

Evidence-based Dentistry

Collecting the right evidence

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Consultant in Dental Public Health, South East Scotland

Programme

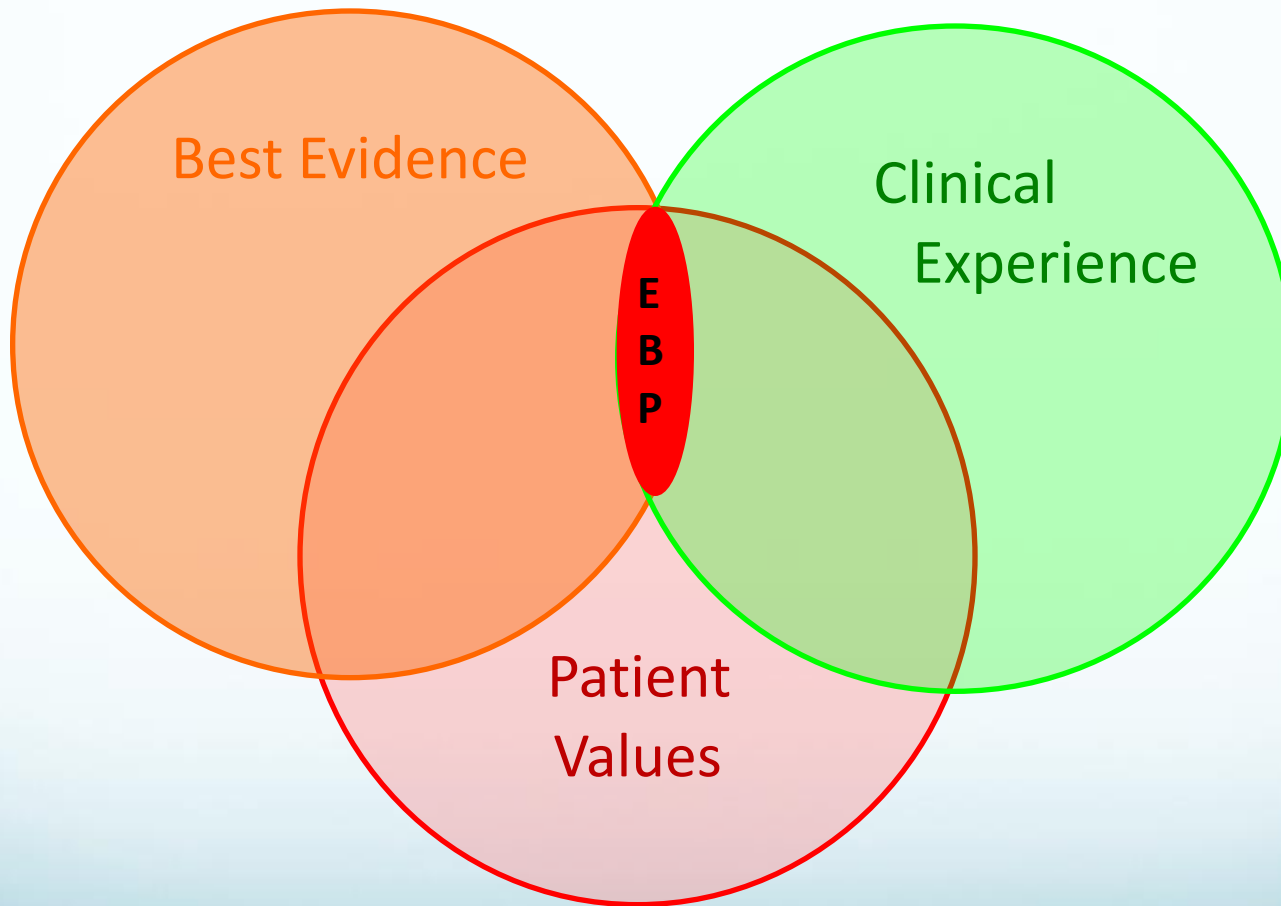
- Introduction
- Question formulation
- Levels of Evidence
- Sources of Evidence
- Pros & Cons of key evidence resources
- How good is the evidence
- Closing discussions and questions

Evidence-based Dentistry

ADA Definition:

- EBD is 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**

Evidence-based Practice



Why?

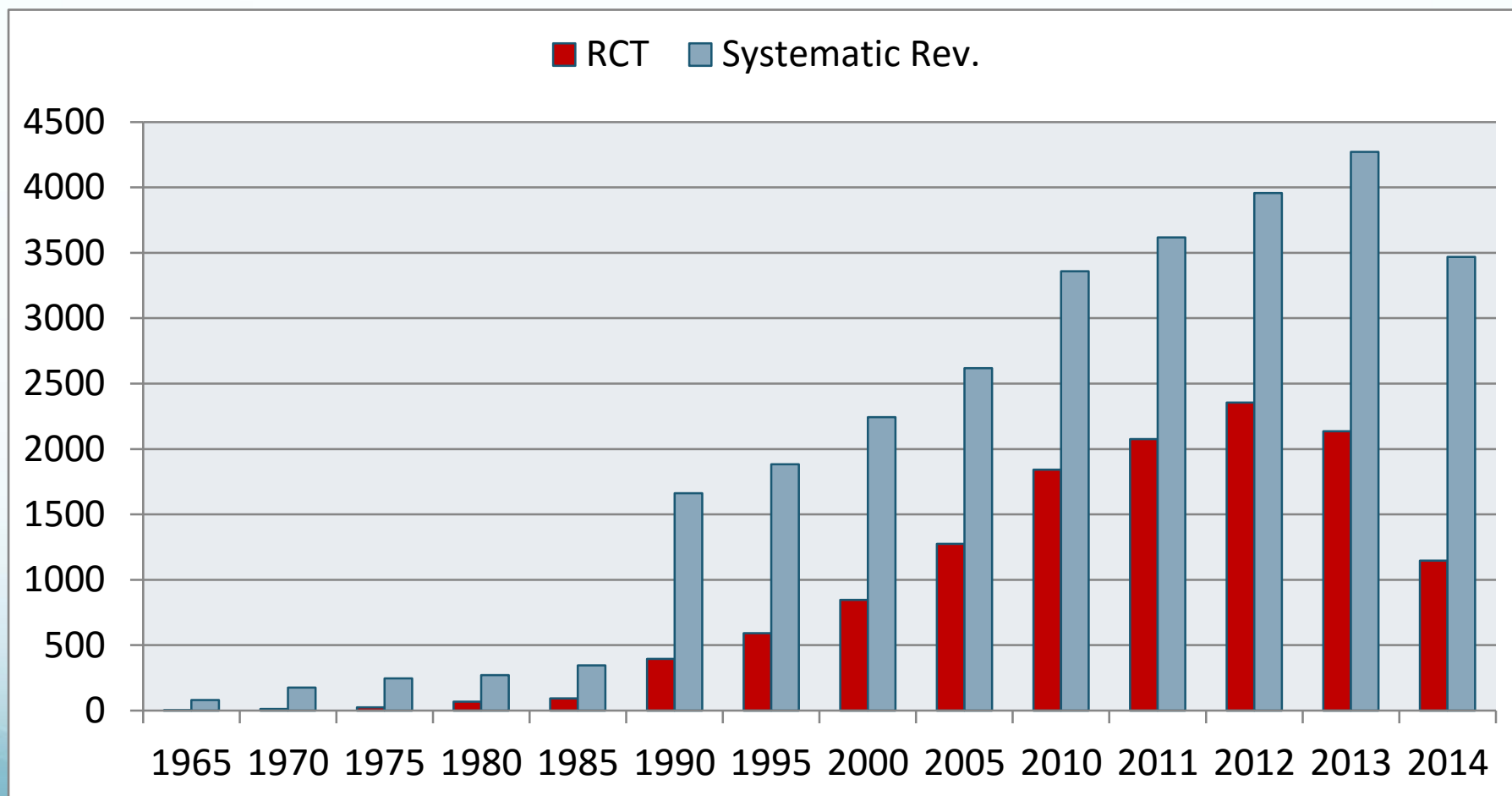
- Not a new idea
- Information overload
- Focus on quality and consistency
- Avoid unnecessary treatment
- Questioning attitude to traditional beliefs
- Lifelong learning
- Patient empowerment
- Resources finite

Information overload

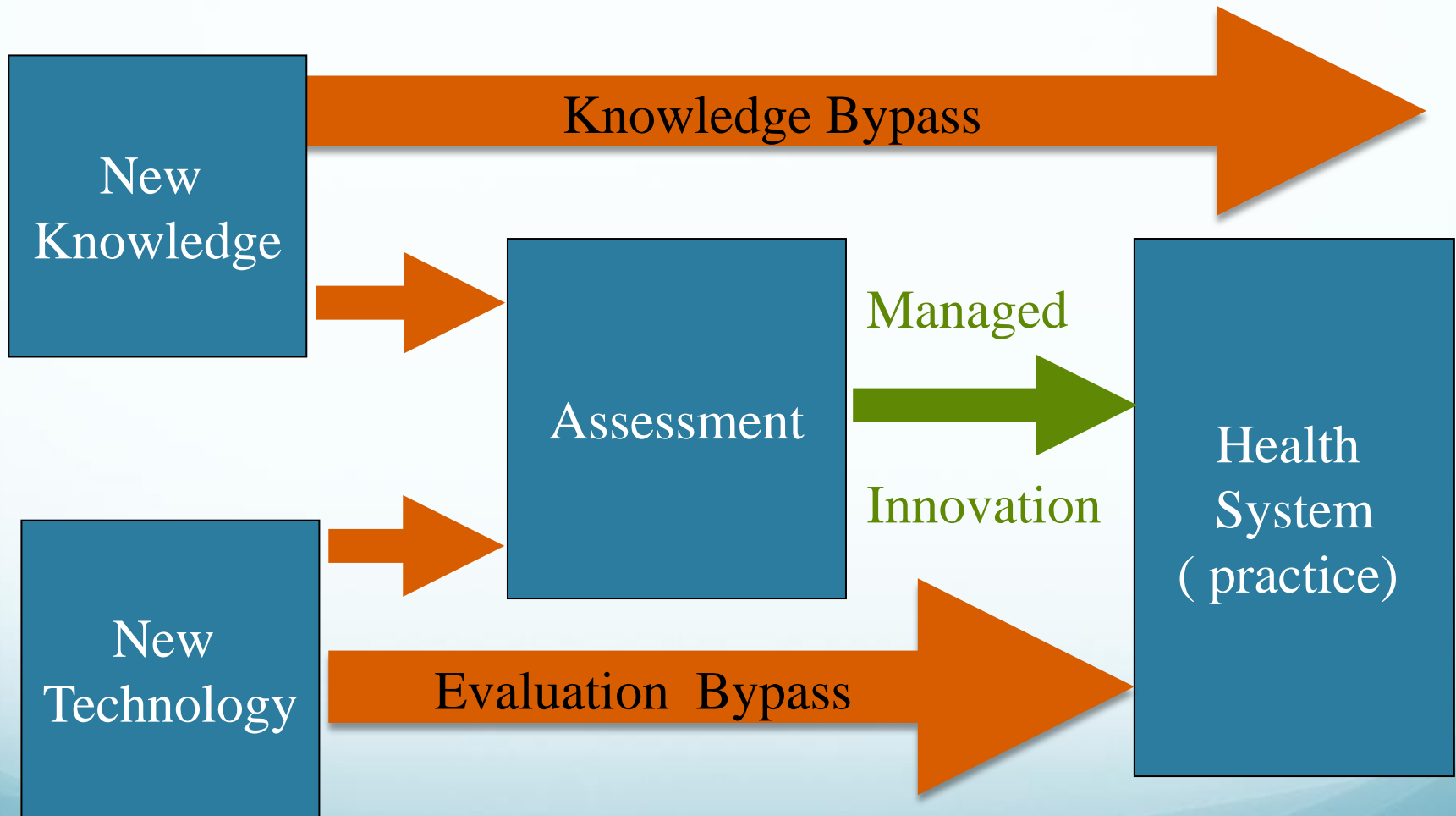
Search using term 'dental'

- Google - > 356 million hits
- Pubmed (Medline) - 458,163
- Cochrane library - 15567
 - Reviews - 179
 - DARE - 559
 - Central - 16412
 - HTA - 96
 - NHSEED - 102

Increase in dental trials and reviews 1965- 2014

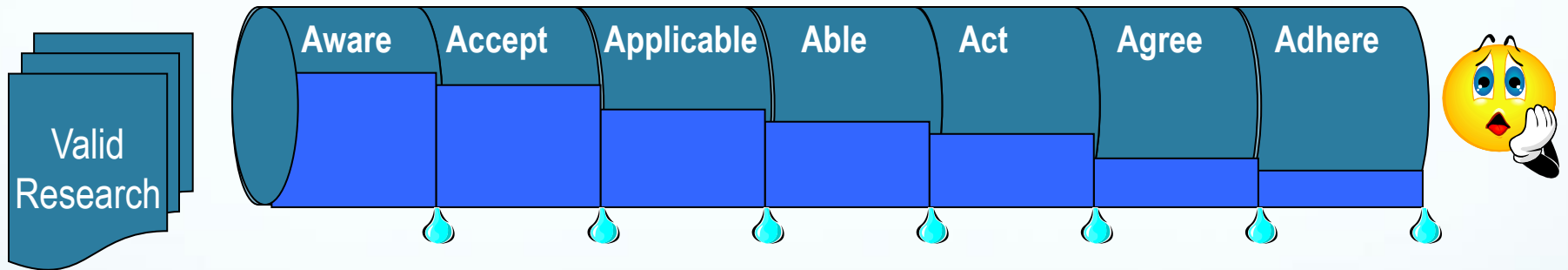


Innovation Bypass



“Leaks” between research & practice

The Evidence Pipeline



$$0.8 \times 0.8 \times 0.8 \times 0.8 \times 0.8 \times 0.8 \times 0.8 = 0.21$$

Evidence-based Practice

An integrated system for aggregating, distilling, and delivering the best clinical evidence:

1. Asking answerable questions (Asking)
2. Searching for the best evidence (Acquiring)
3. Critically appraising the evidence (Appraising)
4. Applying the evidence (Applying)
5. Evaluating the outcome (Assessing)

The 5 As

Question Formulation

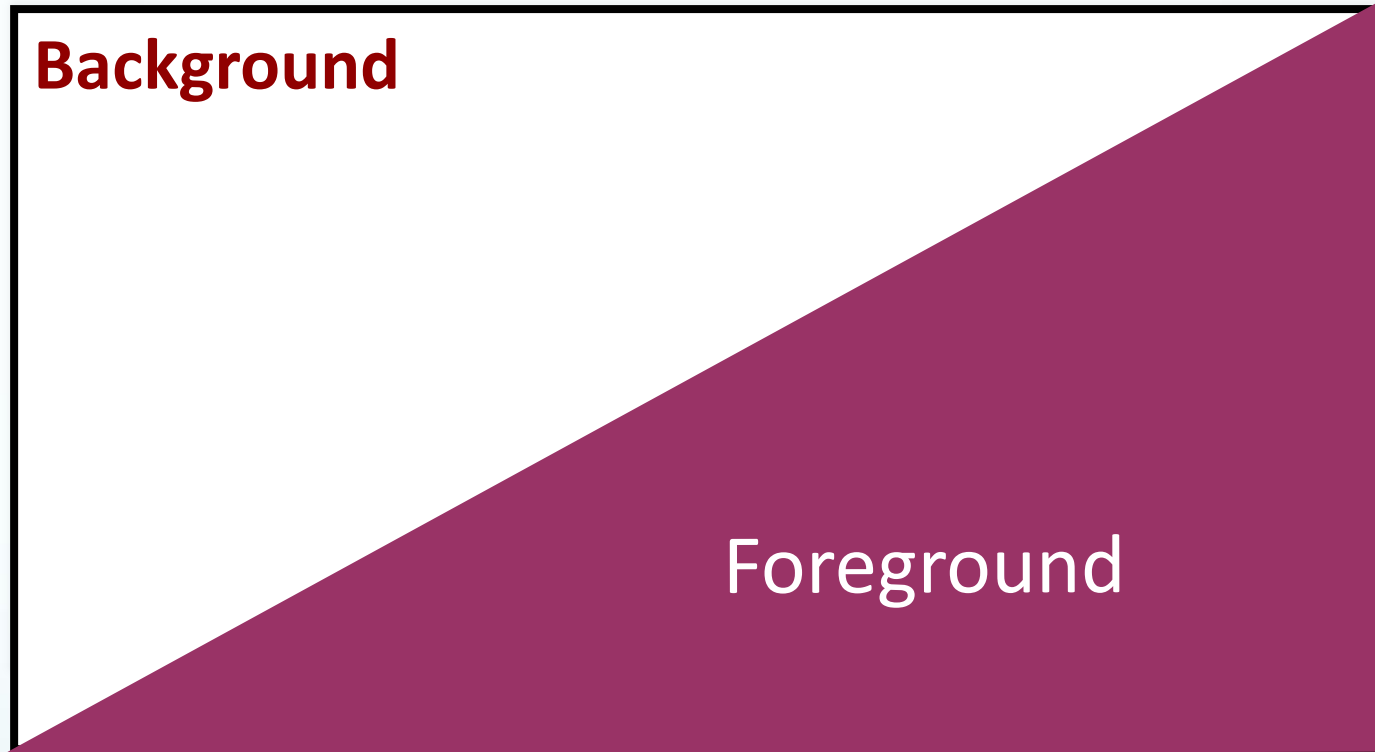
- Exercise
- Work in pairs/ small group
- Identify a clinical problem/challenge you have encountered recently.

Formulating Questions

Two basic types of question

- Background question
 - how? when? why? who? what?
- Foreground question
 - Specific patient specific problem, specific setting

Types of questions..



Student

Intern

5 yr post grad



Asking answerable clinical questions

- The question should be directly relevant to the problem at hand.
- The question should be phrased to facilitate searching for a precise answer.
- To achieve the above two aims the question must be focussed and well articulated for all 4 parts of its “anatomy.”

Asking answerable clinical questions

- **P:** Patient (or Problem)
- **I:** Intervention (or Cause, Prognosis)
- **C:** Comparison (or Control)
- **O:** Outcome(s)

Patient presenting with a clinical problem (7 types of questions)

- | | |
|---|------------|
| 1. How common is the problem | Prevalence |
| 2. Is early detection worthwhile | Screening |
| 3. Is the diagnostic test accurate | Diagnosis |
| 4. What will happen if we do nothing | Prognosis |
| 5. Does this intervention help | Treatment |
| 6. What are the common harms of an intervention | Harms |
| 7. What are the rare harms of an intervention | Harms |

PICO questions

- Working in pairs/ small groups
- Develop a PICO question based on the clinical problems you were talking about earlier.

Study designs & levels of evidence

Study Designs

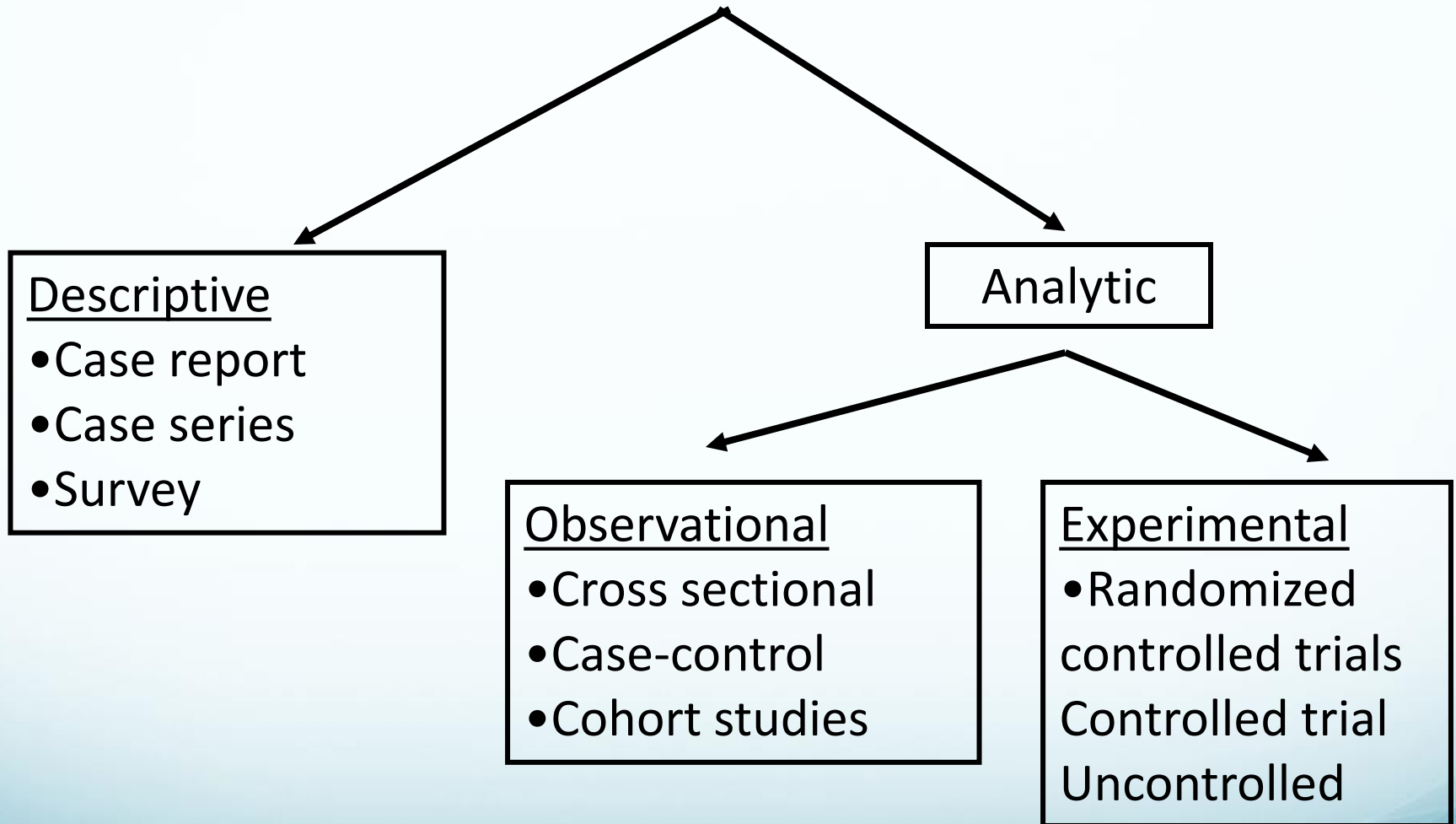
Interventional

- Randomized controlled trials

Observational

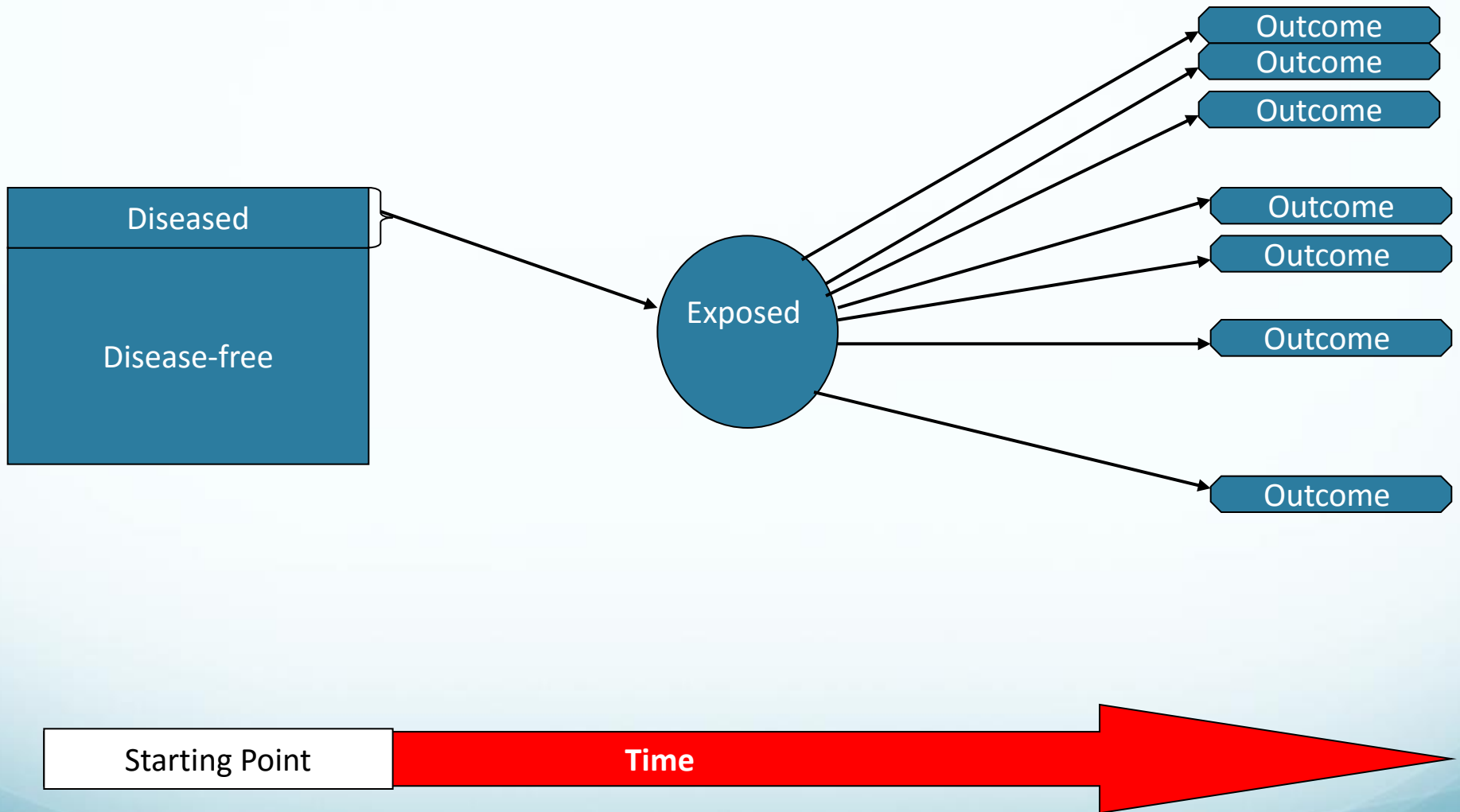
- Cohort Studies
- Case-Control Studies
- Case Series
- Cross-sectional

Study Designs

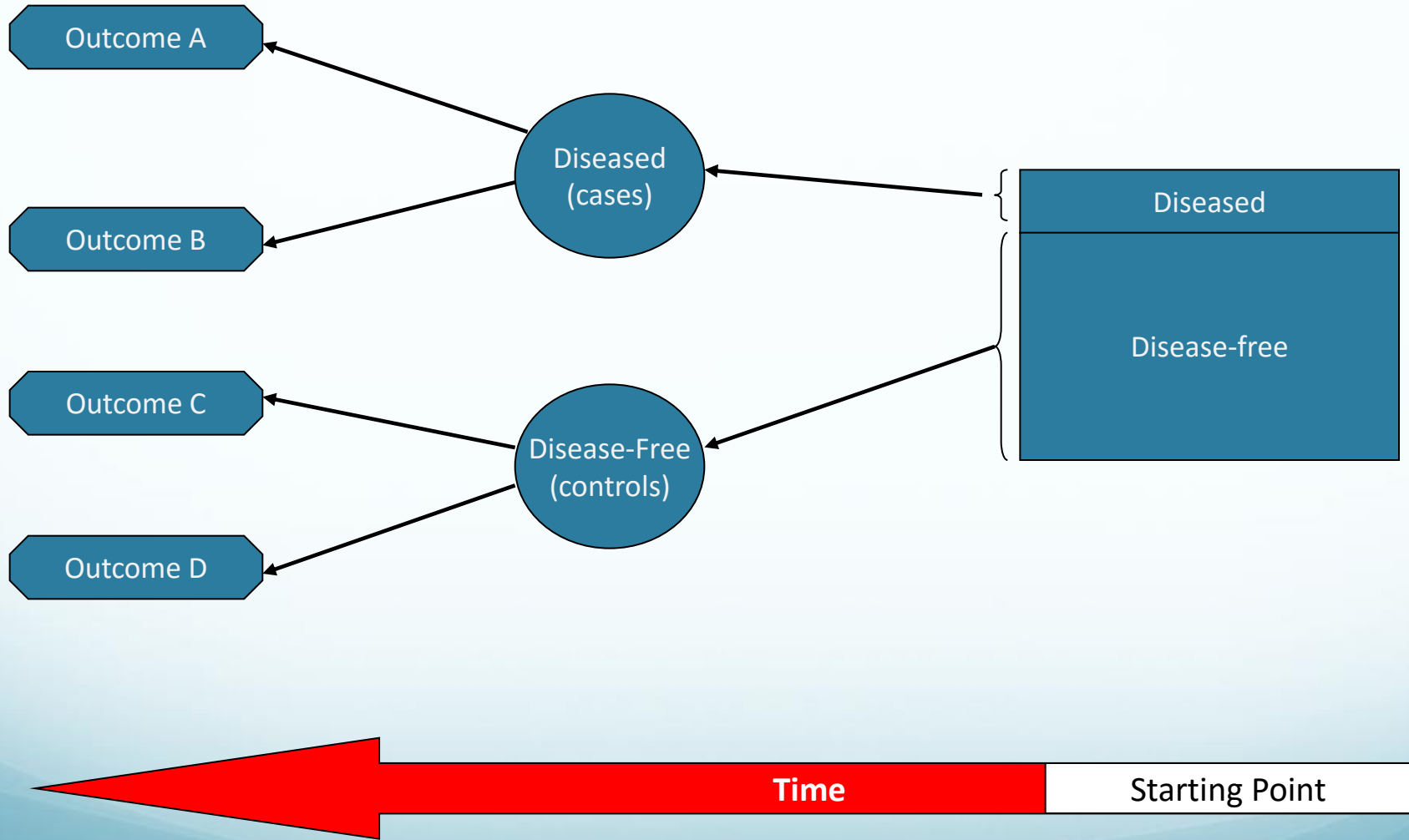


Strength of evidence for causality between a risk factor and outcome

Case Series



Case Controlled Study



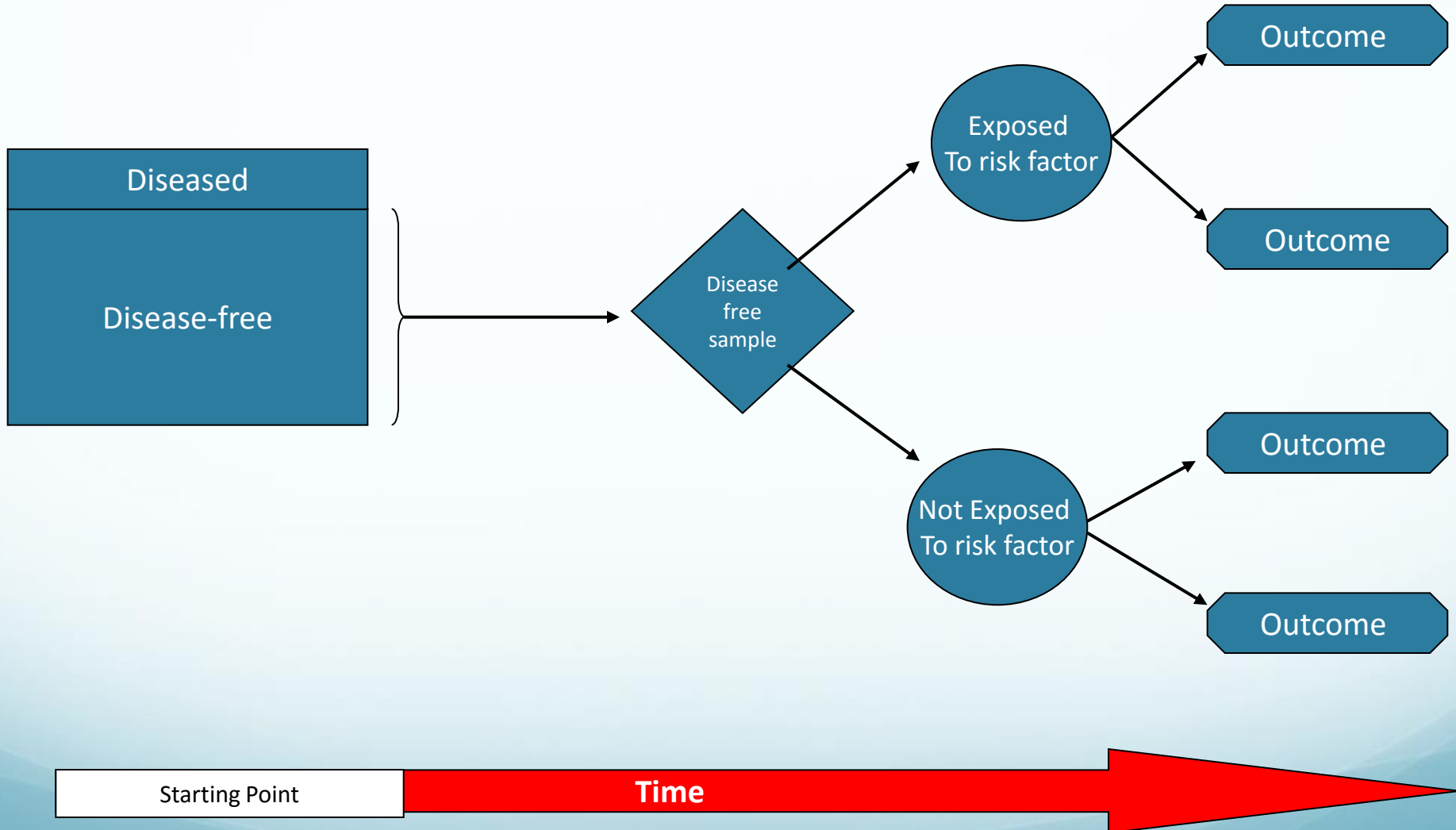
Case-control studies

- Used for
 - Looking at potential causes of diseases (suitable for rare diseases)
- Disadvantages
 - Confounders
 - Selection of controls can be difficult
 - Recall and selection bias
 - Difficult to establish time relationships between exposure to the risk factor and development of the disease

Cross-sectional survey

- Used for
 - Measure prevalence of a disease
 - Look at potential risk factors or cause
- Disadvantages
 - Establishes association at the most, not causality
 - Confounders may be unequally distributed
 - Group sizes may be unequal
 - Recall bias

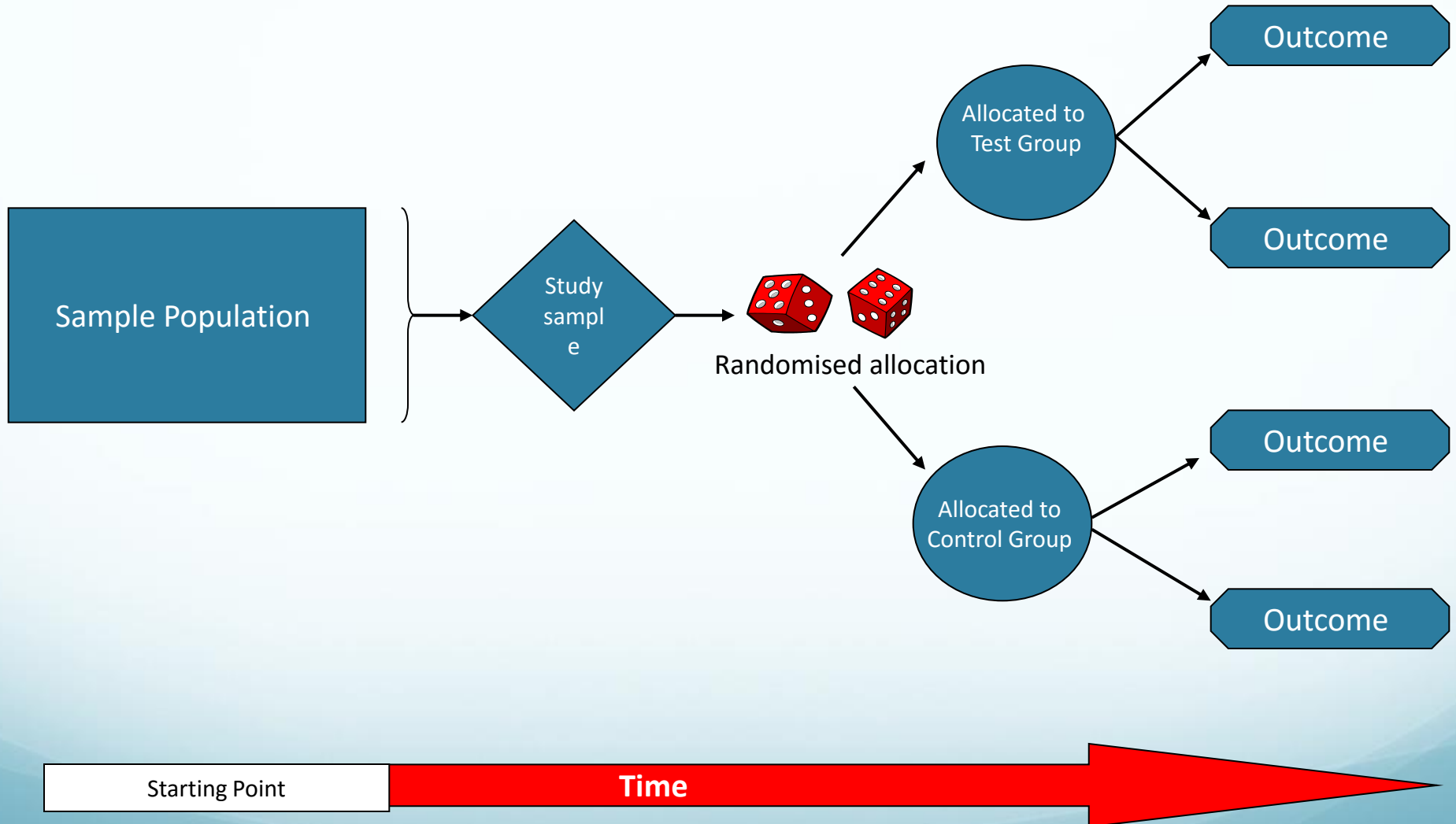
Cohort Study



Cohort

- Used for
 - Measuring the incidence of disease
 - Looking at the causes of disease
 - Determining prognosis
 - Establishing timing and directionality of events
- Disadvantages
 - Controls may be difficult to identify
 - Exposure may be linked to hidden confounder
 - Blinding is difficult
 - For rare diseases, large sample size or long follow-up necessary

Randomised Controlled Trial



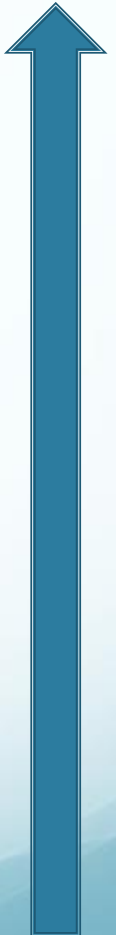
Randomised Controlled Trials

- Used for
 - Causal inferences
 - Minimise bias
 - Specific research question
- Disadvantages
 - Expensive (organisation /size)
 - Ethical issues
 - too small
 - Generalisability
 - publication bias

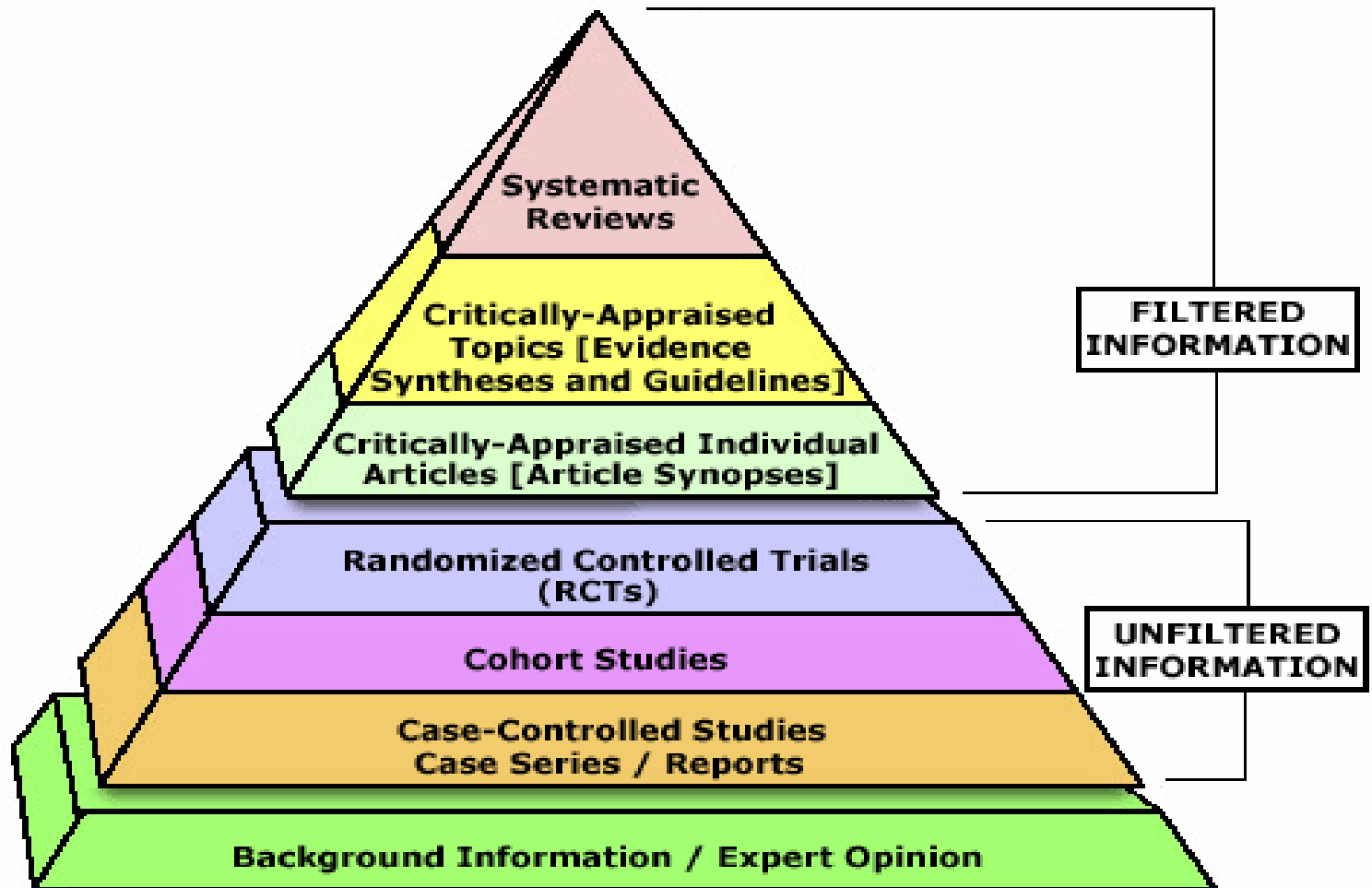
Types of evidence affect the quality



Quality



Evidence levels



Evidence-based Practice

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1. Asking answerable questions (Asking)
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4. Applying the evidence (Applying)
5. Evaluating the outcome (Assessing)

The 5 As

Searching for Evidence

- Where do you look ?

Outlining your search

- Consider the following question

Is toluidine blue an effective method of detecting oral cancer?

Example

Patient or Problem	Intervention	Comparison	Outcome
Patients at risk Oral Cancer	Toluidine Blue	Visual Inspection	increased identification of Oral Cancer

question : *Is toluidine blue an effective method of detecting oral cancer?*

Subject searching

- When performing a search we should use a combination of:
 - text word searching
 - thesaurus headings (MeSH)
 - Boolean operators (AND, OR, NOT)
- Text word searching
 - searching for a keyword in the title or abstract

Developing a search strategy

	Patient or Problem	Intervention	Comparison	Outcome
	Patients at risk Oral Cancer	Toluidine Blue	Visual Inspection	increased identification of Oral Cancer
Textwords	No specific population	Toluidine blue Ora-screen Ora-scan		Oral Cancer Mouth Cancer

Think of alternative names and other ways of describing your terms

Thesaurus headings

- Articles entered into a database, have index terms assigned
- Keywords - describe the main topics in article
- Index terms found in database Thesaurus
 - Medline - Medical Subject Headings or MeSH
 - Embase – Descriptors

Developing a search strategy

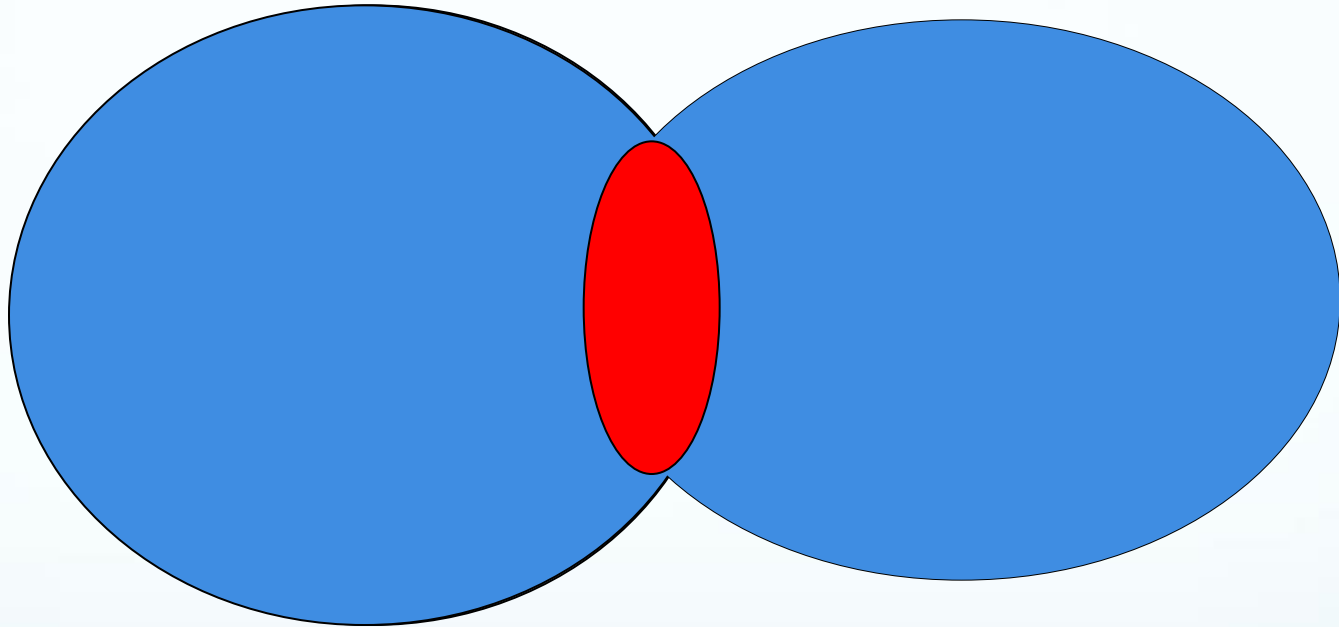
	Patient or Problem	Intervention	Comparison	Outcome
	Patients at risk Oral Cancer	Toluidine Blue	Visual Inspection	increased identification of Oral Cancer
Textwords	No specific population	Toluidine blue Ora-screen Ora-scan		Oral Cancer Mouth Cancer
MeSH Headings		[Tolonium Chloride]		[Mouth Neoplasms}

Boolean operators

- **OR**
 - this broadens the search
 - e.g. toluidine blue OR tolonium chloride
- **AND**
 - this narrows the search
 - e.g. toluidine blue AND oral cancer
- **NOT**
 - this excludes terms from the search
 - e.g. oral cancer NOT tongue cancer

Boolean operators

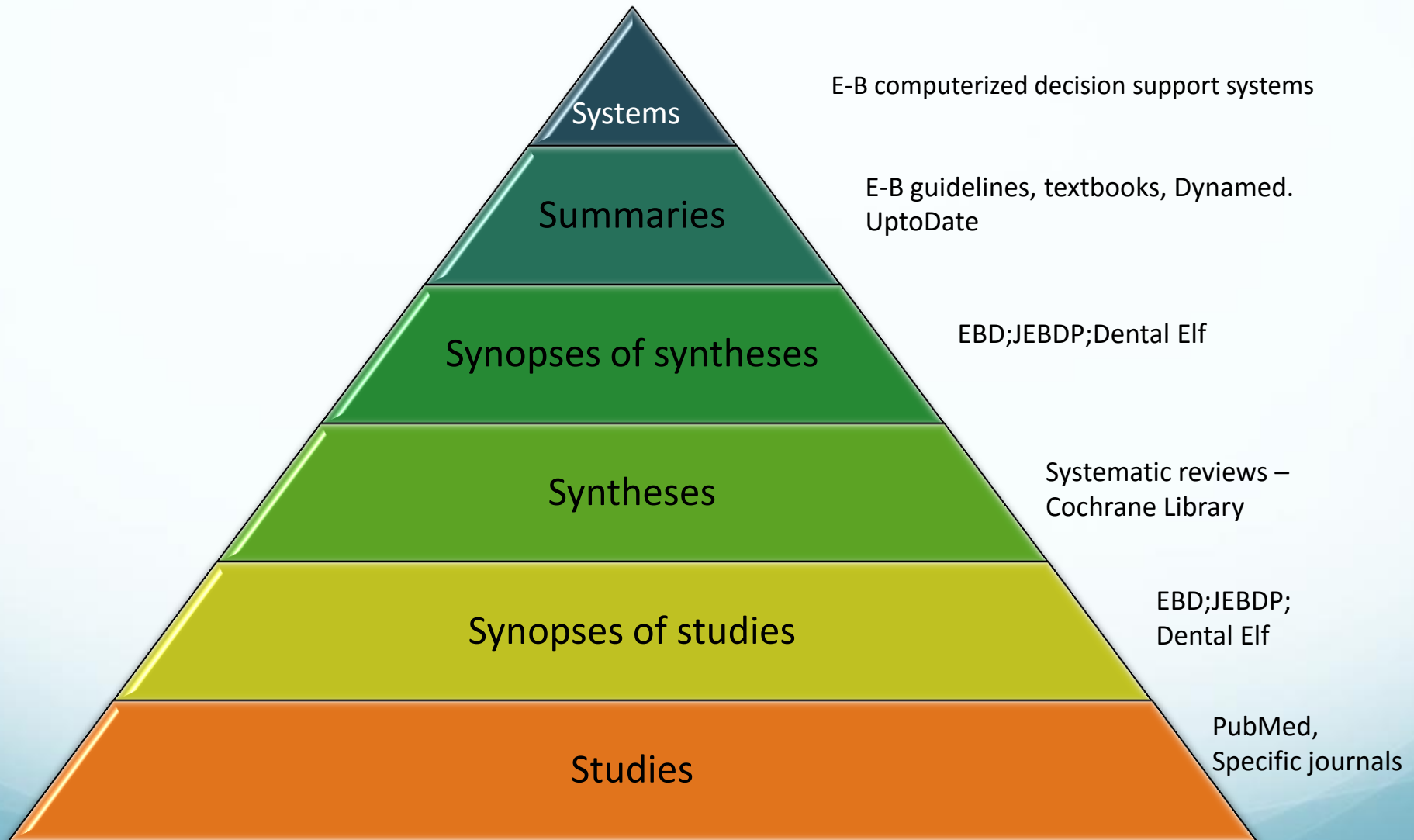
Toluidine blue AND Oral Cancer



Toluidine blue OR Oral Cancer

MORE

The 6S System



Exercise

- SIGN Guidelines Network www.sign.ac.uk/
- Cochrane Library <http://www.cochranelibrary.com/>
- PubMed www.pubmed.gov
- Dental Elf www.thedentalelf.net
- TRIP database <https://www.tripdatabase.com/>
- ADA-EBD - <http://ebd.ada.org/>

Evidence-based Guidelines

- SIGN – www.sign.ac.uk/
- NICE - www.nice.org.uk
- SDCEP - www.sdcep.org.uk/
- ADA-EBD - <http://ebd.ada.org/>
- Royal Colleges
- Specialist societies



The Dental Elf

- www.thedentalelf.net
- Blog site with regular summaries of the latest dental evidence
- Part of National Elf Service
- www.nationalelfservice.net/

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The Dental Elf

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Study suggests that dentifrices containing 1.5% arginine, an insoluble calcium compound provides additional benefit to fluoridated toothpastes

Posted by Derek

No Responses -

Cochrane reviews have clearly documented the anti-caries benefits of fluoridated toothpastes (Marinho et al 2003, Walsh et al 2010). New agents to improve caries prevention would assist efforts to reduce the impact of caries, particularly on children. The aim of this study was to investigate the efficacy of two dentifrices containing 1.5% arginine, an insoluble [read the full story...]

Share this post: [f](#) [t](#) [in](#) [e](#) [f](#) Like [?](#)

Tagged with: arginine, caries, fluoride toothpaste, prevention

Fluoride varnish in pre-school children

Posted by Derek

No Responses -

The effectiveness of fluoride varnishes for caries prevention for children and adolescents is well established with the recent update of the Cochrane review (Marinho et al 2013) estimating the pooled preventive fraction of 43% (95% CI 30-75%) for permanent teeth and 37% (95% CI 24-51%) for primary teeth. However although 22 trials were included there [read the full story...]

Share this post: [f](#) [t](#) [in](#) [e](#) [f](#) Like [?](#)

Tagged with: caries, Cochrane, fluoride varnish, pre-school, prevention

Limited evidence suggests no difference in soft tissues aesthetics between immediate and conventional implant placement

Posted by Derek

No Responses -

The aesthetic appearance of the soft tissues following dental implant placement is an important consideration and potential more of an issue

Recent Posts

- Study suggests that dentifrices containing 1.5% arginine, an insoluble calcium compound provides additional benefit to fluoridated toothpastes
- Fluoride varnish in pre-school children
- Limited evidence suggests no difference in soft tissues aesthetics between immediate and conventional implant placement
- Some evidence of reduction of peri-implant bone loss with platform switching
- Currently little evidence to support smoking as a risk factor for peri-implantitis

Recent Comments

- **Crownsped** on On-demand analgesic use following root canal treatment resulted in similar pain relief but reduced consumption compared with regular prescription
- **Alonso Carrasco** on New Cochrane Protocols January 2014

UTHSCSA CAT library.

- UTHSCSA Dental School Oral Health searchable CAT library.
- <https://cats.uthscsa.edu/>


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ORAL HEALTH EVIDENCE-BASED PRACTICE PROGRAM

Welcome to CATs Library

 Search the Library

Critically Appraised Topics

Welcome to the UTHSCSA Dental School Oral Health searchable CAT library. A CAT is a "Critically Appraised Topic" related to a clinical dental problem. Our students and faculty work together to find and report the strongest, most recent, and most relevant evidence pertaining to dental diagnosis and treatment. This online library rapidly provides users with up-to-date evidence-based answers to focused clinical questions. The CATs are updated as new research is published.

We invite you to [search](#) the CAT library by key words or browse by dental specialty area. You will find a place on each CAT to leave a brief comment if you wish. Your comment may be related to your clinical experience and/or to new published evidence related to the question. Your comment will become a part of the CAT that subsequent users will be able to read.

We invite you to leave general comments about the library by clicking on the [Contact Us](#) button to the left. Leave a suggestion or just let us know what you think.

The UTHSCSA CAT Oral Health Library is supported in part by a grant from the NIDCR, NIH R25DE018663.

Contact: hamandozmy@uthscsa.edu
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Evidence-based Dentistry Journals

- EBD First published as supplement to BDJ - Nov. 1998
- Becomes stand alone in 2000
- Evidence-based Dental Practice launches 2001



The Cochrane Library

- <http://www.cochranelibrary.com/>
- CDSR – Cochrane reviews
- CENTRAL – Trial database
- DARE – Non-Cochrane Systematic reviews
- HTA – Health Technology Assessments
- NHSEED – Economic Evaluations

The screenshot shows the Cochrane Library website interface. At the top left is the Cochrane Library logo with the tagline "Trusted evidence. Informed decisions. Better health." To the right is a search bar with the placeholder text "Search title, abstract, keyword" and a search icon. Below the search bar are navigation links: "Advanced Search", "Search Manager", and "MeSH". A purple navigation bar contains "Cochrane Reviews", "Trials", "More Resources", "About", and "Help". Below this are three tabs: "Editorials", "Highlighted Reviews", and "Special Collections". The main content area displays a list of editorial articles, each with a small image, a title, authors, and a date. The articles listed are: "Should hormone therapy be recommended for prevention of cardiovascular disease?" (Helen Roberts, Martha Hickey, 12 March 2015), "Systematic reviews of case management: too complex to manage?" (Sascha Köpke & Jenny McCleery, 13 January 2015), "The emerging epidemic of endometrial cancer: time to take action" (Emma Crosbie & Jo Morrison, 22 December 2014), "Erythropoiesis-stimulating agents for anaemia in chronic kidney disease: are they all the same?" (David Mudge & Angela Webster, 09 December 2014), and "How should we describe worsening asthma in Cochrane Reviews, and does it matter?" (Rebecca Normansell, on behalf of the Cochrane Airways Group editorial board, 12 November 2014). A "View all editorials" link is at the bottom right of the list. On the right side of the page, there is a "comment" button over a keyboard image, a "submit a comment" link, and a photo of a man using a laptop. At the bottom right, there is a link for "about Anywhere Systematic Review". At the bottom left, there is a "Browse by Topic" section with a link to "Browse the Cochrane Database of Systematic Reviews".


Pub Med/Medline

NCBI Resources How To Sign in to NCBI

PubMed.gov
US National Library of Medicine
National Institutes of Health


PubMed [dropdown] [input] Search Help

Advanced



PubMed

PubMed comprises more than 23 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher web sites.



PubMed Commons

PubMed's new commenting system

More

Using PubMed

- [PubMed Quick Start Guide](#)
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- [PubMed Tutorials](#)
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PubMed Tools

- [PubMed Mobile](#)
- [Single Citation Matcher](#)
- [Batch Citation Matcher](#)
- [Clinical Queries](#)
- [Topic-Specific Queries](#)


More Resources

- [MeSH Database](#)
- [Journals in NCBI Databases](#)
- [Clinical Trials](#)
- [E-Utilities](#)
- [LinkOut](#)

You are here: NCBI > Literature > PubMed Write to the Help Desk

GETTING STARTED <ul style="list-style-type: none">NCBI EducationNCBI Help ManualNCBI HandbookTraining & Tutorials	RESOURCES <ul style="list-style-type: none">Chemicals & BioassaysData & SoftwareDNA & RNADomains & StructuresGenes & ExpressionGenetics & MedicineGenomes & MapsHomologyLiteratureProteinsSequence AnalysisTaxonomyTraining & TutorialsVariation	POPULAR <ul style="list-style-type: none">PubMedBookshelfPubMed CentralPubMed HealthBLASTNucleotideGenomeSNPGeneProteinPubChem	FEATURED <ul style="list-style-type: none">Genetic Testing RegistryPubMed HealthGenBankReference SequencesGene Expression OmnibusMap ViewerHuman GenomeMouse GenomeInfluenza VirusPrimer-BLASTSequence Read Archive	NCBI INFORMATION <ul style="list-style-type: none">About NCBIResearch at NCBINCBI NewsNCBI FTP SiteNCBI on FacebookNCBI on TwitterNCBI on YouTube
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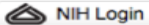


Pub Med/Medline

NCBI Resources How To Sign in to NCBI

Sign in to NCBI

Sign in with

eRA Commons users should sign in via the NIH Login
[See more 3rd party sign in options](#)


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- Display format preferences
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- My Bibliography & NIH public access policy compliance
- Highlighting search terms
- Recent activity searches & records for 6 months
- LinkOut, document delivery service & outside tool selections

NIH funded investigator?

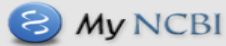
Extramural NIH-funded investigators looking for NIH Public Access Compliance tools should sign in using the "NIH Login" button. Use your eRA Commons credentials on the subsequent sign in page. Once signed in, navigate to the My Bibliography section.

Documentation for using these features is located in the [Managing Compliance to the NIH Public Access Policy](#) section of the NCBI Help Manual.

Information about the NIH Public Access Policy is located at <http://publicaccess.nih.gov>.

Account Troubleshooting FAQ

[Expired email confirmation link message](#)
[Multiple My NCBI accounts](#)
[Link eRA Commons, University, or other account to your NCBI account](#)



Search NCBI databases

Search :

Search

Hint: clicking the "Search" button without any terms listed in the search box will transport you to that database's homepage.

My Bibliography

Your bibliography contains **no items**.

Use the "Send to > My Bibliography" menu in PubMed to add citations,
OR

[Click here](#) to manually create citations.

[Manage My Bibliography >](#)

Recent Activity

Time	Database	Type	Term
04-Feb-2014	PubMed	record	The short neuropeptide F-like receptor from the red imp...
04-Feb-2014	PubMed	search	(honey bee) AND anxiety
04-Feb-2014	PubMed	search	anxiety
04-Feb-2014	PubMed	search	honey bee
04-Feb-2014	PubMed	search	(honey bee) AND dental anxiety
04-Feb-2014	PubMed	search	(Bee*) AND dental anxiety
04-Feb-2014	PubMed	search	dental anxiety
04-Feb-2014	PubMed	search	Bee*
26-Jan-2014	PubMed	search	((
26-Jan-2014	PubMed	search	health psychology

[Clear](#) [Turn Off](#)

[See All Recent Activity >](#)

Saved Searches

Search Name	What's New	Last Searched
PubMed Searches		
Dental Systematic revs 2011	0	today
Implant trials	0	today
Dental RCT search 2011	0	today
TMJ trials	0	yesterday
Perio Trials	0	yesterday
Ortho trials	0	2 days ago
Endo trials	0	3 days ago
Caries trials	2	4 days ago
F-paste text word only	31	last year

[Manage Saved Searches >](#)

Collections

Collection Name	Items	Settings/Sharing	Type
Favorites	edit 0	Private	Standard
My Bibliography	edit 0	Private	Standard
Other Citations	edit 0	Private	Standard
Needs Assessment	edit 124	Private	PubMed
referrals	edit 32	Private	PubMed
Implant test	edit 3	Private	PubMed
GRADE references	edit 14	Private	PubMed
Diet & Caries	edit 5	Private	PubMed

[Manage Collections >](#)

Filters

Filters for:

Active	Name	Type
<input checked="" type="checkbox"/>	Clinical Trial	Standard filter

[Manage Filters >](#)

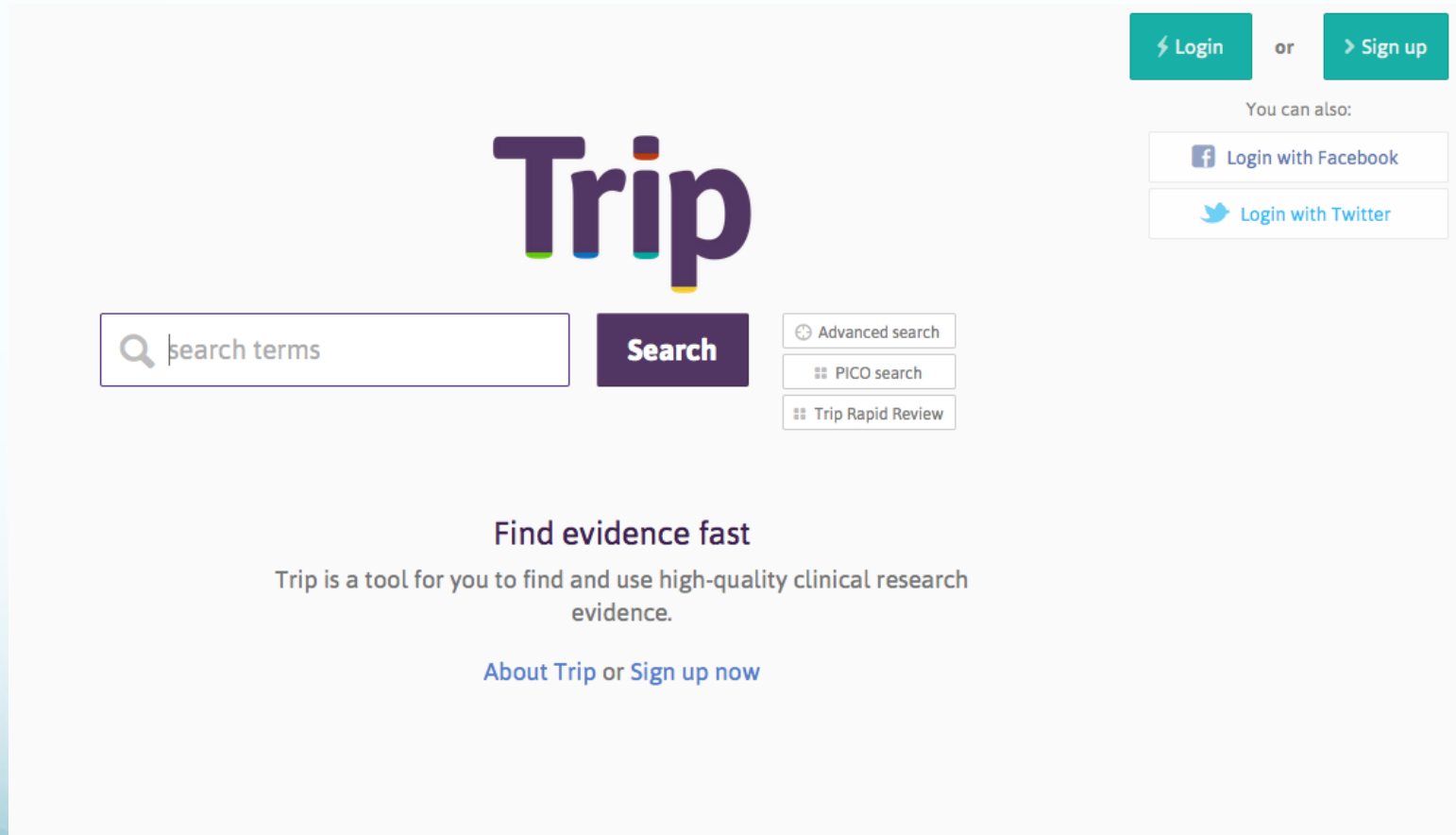
SciENCV

To get started with SciENCV:

If you have an eRA Commons account, [link your eRA account](#) for an expedited setup.

If you do NOT have an eRA Commons account, [follow this link](#) to manually enter your information.

TRIP Database



The screenshot shows the TRIP Database homepage. At the top right, there are two teal buttons: 'Login' with a lightning bolt icon and 'Sign up' with a right-pointing arrow. Below these, the text 'You can also:' is followed by two white buttons with teal borders: 'Login with Facebook' with the Facebook 'f' icon and 'Login with Twitter' with the Twitter bird icon. In the center, the 'Trip' logo is displayed in a large, dark purple font with a small orange square above the 'i' and colored underlines (green, blue, teal, yellow) under the letters. Below the logo is a search bar with a magnifying glass icon and the placeholder text 'search terms', followed by a dark purple 'Search' button. To the right of the search bar are three white buttons with teal borders: 'Advanced search' with a gear icon, 'PICO search' with a grid icon, and 'Trip Rapid Review' with a grid icon. Below the search area, the text 'Find evidence fast' is centered, followed by the description 'Trip is a tool for you to find and use high-quality clinical research evidence.' and a link 'About Trip or Sign up now'.

[Login](#) or [Sign up](#)

You can also:

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Trip

[Search](#)

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[PICO search](#)

[Trip Rapid Review](#)

Find evidence fast

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mouthwash

Search

- Advanced search
- PICO search
- Trip Rapid Review

How to use Trip

- Evidence
- Images
- Videos
- Education
- Patient Information
- News
- PubMed Clinical Queries
- DynaMed

1,119 results for "mouthwash", by quality

- With selected
- Order
- Important papers
- Synonyms
- Add to automated search
- Translate

- 1. Oral rinses, mouthwashes and sprays for improving recovery following tonsillectomy**
 Cochrane Database of Systematic Reviews 2011

Share this Add to BMJ portfolio CPD/CME More
- 2. Chlorhexidine mouthwash better than chlorhexidine dentifrice or gel at inhibiting plaque but it leads to more tooth discolouration**
 The Dental Elf 2014

Share this Add to BMJ portfolio CPD/CME More
- 3. Small trial suggests limited short-term benefit from 0.1% pilocarpine mouthwash for xerostomia**
 The Dental Elf 2014

Share this Add to BMJ portfolio CPD/CME More
- 4. CHX Mouthwash is More Effective in Plaque Removal Than an Essential Oil or Listerine Mouthwash**
 UTHSCSA Dental School CAT Library 2013

Share this Add to BMJ portfolio CPD/CME More
- 5. New study suggests better outcomes with arginine toothpaste and mouthwash regimen for dentine hypersensitivity treatment.**
 The Dental Elf 2013

Share this Add to BMJ portfolio CPD/CME More
- 6. Mouthwashes and plaque control in orthodontic patients**
 The Dental Elf 2015



No thumbnail or rollover available

No thumbnail or rollover available



No thumbnail or rollover available

Refine 1,244 results by evidence type

- All Secondary Evidence
- Evidence-based Synopses 37
- Systematic Reviews 94
- Guidelines
- Aus & NZ 7
- Canada 10
- UK 36
- USA 26
- Other 2
- Clinical Q&A 9
- Key Primary Research 7
- Controlled Trials 768
- Extended Primary Research 150
- Case Reports 0
- eTextbooks 98

- Further refinements
- For developing world SPECIFIC
 - For developing world SENSITIVE
 - By clinical area
 - Previously viewed
 - Starred
 - Since 2012
 - Since 2011
 - Since 2010

Evidence-based Practice

An integrated system for aggregating, distilling, and delivering the best clinical evidence:

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The 5 As

Critical appraisal

The process of assessing and interpreting evidence through the systematic consideration of its validity, relevance and results

Which would you choose?

Treatment A

reduces the risk of having decay by about 62%

Treatment B

reduced the odds of having decay by about 83%

Treatment C

produces an absolute reduction in risk of decay of 42%

Treatment D

requires 3 people to be treated to stop one person having decay

Appraisal tools

- CASP – www.casp-uk.net

- Equator Network = www.equator-network.org/

- CEBD – appraisal page

- www.cebd.org/practising-ebd/appraise/

The image displays three overlapping screenshots of appraisal tool websites. The top screenshot is for the Critical Appraisal Skills Programme (CASP), featuring the text 'CRITICAL APPRAISAL SKILLS PROGRAMME' and 'Making sense of evidence'. The middle screenshot is for the Equator Network, with the text 'Enhancing the QUALITY and Transparency Of health Research' and a navigation menu including 'Home', 'Library', 'Toolkits', 'Courses & events', 'News', 'Blog', 'About us', and 'Contact'. The bottom screenshot is for the Centre for Evidence Based Dentistry (CEBD), showing a page titled 'Appraise' with the sub-heading 'Appraising the evidence' and a quote: 'The important thing is not to stop questioning. Curiosity has its own reason for existing.' The CEBD page also includes a list of 'CASP Appraisal tools' and 'Resources'.

Equator Network

- **CONSORT** - Consolidated Standards of Reporting Trials
- **PRISMA**- Preferred Reporting Items for Systematic Reviews and Meta-Analyses
- **STARD** - Standards for the Reporting of Diagnostic accuracy studies
- **STROBE** - Strengthening the reporting of observational studies in epidemiology

Appraisal Questions

- Is the study valid?
- What are the results ?
- Are the results relevant to my problem?

Is the Study Valid ?

- Is there a clear question?
- Most appropriate study design to answer the question?
- Was study conducted reliably?
- Can you follow what the authors did?

What question was being asked?

- Diagnostic
- Prognostic
- Treatment
- Risk / Benefit
- Cost effective

What question was being asked?

- Participants
- Interventions/Exposure
- Comparison
- Outcomes

How well was the study conducted?

How valid is the study?

- Internal validity:

the degree to which the results of a study are likely to approximate to the 'truth' for the circumstances being studied.

- External validity:

the degree to which the effects observed in the study are applicable to the outside world

Was the study design appropriate?

Which Study Design?

Well participants are chosen on the basis of different exposure, wait to see if they get the disease

Representative sample of people are surveyed to answer a question

Participants randomly allocated to different interventions, then followed and outcomes assessed

People with a disease are matched to those without it and earlier exposure to different environmental factors compared

Description of the medical history of one or several patients

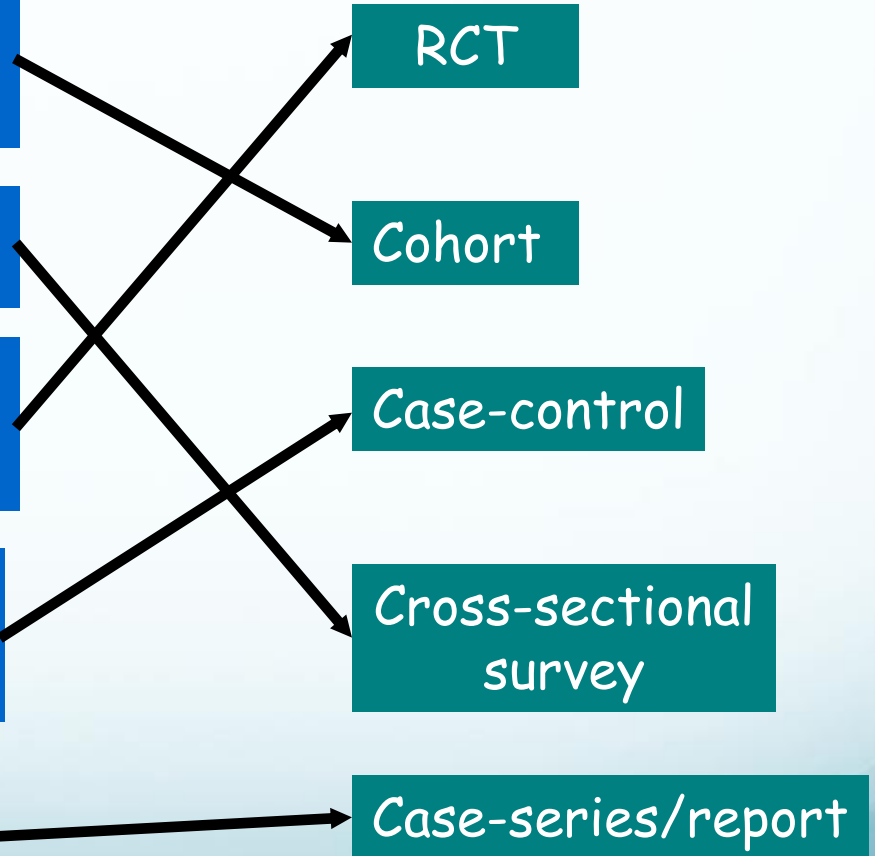
RCT

Cohort

Case-control

Cross-sectional survey

Case-series/report



Bias (Threats to Validity)

- “Lay” bias:
 - An opinion strongly favoring a particular outcome.
- “Research” bias:
 - Any factor causing results to divert from the truth.
 - Not associated with malicious intent
- Affects:
 - Researchers, statisticians, clinicians, patients

Bias Types

- Selection
- Ascertainment
- Publication
- Measurement
- Academic
- Clinical practice
- Territorial
- Empiricism
- Assignment
- Prestigious journal
- Author
- Institution
- Tradition
- Bankbook
- Technology
- Epidemiologist

Main biases

- Selection Bias
- Performance Bias
- Attrition Bias
- Detection Bias
- Reporting Bias
- Reader/Reviewer Bias

Selection bias

- One of the most important factors that may lead to bias and distort treatment comparisons is that which can result from the way that comparison groups are assembled

Performance Bias

- Systematic differences in the care provided to the participants in the comparison groups other than the intervention under investigation.
- To protect against unintended differences in care and placebo effects, those providing and receiving care can be 'blinded' so that they do not know the group to which the recipients of care have been allocated.

Attrition bias

- Attrition bias refers to systematic differences between the comparison groups in the loss of participants from the study.
- It has been called exclusion bias.

Detection Bias

- Detection bias refers to systematic differences between the comparison groups in outcome assessment.
- Blinding of patients, health care providers, and other persons (for example, radiologists) involved in evaluating outcomes minimizes the risk for detection bias, also called observer, ascertainment, or assessment bias. This type of bias arises if the knowledge of a patient's assignment influences the process of outcome assessment

RCTs in Periodontology

Table 3. Quality Assessment of RCTs

	Yes/Adequate		No/Inadequate		Unclear		Not Applicable	
	n	(%)	n	(%)	n	(%)	n	(%)
Described as randomized	161	(91)	15	(8.5)	1	(0.5)		
Randomization methods	29	(16.5)	1	(0.5)	147	(83)		
Allocation concealment method	12	(6.5)	1	(0.5)	164	(93)		
Patient blinding	42	(24)	77	(43)	58	(33)		
Caregiver blinding	26	(17 ^a)	84	(57 ^a)	38	(26 ^a)	29	(16)
Examiner blinding	97	(55)	12	(7)	68	(38)		
All patients accounted for at end of study	100	(56)	25	(14)	52	(30)		
Analysis accounts for patient losses	11	(11 ^a)	33	(33 ^a)	57	(56 ^a)	76	(43)

^a Percentages calculated with "not applicable" articles excluded.

RCT in Prosthetic Journals

- Sixty-two RCTs were identified from 3631 articles screened.
- 47% randomization explicit
- 40% assessment blinding
- 76% accounted for all subjects

Reporting Bias

- Inappropriate/under reporting reporting
- Publication bias

Inappropriate/biased reporting

- Unethical
- Scientific Fraud

Publication Bias

- Direction and statistical significance of research findings influence decisions regarding
 - Manuscript submission
 - Manuscript acceptance
- A tendency among:
 - Investigators
 - Peer reviewers
 - Journal editors



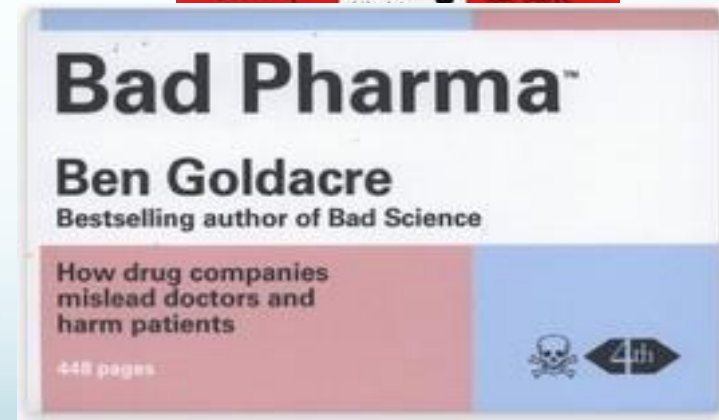
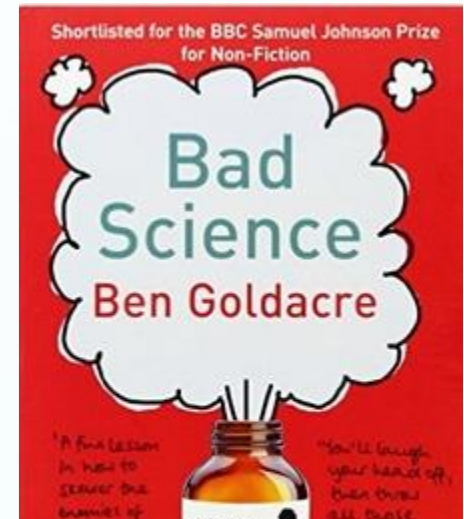
<http://www.alltrials.net/>

Publication Bias

- Poor quality of research design
- Small sample size
- External funding
- Negative findings
- Failure of authors to submit manuscripts
- Rejection of manuscripts by journal editors

Publication Bias

- Trials with positive findings
 - more likely to be published than trials with negative or null findings (OR 3.90; 95% CI 2.68 to 5.68).
 - Tend to be published after 4-5 years
- Trials with Negative findings
 - Tend to be published after 6-8 years



Publication Bias

- 3 Studies found no statistically significant association between sample size and publication.
- 1 study no significant association between either funding mechanism, investigator rank, or sex and publication.

Why does publication bias matter?

- May lead to incorrect conclusions about the safety and efficacy of elements of clinical care
- Raises scientific concerns
- Raises ethical concerns

Reader/Reviewer Bias

- Rivalry bias
- 'I owe him one' bias
- Personal habit bias
- Moral bias
- Clinical practice bias
- Territory bias
- Complementary medicine bias
- 'Do something' bias
- 'Do nothing' bias
- Favoured design bias
- Disfavoured design bias
- Resource allocation bias
- Prestigious journal bias
- Non-prestigious journal bias
- Printed word bias
- Lack-of-peer-review' bias
- Prominent (non-prominent) author bias
- Famous (unknown) institution bias
- Large (small) trial bias
- Multicentre trial bias
- Multicentre trial bias
- Flashy title' bias
- Substituted question bias
- Credential or professional background bias
- Esteemed author bias
- Geography bias
- Language bias of publication
- Omission bias
- Tradition bias
- Bankbook bias
- Belligerence bias
- Technology bias
- Empiricism bias
- 'I am an epidemiologist bias'

What are the results?

- Are the results presented in a clear and simple manner ?
- Is there a clear bottom line ?
- Are they clinically important ?

Statistical significance

- **P-value**
- **Confidence intervals**



How often you would see a similar result by chance, when actually there was no effect by the drug or treatment?



0

1

impossible

Absolutely
certain

So what does $p = 0.5$ mean ?



How often you would see a similar result by chance, when actually there was no effect by the drug or treatment?



So what does $p = 0.1$ mean ?



How often you would see a similar result by chance, when actually there was no effect by the drug or treatment?



impossible

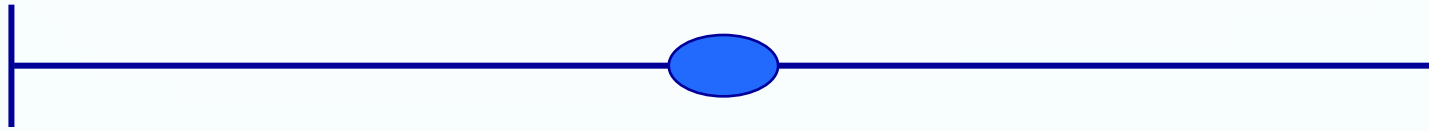
Absolutely
certain

So what does $p = 0.05$ mean ?

Statistical significance: Confidence intervals (CI)

- **Is the range within which the true size of effect (never exactly known) lies, with a given degree of assurance (95% or 99%).**

Confidence Intervals (Wobble factor)



Confidence intervals (CI)

the wobble factor, how sure are we about the results?

- the shorter the CI the more certain we are about the results
- if it crosses the line of no treatment effect the intervention might not be doing any good and could be doing harm

Which would you choose?

Treatment A - reduces the risk of having decay by about 62%

Treatment C - produces an absolute reduction in risk of decay of 42%

Treatment B – reduced the odds of having decay by about 83%

Treatment D - requires 3 people to be treated to stop one person having decay

Test

Control

Start 107

94

Drop-out 2

5

Outcome 58

24

Results 58/105

24/89

= 55.24%

= 26.96%

Risk

55.24-26.96 = 28.28%

Absolute Risk Reduction = ARR

55.24/26.96 = 2.05

Relative Risk = RR

55.24-26.96/26.96 = 1.05

Relative Risk Reduction = RRR

100/28.28 = 4 (3.53)

Number Needed to Treat =NNT

Test Control

Start

107 94

Drop-out

2 5

Outcome (improved)

58 24

Not improved

105-58 89-24

Results

58/47 24/65

=1.2340 = 0.375

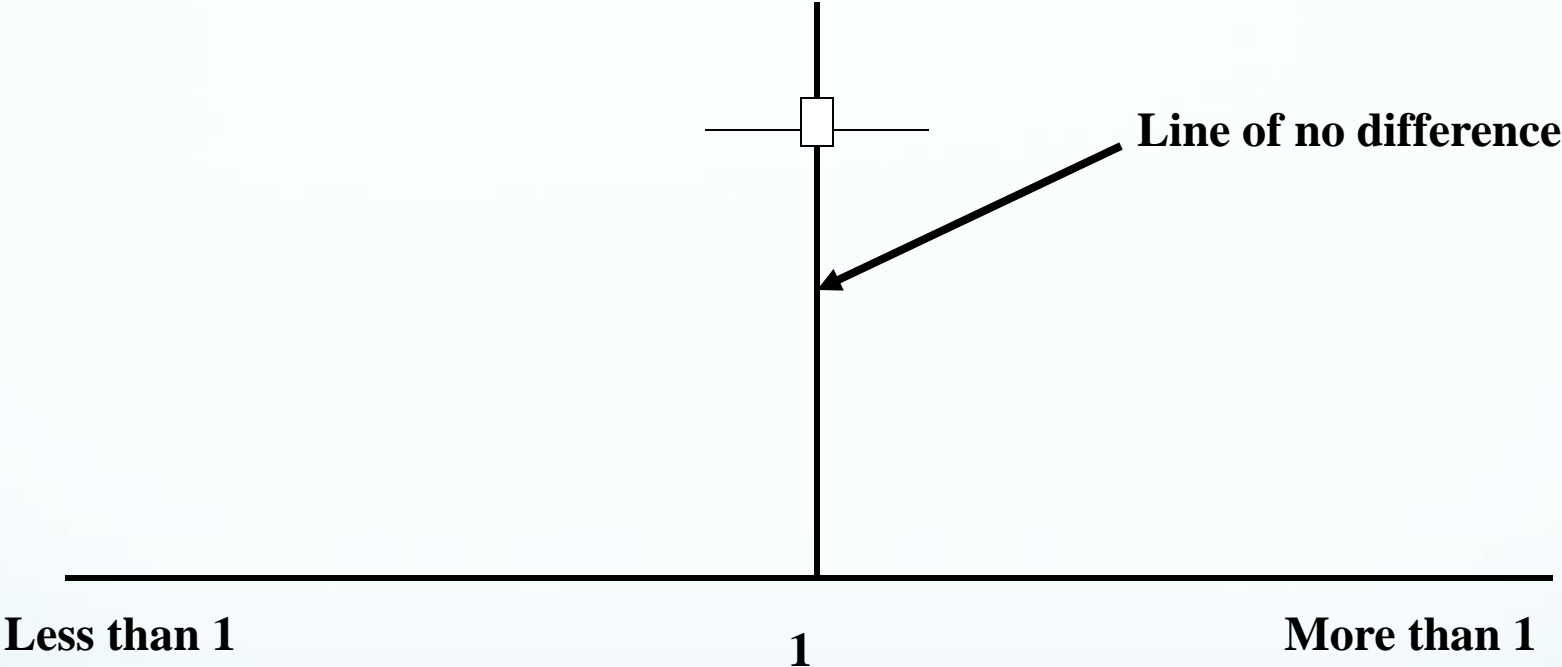
Odds

1.2340 = 3.25

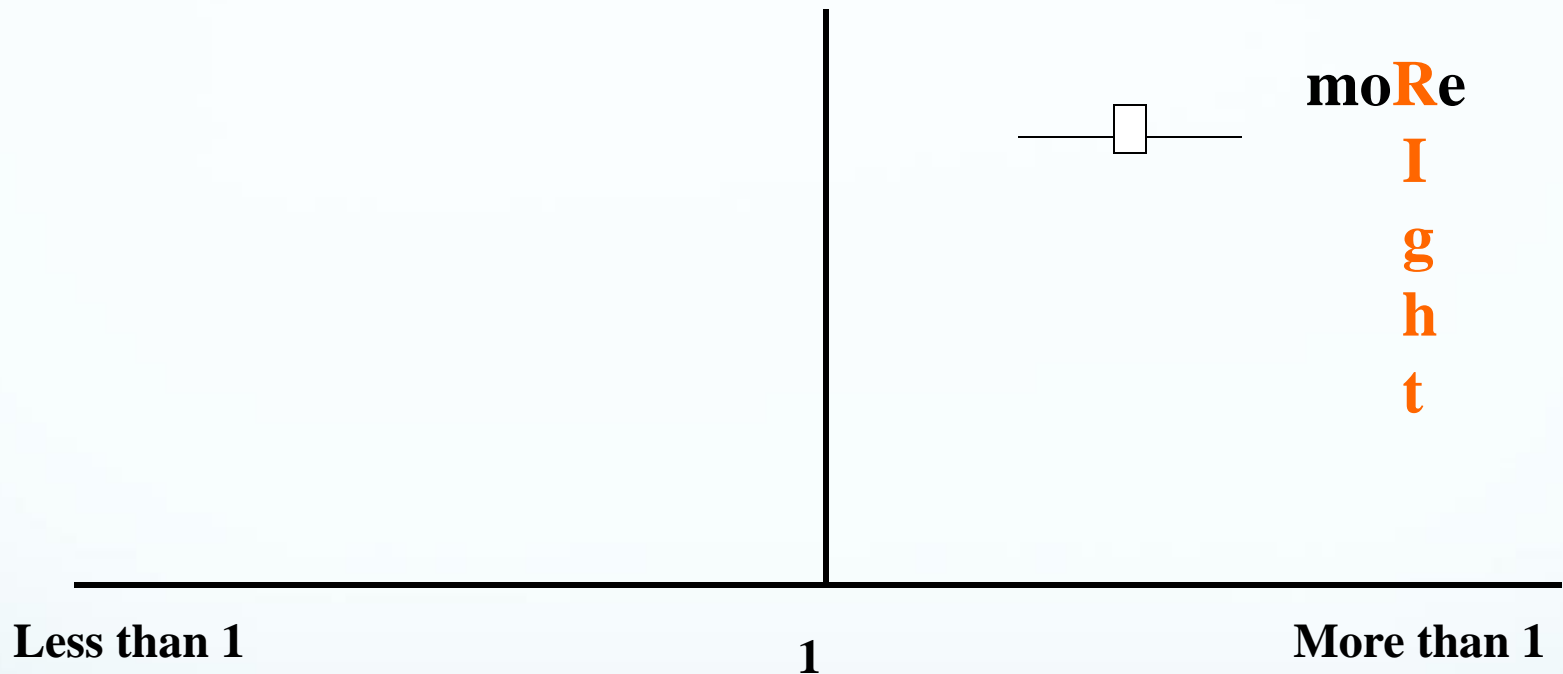
Odds ratio

0.375

Odds Ratio

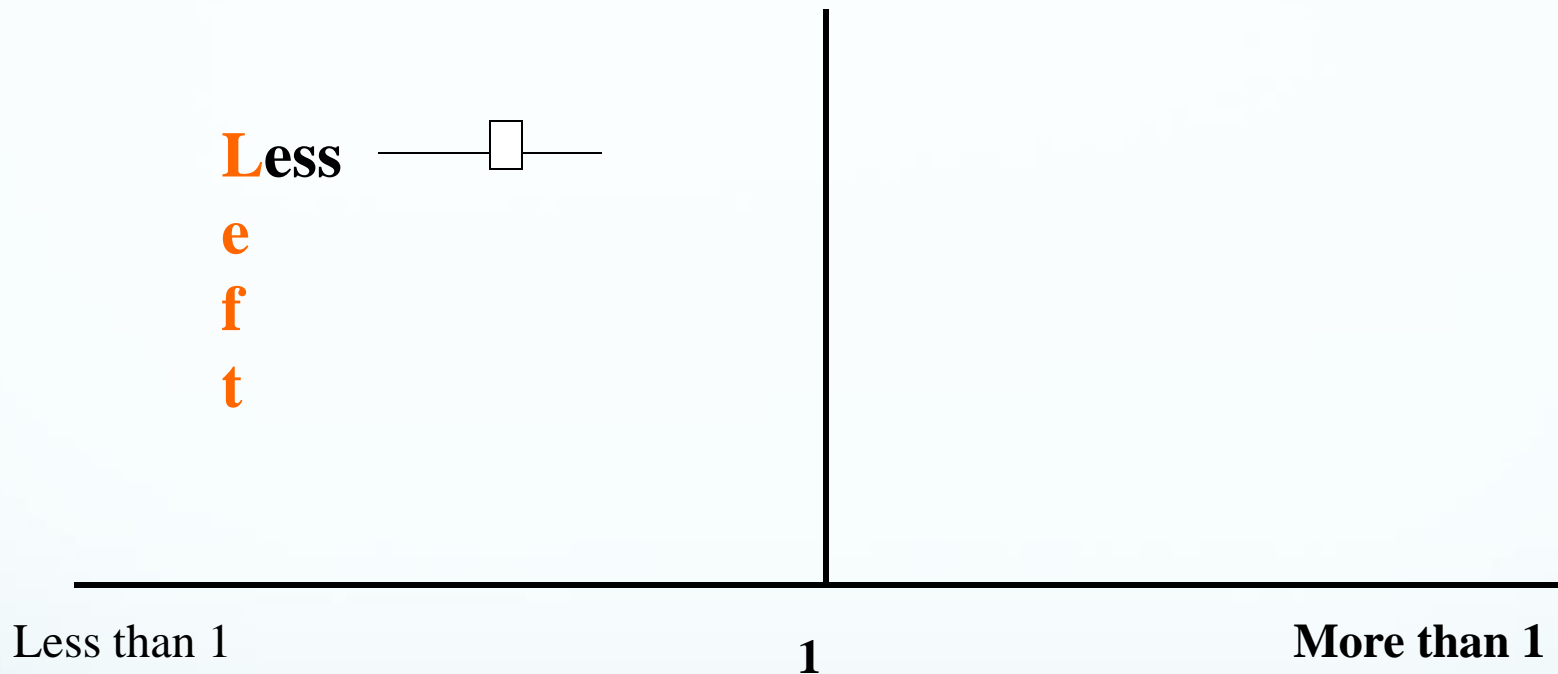


Odds Ratio



- If you want **more** of something to happen, such more people with no tooth decay and the experimental intervention is successful
- the results will show in the **right-hand side**

Odds Ratio

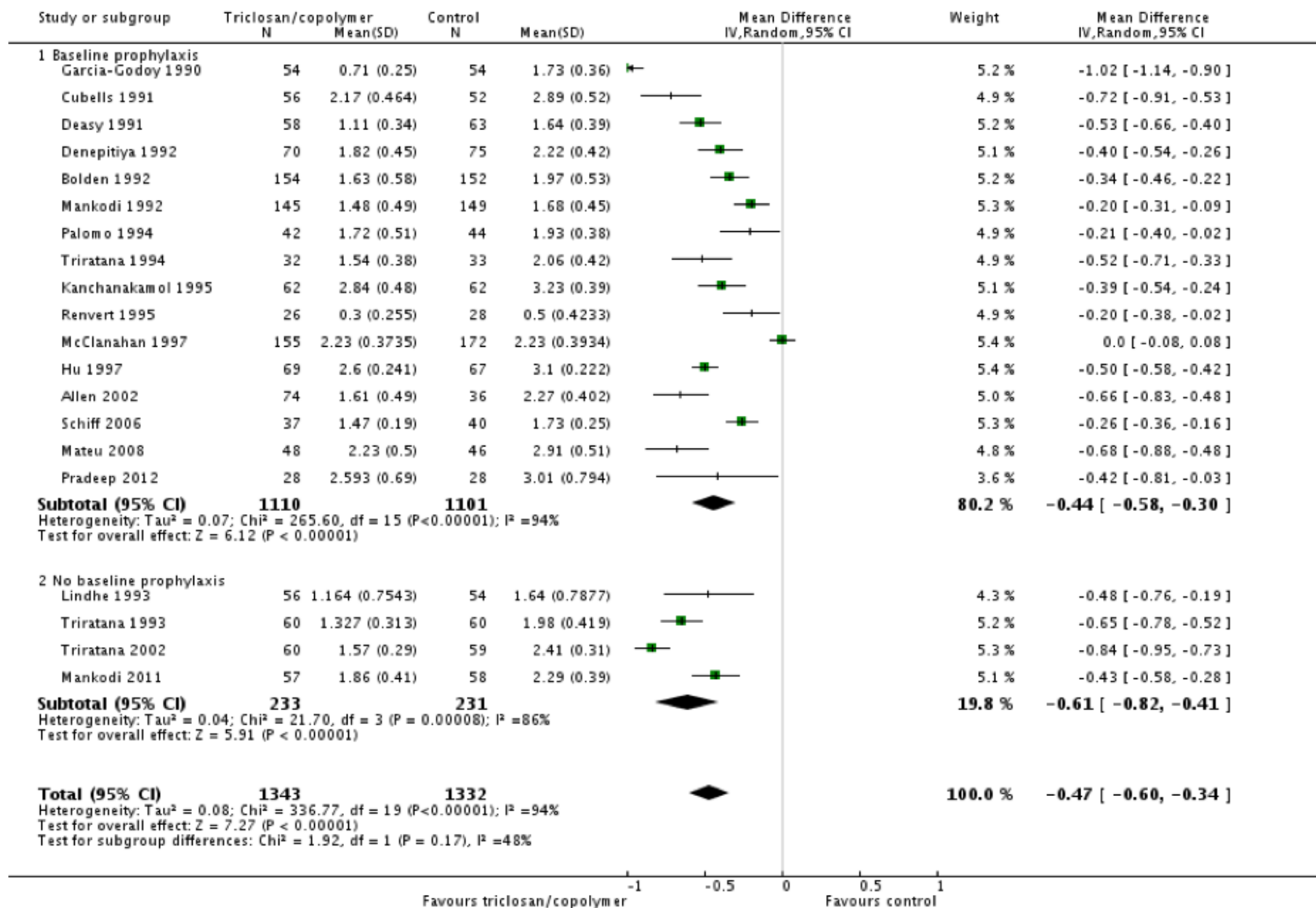


- If you want **less** of something to happen, such as fewer cavities and the experimental intervention is successful the results will show in the **left-hand side**

Risk & Odds

- Risks and odds are just ways of expressing chance
- Risk ratios and odds ratios are ways of comparing chances in more than one setting
- RR and OR differ when the event is common
- Risk difference shows the amount of change from baseline in absolute terms
- NNT communicates how many people would need to be treated for one extra to be helped
- ALL these estimates of treatment effect are uncertain, and should be presented with a confidence interval

Review: Triclosan/copolymer containing toothpastes for oral health
 Comparison: 1 Plaque
 Outcome: 1 Plaque at 6 to 7 months (Quigley-Hein Plaque Index)



Are the results relevant to your clinical practice?

- Not all valid research is relevant
- How generalisable are the findings?
- Is it feasible to implement the findings?

Are the results relevant to my problem?

- Are the participants similar to my patients
- Is it realistic for me to apply this to my patients

Summary

- Different types of questions require different types of evidence
- Need to be able to identify most appropriate evidence for your question
 - Ideally a systematic review
- Whatever the level of evidence its quality/validity and relevance to your practice needs to be considered

"If a man will begin with certainties, he shall end in doubts; but if he will be content to begin with doubts, he shall end in certainties."

The Advancement of Learning 1605, Francis Bacon 1561–1626

