



How to conduct Systematic Reviews

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What is a "Systematic Review" (SR)?

A: I have no clue

B: Vaguely aware what SRs are

C: Is familiar with identifying SRs

D: I have authored an SR myself

E: Don't know what SRs are and
couldn't care less



Definition of Evidence-Based Dentistry



“...an approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to the patient's oral and medical condition and history, with the dentist's clinical expertise and the patient's treatment needs and preferences.”



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Systematic Reviews

Systematic reviews are designed to minimize bias inherent in traditional literature reviews

- incomplete identification of studies
 - *thorough search*
- subjective include/exclude decisions
 - *formal inclusion criteria*
- no / non-objective assessment of study strength
 - *quality criteria*
- subjective synthesis of individual studies
 - *meta-analysis*



Steps in a Systematic Review

1. Formulate key clinical question
2. State inclusion & exclusion criteria
3. Develop search strategy
4. Search and select studies
5. Extract data
6. Analyze and present results
7. Interpret the review results



Steps in a Systematic Review

Step 1: Key Clinical Question

- Population or patient type
persons for whom an answer is sought
- Intervention or exposure
treatment or clinical condition of interest
- Comparison
alternative treatment or control condition
- Outcome
measure(s) used to assess effects



Steps in a Systematic Review

Step 1: Key Clinical Question

- **P**opulation or patient type
persons for whom an answer is sought
- **I**ntervention or exposure
treatment of clinical condition of interest
- **C**omparison
alternative treatment or control
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Steps in a Systematic Review

Step 1: Key Clinical Question

“What is the effectiveness of semiannual fluoride varnish compared to semiannual fluoride gel treatment in preventing dental caries in permanent teeth among caries-active adults?”



Steps in a Systematic Review

Step 1: Key Clinical Question

“What is the effectiveness of semiannual fluoride varnish compared to semiannual fluoride gel treatment in preventing dental caries in permanent teeth among **caries-active adults?**”

Population

A white arrow originates from the word "Population" and points diagonally upwards and to the right, ending at the phrase "caries-active adults" in the clinical question above.



Steps in a Systematic Review

Step 1: Key Clinical Question

“What is the effectiveness of **semiannual fluoride varnish** compared to semiannual fluoride gel treatment in preventing dental caries in permanent teeth among caries-active adults?”

Intervention



Steps in a Systematic Review

Step 1: Key Clinical Question

“What is the effectiveness of semiannual fluoride varnish compared to **semiannual fluoride gel treatment** in preventing dental caries in permanent teeth among caries-active adults?”

Comparison



Steps in a Systematic Review

Step 1: Key Clinical Question

“What is the effectiveness of semiannual fluoride varnish compared to semiannual fluoride gel treatment in **preventing dental caries in permanent teeth** among caries-active adults?”

Outcome



Steps in a Systematic Review

Example

“In patients requiring single tooth replacement, what are the outcomes of implant as compared with tooth supported restorations?”



Steps in a Systematic Review

Example #1

“In patients requiring single tooth replacement, what are the outcomes of implant as compared with tooth supported restorations?”

Population



Steps in a Systematic Review

Example #1

“In patients requiring single tooth replacement, what are the outcomes of **implant** as compared with tooth supported restorations?”

Intervention

A white arrow points from the word "Intervention" to the word "implant" in the question above.



Steps in a Systematic Review

Example #1

“In patients requiring single tooth replacement, what are the outcomes of implant as compared with **tooth supported restorations**?”

Comparison





Steps in a Systematic Review

Example #1

“In patients requiring single tooth replacement, what are **the outcomes** of implant as compared with tooth supported restorations?”

Outcome





Steps in a Systematic Review

Example #2

“How do smoking, diabetes, adverse loading, and periodontal disease affect outcomes?”



Steps in a Systematic Review

Example #2

“How do smoking, diabetes, adverse loading, and periodontal disease affect outcomes?”

Population?



Steps in a Systematic Review

Example #2

“How do smoking, diabetes, adverse loading, and periodontal disease affect outcomes?”

Intervention?



Steps in a Systematic Review

Example #2

“How do **smoking, diabetes, adverse loading, and periodontal disease** affect outcomes?”

Clinical conditions



Steps in a Systematic Review

Example #2

“How do smoking, diabetes, adverse loading, and periodontal disease affect outcomes?”

Comparison?



Steps in a Systematic Review

Example #2

“How do smoking, diabetes, adverse loading, and periodontal disease affect **outcomes**?”



Outcome



Steps in a Systematic Review

Step 2: Inclusion and Exclusion Criteria

- key question PICO elements
- details of population / subject eligibility
- details of treatment procedures
- details of evaluation procedures
- language
- publication dates
- study design*



Steps in a Systematic Review

Step 2: Inclusion and Exclusion Criteria

study design---where to draw the line?

1. randomized controlled trials (**RCTs**)
2. observational studies
 - Prospective Cohort**
 - Case-Control**
 - Retrospective Cohort**
 - Case**
3. expert opinion



Steps in a Systematic Review

Step 3: Search Strategy

- electronic indices* -- *MEDLINE, EMBASE*
- Cochrane library
- hand searching -- *current & non-indexed journals*
- reference listings
- gray literature -- *theses, dissertations, conference reports, abstracts, unpublished studies*



Steps in a Systematic Review

Step 3: Search Strategy

selecting search terms for electronic indices

Ideal: *A and B and C and D*

Actual: *A or B or C or D*

Searches are always sensitive but often not specific



Steps in a Systematic Review

Step 4: Select Studies from Search Results

- application of inclusion & exclusion criteria
- two reviewers independently
- rules for resolving disagreements
- two stages--title/abstract, full paper
- log of reasons for exclusion



Steps in a Systematic Review

Step 5: Extract Data

- evidence table--detailed information about
 - research design*
 - subjects*
 - methods*
 - results*
- abstraction form
- two abstractors independently
- rules for resolving disagreements



Steps in a Systematic Review

Step 6: Analyze and Present Results

- evidence table(s)
- qualitative summary
 - designs*
 - outcomes*
- quantitative summary
 - methodologic quality**
 - heterogeneity*
 - meta-analysis*
 - meta-regression*
 - sensitivity analysis*



Steps in a Systematic Review

Step 6: Analyze and Present Results

methodologic quality--key elements for RCTs

- randomization
- blinding
- statistical analysis
- funding/sponsorship
- population (specificity)
- intervention (specificity)
- outcomes (specificity)



Steps in a Systematic Review

Step 7: Interpretation

- limitations of the review
- implications for needed research
- implications for the clinician
- strength of the evidence*



Steps in a Systematic Review

Step 7: Interpretation

strength of the evidence

1. Quantity
 - n of studies*
 - sample size*
2. Quality
3. Consistency

