



Research synthesis

A. Metin Gülmezoglu

From Research to Practice
Postgraduate Training in Reproductive Health / Chronic Disease
3 March - 10 April 2003



What is research synthesis?

- Research synthesis is the process through which two or more research studies are assessed with the objective of summarizing the evidence relating to a particular question.



Why do we need research synthesis?

- To make sense of current research (science is cumulative)
 - volume of research is overwhelming
 - access to reports of research is haphazard, and often biased
 - the quality of research is very variable
 - most studies are too small



What is the science of research synthesis?



The medical review article:
state of the science.
[Mulrow. Ann Int Med, 1987]

"Current medical reviews do not routinely use scientific methods to identify, assess, and synthesize information."



Research synthesis is required for which types of research?

- Basic science research
Johanna Horn et al. Nimodipine in animal model experiments of focal cerebral ischaemia. Stroke 2001;32:2433-2438
- Screening/diagnostic tests
- Prevalence/incidence studies
- Prognosis studies
- Effects of practices



Why is research synthesis important?

- Patients (and the public more generally) suffer directly and indirectly
- Policymakers, practitioners, and patients have inadequate information to guide their choices among alternatives
- Limited resources for health care and new research are used inefficiently



The science of research synthesis

- Systematic reviews
 - protocol development
 - critical appraisal
 - meta-analysis
- Updating/electronic publication



“Reviews”

- Why do we need reviews?
- Traditional (narrative) reviews
- Systematic reviews
- By definition a “review” is a retrospective study



Essentials of a systematic review

- Clear, explicit strategy
- Comprehensive
- Reproducible



What constitutes a systematic review?

- Clearly formulated question
- Methods to identify studies (searching)
- Selecting studies
- Critical appraisal



What is a systematic review?

- A review of a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant research, and to collect and analyse data from the studies that are included in the review. Statistical methods (meta-analysis) may or may not be used to analyse and summarise the results of the included studies.



Review protocol

- Systematic reviews are research projects
- Systematic reviews are retrospective studies
- protocol preparation allows 'a priori' decisions
- To obtain feedback and criticism for the review before it is finalised



Sections of a protocol

- Cover sheet
- Background
- Objectives
- Selection criteria
- Search strategy
- Methods



Selection criteria

- Types of studies
 - RCTs, placebo-controlled etc.
- Participants
 - sex, age groups, community vs hospital
- Interventions
 - Treatment vs nothing? Placebo?
 - Treatment vs another treatment
- Outcomes
 - Substantive outcomes vs surrogate outcomes
 - Outcomes important for decision-making
 - Outcomes important for users (consumers)



Sections of a protocol

- Cover sheet
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Search strategy

- Search terms
- databases
- handsearching

- expert help usually needed



Sections of a protocol

- Cover sheet
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- **Methods**



Methods

- How will you decide to include or exclude a study from the review (critical appraisal)?
 - A priori description
 - Duplicate assessments
 - Quality assessment
 - Missing data



Sections of a systematic review

- Cover sheet
- Background
- Objectives
- Selection criteria
- Search strategy
- Methods
- Description of studies
- Methodological quality of included studies
- Results
- Discussion
- Conclusions
 - Implications for practice
 - Implications for research
- Acknowledgements
- Conflict of interest



What is a meta-analysis?

- The use of statistical techniques in a systematic review to integrate the results of the included studies. Also used to refer to systematic reviews that use meta-analysis.



1977

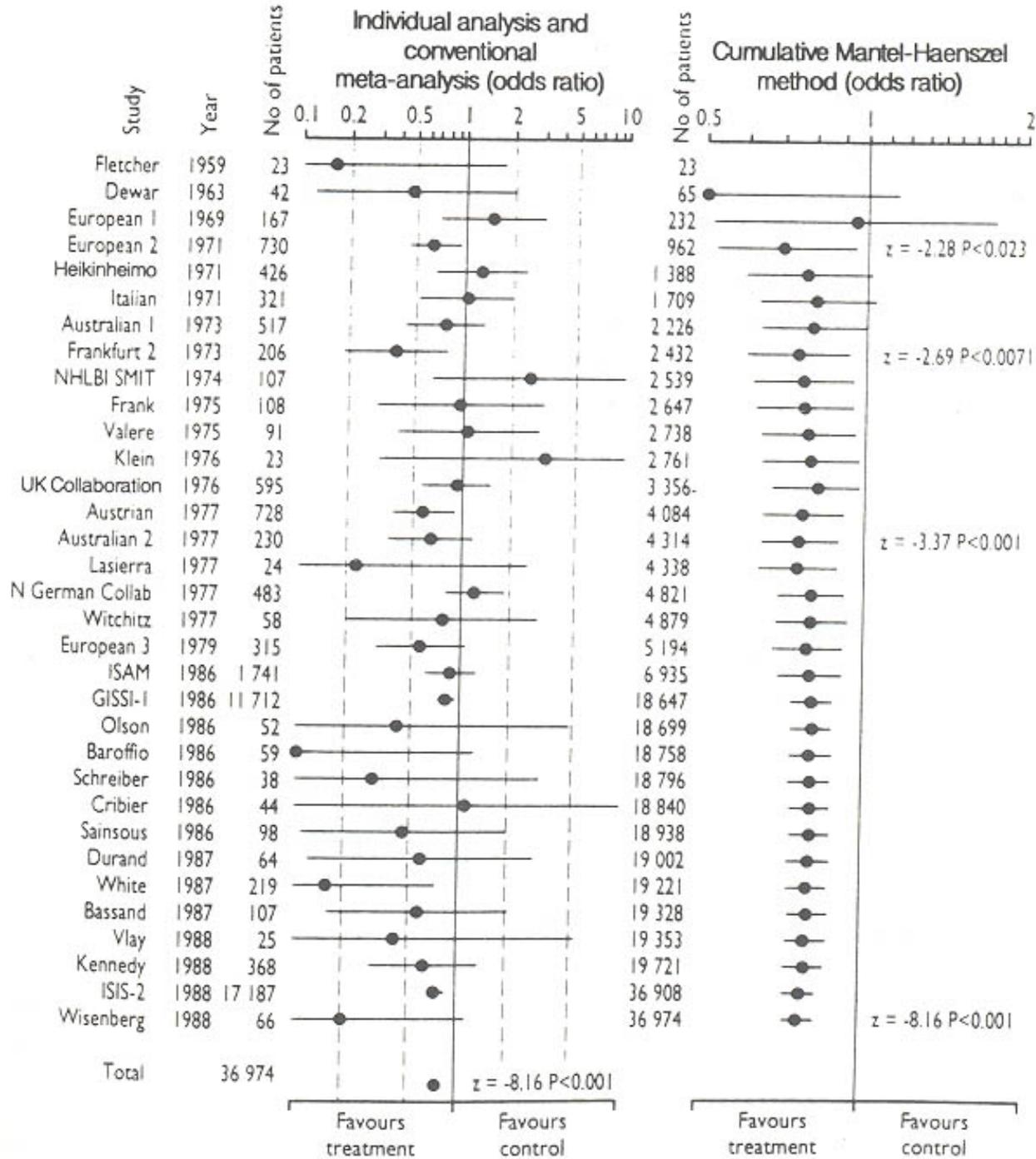


Figure 1.1 Conventional and cumulative meta-analysis of 33 trials of intravenous

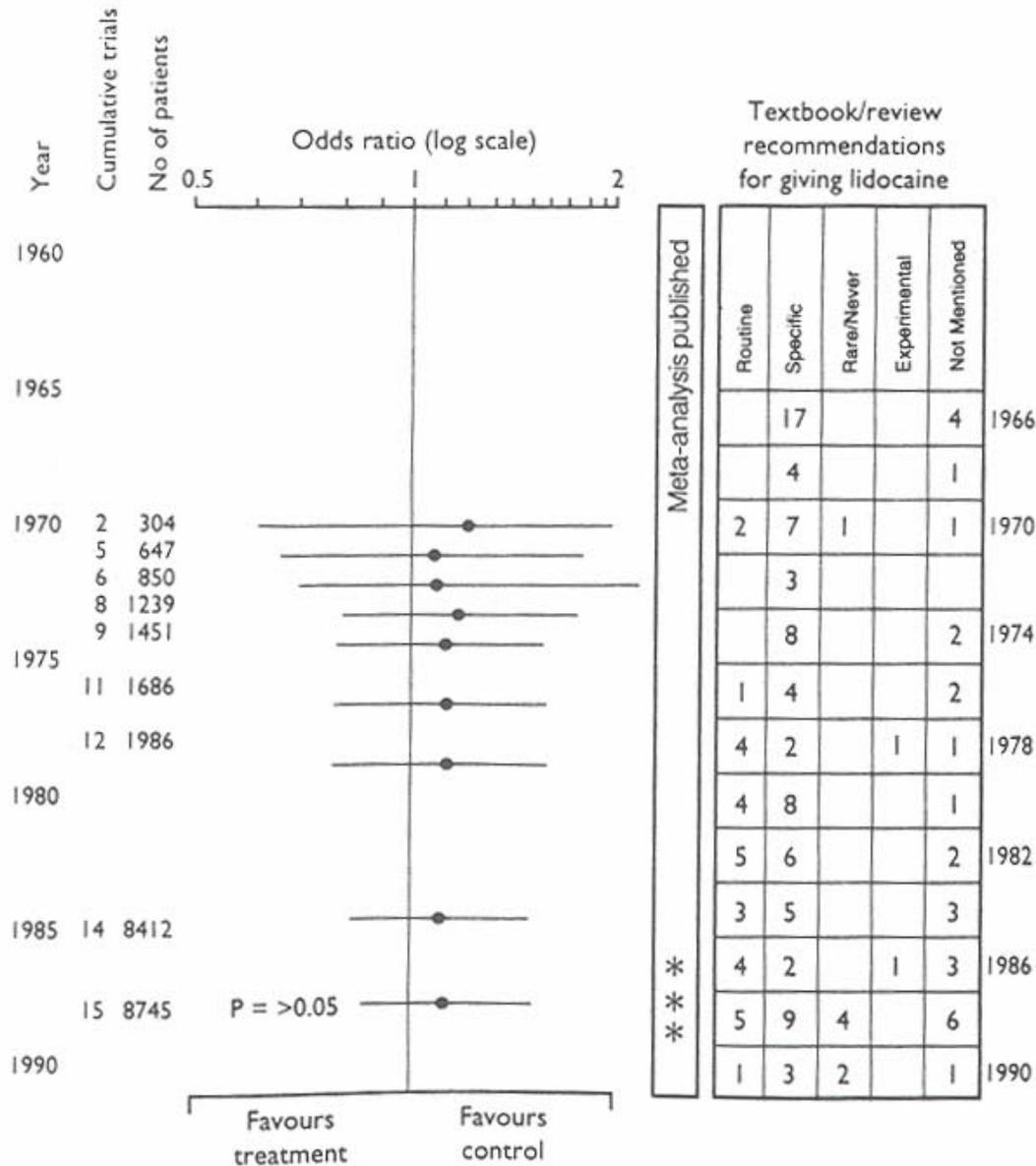
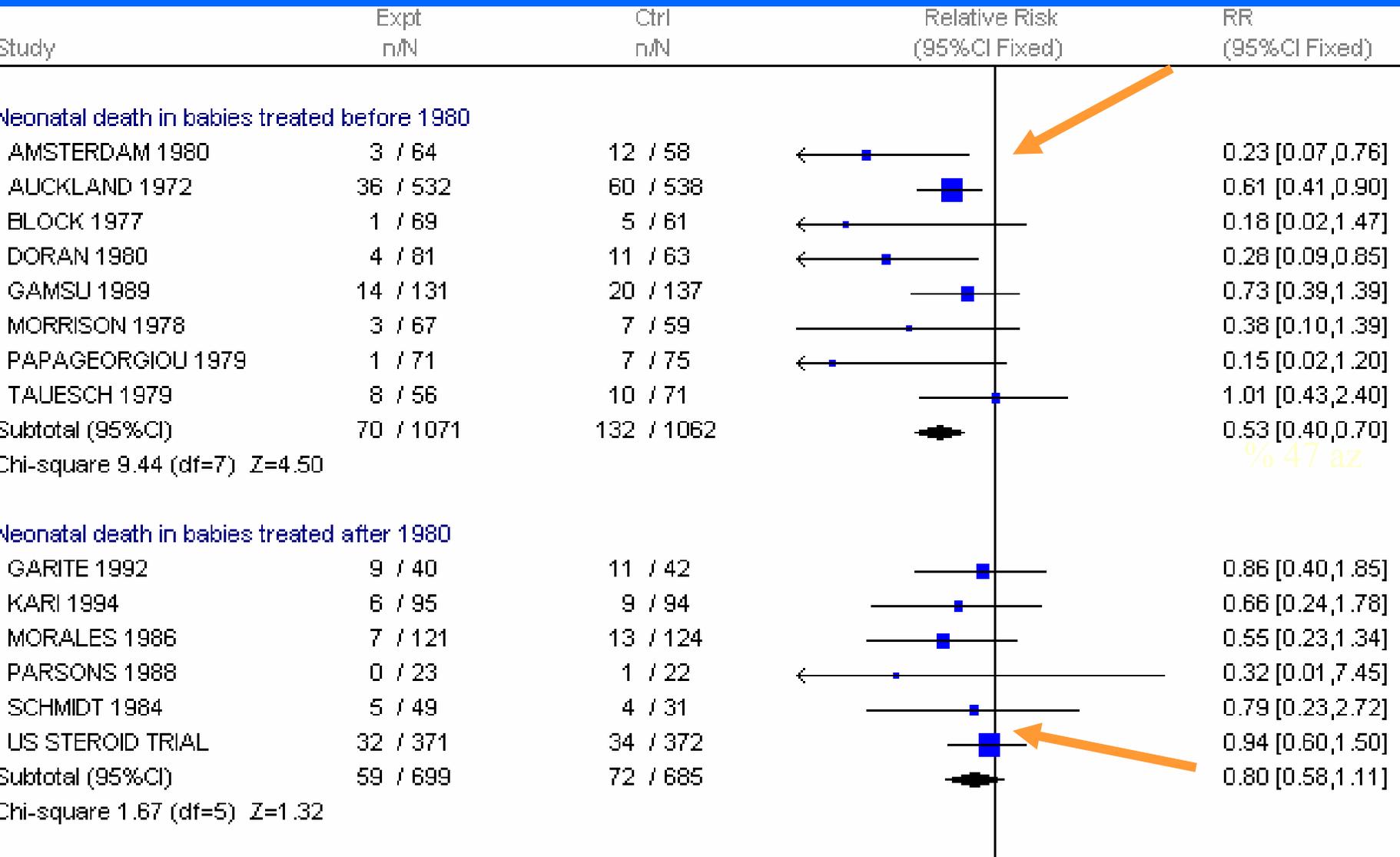


Figure 1.3 Cumulative meta-analysis by year of publication or randomized controlled trials of prophylactic lidocaine for acute myocardial infarction, and recommendations of clinical expert reviewers (adapted from Antman *et al*¹⁴)

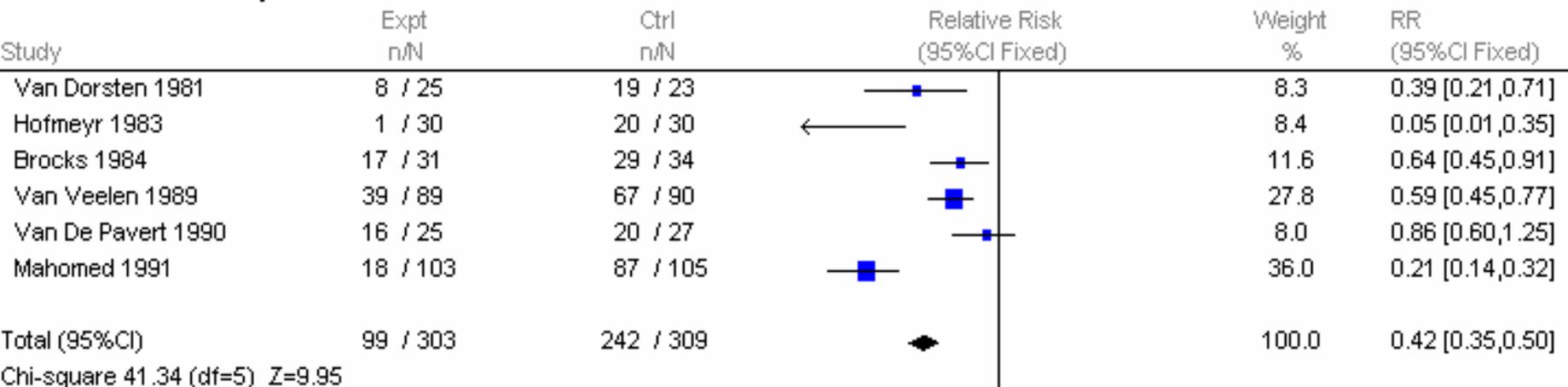
Corticosteroid treatment for women in preterm labour: effects on neonatal death



External cephalic version

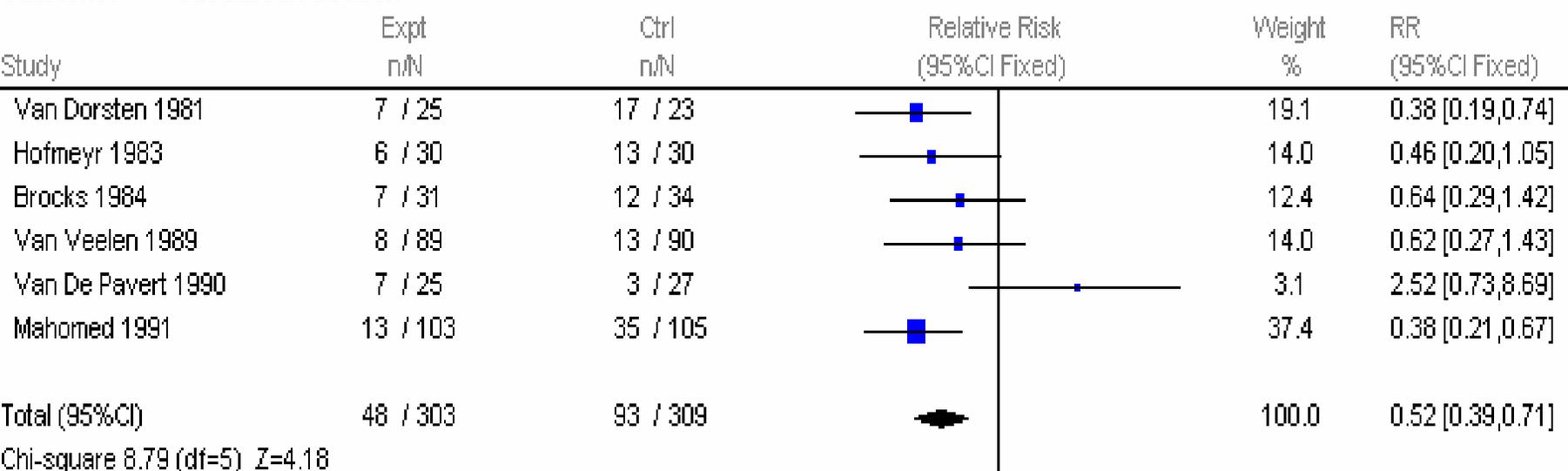
Comparison: External cephalic version at term

Outcome: Non-cephalic births



Comparison: External cephalic version at term

Outcome: Caesarean section





Conclusions

- The methodology is well-established for RCTs
- For other types of studies (answering other types of questions) methodology is being developed
 - search
 - critical appraisal
- The principle remains the same



Useful resources

- WHO Programme to Map Best Reproductive Health Practices web site
(<http://www.who.int/reproductive-health/hrp/practices/index.htm>)
- WHO Reproductive Health Library
- Cochrane Library
- Cochrane Collaboration web site
(<http://www.cochrane.org>)
- Netting the evidence:
(<http://www.shef.ac.uk/~scharr/ir/netting/>)



Importance of research synthesis implies:

- stating the objectives of the research
- defining eligibility criteria for studies to be included
- identifying (all) potentially eligible studies
- applying eligibility criteria
- assembling the most complete dataset feasible
- analysing this dataset, using statistical synthesis and
- sensitivity analyses, ***if appropriate and possible***
- preparing a structured report of the research