Intro to Systematic Reviews

• Characteristics
• Role in research & EBP
• Overview of steps
• Standards
Dr. Ben Goldacre, award-winning *Bad Science* columnist and medical doctor, forward in *Testing Treatments*

“The notion of systematic review – looking at the totality of evidence – is quietly one of the most important innovations in medicine over the past 30 years.”
Narrative Reviews

**Narrative reviews**: aim to summarize the critical points of current knowledge of a particular topic. Also called literature reviews

Lit review can be written as
- As introduction to a study to:
  - Demonstrate how a study fills a gap in research
  - Compare a study with other research
- As a separate work to provide:
  - Organize/describe a topic
  - Describe variables influencing a particular issue/problem
Systematic review: a research method that aims to answer question(s) by analyzing studies meeting a specified criteria\(^1\)

- **Define**
  - Transparent: record & report all methods

- **Search**
  - Follow standards and evidence based practices

- **Select**
  - Minimize bias

- **Code**

- **Synthesize**

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\(^1\) Medical Research Library of Brooklyn. Evidence Based Medicine tutorial. Accessed 2/27/07

From: http://library.downstate.edu/ebm/2700.htm
Meta-analysis: a statistical method which combines data from studies\(^2\)

* Usually starts with a systematic review
* Run tests to determine if study data can be combined
* Combine study data into 1 study

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Comparing review types

**Narrative Reviews**
- Depend on authors’ inclination (bias)
- Author selects any criteria
- Search any databases
- Methods not usually specified
- Can’t replicate review

**Systematic Reviews**
- Scientific approach to a review article
- Criteria determined at outset
- Comprehensive search for relevant articles
- Explicit methods of appraisal and synthesis

Subjective → Systematic Review → Meta analysis → Objective
Example: narrative review


Diabetes and depression: a combination of civilization and life-style diseases is more than simple problem adding - literature review.

Dziemidok P, Makara-Studzińska M, Jarosz NJ.
Institute of Public Health, Pope John Paul II State School of Higher Education, Biała Podlaska, Poland. piotr.dziemidok@op.pl

Abstract
The article presents a review of current medical and psychological literature published between 2000 - 2010, with the use of the PubMed database, concerning the occurrence of anxiety and depression in diabetic patients, with particular consideration of those affected by complications. Anxiety and fear are the most frequent emotional disorders among diabetic patients. Depression occurs in approximately 30% of patients with diabetes. Both diabetes and depression belong to so called 'life style' or 'civilization diseases'. Numerous studies have confirmed that the course of depression in patients with diabetes is more severe, and the relapses of depression episodes are more frequent. The studies show that diabetic patients experience various types of psychosocial and emotional problems due to which the monitoring of own state of health is not the priority in life. In the process of treatment of both sole diabetes and concomitant anxiety and depression it is important to adjust and motivate patients to apply widely understood therapeutic recommendations. The treatment of depression syndrome in the course of diabetes does not have to lead to improvement in glycaemic control. The following factors influencing the therapeutic effect should be mentioned: duration of diabetes, presence of complications, and the effect of the drugs applied on body weight, or possibly initial diabetes management. It seems, therefore, that the patient education model based on the provision of knowledge concerning diabetes and its complications, methods of treatment, principles of nutrition and health-promoting life style, may be insufficient, at least for patients with depression. The results of a review of reports shows that an optimum treatment of diabetes, in accordance with the current state of knowledge, requires from physicians a special consideration of psychological and psychiatric knowledge for the 2 following reasons. 1) effectiveness of therapy to a high degree depends on the proper behaviour of a patient, 2) considerably more frequent, compared to the total population, occurrence of the symptoms of emotional disorders negatively affect the course of diabetes.

PMID: 22216806 [PubMed - indexed for MEDLINE]  Free full text
Example: Systematic Review

In search of quality evidence for lifestyle management and glycemic control in children and adolescents with type 2 diabetes: A systematic review.

Johnson ST, Newton AS, Chopra M, Buckingham J, Huang TT, Franks PW, Jetta NM, Ball GD.
Centre for Nursing & Health Studies, University Drive Athabasca University, AB, Canada.

Abstract

BACKGROUND: Our purpose was to evaluate the impact of lifestyle behavior modification on glycemic control among children and youth with clinically defined Type 2 Diabetes (T2D).

METHODS: We conducted a systematic review of studies (randomized trials, quasi-experimental studies) evaluating lifestyle (diet and/or physical activity) modification and glycemic control (HbA1c). Our data sources included bibliographic databases (EMBASE, CINAHL®, Cochrane Library, Medline®, PASCAL, PsycINFO®, and Sociological Abstracts), manual reference search, and contact with study authors. Two reviewers independently selected studies that included any intervention targeting diet and/or physical activity alone or in combination as a means to reduce HbA1c in children and youth under the age of 18 with T2D.

RESULTS: Our search strategy generated 4,572 citations. The majority of citations were not relevant to the study objective. One study met inclusion criteria. In this retrospective study, morbidly obese youth with T2D were treated with a very low carbohydrate diet. This single study received a quality index score of < 11, indicating poor study quality and thus limiting confidence in the study's conclusions.

CONCLUSIONS: There is no high quality evidence to suggest lifestyle modification improves either short- or long-term glycemic control in children and youth with T2D. Additional research is clearly warranted to define optimal lifestyle behaviour strategies for young people with T2D.
Example: Meta-analysis

Many meta-analysis contain a Forest plot displays relative strength of treatment effects of various studies.
Myths

“Systematic Reviews...
* are same as ordinary reviews only bigger
* include only randomized controlled trials
* are substitute for conducting good quality individual studies
* involve statistical synthesis
* must be done by experts
* can be done without help of experienced librarians
* have no relevance in real world”

Why do we need reviews?

* Too much literature for one individual
* Hidden biases of studies
* Any individual study may be fallible
* Any individual study may have limited relevance
* Identify gaps in current research
* Provide organized evidence for decision making
* Help in planning new interventions

Undertaking new primary studies without clear understanding of previous research may result in:
  - Unnecessary
  - Inappropriate
  - Irrelevant
  - Unethical research

Gough, D., Oliver, S., and Thomas, J. An introduction to systematic reviews. (2012) Los Angeles, SAGE.
Limitations

* Results may be inconclusive
* There may be no trials/evidence
* Existing trials may be of poor quality
* Practice does not change just because there is evidence of effect/effectiveness

Many studies have shown that banning smoking helps to reduce harmful effects of first, second, and tertiary smoke. However, policies are slow to be implemented.

1 Medical Research Library of Brooklyn. Evidence Based Medicine tutorial. Accessed 2/27/07
   From: http://library.downstate.edu/ebm/2700.htm
Evidence Based Medicine

- “use of current best evidence in making decisions about the care of the individual patient.”
- “integrating individual clinical expertise with the best available external clinical evidence from systematic research”

http://www.bmj.com/cgi/content/full/312/7023/71
Secondary studies

By study collection:
* **Objectively**: systematic reviews, meta analyses, evidence based guidelines
* **Subjectively**: Narrative reviews, consensus guidelines

By type of evidence synthesized: experimental, observational, descriptive, mixed

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How many health sciences related systematic reviews were written in 2013?

a) 5,000  
b) 7,000  
c) 10,000  
d) 16,000
Increase in publication

Number of systematic reviews/meta analysis in Scopus 1995-2013
Systematic review organizations

* What?
  • Organizations that write and distribute reviews

* Who?
  • Non-profit and private groups
  • International, national

* How?
  • Volunteer
  • Appointed by government
  • hired

* Why?
Cochrane Collaboration

* **Description:** International and non-profit organization that prepares, maintains, and disseminates systematic reviews

* **Databases:** Cochrane Library includes Cochrane Reviews, Other Reviews, Trials, Methods Studies, Technology Assessments, Economic Evaluations

* **Site:** http://www.cochrane.org/

Photo: Cardiff University Library, Cochrane Archive, University Hospital Llandough
* **Sponsor:** National Institute for Health Research (NIHR), a department of the University of York
* **Focus:** varies
* **Databases:** DARE, NHS EED, HTA
* **Site:** [www.york.ac.uk/inst/crd/](http://www.york.ac.uk/inst/crd/)
* **Sponsor:** CDC
* **Focus:** Reviews of community interventions
* **Note:** provides guide to systematic review methods
* **Site:** www.thecommunityguide.org
Overview of steps

For each step there are different documentation needs.
I use a spreadsheet to record methods and results (RIGOR).

1 Define
2 Search
3 Select
4 Expand search
5 Assess & Code
6 Synthesize & write
Records retrieved from database searching (n=3000) → Total retrieved records (n=4500) → Records screened by title (n=3500) → Records excluded (n=2500)

Records retrieved from additional sources (n=1500) → Duplicates removed (n=2000) → Records excluded (n=700)

300 wrong population
400 wrong intervention

Records screened by abstract (n=1000) → Records excluded (n=300)

100 wrong population
100 wrong intervention
50 wrong education issue

Records screened by full text (n=300) → Records excluded (n=250)

12 wrong outcome
13 lack of follow up

Records included in qualitative synthesis (n=500) → Records excluded (n=25)

100 wrong population
100 wrong intervention
50 wrong education issue

Records included in quantitative synthesis (n=25)

See full PRISMA statement at http://www.prisma-statement.org
Institute of Medicine of the National Academies (2011) has two standards specifically referring to librarians:

* **3.1.1** Work with a librarian or other information specialist trained in performing systematic reviews to plan the search strategy

* **3.1.3** Use an independent librarian or other information specialist to peer review the search strategy

**27 items in the PRISMA check list...**

* 7. “information sources,” “describe all information sources...in the search and date last searched.”

* 8. “Search,” “present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.”
Information roles

- Project leader
- Project manager
- Literature searcher
- Reference manager
- Document supplier
- Critical appraiser
- Data extractor
- Data synthesizer
- Report writer
- Disseminator