# Research synthesis

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# What is research synthesis?

- 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


THE LATEST RESEARCH SHOWS THAT WE REALLY SHOULD DO SOMETHING WITH ALL THIS RESEARCH

# 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:* Horn J et al. Nimodipine in animal model experiments of focal cerebral ischaemia. **Stroke 2001**
- *Risk factors:* Factors predisposing women to chronic pelvic pain: systematic review. Latthe P, Mignini L, Gray R, Hills R, Khan K. **BMJ 2006**
- *Aetiology:* Mignini L, Villar J, Khan K. Mapping the theories of preeclampsia: the need for systematic reviews of mechanisms of the disease. **AJOG 2006**
- *Screening/diagnostic tests:*Selman TJ, Luesley DM, Acheson N, Khan KS, Mann CH. A systematic review of the accuracy of diagnostic tests for inguinal lymph node status in vulvar cancer. **Gynecol Oncol. 2005**
- *Prevalence/incidence studies:* Say L, Donner A, Gülmezoglu AM, Taljaard M, Piaggio G. The prevalence of stillbirths: a systematic review. **Reproductive Health 2006**
- *Effects of practices:*Hofmeyr GJ, Walraven G, Gulmezoglu AM, Maholwana B, Alfirevic Z, Villar J.*Misoprostol to treat postpartum haemorrhage: a systematic review.* **BJOG 2005**

# 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
- A “review” is a retrospective study

# 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

- 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

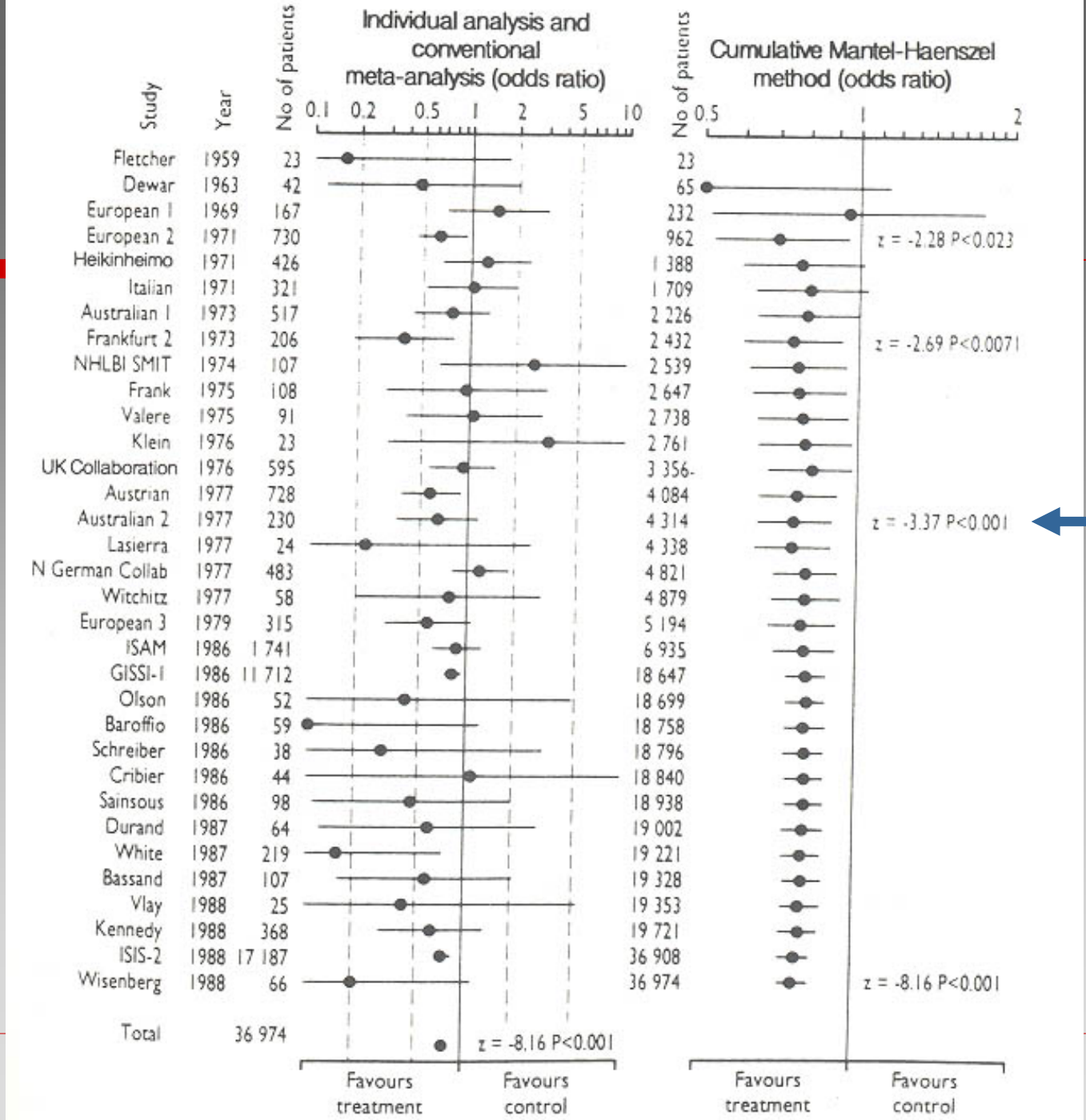



Figure 1.1 Conventional and cumulative meta-analysis of 33 trials of intravenous

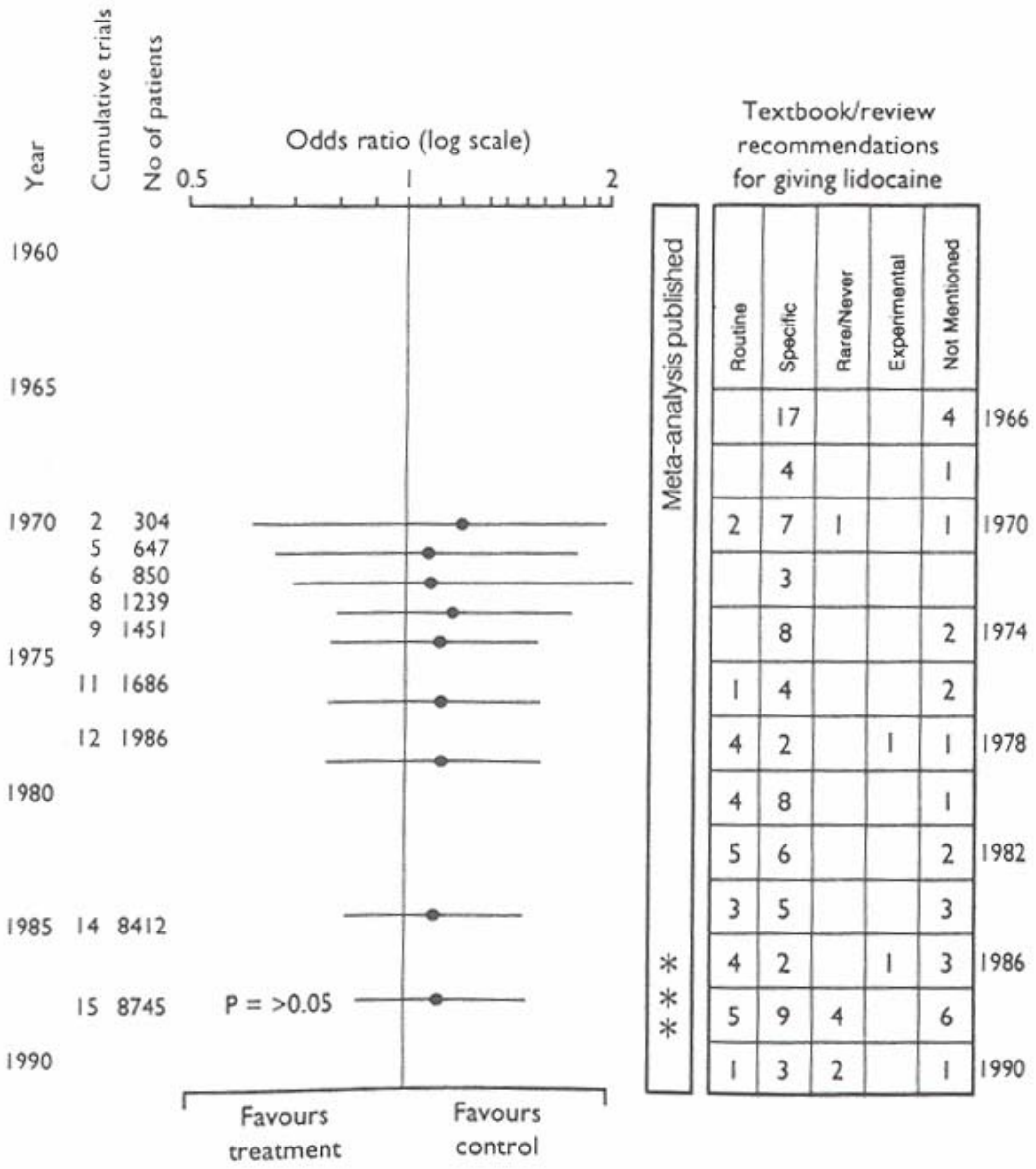
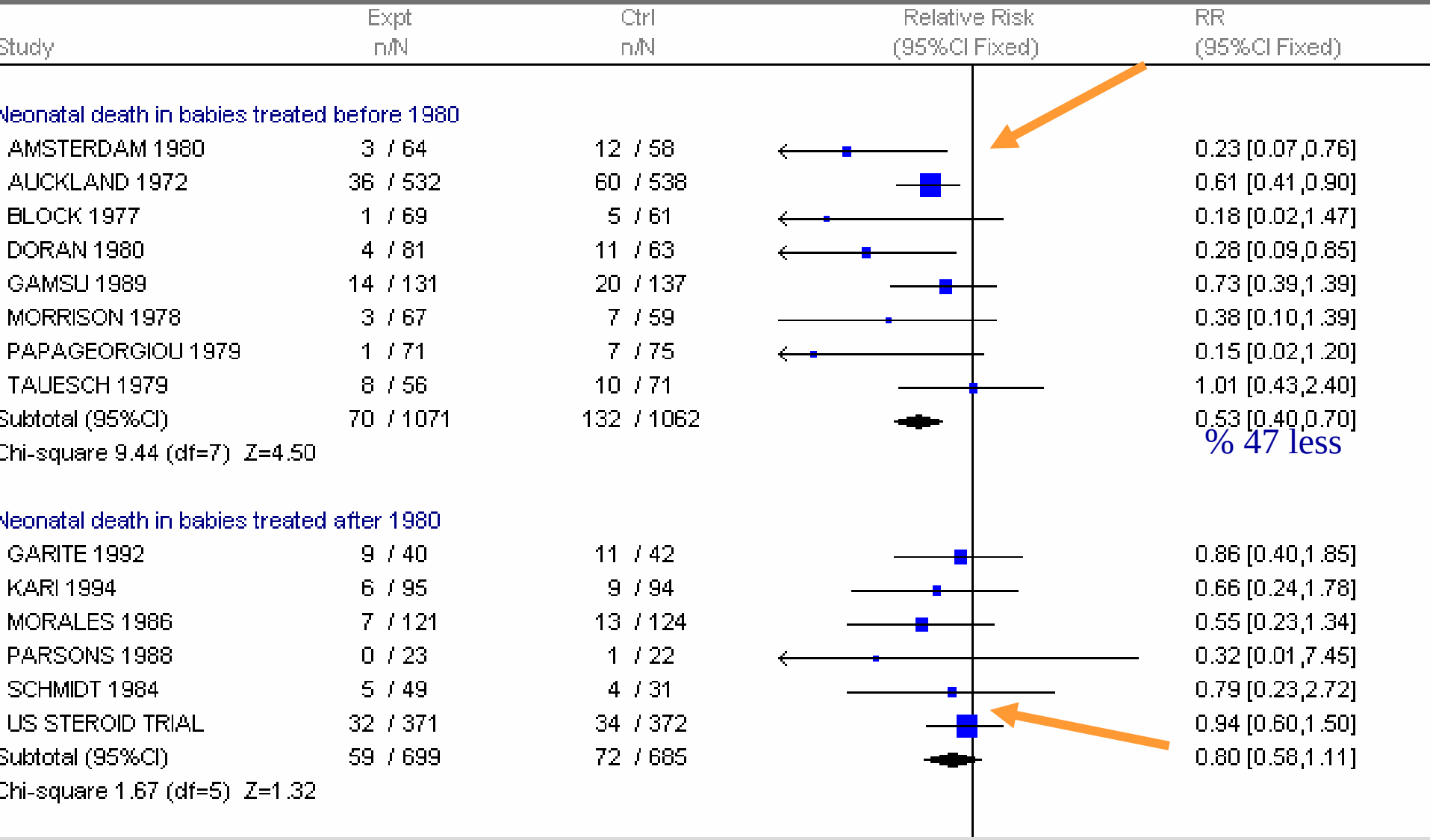


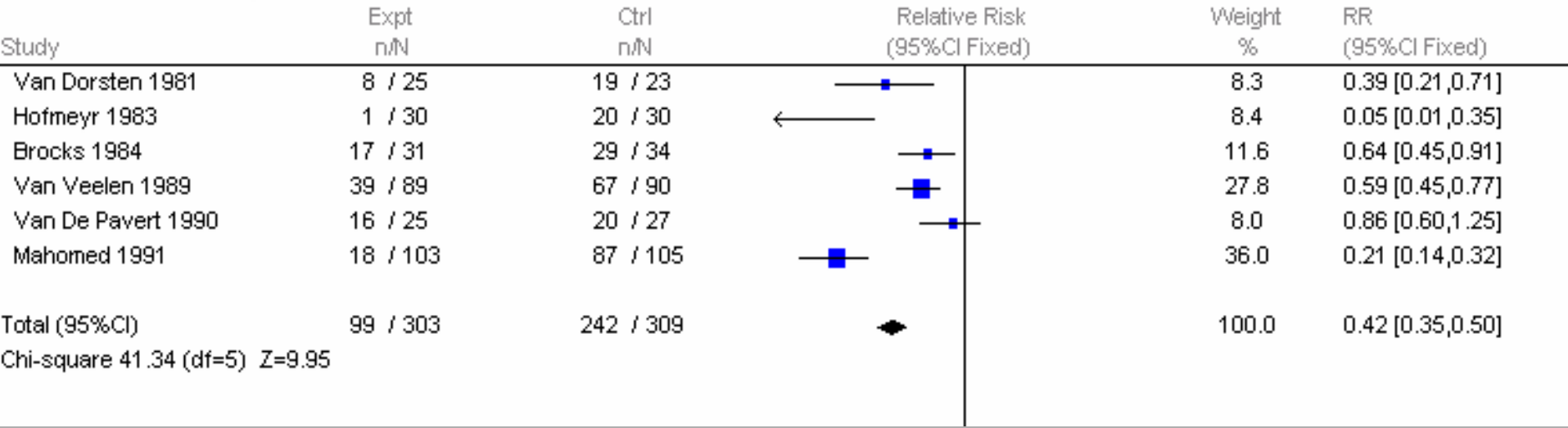

Figure 1.3 Cumulative meta-analysis by year of publication or randomised controlled trials of prophylactic lidocaine for acute myocardial infarction, and recommendations of clinical expert reviewers (adapted from Antman *et al*[14])

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



# External cephalic version

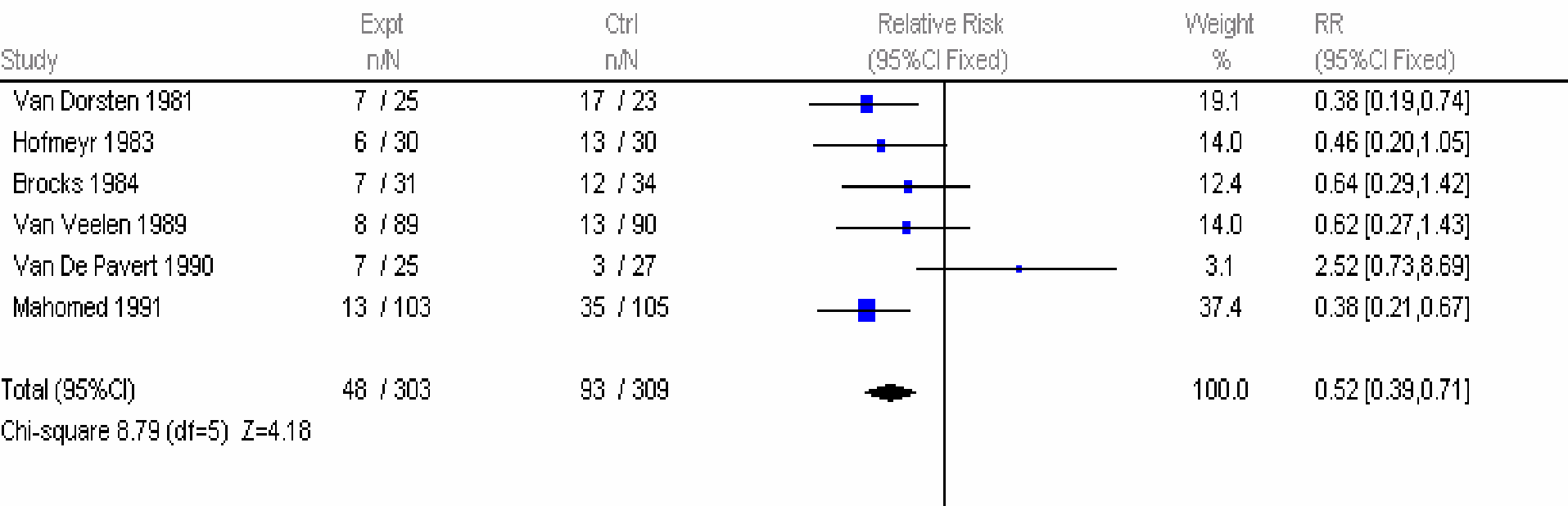
**Comparison: External cephalic version at term**
**Outcome: Non-cephalic births**



| Study | Expt n/N | Ctrl n/N | Relative Risk (95%CI Fixed) | Weight % | RR (95%CI Fixed) |
|---|---|---|---|---|---|
| Van Dorsten 1981 | 8 / 25 | 19 / 23 | | 8.3 | 0.39 [0.21,0.71] |
| Hofmeyr 1983 | 1 / 30 | 20 / 30 | | 8.4 | 0.05 [0.01,0.35] |
| Brocks 1984 | 17 / 31 | 29 / 34 | | 11.6 | 0.64 [0.45,0.91] |
| Van Veelen 1989 | 39 / 89 | 67 / 90 | | 27.8 | 0.59 [0.45,0.77] |
| Van De Pavert 1990 | 16 / 25 | 20 / 27 | | 8.0 | 0.86 [0.60,1.25] |
| Mahomed 1991 | 18 / 103 | 87 / 105 | | 36.0 | 0.21 [0.14,0.32] |
| Total (95%CI) | 99 / 303 | 242 / 309 | | 100.0 | 0.42 [0.35,0.50] |

Chi-square 41.34 (df=5) Z=9.95

**Comparison: External cephalic version at term**
**Outcome: Caesarean section**



| Study | Expt n/N | Ctrl n/N | Relative Risk (95%CI Fixed) | Weight % | RR (95%CI Fixed) |
|---|---|---|---|---|---|
| Van Dorsten 1981 | 7 / 25 | 17 / 23 | | 19.1 | 0.38 [0.19,0.74] |
| Hofmeyr 1983 | 6 / 30 | 13 / 30 | | 14.0 | 0.46 [0.20,1.05] |
| Brocks 1984 | 7 / 31 | 12 / 34 | | 12.4 | 0.64 [0.29,1.42] |
| Van Veelen 1989 | 8 / 89 | 13 / 90 | | 14.0 | 0.62 [0.27,1.43] |
| Van De Pavert 1990 | 7 / 25 | 3 / 27 | | 3.1 | 2.52 [0.73,8.69] |
| Mahomed 1991 | 13 / 103 | 35 / 105 | | 37.4 | 0.38 [0.21,0.67] |
| Total (95%CI) | 48 / 303 | 93 / 309 | | 100.0 | 0.52 [0.39,0.71] |

Chi-square 8.79 (df=5) Z=4.18

# Conclusions

- Research synthesis is an essential component of decision-making for
  - Research
  - Practice
  - Policy

# Useful resources

- WHO Reproductive Health Library www.rhlibrary.com
- Cochrane Collaboration web site (http://www.cochrane.org)
- Netting the evidence: (http://www.shef.ac.uk/~scharr/ir/netting/)