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Sociedad Argentina de Medicina Física y Rehabilitación

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ISPRM Conference

Buenos Aires, 30 April – 4 May, 2017

Cochrane Rehabilitation Symposium

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Disclosure

I have no conflicts of interest with anything in this presentation

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How to read a systematic review

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- musculoskeletal injuries and diseases is the leading cause of long-term pain and physical disability
- associated with 130 million health care encounters and estimated to cost over $50 billion annually in the United States
- the Cochrane Musculoskeletal Review Group (CMSG) is among the largest review groups in the Cochrane Collaboration, responsible for more than 200 SRs

Horton R. GBD 2010: understanding disease, injury, and risk. Lancet. 2012;380(9859):2053–2054.

HSE: The health and safety executive statistics 2010/11 In.: http://www.hse.gov.uk/statistics/overall/hssh1011.pdf Accessed 31 Jan 2016.

Utterback DF, Schnorr TM: Use of workers' compensation data for occupational safety and health: proceedings from June 2012 workshop. In US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. In.http://www.cdc.gov/niosh/topics/workercomp/cwcs/publications.html: Assessed 25 Aug 2016.

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systematic reviews (SR's) - answers a defined research question by collecting and summarising all empirical evidence that fits pre-specified eligibility criteria

meta-analysis - use of statistical methods to summarise the results of these studies

key elements in both evidence-based healthcare and evidence-based research

SR's support clinicians in making well-informed decisions about health care and researchers in deciding which topics are the most relevant for new research

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Which databases is necessary to search and how many?

- comprehensive literature search to identify all published studies relevant to the specific research question

- The Cochrane Collaborations Methodological Expectations of Cochrane Intervention Reviews (MECIR) guidelines state that searching MEDLINE, EMBASE and CENTRAL should be considered mandatory

Chandler J, Churchill R, Higgins J, Lasserson T, Tovey D. Methodological standards for the conduct of new Cochrane Intervention Reviews. The Cochrane Unit. 2013;2:3.

Aagard T, Lund H, Juhl C. BMC Med Res Methodol 2016; 16: 161

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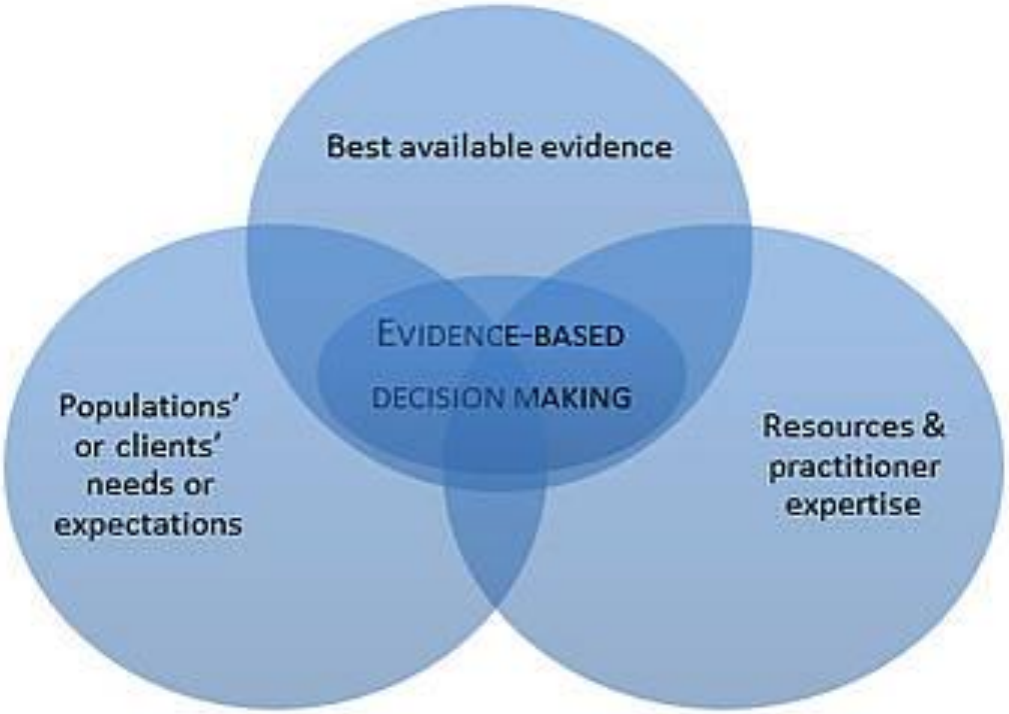

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Steps which lead to systematic review

1. **Framing the question** - clear, unambiguous and structured questions before beginning the review work

2. **Identifying relevant work** - To capture as many relevant citations as possible, a wide range of medical and scientific databases were searched to identify primary studies

3. **Assesing the quality of studies** - Selected studies should be subjected to a more refined quality assessment by use of general critical appraisal guides and design-based quality checklists

4. **Summarizing the evidence** - Data synthesis consists of tabulation of study characteristics, quality and effects as well as use of statistical methods for exploring differences between studies and combining their effects (meta-analysis). Exploration of heterogeneity and its sources should be planned in advance (Step 3). If an overall meta-analysis cannot be done, subgroup meta-analysis may be feasible

5. **Interpreting the findings** - The risk of publication bias and related biases should be explored. Exploration for heterogeneity should help determine whether the overall summary can be trusted, and, if not, the effects observed in high-quality studies should be used for generating inferences. Any recommendations should be graded by reference to the strengths and weaknesses of the evidence

Khan KS, Kunz R, Kleijnen J, Antes G. J R Soc Med 2003; 96(3): 118–21.

Khan KS, Kunz R, Kleijnen J, Antes G. Systematic Reviews to Support Evidence-Based Medicine. How to Review and Apply findings of Health Care Research. London: RSM Press, 2003. [http://www.rsmpress.co.uk/bkkhan.htm]

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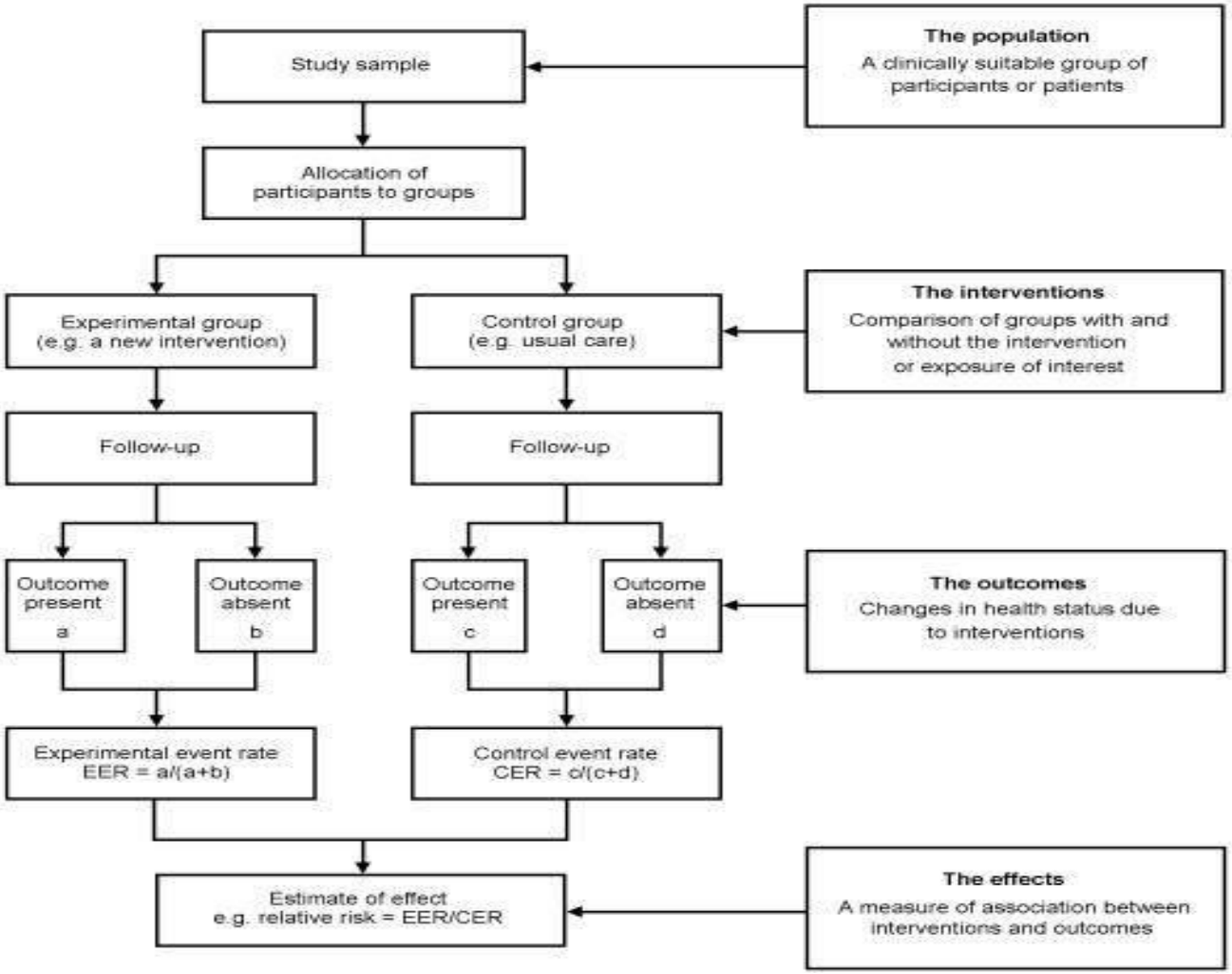

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Interpreting forest plots and meta-analysis statistics

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Meta-analysis

- formal, epidemiological study design used to systematically assess the results of previous research to derive conclusions about that body of research

- **Steps in meta-analysis**: formulation of problem, literature search, selection of studies, decision which dependent variables or summary measures are allowed, selection of a meta-regression statistical model
- useful guide to improve reporting of systematic reviews and meta-analyses is the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-analyses) statement

- the results of meta-analyses are often presented in a forest plot (each study is shown with its effect size and the corresponding 95% confidence interval)

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Meta-analysis

- to examine the results of each meta-analysis for **evidence of publication bias**
- several methods have been developed to provide an assessment of publication bias - most commonly used is the funnel plot
- the classical meta-analysis compares two treatments while network meta-analysis (or multiple treatment metaanalysis) can provide estimates of treatment efficacy of multiple treatment regimens
- meta-analysis can also be used to summarize the performance of diagnostic and prognostic tests

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Forest plot (blobbogram)

- graphical representation of a meta-analysis of the results of RCT's
- accompanied by a table listing references (author and date) of the studies included in the meta-analysis → addressing one particular question
- the right-hand column is a plot of the measure of effect (*e.g.* an odds ratio) for each of these studies (often represented by a square) incorporating confidence intervals represented by horizontal lines

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Interpretation of forestplots...

1. **To determine the effect size**: black diamond at the bottom of the graph shows the average effect size of the studies

2. **Assess the heterogeneity (or difference) between studies: -** if heterogeneity is due to chance (or not) by interpreting the **I^2 statistic** (found at the bottom of the table in a forest plot)

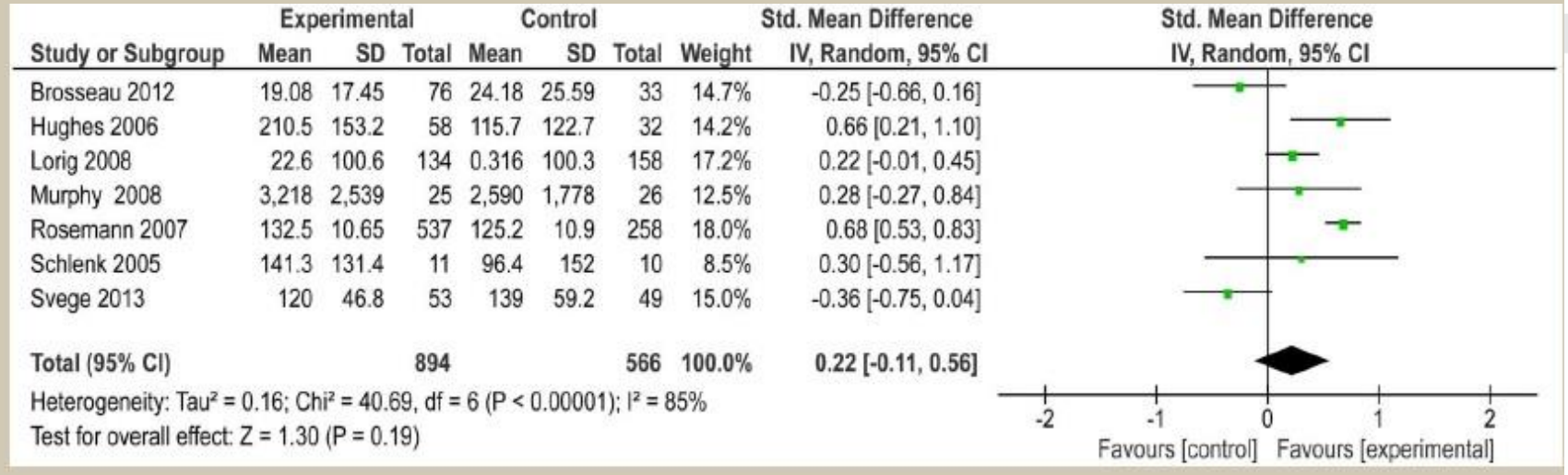
   - I^2 statistic > 50% is considered high

3. **.....finally**: **Evidence-based interventions or programmes are those which have been proven effective in multiple, high-quality randomised controlled trials (RCTs)**

BMJ Open

Behavioural physical activity interventions in participants with lower-limb osteoarthritis: a systematic review with meta-analysis

Wilby Williamson,[1] Stefan Kluzek,[2] Nia Roberts,[3] Justin Richards,[4] Nigel Arden,[2] Paul Leeson,[1] Julia Newton,[2] Charlie Foster[5]



	Experimental			Control				Std. Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI
Brosseau 2012	19.08	17.45	76	24.18	25.59	33	14.7%	-0.25 [-0.66, 0.16]
Hughes 2006	210.5	153.2	58	115.7	122.7	32	14.2%	0.66 [0.21, 1.10]
Lorig 2008	22.6	100.6	134	0.316	100.3	158	17.2%	0.22 [-0.01, 0.45]
Murphy 2008	3,218	2,539	25	2,590	1,778	26	12.5%	0.28 [-0.27, 0.84]
Rosemann 2007	132.5	10.65	537	125.2	10.9	258	18.0%	0.68 [0.53, 0.83]
Schlenk 2005	141.3	131.4	11	96.4	152	10	8.5%	0.30 [-0.56, 1.17]
Svege 2013	120	46.8	53	139	59.2	49	15.0%	-0.36 [-0.75, 0.04]
Total (95% CI)			**894**			**566**	**100.0%**	**0.22 [-0.11, 0.56]**

Heterogeneity: Tau² = 0.16; Chi² = 40.69, df = 6 (P < 0.00001); I² = 85%

Test for overall effect: Z = 1.30 (P = 0.19)

Figure 2 Forest plot for meta-analysis of self-reported physical activity outcomes following exercise intervention.

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Effect sizes versus p-values: difference

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Effect size

- quantitative measure of the difference between two groups
- effect sizes are calculated based on the ‘standardised mean difference’ (SMD) between two groups in a trial
- this is the difference between the average score of participants in the intervention group and the average score of participants in the control group

- Effect sizes are usually reported using the label ‘d=’, and in the form of a fraction, such as d=0.2 or d=0.5.
- interpreting effect sizes: < 0.2 = small effect size; 0.5 = medium effect size; > 0.8 and above = large effect size.

- Cohen’s suggestions are generally accepted and are a good basis for interpreting the results of trials and in reading systematic reviews and meta-analyses

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What's the difference between an effect size and statistical significance?

- **'statistical significance'** →pointing you if an intervention had an effect that was unlikely to have happened by chance
- not as useful for comparing effect sizes of multiple studies as done in SR's
- because statistical significance does not take into account sample size (i.e. the number of participants in a study)
- if two studies are identical except that one has a larger sample size, we would usually consider the study with the larger sample size to be more reliable, but statistical significance does not give more weight to a study with more participants – all studies are treated equally.

- Effect sizes are 'weighted' according to the number of participants in a study
- For instance, a study with 10 participants might have had a big effect size (such as 0.8); while another study of the same intervention may have had 1000 participants but a small effect size (such as 0.2).
- If all other things are equal (e.g. both studies had a low risk of bias), then both studies may have shown that the intervention had a statistically significant effect, but the overall effect size would be small, because the larger of the two studies would be given more 'weight'.

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GRADE

- **G**rades of **R**ecommendation, **A**ssessment, **D**evelopment and **E**valuation
- system for grading the quality of evidence
- adopted by many different organizations (WHO, BMJ Clinical evidence, Cochrane Collaboration....)

- offers a transparent and structured process for developing and presenting evidence summaries for systematic reviews and guidelines and for carrying out the steps involved in developing recommendations

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GRADE

- Evidence can be graded as: high, moderate, low and very low (eg. RCT's starts as high quality evidence, observational studies start as low quality)

- Factors that can lower quality of evidence: limitations of design and performance, inconsistency, indirectness (PICO and apllicability), imprecision (number of events and confidence intervals), publication bias

- Factors that may increase the quality level of a body of evidence: large magnitude effect, dose-response gradient, all plausible confounding would reduce a demonstrated effect or suggest a spurious effect when results show no effect

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Take home messages....

- systematic reviews often have to summarise findings from large and complex fields of research

- *Cochrane Library* provides a collection of full-text systematic reviews developed using rigorous reporting standards and methods

- each review has a plain language summary and a structured abstract, which includes a section for the authors' conclusions

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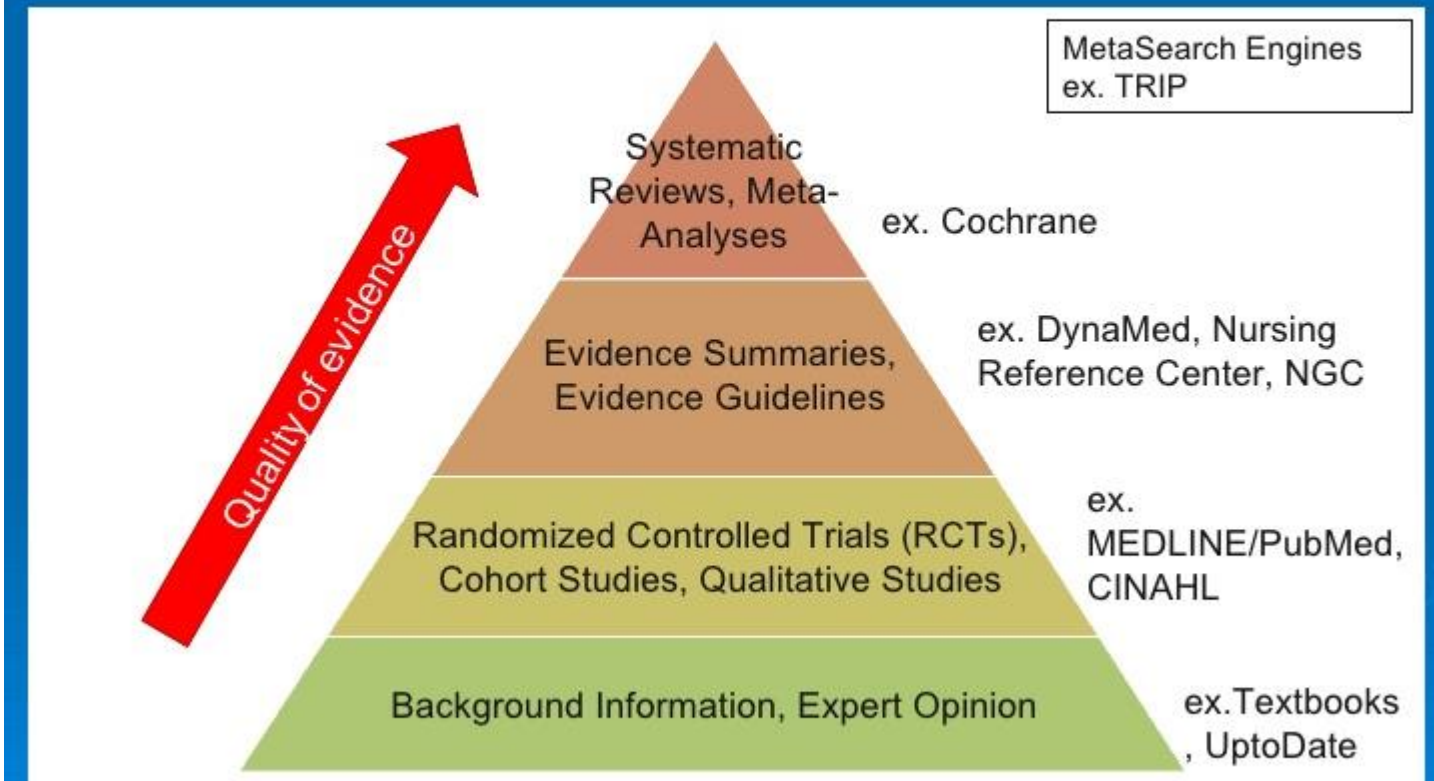
Searching for Evidence Pyramid: Basic

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END
thank you all!