HOW TO TEACH ABOUT TEACHING ABOUT SYSTEMATIC REVIEWS

David Nunan, PhD

Research Fellow at the Department of Primary Care Health Sciences and Tutor at Centre for Evidence based medicine

University of Oxford

November 2014

Feb 2015

?

8.30	
(Mon 09:15) 9.00-10.30	
10.30-11.00	
11.00-12.30	
12.30-13.30	
13.30-15.00	
15.00-15.30	
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18:30	

Small group work 1

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~~p (11.00-12.00)~~

3:30)Group nominated
emonstration to
Wrap up – Whats next
ghan)

urney home

roups


BOURBON

14 (42%)

If you had to teach an EBM session on systematic reviews, what would you consider the 'essentials'?

My aims for this session

Give sample of one of my sessions on SR

Pass on some of my teaching tips

Learn from you

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Hands up if the 1st (or 2nd) thing you do when preparing for a teaching session =

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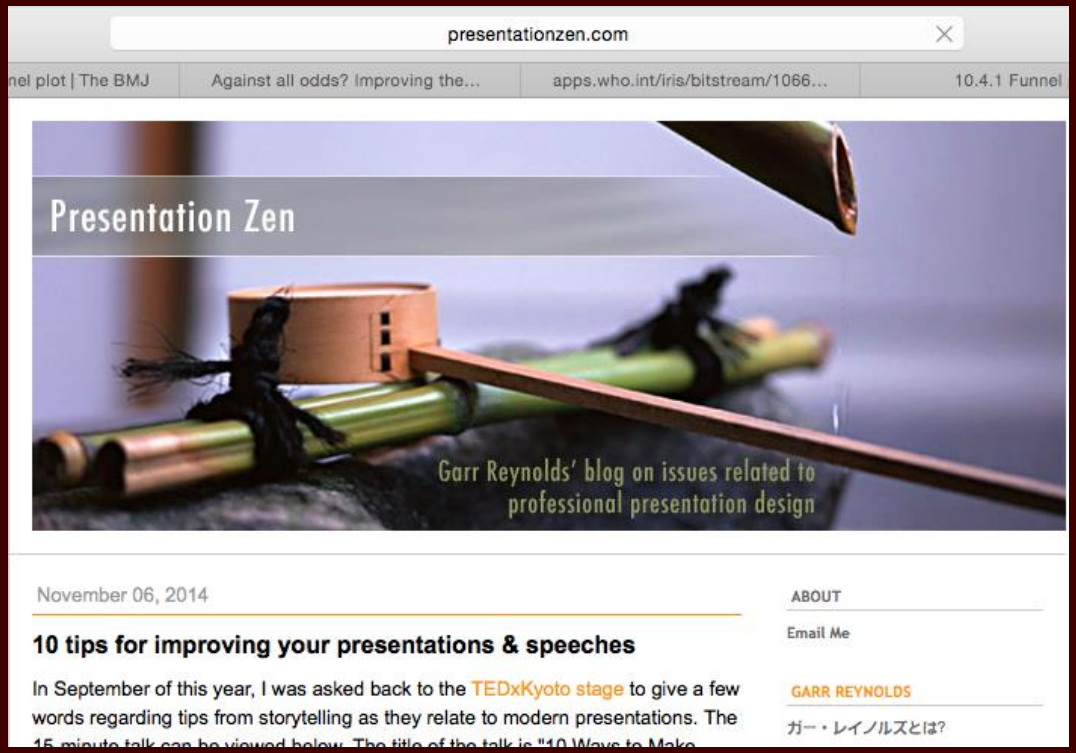
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Garr Reynolds' blog on issues related to professional presentation design
November 06, 2014
10 tips for improving your presentations & speeches
In September of this year, I was asked back to the TEDxKyoto stage to give a few words regarding tips from storytelling as they relate to modern presentations. The
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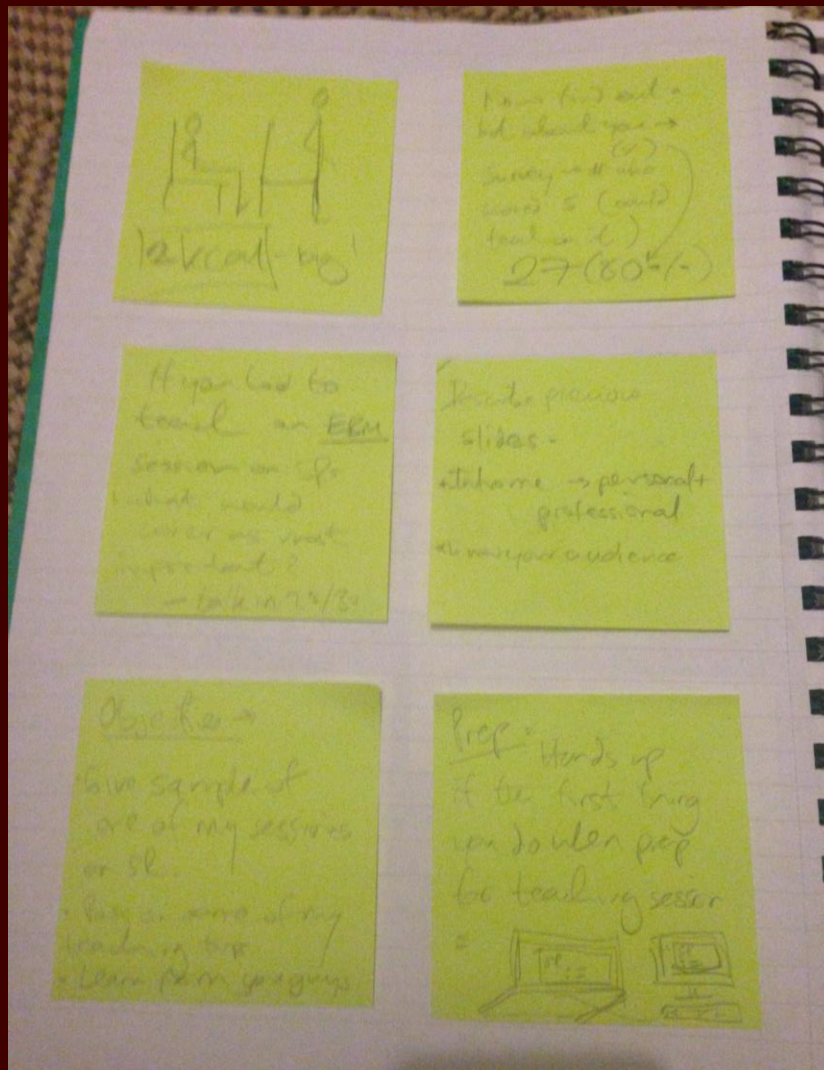
ガー・レイノルズとは?


If you had to
teach an EBM
slides
professional
know your audience
Give sample of
one of my sessions
Prep:
Hands up
if the first thing
you do when prep
for teaching session

Mr Smith is 64 years old and recently diagnosed with atrial fibrillation, a condition associated with a high risk of stroke.

You wish to know if prescribing warfarin will reduce his risk of stroke?

How will you answer this?

- *Conduct a trial?*
- *Search and appraise a relevant RCT?*
- *Conduct a systematic review?*
- *Search and appraise a relevant SR?*

EBM and Systematic Review

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EBM (quick & dirty)

- **Steps**
  1. Ask Question
  2. Search
  3. Appraise
  4. Apply

- Time: 120 seconds
- < 20 articles
- This patient survives!

Systematic Review

- **Steps**
  1. Ask Question
  2. Search ++++ x 2
  3. Appraise x 2
  4. Synthesize
  5. Apply

- Time: 6+ months, team
- < 2,000 articles
- This patient is dead

Find a systematic review (and appraise it quickly)!

What is a systematic review?

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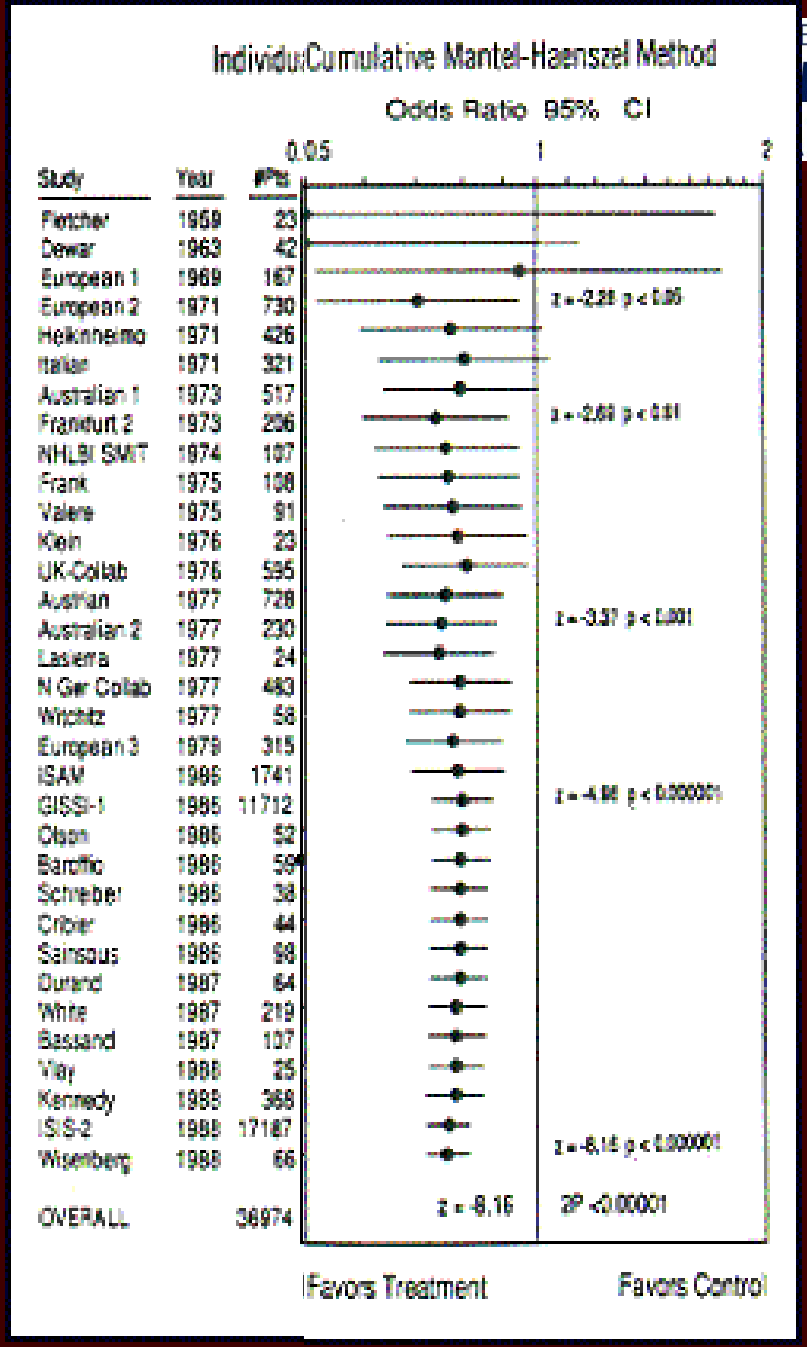
"The application of strategies that limit bias in the assembly, critical appraisal, and synthesis of all relevant studies on a specific topic"

Oxford Centre of Evidence Based Medicine (OCEBM) Levels Table

Ensures that all available evidence is taken into account and minimises "cherry-picking"

Not performing SRs can be dangerous and/or unethical!

How many people died unnecessarily because a systematic review wasn't performed?



What makes a review "Systematic"?

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Feature	Systematic review	Narrative review


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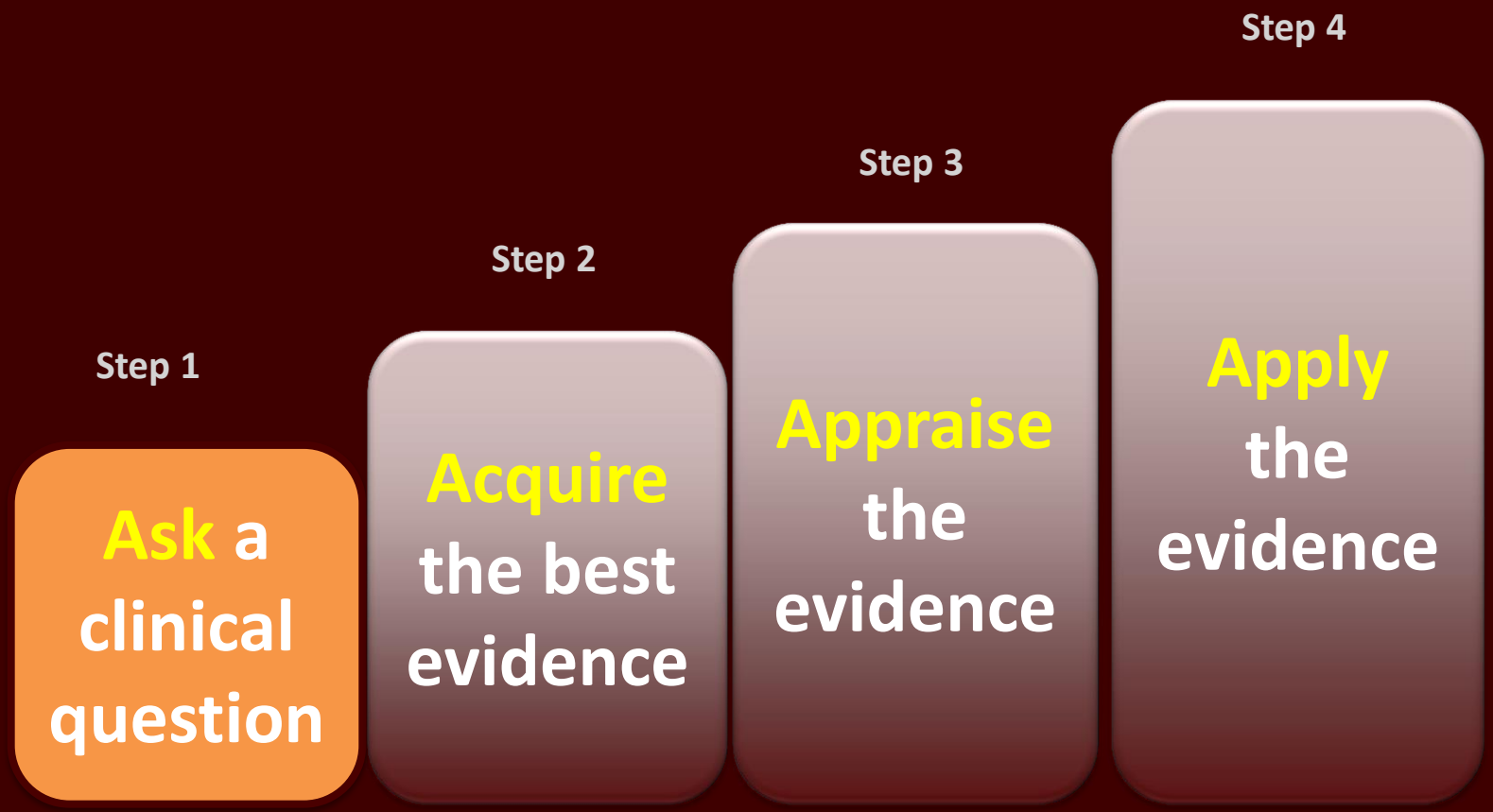
GUARÁ CA

Delay or not delay?

Practising EBM – the 4 A's



Step 1 – Framing the question

- Clear, unambiguous, *structured* question
- Questions formulated around:
  - **P** opulations of interest
  - **I** nterventions
  - **C** ontrol
  - **O** utcomes

Unstructured Question

"Is it better to delay knee surgery?"

- For what?
- For whom?
- Compared to what?
- What is meant by "better"?

Structured Question

Population
Amongst adults with acute ACL injuries, does

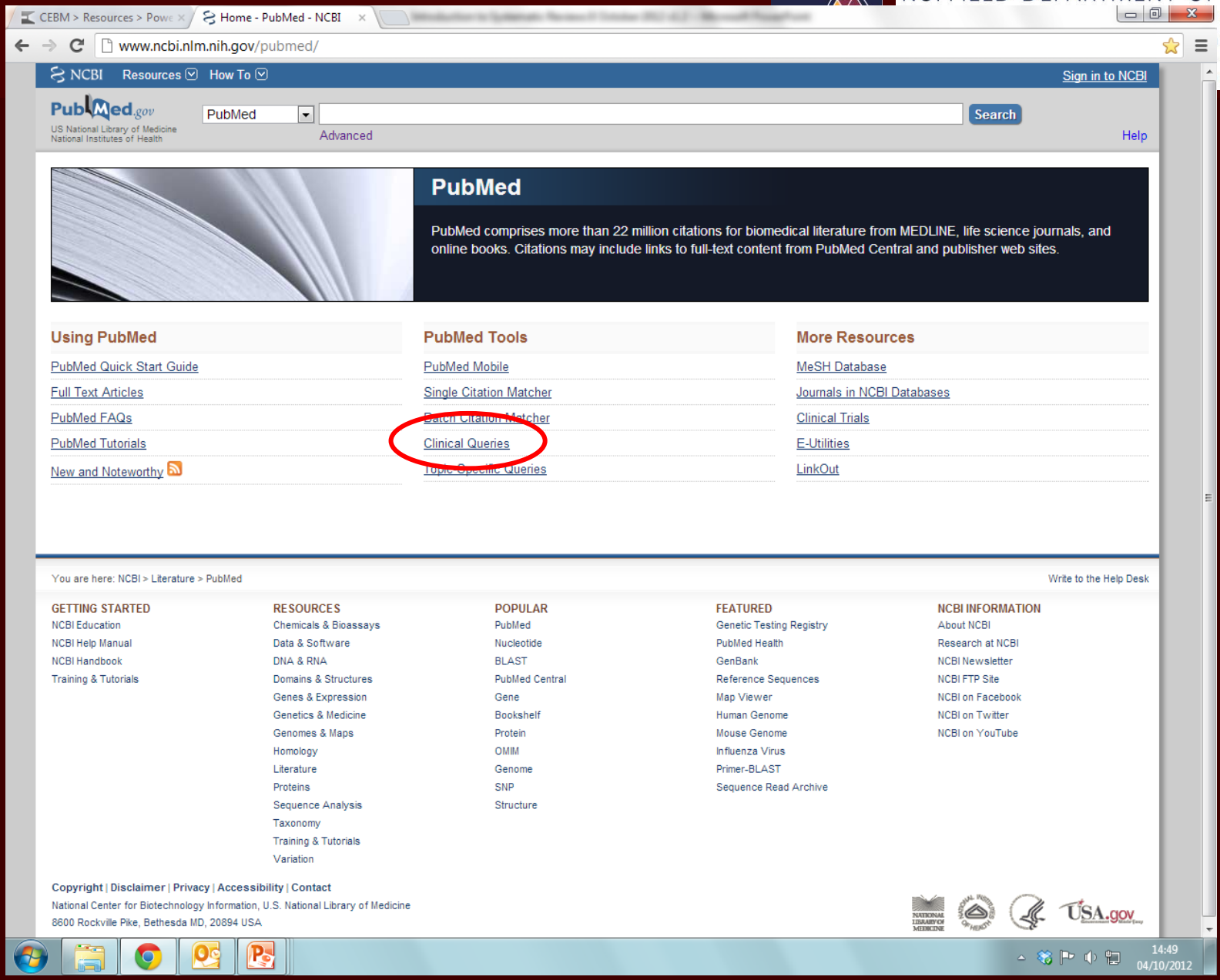
Intervention
early reconstructive surgery compared with

Control
delayed reconstructive surgery lead to

Outcome 1 *Outcome 2*
earlier return to former activity and/or less risk of

recurrent knee injury?

Practising EBM – the 4 A's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Results of searches on this pag
Anterior cruciate ligament early
Clinical Study Categories
Category: Therapy
Scope: Broad
Results: 5 of 18
Timing of Surgery of the Anterior C
Andernord D, Karlsson J, Musahl V, Bhan
Arthroscopy. 2013 Sep 18; . Epub 2013 S
Treatment for acute anterior cruciat
outcome of randomised trial.
Frobell RB, Roos HP, Roos EM, Roemer FV
BMJ. 2013 Jan 24; 346:f232. Epub 2013 J
The optimal timing for anterior cruc
with respect to the risk of postoper
Kwok CS, Harrison T, Servant C.
Arthroscopy. 2013 Mar; 29(3):556-65. Ep
[Infection after anterior cruciate liga
error in treatment?].
Regauer M, Neu J.
Unfallchirurg. 2012 Sep; 115(9):844-6.
Change in cartilage thickness, pos
lesions, and joint fluid volumes afte
two-year prospective MRI study of
Frobell RB.
J Bone Joint Surg Am. 2011 Jun 15; 93(12
Multiple-ligament knee injuries: a systematic review of the timing of operative intervention and postoperative rehabilitation.
Mook WR, Miller MD, Diduch DR, Hertel J, Boachie-Adjei Y, Hart JM.
J Bone Joint Surg Am. 2009 Dec; 91(12):2946-57.
Early versus delayed surgery for anterior cruciate ligament reconstruction: a systematic review and meta-analysis.
Smith TO, Davies L, Hing CB.
Knee Surg Sports Traumatol Arthrosc. 2010 Mar; 18(3):304-11. Epub 2009 Oct 17.
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Practising EBM – the 4 A's

‘Critical appraisal is the process of carefully and systematically examining research to judge its trustworthiness, and its value and relevance in a particular context.’

"Hang on. Systematic reviews collect, appraise and combine evidence."

"So why do we need to appraise them?"

Not all systematic reviews are high quality!

Concealing group allocation

February 1, 1995, Vol 273, No. 5 >

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ARTICLE | February 1, 1995

Empirical Evidence of Bias

Dimensions of Methodological Quality Associated With Estimates of Treatment Effects in Controlled Trials

Kenneth F. Schulz, PhD, MBA; Iain Chalmers, MBBS, MSc; Richard J. Hayes, MSc; Douglas G. Altman

JAMA. 1995;273(5):408-412. doi:10.1001/jama.1995.03520290060030. Text Size: A A A

Article | References

ABSTRACT

"Odds ratios were exaggerated by 41% for inadequately concealed trials and by 30% for unclearly concealed trials (adjusted for other aspects of quality)."

“Go it alone!”

Tools for critical appraisal

CASP: Critical Appraisal Skills Programme Checklists

Critically Appraised Topics: Generic systematic reviews (DARE; ACP Journal club)

SIGN: Scottish Intercollegiate Guidelines Network (based on AMSTAR)

CEBM: Centre for Evidence Based Medicine Appraisal Sheets (www.cebm.net)

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Critical Appraisal too

Critical appraisal worksheets to hel

Systematic Review Appraisal Sheet

SYSTEMATIC REVIEW: Are the results of the review valid?

What question (PICO) did the systematic review address?	
What is best?	Where do I find the information?
The main question being addressed should be clearly stated. The exposure, such as a therapy or diagnostic test, and the outcome(s) of interest will often be expressed in terms of a simple relationship.	The ***Title, Abstract*** *or final paragraph of the* ***Introduction*** should clearly state the question. If you still cannot ascertain what the focused question is after reading these sections, search for another paper!
This paper: Yes ☐ No ☐ Unclear ☐ Comment:	

F - Is it unlikely that important, relevant studies were missed?	
What is best?	Where do I find the information?
The starting point for comprehensive search for all relevant studies is the major bibliographic databases (e.g., Medline, Cochrane, EMBASE, etc) but should also include a search of reference lists from relevant studies, and contact with experts, particularly to inquire about unpublished studies. The search should not be limited to	The ***Methods*** section should describe the search strategy, including the terms used, in some detail. The ***Results*** section will outline the number of titles and abstracts reviewed, the number of full-text studies retrieved, and the number of studies excluded together with the reasons for exclusion. This information may be presented in a figure or

Critical appraisal

- 2 sections to CEBM systematic review appraisal sheet:
  - A: Are the results of the review valid?
  - B: What were the results?
- 6 questions in total
- We are going to work through each section as a group

Appraising a systematic review

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Knee Surg Sports Traumatol Arthrosc (2010) 18:304–311
DOI 10.1007/s00167-009-0965-z

KNEE

Early versus delayed surgery for anterior cruciate ligament reconstruction: a systematic review and meta-analysis

Toby O. Smith · Leigh Davies · Caroline B. Hing

Received: 1 July 2009 / Accepted: 5 October 2009 / Published online: 17 October 2009

Abstract There is no consensus in the literature regarding the optimal timing of surgical reconstruction of the ruptured anterior cruciate ligament (ACL). Previous authors have suggested that early reconstruction may facilitate an early return to work or sport but may increase the incidence of post-operative complications such as arthrofibrosis. This study systematically reviewed the literature to determine whether ACL reconstruction should be performed acutely following rupture. Medline, CINAHL, AMED, EMBASE databases and grey literature were reviewed with a meta-analysis of pooled mean differences where appropriate. Six papers including 370 ACL reconstructions were included. Early ACL reconstructions were considered as those undertaken within a mean of 3 weeks post-injury; delayed ACL reconstructions were those undertaken a minimum of 6 weeks post-injury. We found there was no difference in clinical outcome between patients who underwent early compared to delayed ACL reconstruction. However, this conclusion is based on the current literature which has substantial methodological limitations.

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Keywords Anterior cruciate ligament · Reconstruction · Timing of surgery · Meta-analysis

Introduction

The anterior cruciate ligament (ACL) is the most frequently injured ligament of the knee with an incidence of 8 per 100,000 cases per year [6, 28]. Surgery is the typical treatment for younger athletes or those with physically demanding occupational or sporting pursuits since it restores stability and limits the potential for progressive degeneration and long-term instability of the knee [2, 4, 19].

Surgical techniques of ACL reconstruction have evolved over the past three decades with debate regarding timing of reconstruction [37]. In a national survey by Francis et al. [12], of 101 consultant orthopaedic surgeons in the UK, 81% reported that they considered the ideal time span from injury to operation to be between 1 and 6 months, although it was acknowledged that only 35% of ACL reconstructions are performed within this time-frame in National Health Service hospitals.

Proponents of early surgical intervention during the initial weeks post-injury have suggested that restoring tibiofemoral stability may minimise the risk of further meniscal and chondral injury which may be associated with degenerative joint changes [3, 9, 35]. Early surgery may also facilitate return to sporting and occupational pursuits with considerable economic consequences. Delayed ACL reconstruction may be associated with an increase in muscle atrophy and reduced strength which may delay early rehabilitation [10, 29]. Conversely, delaying surgical intervention allows optimisation of pre-operative knee range of motion and recovery of surrounding soft tissues from the initial injury potentially reducing the incidence of

7 minutes

Question 1

1. What question (PICO) did the systematic review address?

- Is question clearly stated early on?
- Treatment/exposure described?
- Comparator/control described?
- Outcome(s) described?

Title, abstract, introduction

Knee Surg Sports Traumatol Arthrosc (2010) 18:304–311

post-operative arthrofibrosis and wound complications [17, 31, 37, 38].

There is no consensus in the current literature regarding the optimal time of surgical intervention [29]. The purpose of this study was to assess the effects of duration from injury to surgical intervention for patients undergoing ACL reconstruction by comparing the clinical and radiological outcomes of early to delayed ACL reconstruction following initial injury.

P
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Question 2

2. Is it unlikely that important, relevant studies were missed?

Look for

- Which bibliographic databases were used? More than 1?
- Search terms used (text and MeSH?)
- Search for unpublished as well as published studies?
- Search for non-English studies

Methods

Patients and methods

Data sources and searches

A database search was performed via Ovid of Medline (1950 to June 2009), CINAHL (1982 to June 2009), AMED (1985 to June 2009) and EMBASE (1974 to June 2009) using MeSH terms to identify all English-language randomised and non-randomised clinical trials specifically comparing outcomes of early versus delayed ACL reconstructions. The key word terms and Boolean operators used were "anterior cruciate ligament reconstruction" AND "surgery" AND "timing" OR "delay." We also searched for unpublished literature using the search term "anterior cruciate ligament" from the databases SIGLE (System for Information on Grey Literature in Europe), the National Technical Information Service, the National Research Register (UK) and Current Controlled Trials databases. We attempted to contact the corresponding authors of each included paper to highlight any omitted citations. Trials

Is finding all published studies enough?

- Negative studies less likely to be published than ‘Positive’ ones
- How does this happen?
- Positive studies SUBMITTED 2.5x more often than negative (Dickersin, JAMA, 1992)

Publication Bias: solutions (some)

- All trials registered at inception,
  - The National Clinical Trials Registry: Cancer Trials
  - National Institutes of Health Inventory of Clinical Trials and Studies
  - International Registry of Perinatal Trials
- Meta-Registry of trial Registries
  - www.clinicaltrials.gov
  - www.controlled-trials.com

Question 3

3. Were the criteria used to select articles for inclusion appropriate?

Look for

- Inclusion/exclusion criteria a priori?
- Are eligibility criteria related to PICO?
- Types of studies?

Methods

Patients and methods

Data sources and searches

A database search was performed via Ovid of Medline (1950 to June 2009), CINAHL (1982 to June 2009), AMED (1985 to June 2009) and EMBASE (1974 to June 2009) using MeSH terms to ide
randomised and non-randomised
comparing outcomes of early ve
or arthroscopic, the type of graft, gender or post-operative rehabilitation. The reference lists of review papers were scrutinised for relevant publications not identified by the initial search strategy. Single case reports, comments, letters, editorials, protocols, guidelines and review papers were excluded. We also excluded studies evaluating cases under the age of 16; studies of revision ACL reconstruction; studies presenting result of ACL repair rather than reconstruction; and papers which did not specifically detail the range of time between injury and surgery for their acute and delayed groups. Two investigators (TS, LD) independently selected articles meeting the inclusion criteria.

Is it worth continuing?

Question 4

4. Were the included studies sufficiently valid for the type of question?

Look for

- Criteria for quality assessment defined?
- Appropriate for the question?
- Were the assessment results provided?

Methods, Results

Criteria for quality assessment defined?

Data extraction and quality assessment

Two investigators (TS, LD), blinded to the source, publication date, authors and affiliations for each paper, used a standardised extraction form. All papers were then evaluated against the eleven-item PEDro scoring system by TS and LD independently. The PEDro appraisal tool has demonstrated reliability and validity in the assessment of

Appropriate for the question?

PEDro scale

1.	eligibility criteria were specified	no ❑ yes ❑ where:
2.	subjects were randomly allocated to groups (in a crossover study, subjects were randomly allocated an order in which treatments were received)	no ❑ yes ❑ where:
3.	allocation was concealed	no ❑ yes ❑ where:
4.	the groups were similar at baseline regarding the most important prognostic indicators	no ❑ yes ❑ where:
5.	there was blinding of all subjects	no ❑ yes ❑ where:
6.	there was blinding of all therapists who administered the therapy	no ❑ yes ❑ where:
7.	there was blinding of all assessors who measured at least one key outcome	no ❑ yes ❑ where:
8.	measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups	no ❑ yes ❑ where:
9.	all subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analysed by "intention to treat"	no ❑ yes ❑ where:
10.	the results of between-group statistical comparisons are reported for at least one key outcome	no ❑ yes ❑ where:
11.	the study provides both point measures and measures of variability for at	

Highest (best) score = 11

Lowest (worst) score = 0

Validated for RCTs

Were quality assessment results provided?

Table 3 PEDro critical appraisal results

	Bottoni et al. [4]	Marcacci et al. [26]	Meighan et al. [28]	Petersen and Laprell [34]	Sgaglione et al. [35]	Wasilewski et al. [42]
Eligibility criteria	1	0	1	0	1	0
Random allocation	1	0	1	0	0	0
Concealed allocation	1	0	0	0	0	0
Baseline comparability	1	0	0	0	0	1
Blind subject	0	0	0	0	0	0
Blind clinician	0	0	0	0	0	0
Blind assessor	0	0	1	0	0	0
Adequate follow-up	1	1	1	0	1	1
Intention-to treat analysis	0	0	1	0	0	0
Between-group analysis	1	1	1	1	1	1
Point estimates and variability	1	0	0	1	1	0
Total score	7	2	6	2	4	3

1 one point, 0 no point

Question 5

5. Were the results similar from study to study?

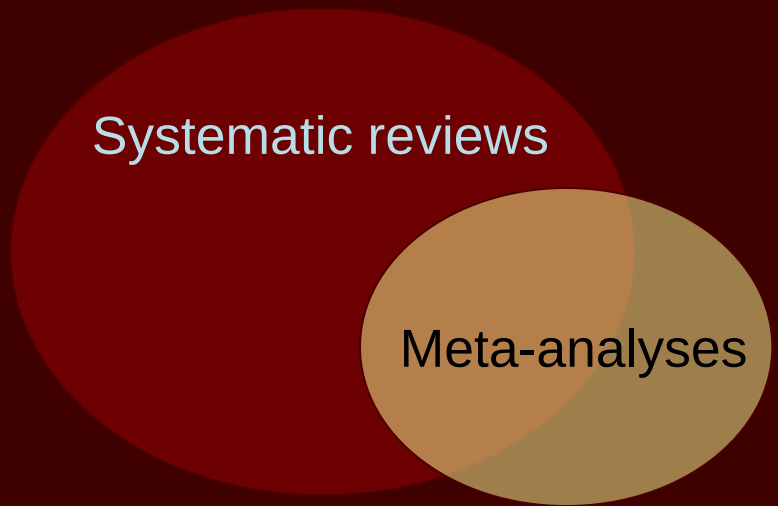
Consider whether

- The results of all the included studies are clearly displayed
- The results are combined (meta-analysis)
  - Results of different studies are sufficiently similar
- The reasons for any variations in results are discussed

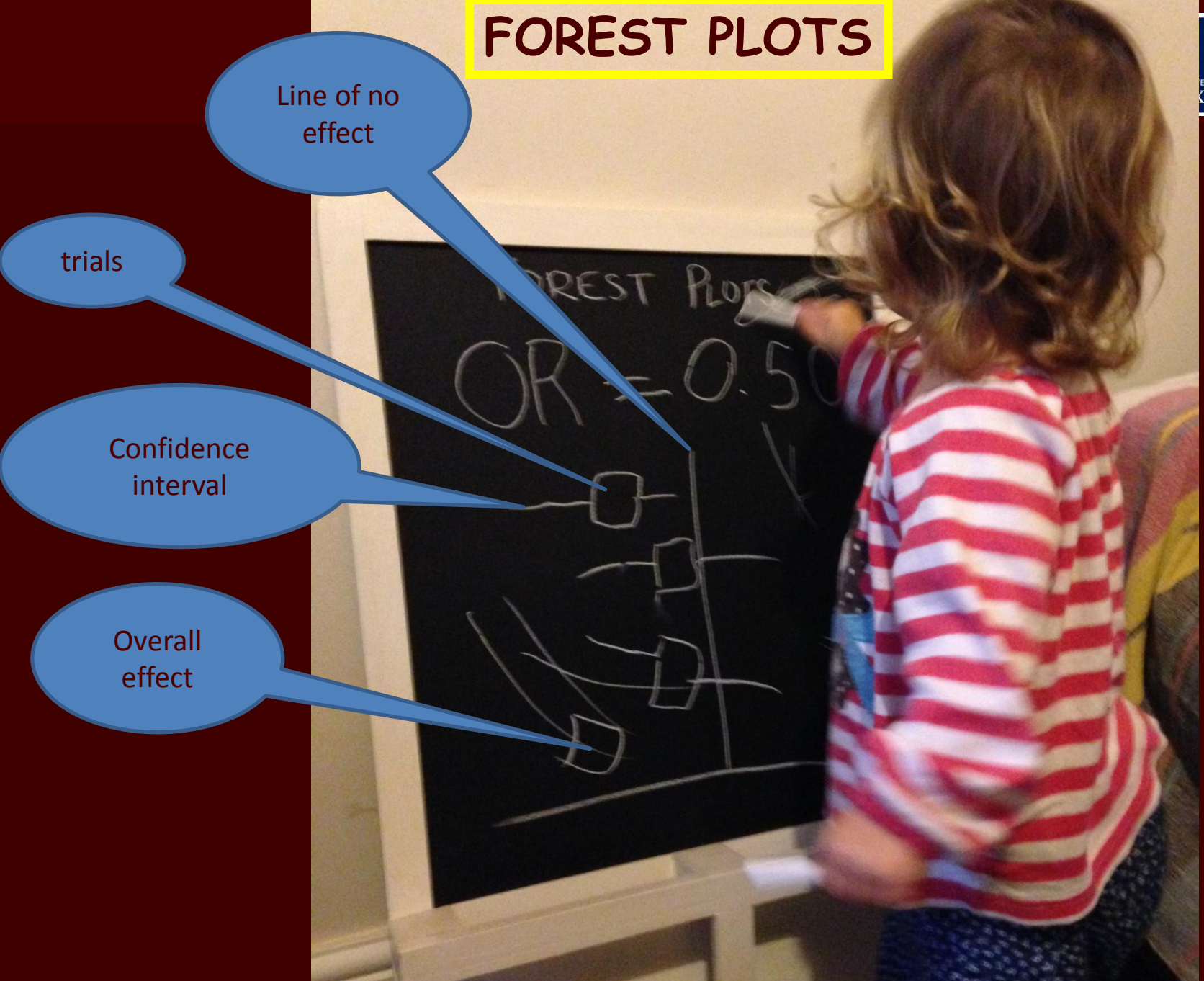
Meta-analysis

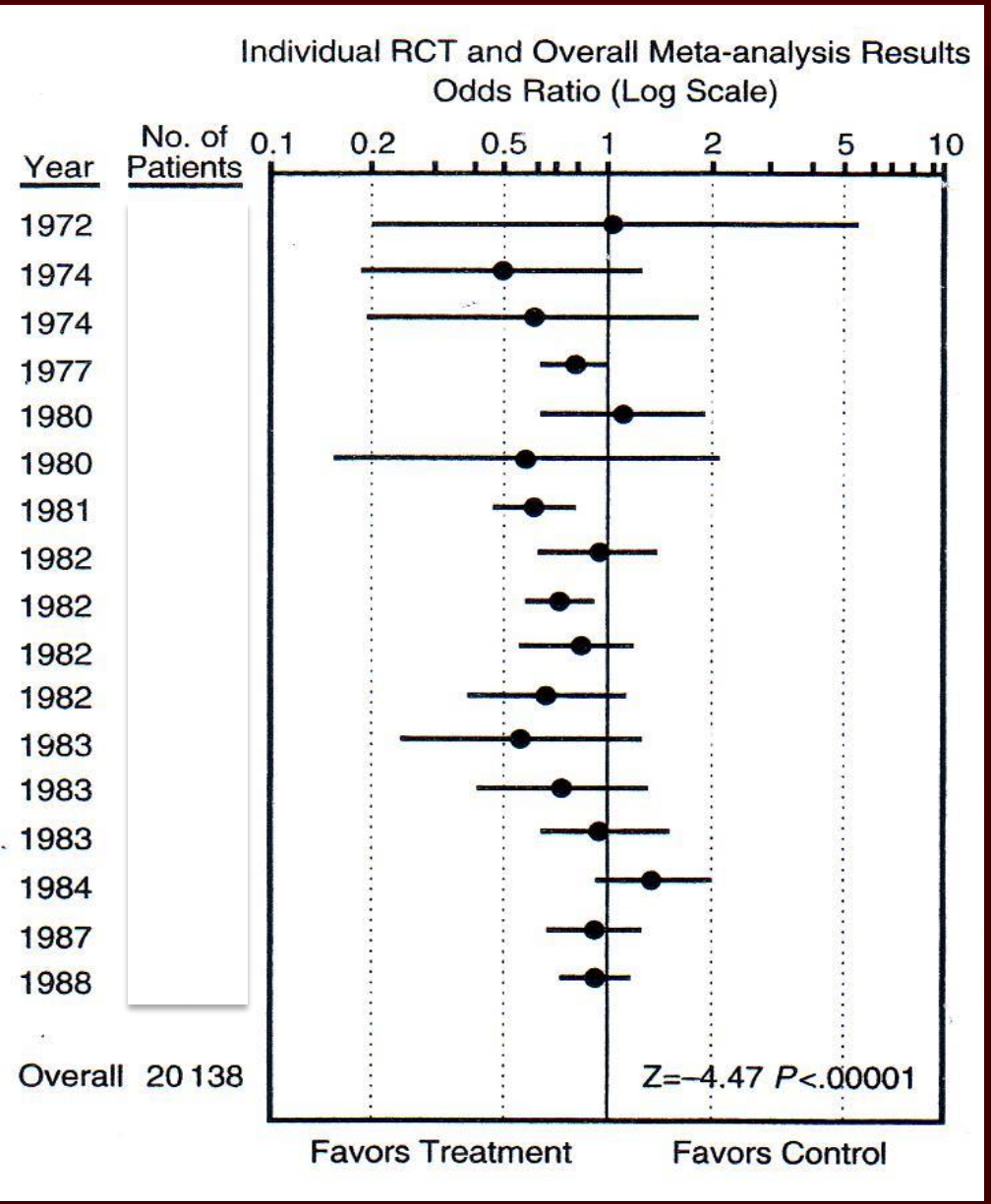
= calculated "best guess" of the true effect size

- The statistical combination of the results gives a pooled, weighted average of the primary results
- It weighs the effect size (result) of each study in relation to sample size of the study
- Optional part of SR

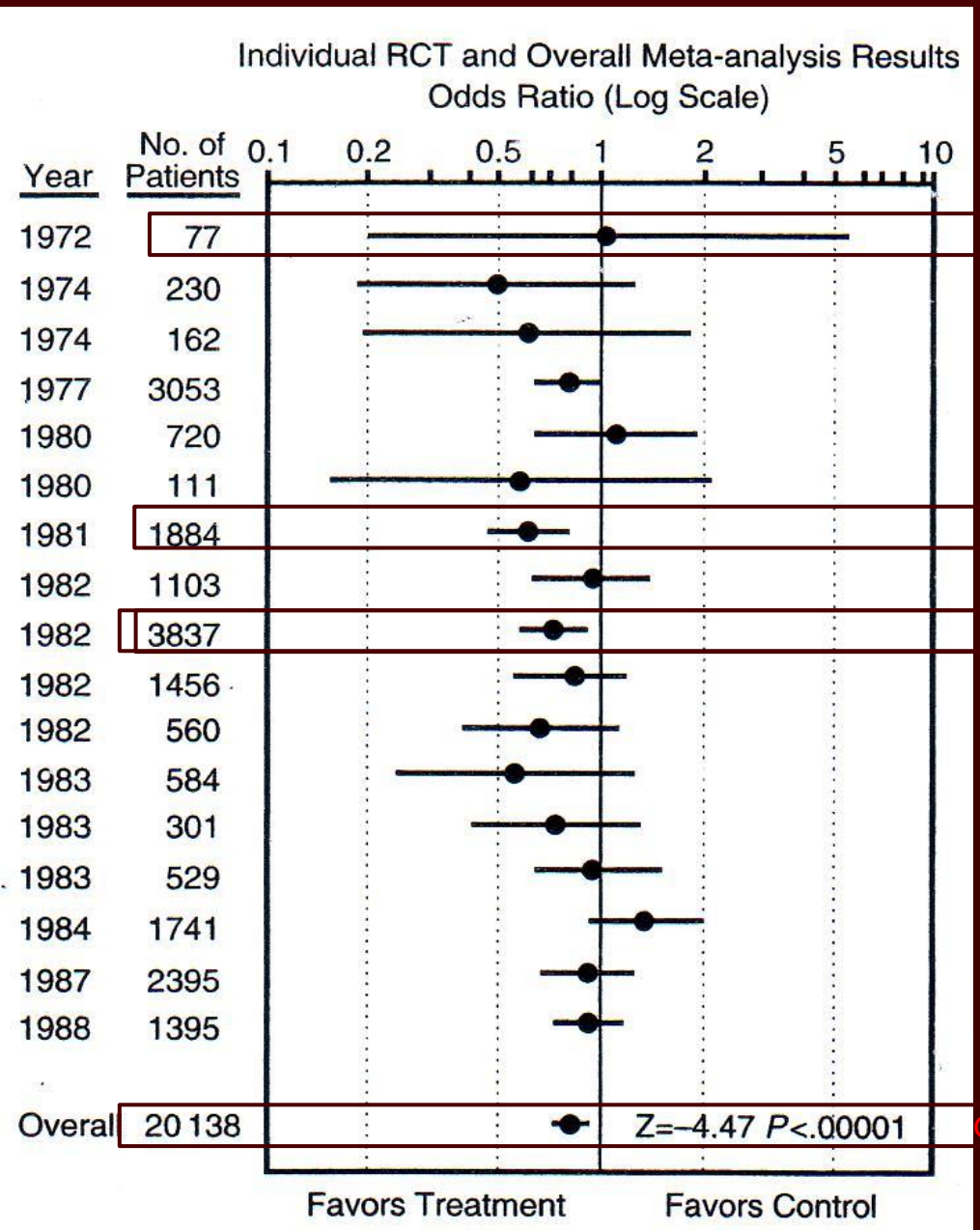


FOREST PLOTS



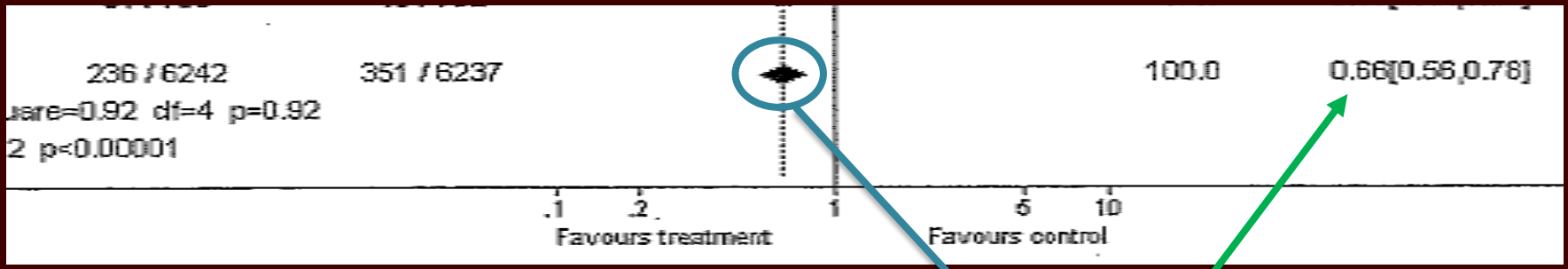


A. Which is the smallest study?
B. Which is the largest study?
C. How many are statistically significant?



A. Which is the smallest study?
B. Which is the largest study?
C. How many are statistically significant?

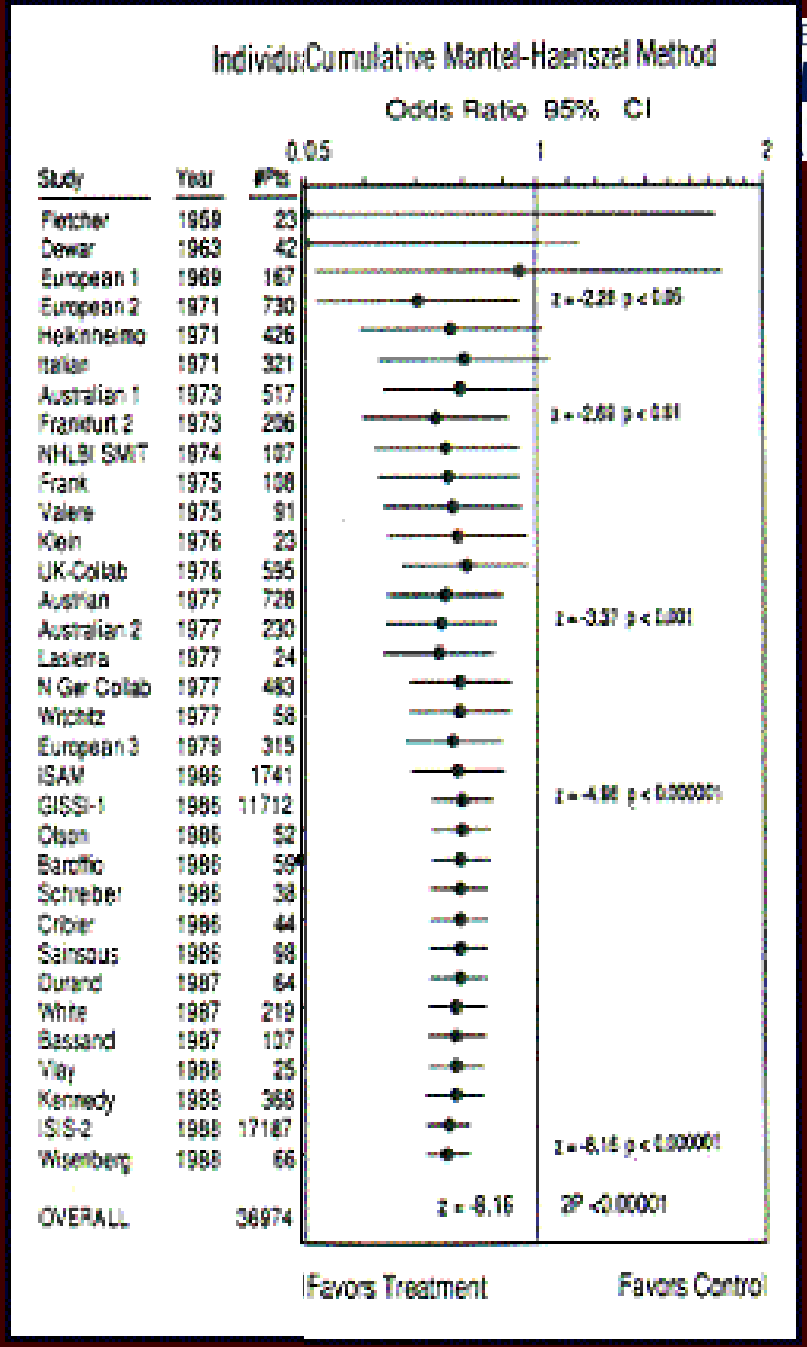
Should I give streptokinase following MI?



Effect size =
1 – 0.66 = 0.34 (0.44 – 0.22)
0.34 x 100 = 34% (44% - 22%)

There is a 34% reduced risk of mortality in the treatment compared to the control group

How many people died unnecessarily because a systematic review wasn't performed?



Heterogeneity

- **Clinical heterogeneity**

Variability in the participants, interventions and/or outcomes studied

- **Methodological heterogeneity**

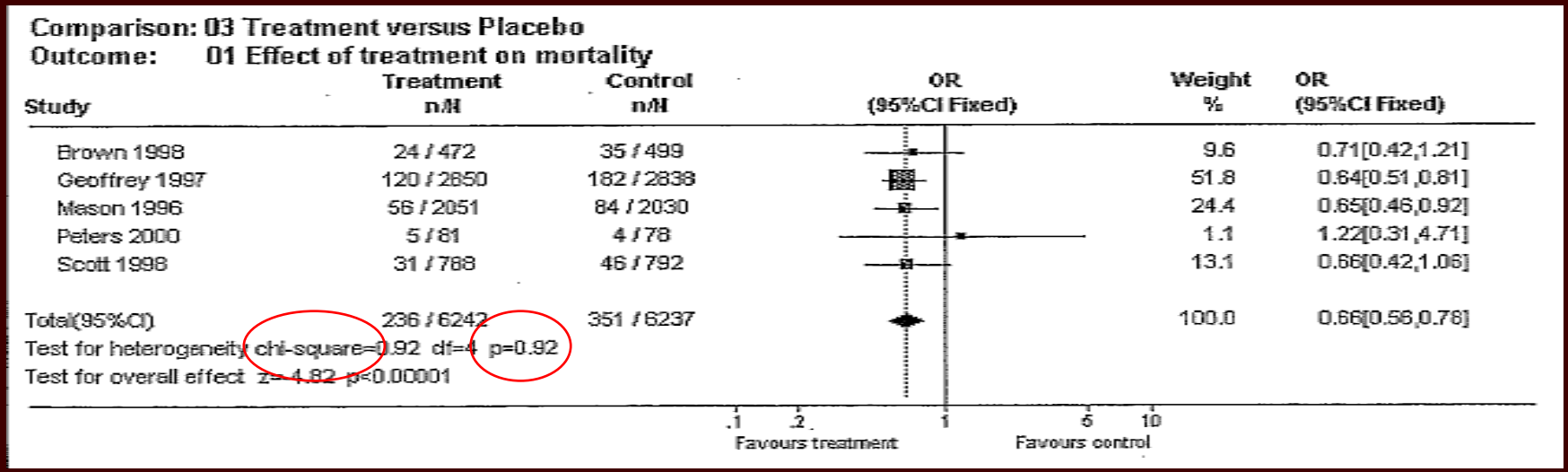
Variable in study design and risk of bias

- **Statistical heterogeneity**

The observed intervention effects being more different from each other than we would expect due to random error (chance) alone

Too much heterogeneity = inappropriate to pool data

Are the results similar across studies?



3 tests

1. 'Eyeball' test – do they look they same?
2. Formal tests
   a) Test of 'Null hypothesis' of no variation (Chi square, p-value)
   b) Proportion of variation not due to chance (I^2)
      - 0% to 40%: might not be important;
      - 30% to 60%: may represent moderate heterogeneity;
      - 50% to 90%: may represent substantial heterogeneity;
      - 75% to 100%: considerable heterogeneity

Are these trials different?

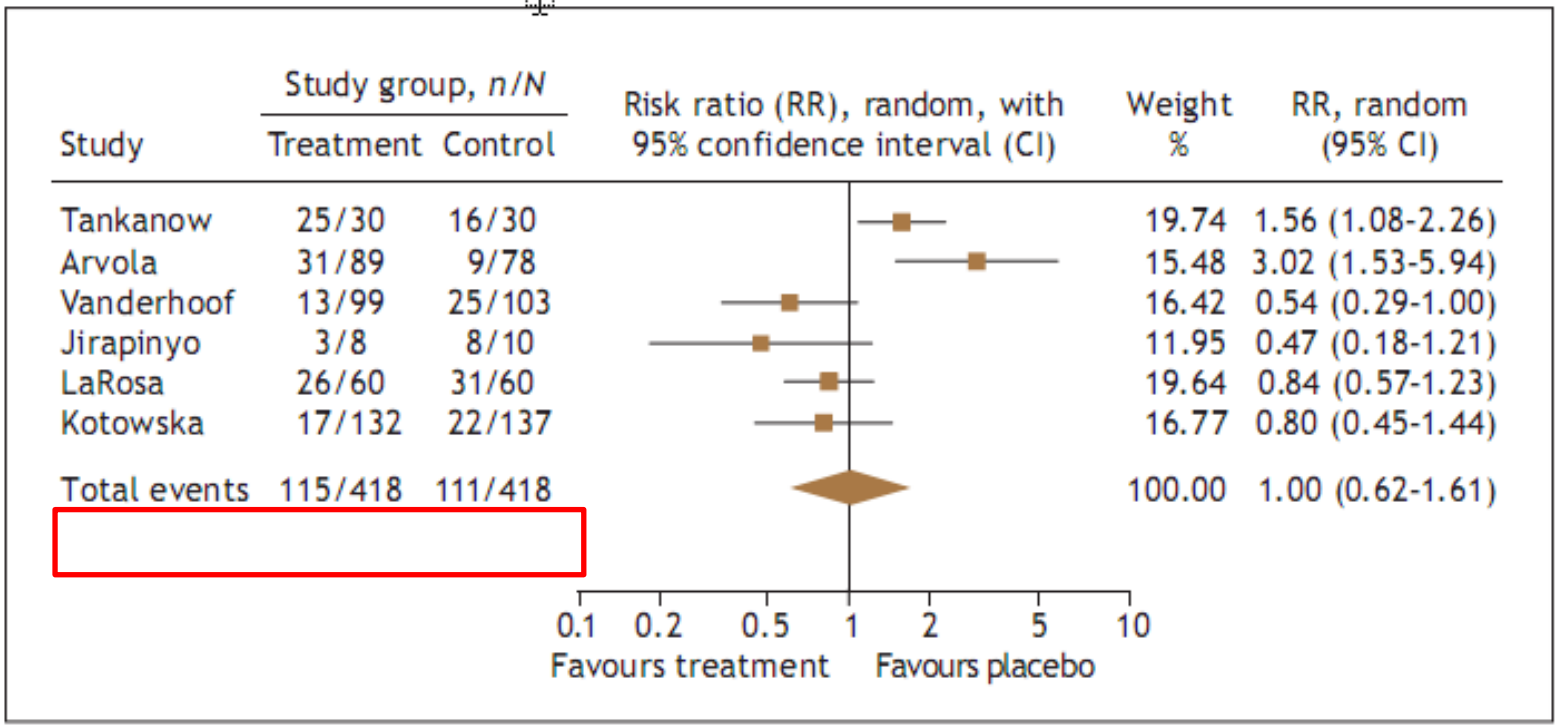


Fig 3: Incidence of antibiotic-associated diarrhea — intention-to-treat analysis. The analysis showed a nonsignificant difference between probiotics and placebo (z score) and statisti-

Were studies similar?

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Table 2 Results of meta-analysis

Outcome	Papers	Relative risk (95% CI)	Overall effect (*P* value)	Heterogeneity	
				χ^2	I^2
Lysholm Score	[4, 34, 35]	0.07 (−9.93, 10.08)*	0.99	0.02	81
Lysholm Score (Good/excellent)	[26]				
Tegner Score	[4, 34, 35]	−0.07 (−0.42, 0.29)*	0.71	0.60	0
KT-1000 Arthrometer	[4, 34, 35]	0.05 (−0.52, 0.63)*	0.85	0.19	42
Tibiofemoral Displacement > 3 mm	[25, 35]	0.59 (0.25, 1.43)	0.24	0.19	43
Positive Lachman	[26, 34, 35]	0.64 (0.27, 1.51)	0.31	0.02	73
Positive pivot shift	[26, 34, 35]	0.69 (0.43, 1.11)	0.13	0.52	0
Extension deficit	[4, 35]	−0.90 (−2.39, 0.59)*	0.24	N/E	N/E
Flexion deficit	[4, 35]	−0.50 (−2.55, 1.55)*	0.63	N/E	N/E
Extension deficit > 10°	[4, 26, 34]	0.96 (0.21, 4.37)	0.96	0.21	36
Incidence of arthrofibrosis	[28, 34, 35, 42]	1.83 (0.81, 4.14)	0.15	0.76	0
Incidence of meniscal injury	[4, 26, 28, 34, 42]	0.92 (0.71, 1.19)	0.53	<0.01	74
Incidence of chondral injury	[4, 26, 34, 42]	0.77 (0.44, 1.37)	0.38	0.26	25
Frequency of revision surgery	[26, 28, 34, 35, 42]	0.81 (0.42, 1.58)	0.54	0.30	17
Incidence of patellofemoral pain	[35, 42]	2.05 (0.86, 4.89)	0.11	0.58	0
Incidence of thromboembolic complication	[28, 35]	1.79 (0.21, 27.29)	0.68	0.21	37

* Mean difference (95% confidence intervals), ° degrees, *CI* confidence intervals, *mm* millimetres, N/E not estimated

Question 6

6. What were the results? How are they presented?

Consider

- If you are clear about the review's 'bottom line' results
- What these are (numerically if appropriate)
- How were the results expressed (risk ratio, odds ratio etc)

Table 2

What's missing? What are we interested in?

Table 2 Results of meta-analysis

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Page 306:

There was no statistically significant difference between the early and delayed ACL reconstruction groups for the Lysholm score or Tegner score (Table 2). There was no significant difference between the groups for International Knee Documentation Committee rating score [not significant (n.s.)] [26], IKDC perceived stability rating (n.s.) [26], or the Hospital for Special Surgery score system (n.s.) [35]. There was no reported significant difference in patient satisfaction ($P = 0.19$) [35]. The frequency that patients returned to the same level of sporting participation was assessed in Marcacci et al.'s [26] paper. This reported that there was no statistically significant difference in return rates between the two groups (n.s.) [26].

What where the results?

Table 2 Results of meta-analysis

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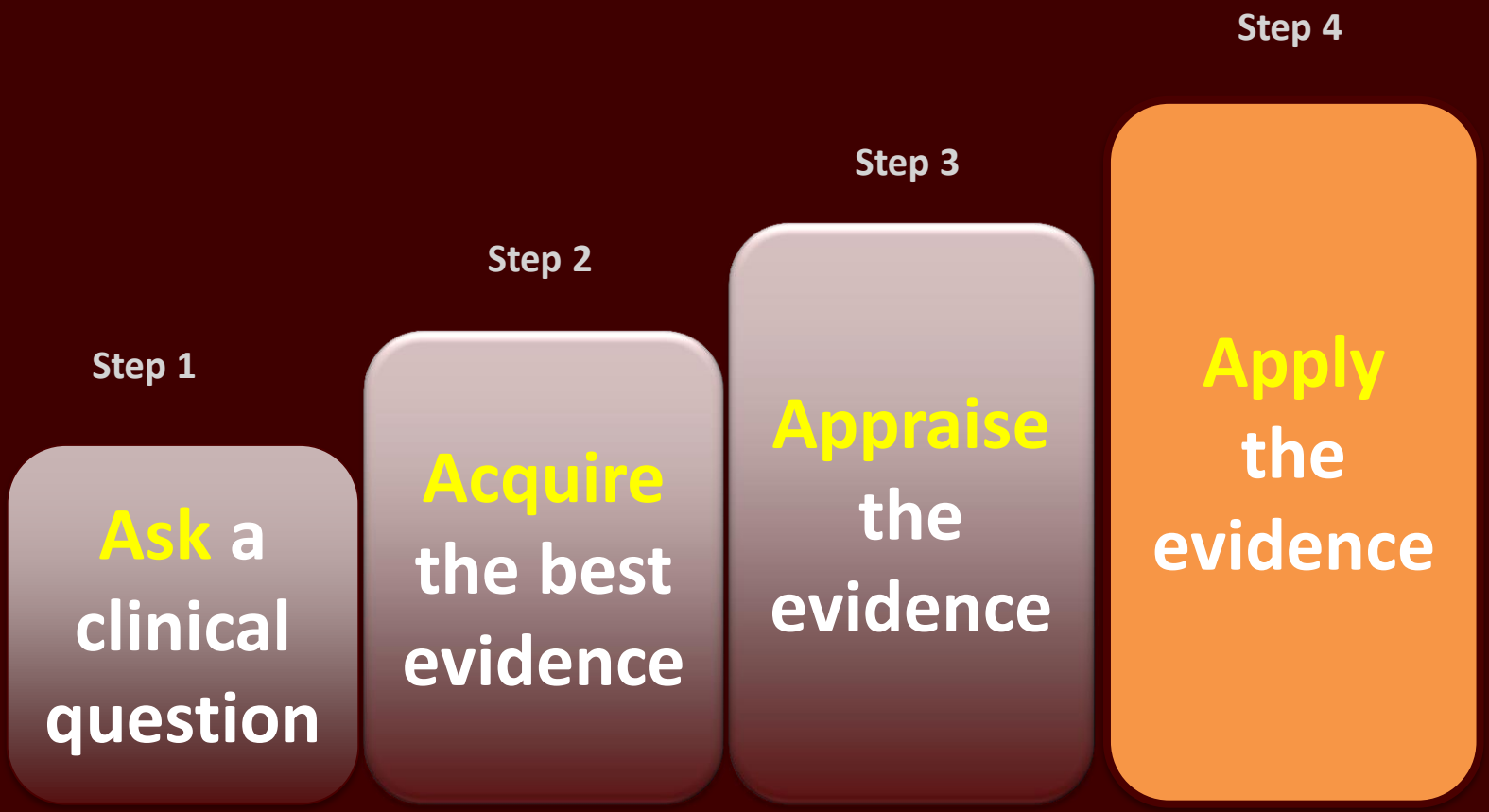
Conclusions

Conclusions

The findings of this study suggested that there was no statistically significant difference in outcomes between those patients who underwent earlier compared to delayed ACL reconstruction. The present evidence-base presented with substantial methodological limitations. A sufficiently powerful, well-design randomised controlled trial is required to determine whether of duration from injury to surgical intervention is an important prognostic indicator for patients who undergo an ACL reconstruction.

Practising EBM – the 4 A's



Can I apply these results to my case?

- Is my patient so different to those in the study that the results cannot apply?

early were compared to 209 delayed procedures. The mean age was 25.6 years in the early group [Standard deviation (SD) = 2.3] compared to 26.2 years (SD = 1.1) in the delayed group (Table 1).

Delay or not delay?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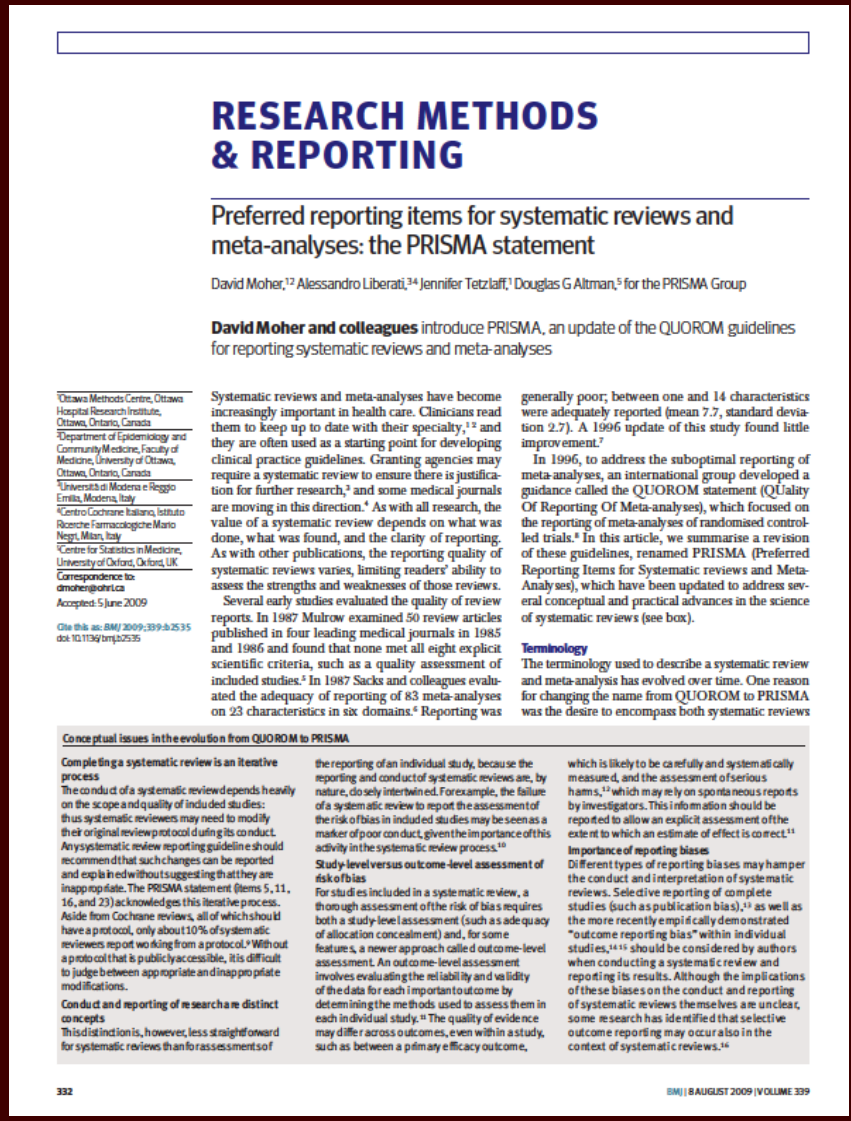
Preferred Reporting Items for Systematic Reviews and Meta-Analyses

- Consists of a 27-item checklist and four phase flow diagram
- Evidence-based minimum set of items for reporting in systematic reviews and meta-analyses
- Can be used for critical appraisal but not designed for it

http://www.prisma-statement.org/



RESEARCH METHODS & REPORTING

Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement

David Moher,[1,2] Alessandro Liberati,[3,4] Jennifer Tetzlaff,[1] Douglas G Altman,[5] for the PRISMA Group

David Moher and colleagues introduce PRISMA, an update of the QUOROM guidelines for reporting systematic reviews and meta-analyses

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Systematic reviews and meta-analyses have become increasingly important in health care. Clinicians read them to keep up to date with their specialty,[1 2] and they are often used as a starting point for developing clinical practice guidelines. Granting agencies may require a systematic review to ensure there is justification for further research,[3] and some medical journals are moving in this direction.[4] As with all research, the value of a systematic review depends on what was done, what was found, and the clarity of reporting. As with other publications, the reporting quality of systematic reviews varies, limiting readers' ability to assess the strengths and weaknesses of those reviews.

Several early studies evaluated the quality of review reports. In 1987 Mulrow examined 50 review articles published in four leading medical journals in 1985 and 1986 and found that none met all eight explicit scientific criteria, such as a quality assessment of included studies.[5] In 1987 Sacks and colleagues evaluated the adequacy of reporting of 83 meta-analyses on 23 characteristics in six domains.[6] Reporting was generally poor; between one and 14 characteristics were adequately reported (mean 7.7, standard deviation 2.7). A 1996 update of this study found little improvement.[7]

In 1996, to address the suboptimal reporting of meta-analyses, an international group developed a guidance called the QUOROM statement (QUality Of Reporting Of Meta-analyses), which focused on the reporting of meta-analyses of randomised controlled trials.[8] In this article, we summarise a revision of these guidelines, renamed PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses), which have been updated to address several conceptual and practical advances in the science of systematic reviews (see box).

Terminology

The terminology used to describe a systematic review and meta-analysis has evolved over time. One reason for changing the name from QUOROM to PRISMA was the desire to encompass both systematic reviews

Conceptual issues in the evolution from QUOROM to PRISMA

Completing a systematic review is an iterative process
The conduct of a systematic review depends heavily on the scope and quality of included studies: thus systematic reviewers may need to modify their original review protocol during its conduct. Any systematic review reporting guideline should recommend that such changes can be reported and explained without suggesting that they are inappropriate. The PRISMA statement (items 5, 11, 16, and 23) acknowledges this iterative process. Aside from Cochrane reviews, all of which should have a protocol, only about 10% of systematic reviewers report working from a protocol.[9] Without a protocol that is publicly accessible, it is difficult to judge between appropriate and inappropriate modifications.

Conduct and reporting of research are distinct concepts
This distinction is, however, less straightforward for systematic reviews than for assessment of the reporting of an individual study, because the reporting and conduct of systematic reviews are, by nature, closely intertwined. For example, the failure of a systematic review to report the assessment of the risk of bias in included studies may be seen as a marker of poor conduct, given the importance of this activity in the systematic review process.[10]

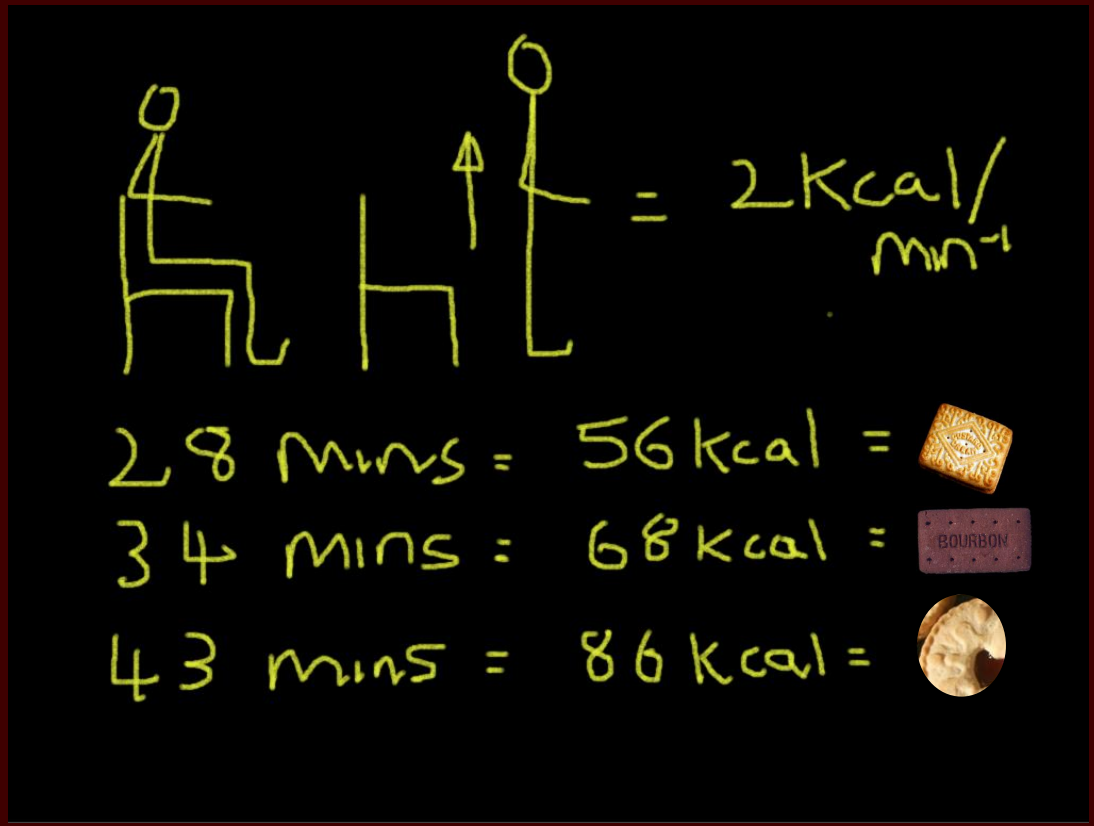
Study-level versus outcome-level assessment of risk of bias
For studies included in a systematic review, a thorough assessment of the risk of bias requires both a study-level assessment (such as adequacy of allocation concealment) and, for some features, a newer approach called outcome-level assessment. An outcome-level assessment involves evaluating the reliability and validity of the data for each important outcome by determining the methods used to assess them in each individual study.[11] The quality of evidence may differ across outcomes, even within a study, such as between a primary efficacy outcome, which is likely to be carefully and systematically measured, and the assessment of serious harms,[12] which may rely on spontaneous reports by investigators. This information should be reported to allow an explicit assessment of the extent to which an estimate of effect is correct.[11]

Importance of reporting biases
Different types of reporting biases may hamper the conduct and interpretation of systematic reviews. Selective reporting of complete studies (such as publication bias),[13] as well as the more recently empirically demonstrated "outcome reporting bias" within individual studies,[14 15] should be considered by authors when conducting a systematic review and reporting its results. Although the implications of these biases on the conduct and reporting of systematic reviews themselves are unclear, some research has identified that selective outcome reporting may occur also in the context of systematic reviews.[16]

‘Clinical pearls’

- Look for ‘key’ references: AMSTAR, PRISMA, Cochrane Risk of Bias
  - If absent, may be an indication of a poor quality review
- I^2 >50%: adequate statistical heterogeneity to suggest looking deeper into clinical, methodological heterogeneity reported
- Would your patient meet the inclusion criteria of trials/studies in the review?

30 minutes!


= 2Kcal/min⁻¹
28 mins = 56kcal =
34 mins = 68kcal =
BOURBON
43 mins = 86kcal =

Summary

Teach only what the needs of the audience dictates

Have a hook

Keep it simple