

Unit One: Background to Systematic Reviews

Learning Objectives

- To understand the terms 'systematic review' and 'meta-analysis'
- To be familiar with different types of reviews (advantages/disadvantages)
- To understand the complexities of reviews of health promotion and public health interventions

Types of reviews

Generally, reviews may be grouped into the following two categories (see Table One):

- 1) Traditional literature reviews/narrative reviews
- 2) Systematic reviews (with or without) meta-analysis

Narrative or traditional literature review

The authors of these reviews, who may be 'experts' in the field, use informal, unsystematic and subjective methods to collect and interpret information, which is often summarised subjectively and narratively.² Processes such as searching, quality appraisal and data synthesis are not usually described and as such, they are very prone to bias. Although an advantage of these reviews is that they are often conducted by 'experts' who may have a thorough knowledge of the research field, but they are disadvantaged in that the authors may have preconceived notions or biases and may overestimate the value of some studies.³

Note: A narrative review is not to be confused with a narrative systematic review – the latter refers to the type of synthesis of studies (see Unit Nine).

Systematic review

Many of the tools of systematic research synthesis were developed by American social scientists in the 1960s.⁴ However, today's systematic evidence reviews are very much driven by the evidence-based medicine movement, in particular, from the methods developed by the Cochrane Collaboration. A systematic review is defined as "a review of the evidence on a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant primary research, and to extract and analyse data from the studies that are included in the review."¹

What is a meta-analysis?

"A meta-analysis is the statistical combination of at least 2 studies to produce a single estimate of the effect of the health care intervention under consideration."² Note: a meta-analysis is simply the statistical combination of results from studies – the final estimate of effect may not always be the result of a systematic review of the literature. Therefore, it should not be considered as a type of review.

Table One. Comparing different types of reviews

Review	Characteristics	Uses	Limitations
Traditional literature review / narrative review	Describes and appraises previous work but does not describe specific methods by which the reviewed studies were identified, selected and evaluated	<p>Overviews, discussions, critiques of previous work and the current gaps in knowledge</p> <p>Often used as rationale for new research</p> <p>To scope the types of interventions available to include in a review</p>	<p>The writers assumptions and agenda often unknown</p> <p>Biases that occur in selecting and assessing the literature are unknown</p> <p>Cannot be replicated</p>
Systematic review	<p>The scope of the review is identified in advance (eg review question and sub-questions and/or sub-group analyses to be undertaken)</p> <p>Comprehensive search to find all relevant studies</p> <p>Use of explicit criteria to include / exclude studies</p> <p>Application of established standards to critically appraise study quality</p> <p>Explicit methods of extracting and synthesising study findings</p>	<p>Identifies, appraises and synthesises <i>all</i> available research that is relevant to a particular review question</p> <p>Collates all that is known on a given topic and identifies the basis of that knowledge</p> <p>Comprehensive report using explicit processes so that rationale, assumptions and methods are open to scrutiny by external parties</p> <p>Can be replicated / updated</p>	<p>Systematic reviews with narrowly defined review questions provide specific answers to specific questions</p> <p>Alternative questions that have not been answered usually need to be reconstructed by the reader</p>

Advantages of systematic reviews

- Reduces bias
- Replicable
- Resolves controversy between conflicting findings
- Provides reliable basis for decision making

Reviews of clinical interventions vs. reviews of public health interventions

Some of the key challenges presented by the health promotion and public health field are a focus or emphasis on;

- populations and communities rather than individuals;
- combinations of strategies rather than single interventions;
- processes as well as outcomes;
- involvement of community members in program design and evaluation;
- health promotion theories and beliefs;
- the use of qualitative as well as quantitative approaches to research and evaluation;
- the complexity and long-term nature of health promotion intervention outcomes.⁵

REFERENCES

1. Undertaking Systematic Reviews of Research on Effectiveness. CRD's Guidance for those Carrying Out or Commissioning Reviews. CRD Report Number 4 (2nd Edition). NHS Centre for Reviews and Dissemination, University of York. March 2001.
2. Klassen TP, Jadad AR, Moher D. Guides for Reading and Interpreting Systematic Reviews. 1. Getting Started. Arch Pediatr Adolesc Med 1998;152:700-704
3. Hedin A, and Kallestal C. Knowledge-based public health work. Part 2: Handbook for compilation of reviews on interventions in the field of public health. National Institute of Public Health. 2004. http://www.fhi.se/shop/material_pdf/r200410Knowledgebased2.pdf
4. Chalmers I, Hedges LV, Cooper H. A brief history of research synthesis. Eval Health Prof 2002;25:12-37.
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ADDITIONAL READING

Mulrow CD. Systematic reviews: Rationale for systematic reviews. BMJ 1994;309:597-599.

McQueen D. The evidence debate. J Epidemiol Community Health 2002;56:83-84.

Petticrew M. Why certain systematic reviews reach uncertain conclusions. BMJ 2003;326:756-8.

Petticrew M. Systematic reviews from astronomy to zoology: myths and misconceptions. BMJ 2001;322:98-101.

Grimshaw JM, Freemantle N, Langhorne P, Song F. Complexity and systematic reviews: report to the US Congress Office of Technology Assessment. Washington, DC: Office of Technology Assessment, 1995.

Rychetnik L, Hawe P, Waters E, Barratt A, Frommer M. A glossary for evidence based public health. J Epidemiol Community Health 2004;58:538-45.

EXERCISE

1. In pairs, discuss some of the differences (**using examples**) between reviews of clinical/medical/pharmaceutical interventions *vs.* reviews of health promotion or public health interventions.

Examples

Clinical
E.g. effectiveness of antibiotics for sore throat

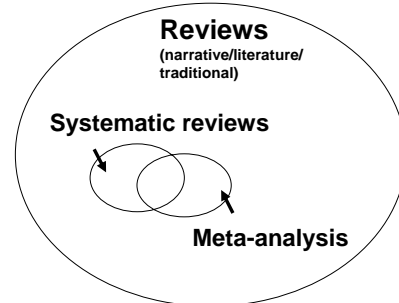
Health promotion/public health
E.g. effectiveness of mass media interventions for preventing smoking in young people

Clinical/medical/pharmaceutical	Health promotion/public health
Study participants:	
Types of interventions:	
Types of outcomes (process, proxy outcomes, intermediate and/or long-term):	
Participants involved in design of intervention:	
Potential influences on intervention success/failure (consider external environment (social, political, cultural) and internal factors (training of those implementing intervention, literacy of population, access to services, etc))	

Background to systematic reviews



Types of reviews



EBPH

Narrative reviews

- Usually written by experts in the field
- Use informal and subjective methods to collect and interpret information
- Usually narrative summaries of the evidence

Read: Klassen et al. Guides for Reading and Interpreting Systematic Reviews. Arch Pediatr Adolesc Med 1998;152:700-704.

EBPH

What is a systematic review?

- A review of the evidence on a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant primary research, and to extract and analyse data from the studies that are included in the review*

*Undertaking Systematic Reviews of Research on Effectiveness. CRD's Guidance for those Carrying Out or Commissioning Reviews. CRD Report Number 4 (2nd Edition). NHS Centre for Reviews and Dissemination, University of York. March 2001.

EBPH

High quality

Structured, systematic process involving several steps :

1. Plan the review
2. Formulate the question
3. Comprehensive search
4. Unbiased selection and abstraction process
5. Critical appraisal of data
6. Synthesis of data (may include meta-analysis)
7. Interpretation of results

All steps described explicitly in the review

EBPH

Systematic vs. Narrative reviews

- | | |
|--|---|
| <ul style="list-style-type: none"> ■ Scientific approach to a review article ■ Criteria determined at outset ■ Comprehensive search for relevant articles ■ Explicit methods of appraisal and synthesis ■ Meta-analysis may be used to combine data | <ul style="list-style-type: none"> ■ Depend on authors' inclination (bias) ■ Author gets to pick any criteria ■ Search any databases ■ Methods not usually specified ■ Vote count or narrative summary ■ Can't replicate review |
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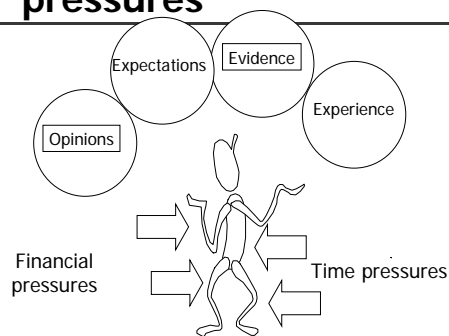
EBPH Advantages of systematic reviews

- Reduce bias
- Replicability
- Resolve controversy between conflicting studies
- Identify gaps in current research
- Provide reliable **basis** for decision making

EBPH Increased interest in systematic reviews

- Government interest in health costs
- Variations in practice
- Public want information
- Facilitated by computer developments

EBPH Competing factors and pressures



EBPH Who benefits?

Practitioners	- current knowledge to assist with decision making
Researchers	- reduced duplication - identify research gaps
Community	- recipients of evidence-based interventions
Funders	- identify research gaps/priorities
Policy makers	- current knowledge to assist with policy formulation

EBPH Limitations

- Results may still be inconclusive
- There may be no trials/evidence
- The trials may be of poor quality
- The intervention may be too complex to be tested by a trial
- Practice does not change just because you have the evidence of effect/effectiveness

EBPH Clinical vs. public health interventions

Clinical	Public health
<ul style="list-style-type: none"> ■ Individuals ■ Single interventions ■ Outcomes only (generally) ■ Often limited consumer input ■ Quantitative approaches to research and evaluation 	<ul style="list-style-type: none"> ■ Populations and communities ■ Combinations of strategies ■ Processes as well as outcomes ■ Involve community members in design and evaluation ■ Qualitative and quantitative ■ Health promotion theories and beliefs