Consequences of poor reporting for the development of Cochrane reviews

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26 June 2008

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Research reporting is like swimwear
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What it reveals is suggestive

...but what is conceals is vital

Mahajan 2007 (evidence-mangled: apologies!)
Overview

- Why is study reporting so important to systematic reviews?
- What is the impact of study reporting on systematic reviews?
- What is the quality of reporting of Cochrane and other systematic reviews?
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What is Evidence-Based Healthcare?
What is Evidence-Based Healthcare?

• Achieving the best care for individual patients (or communities) that addresses their problems, based on great clinical skills and best available research evidence.
Discussion Sections in Reports of Controlled Trials Published in General Medical Journals

Islands in Search of Continents?

Michael Clarke, DPhil; Iain Chalmers, MSc

Research (publications) should always begin with a systematic review (within introduction) and conclude with an updated systematic review of the evidence (within discussion).

Need to report what do we already know and what does the new study add to the totality of the evidence.
An inquiry into the Nature, Causes, and Cure, of that Disease.

A Critical and Chronological View of what has been published on the subject.

By James Lind, M.D.
Fellow of the Royal College of Physicians in Edinburgh;

EDINBURGH:
Printed by Sandi, Murray, and Cochran
For A. Kincaid & A. Donaldson,
MDCCCLIII.
Overview

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• What is the quality of reporting of Cochrane and other systematic reviews?
Research totality in oral health

RESEARCH REPORTS
Clinical

D.R. Moles1*, I.G. Needleman1, R. Niederman2, and J. Lau3

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Introduction to Cumulative Meta-analysis in Dentistry: Lessons Learned from Undertaking a Cumulative Meta-analysis in Periodontology

• Only 8/25 trials adequately reported to include in the meta-analysis

J Dent Res 84(4):345-349, 2005
Excluding studies due to missing information

Uncertainty

Risk of selection bias

Potentially huge impact on healthcare

Precision
Reporting of methodology
Improving the completeness and transparency of reports of randomized trials in oral health: The CONSORT Statement

IAN NEEDLEMAN, PhD, FDSRCS (Eng), HELEN WORTHINGTON, PhD, DAVID MOHER, PhD, KEN SCHULZ, PhD & DOUGLAS G. ALTMAN, DSc
Impact of poor reporting of methods

• Internal validity
  – Risk of bias
  – Balancing of confounders
  – Analytic errors

• External validity
  – Types of patients
  – Types of intervention
  – Setting
Empirical evidence of bias

• What is the effect of inadequate methods of bias protection on the magnitude of outcome size?
• Studies in mid-late 1990s investigated effect of bias protection on data from published meta-analyses
• Comparison of ORs in meta-analyses of interventions; adequate vs. inadequate methodology: including randomisation, masking
Bias and exaggeration of treatment effect

- Low quality study: 34%
- Inadequate method of treatment allocation: 41%
- Undeclared method of treatment allocation: 30%
- Not double blind: 17%

Sources:
- Schultz et al. 1995
- Moher et al. 1998
- Juni et al. 2001
Empirical evidence of bias in treatment effect estimates in controlled trials with different interventions and outcomes: meta-epidemiological study

Lesley Wood, research student,¹ Matthias Egger, head of department and professor of epidemiology and public health,² Lise Lotte Gluud, senior registrar,³ Kenneth F Schulz, vice president of quantitative sciences and clinical professor,⁴ Peter Jüni, head of division and reader in clinical epidemiology,² Douglas G Altman, director and professor of statistics in medicine,⁵ Christian Gluud, head of department,³ Richard M Martin, reader in clinical epidemiology,¹ Anthony J G Wood, research assistant,¹ Jonathan A C Sterne, professor of medical statistics and epidemiology³

BMJ, 2008; 336: 601 - 605

• 146 meta-analyses (1346 trials)
**Fig 1** Ratios of odds ratios comparing estimates of intervention effects in 532 trials with inadequate or unclear allocation concealment versus 272 trials with adequate concealment.

<table>
<thead>
<tr>
<th>Comparison (No of meta-analyses)</th>
<th>No of trials*</th>
<th>Ratio of odds ratios</th>
<th>Ratio of odds ratios (95% CI)</th>
<th>P value of test of interaction</th>
<th>Variability in bias† (P value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall (102)</td>
<td>532 v 272</td>
<td></td>
<td>0.83 (0.74 to 0.93)</td>
<td>–</td>
<td>0.11 (&lt;0.001)</td>
</tr>
<tr>
<td>All cause mortality (23)</td>
<td>119 v 90</td>
<td></td>
<td>1.01 (0.90 to 1.15)</td>
<td>0.002</td>
<td>0.02 (0.24)</td>
</tr>
<tr>
<td>Other outcomes (79)</td>
<td>415 v 182</td>
<td></td>
<td>0.76 (0.66 to 0.87)</td>
<td>0.14 (0.001)</td>
<td></td>
</tr>
<tr>
<td>Objective outcomes (62)</td>
<td>310 v 174</td>
<td></td>
<td>0.91 (0.80 to 1.03)</td>
<td>0.11 (0.001)</td>
<td></td>
</tr>
<tr>
<td>Subjective outcomes (40)</td>
<td>222 v 98</td>
<td></td>
<td>0.69 (0.59 to 0.82)</td>
<td>0.07 (0.011)</td>
<td></td>
</tr>
<tr>
<td>Drug intervention (65)</td>
<td>411 v 205</td>
<td></td>
<td>0.87 (0.76 to 1.00)</td>
<td>0.09 (&lt;0.001)</td>
<td></td>
</tr>
<tr>
<td>Other intervention (37)</td>
<td>121 v 67</td>
<td></td>
<td>0.77 (0.64 to 0.93)</td>
<td>0.16 (&lt;0.001)</td>
<td></td>
</tr>
</tbody>
</table>

* Inadequately or unclearly concealed v adequately concealed
† Between-meta-analysis heterogeneity variance

**Fig 2 Ratios of odds ratios comparing intervention effect estimates in 314 non-blinded trials versus 432 blinded trials.**

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<th>Comparison (No of meta-analyses)</th>
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<td>Overall (76)</td>
<td>314 v 432</td>
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<td>0.93 (0.83 to 1.04)</td>
<td>–</td>
<td>0.11 (0.001)</td>
</tr>
<tr>
<td>All cause mortality (18)</td>
<td>79 v 121</td>
<td></td>
<td>1.04 (0.95 to 1.14)</td>
<td>0.011</td>
<td>0.01 (0.27)</td>
</tr>
<tr>
<td>Other outcomes (58)</td>
<td>235 v 311</td>
<td>0.83 (0.70 to 0.98)</td>
<td></td>
<td>0.18 (0.001)</td>
<td></td>
</tr>
<tr>
<td>Objective outcomes (44)</td>
<td>210 v 227</td>
<td>1.01 (0.92 to 1.10)</td>
<td></td>
<td>0.08 (0.001)</td>
<td></td>
</tr>
<tr>
<td>Subjective outcomes (32)</td>
<td>104 v 205</td>
<td>0.75 (0.61 to 0.82)</td>
<td></td>
<td>0.14 (0.001)</td>
<td></td>
</tr>
<tr>
<td>Drug intervention (57)</td>
<td>250 v 372</td>
<td>0.92 (0.81 to 1.05)</td>
<td></td>
<td>0.10 (0.001)</td>
<td></td>
</tr>
<tr>
<td>Other intervention (19)</td>
<td>64 v 60</td>
<td>1.00 (0.71 to 1.39)</td>
<td></td>
<td>0.66</td>
<td>0.22 (0.003)</td>
</tr>
</tbody>
</table>

* Non-blinded v blinded
† Between-meta-analysis heterogeneity variance

Evidence of dose dependent impact of bias in three meta-analyses of guided tissue regeneration?

- The greater the risk of bias of included studies, the greater the apparent benefit of GTR over access flap surgery
- Treatment effect differs between the three meta-analyses by more than 2x
- Needleman, Worthington et al. 2006 Cochrane Library
Research reporting

- Reporting quality is problematic across healthcare preventing studies contributing to the totality of evidence
- Key details of methods with the potential to distort outcomes are frequently poorly reported impairing the evaluation of risk of bias
- As a result, conclusions for healthcare can be compromised hampering the development of innovation
- Research recommendations are a key component of systematic reviews. Poor reporting reduces the strength of recommendation for future research thereby interfering with innovation in healthcare
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• What is the quality of reporting of Cochrane and other systematic reviews?
ORIGINAL ARTICLE

The reporting quality of meta-analyses improves: a random sampling study

Jin Wen\textsuperscript{a}, Yu Ren\textsuperscript{b}, Li Wang\textsuperscript{a}, Youping Li\textsuperscript{a,\ast}, Ya Liu\textsuperscript{c}, Min Zhou\textsuperscript{c}, Ping Liu\textsuperscript{c}, Lu Ye\textsuperscript{b}, Yi Li\textsuperscript{b}, Wei Tian\textsuperscript{d}

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Accepted 3 October 2007
Reporting quality of systematic reviews

• QUOROM (now PRISMA) statement
• Maximum score 18.0
• Overall: rise in score from 2000-2005 (10.5 -13.0)
• Cochrane reviews better than non-Cochrane reviews (14.2 vs. 11.7)
• ‘Room still exists for improvements in the reporting quality of both Cochrane and paper-based articles’

Wen et al. 2008 J Clin Epidemiol
Conclusions

• We spend huge amounts of effort and resource in designing and conducting research on humans – well covered by research governance.

• Poor reporting quality rips the heart out of research evidence.

• Improving the reporting of such studies could be the most rapid and cost-effective approach to improving healthcare in terms of R&D resources.

• In view of the responsibilities of researchers, reporting standards should be considered within the ethical framework.

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