



# Systematic Reviews and Meta-analysis in Aquatic therapy

Prof. Daniel Daly


Ben Waller PT, MSc

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UNIVERSITY OF JYVÄSKYLÄ



# Systematic Review

A systematic review attempts to collate all empirical evidence that fits ***PRE-SPECIFIED*** eligibility criteria to answer specific research questions.

## Characteristics

- Clearly stated objective
- A systematic search
- Assessment of included studies including risk of bias
- Systematic approach to presentation and synthesis of the characteristics and findings of included studies



# Meta-analysis

Meta-analysis is the use of statistical techniques to integrate and summarize the results of included studies.

- Not all systematic reviews need to/ should contain a meta-analysis. They can be a qualitative synthesis if the data is appropriate
- Provide more precise estimates of the effect of health care



# PRISMA

**P**referred **R**eporting **I**tems for **S**ystematic reviews and **M**eta-**A**nalysis

Replaced QUOROM guidelines

27-item check list with a four-phase flow chart

Website:

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



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# PRISMA

- PRISMA statement (Moher et al 2009, free open access)
  - <http://www.bmj.com/content/339/bmj.b2535.full?view=long&pmid=19622551>
- PRISMA – Explanation and Elaboration (Liberati et al 2009, free open access)
  - <http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1000100>
- PRISMA check list and Flow chart:
  - <http://www.prisma-statement.org/statement.htm>



# Reference Manager

- Reference managers include:
  - Refworks
  - EndNote
  - Reference Manager
- There are many free including
  - <https://www.mendeley.com/>



# Software for Meta-Analysis

- Universally used is the Cochrane Library software Review Manager 5.3.5. This is free software.
  - <http://tech.cochrane.org/revman/download>



# Register for Systematic reviews

- PROSPERO - NHS, University of York, UK.  
International prospective register of  
systematic reviews
  - <http://www.crd.york.ac.uk/prospero/>
- Cochrane Library
  - <http://www.cochranelibrary.com/>





# Development of Research question(s)

## PICOS

- Population
  - E.g. women with (x-ray) diagnosed knee OA
- Intervention/exposure
  - E.g. Aquatic exercise 3 x weeks for 6 months
- Comparator group
  - Usual care (need to state this)
- Outcomes/end point
  - *A priori*, based on pre set ranking list
- Study design
  - RCT, CCT,

## Report characteristics

- Language
- Duration of follow-up
- Publication date



# Outcome measures

- Should be decided *a priori*
- Care should be taken to:
  - Avoid representing the same population twice in a meta-analysis
  - Selecting only one outcome measure for inclusion into meta-analysis
  - Not to combine data from outcome measures that do not measure the same construct
- Selection should be:
  - Based on primary and secondary outcomes (ideally)
  - Based on pre designed ranking list using clinimetric properties



# Example 1. Hierarchy of continuous pain-related outcomes (Jüni et al 2006)

1. Global pain score
2. Pain on Walking
3. WOMAC osteoarthritis index pain subscore
4. Composite pain scores other than WOMAC
5. Pain on activities other than walking
6. WOMAC global score
7. Lesquesne osteoarthritis index global score
8. Other Algofunctional composite scores
9. Patient's global assessment
10. Physicians global assessment



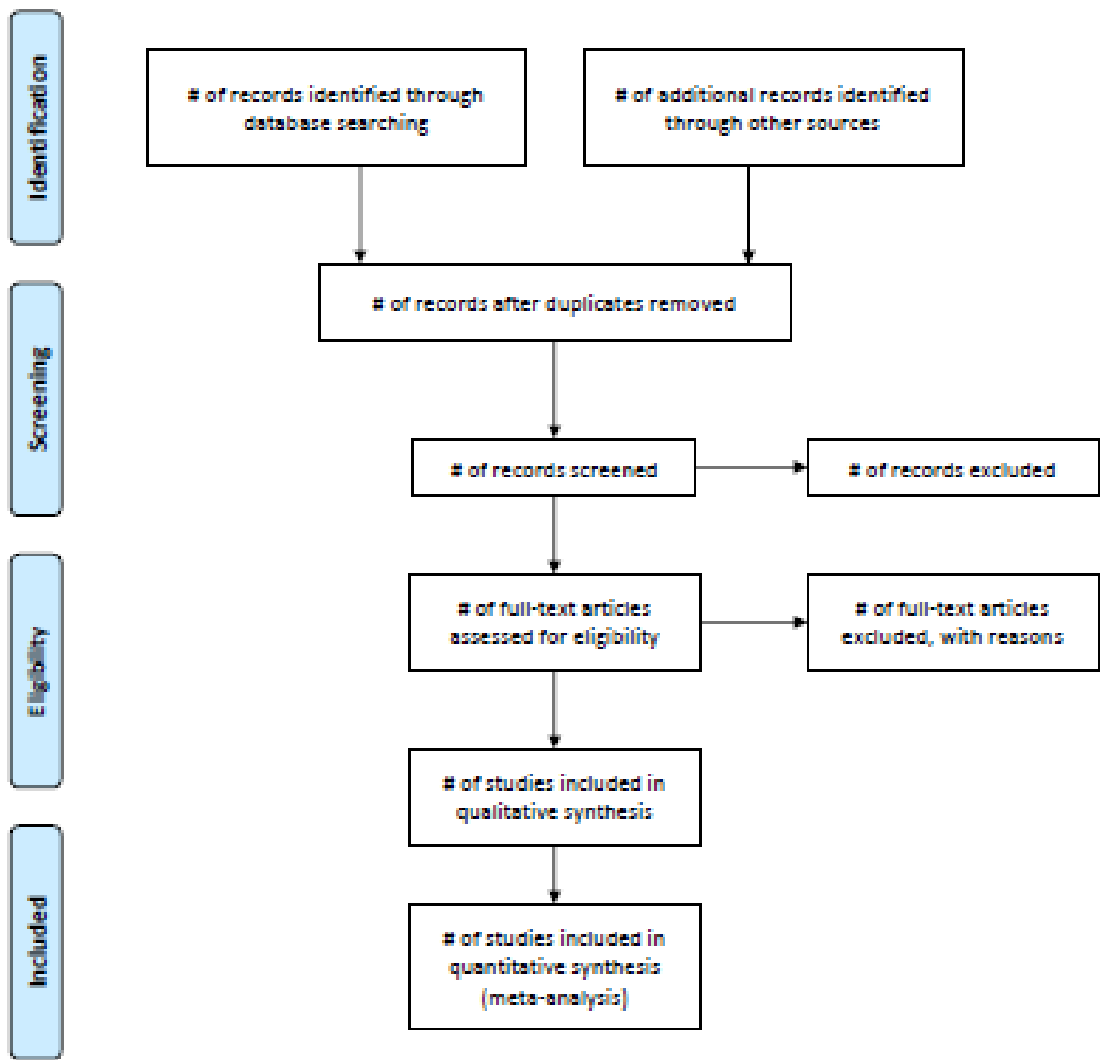
# Example 2: Physical function test

- ❏ Ideally the study should have reported primary and secondary outcomes i.e. outcome matched to intervention
- ❏ We divided into activities, muscle strength and joint range of motion (ROM). Then ranked each outcome selecting only ONE to be entered in to meta-analysis
- ❏ Activities
  - based on the suggestions of Dobson et al 2013, in cases of disagreement we selected the outcome that best covered different constructs related to activity (TUG/stairs selected before walking ability)





# PRISMA 2009 Flow Diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(8): e1000097. doi:10.1371/journal.pmed1000097



# Assessment of Bias

- Quality VERSUS risk of bias
- Cochrane Reviews bias tool consists of 5 items
  - Sequence generation
  - Allocation
  - Blinding
  - Incomplete data
  - Selective outcome reporting



# Risk of Bias (Hansen et al 2015)

- Selection Bias
  - Sequence generation
  - Allocation generation
- Performance bias
  - Blinding of participants
- Detection Bias
  - Blinding of Key study personnel
- Attrition bias
  - Incomplete outcome data
- Other Bias
  - Centre status multiple/singular
  - Trial size
  - Funding



# Challenges in Aquatic therapy

- Few high quality previously registered RCT studies published
  - SR tend to focus on high level
- High risk of bias in the majority of studies:
  - Small n (low power)
  - Unclear allocation
  - Single center
  - Unclear reporting
  - Inappropriate statistical methods

**BUT we must continue to write  
systematic review with/without meta-  
analysis!!!!!!!**

