
- **Study Selection**: 2-3 months
- **Risk of bias assessment**: 3-4 months
- **Data extraction**: 1-2 months
- **Analysis and reporting**: 2-3 months

Total duration: 1-2 years
Questions?

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Thank you!