Avoiding common errors in research reporting:

Increasing usability (and potential impact) of your research

Iveta Simera

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Outline

- Common reporting deficiencies in published research
  - Particularly those limiting the usability of articles
- Some tips how to avoid these shortcomings

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Reporting deficiencies – a big problem for systematic reviews

- Key steps:
  - Formulation of a clear question
  - Eligibility criteria for studies
  - **Search** for potentially relevant studies
  - **Selection** of studies into the review
  - **Extraction of data**
  - **Assessment of methodological quality of included studies** (risk of bias)
  - **Synthesis of findings** (possibly using meta-analysis)
  - Presentation of data and results
  - Interpretation and drawing conclusions

Looking closely at research

- Research on research (meta-research)
  - Investigating the available research (mostly by looking at research publications, protocols, other information available about research)

- Quite depressing findings

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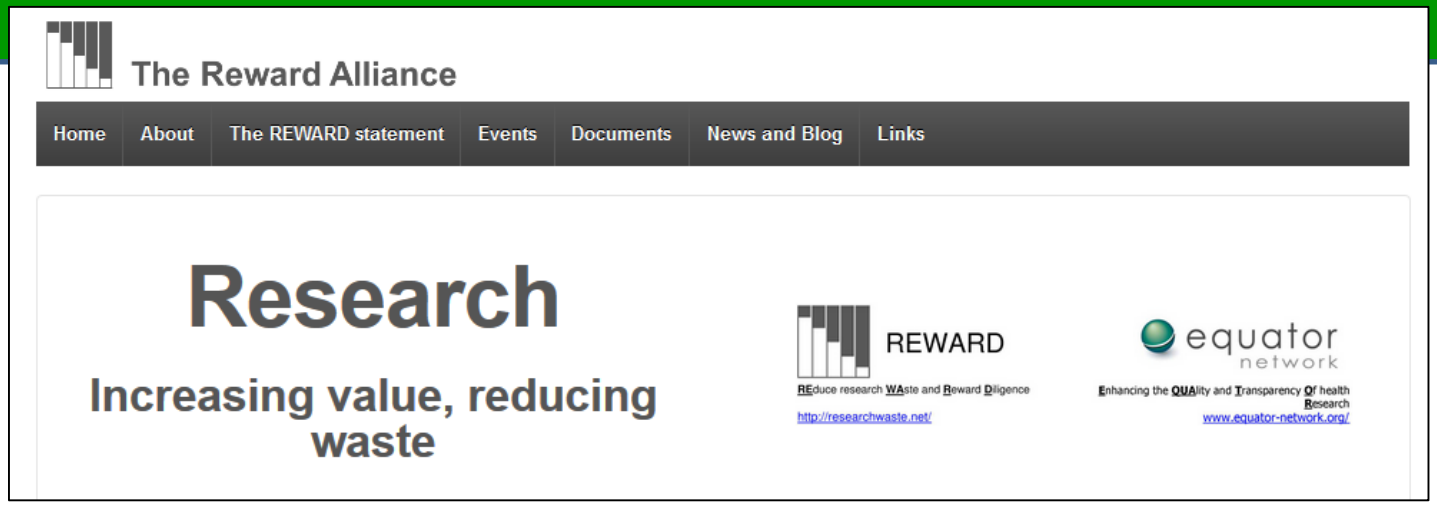


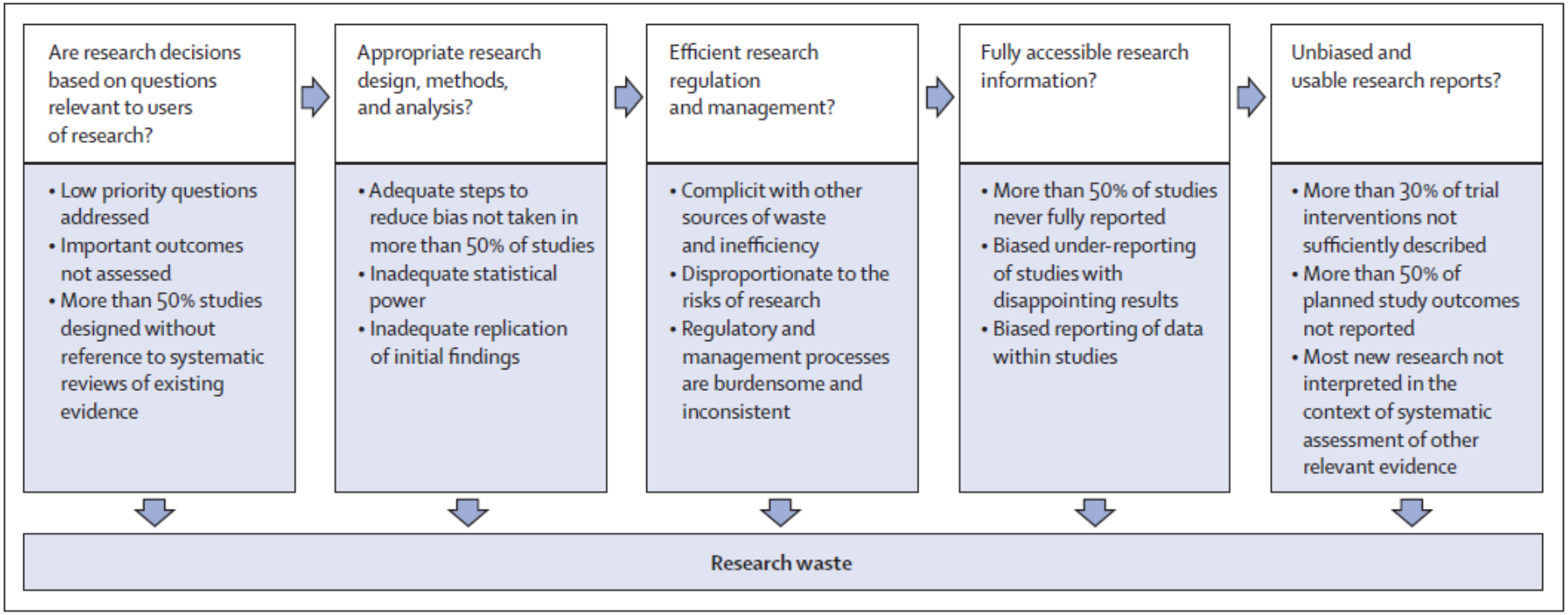


Figure: Avoidable waste or inefficiency in biomedical research

Reproducibility and reliability of biomedical research

The Academy of Medical Sciences held a symposium in April 2015 to explore the challenges and opportunities for improving the reproducibility and reliability of biomedical research in the UK. The report was published in October 2015.

Status

Launched

Ongoing

Reproducibility and reliability of biomedical research: improving research practice

Symposium | Steering committee

The Academy of Medical Sciences, jointly with the BBSRC, MRC and Wellcome Trust, held a symposium on 1-2 April 2015 to explore the challenges and opportunities for improving the reproducibility and reliability of biomedical research in the UK.

Questions about the reproducibility of scientific research have been raised in a number of different arenas over the last few years, including the general and scientific media, sparked in part by an increase in the number of retracted papers and a failure by industry to replicate findings in 'landmark' papers. The consequences are potentially significant for many areas of biological and broader scientific research. The meeting considered the implications for the future of biomedical research in particular, but we hope that the outcomes will be of interest

Downloads

Reproducibility and reliability of biomedical research: improving research practice

Download

Research reproducibility: joint statement, October 2015

Download

Reproducibility issues and possible strategies

Download

The role of the MRC

While everyone must accept their responsibilities in the problems and solutions of reproducibility, the MRC, as a major funder of medical research, has an important role to play.

Like our partner organisations, we will be developing and implementing changes to our own practices, as well as working alongside others to tackle this question. We'll update you on our progress within the next year, and in the meantime I welcome the comments of colleagues. Email me at jim.smith@headoffice.mrc.ac.uk.

Deficiencies in research literature

- **Non-reporting (or delayed reporting) of whole studies**
- **Incomplete reporting**
- **Selective reporting**
- **Misleading reporting**

Non-publication of research

- Failure to publish a report of a completed study (even if presented at a conference)
- Large number of studies investigating publication bias

Factors Influencing the Publication of Randomized Controlled Trials in Child Health Research

Lisa Hartling, BScPT, MSc; William R. Craig, MDCM, FRCPC; Kelly Russell, BSc; Kelly Stevens, BSc; Terry P. Klassen, MD, MSc, FRCPC

Arch Pediatr Adolesc Med. 2004;158:983-987

- 393 RCT presented at Society of Pediatric Research mtgs 1992-1995
- Survey: 166 (45%) response rate
  - 119 (72%) published as full manuscript
  - 47 (38%) not published – only 8 submitted
  - Reasons: not enough time, co-authors problems, journal unlikely to accept, lack of significant findings

Consequences of failure to publish

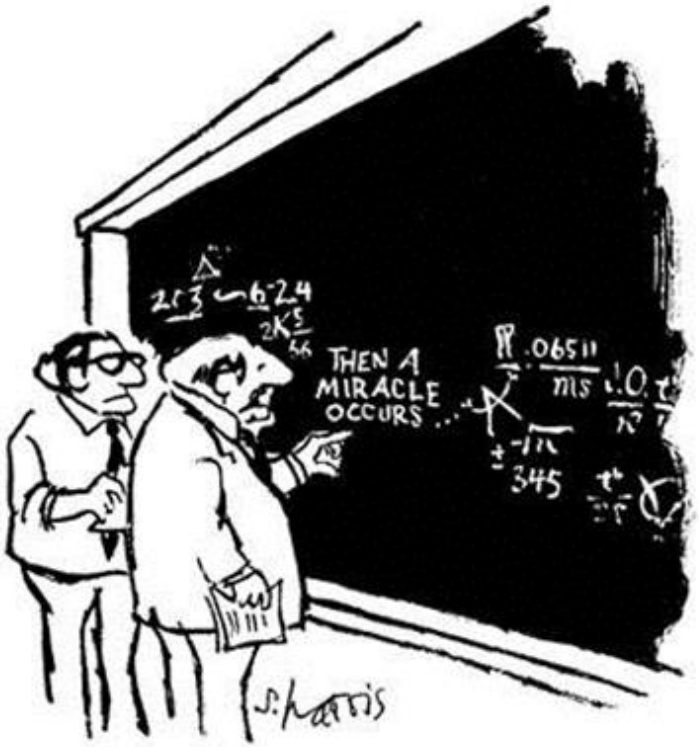
- Non-publication of research findings always leads to a *reduced* evidence-base

- Main concern is that inadequate publication *distorts* the evidence-base – if choices are driven by results

Pictures: www.renodis.com; syniadau--buildinganindependentwales.blogspot.com

Incomplete reporting

- Hundreds of published reviews show that key elements of *methods* and *findings* are commonly missing from journal reports
- We often cannot tell exactly how the research was done
- These problems are generic
  - not specific to randomised trials
  - not specific to studies of medicines
  - not specific to research by pharmaceutical companies



"I think you should be more explicit here in step two."

from *What's so Funny About Science?* by Sidney Harris (1977)

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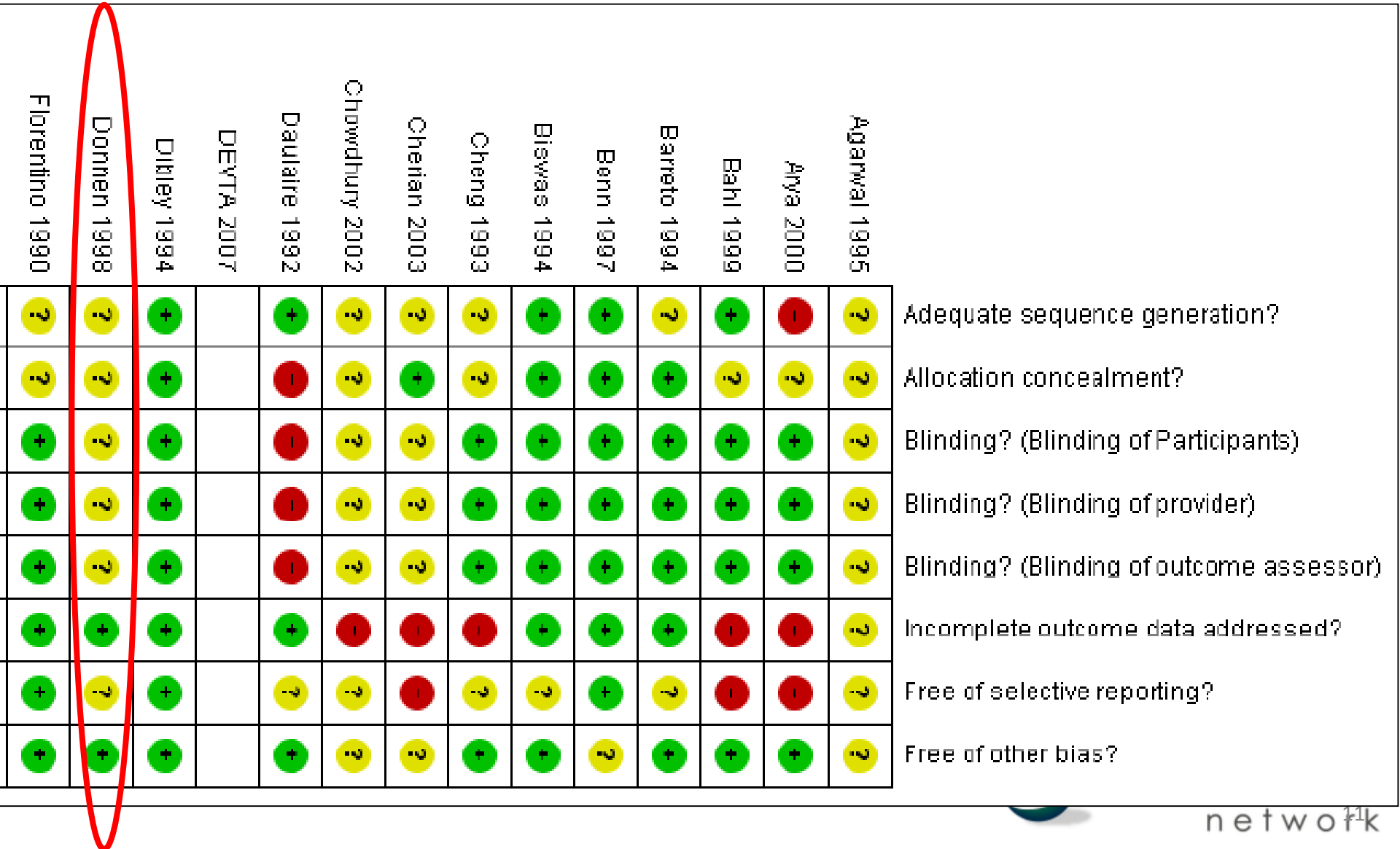
RoB assessment by Cochrane authors



Poor description of interventions

Poor description of non-pharmacological interventions: analysis of consecutive sample of randomised trials

Tammy C Hoffmann *associate professor of clinical epidemiology*, Chrissy Erueti *assistant professor*, Paul P Glasziou *professor of evidence-based medicine*

- Hoffmann et al, BMJ 2013;347:f3755
  - 133 RCT of NPI published in 2009 in 6 gen med j
  - Only 53/137 (39%) interventions were adequately described
  - increased to 81 (59%) by using responses from contacted authors
  - 46 (34%) had further information / materials available on websites
    - Not mentioned in the report
    - Not freely accessible
    - URL not working

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Poor reporting of adverse effects

ORIGINAL ARTICLES

Side effects are incompletely reported among systematic reviews in gastroenterology

Suzanne E. Mahady[a,b,*], Timothy Schlub[a], Lisa Bero[c], David Moher[d], David Tovey[e], Jacob George[b], Jonathan C. Craig[a,f]

- 78 SR of RCTs of gastroenterology interventions 2008-2012:
  - 26 (33%) did not refer to harms of the intervention anywhere in the article
  - AE data presented in results section frequently misrepresented in the discussion:
    - Results: “adverse events were not well reported”
    - Discussion: “adverse events are minimal and the risk benefit ration is good”

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Selective reporting

BMJ 2014;349:g6501 doi: 10.1136/bmj.g6501 (Published 21 November 2014) Page 1 of 11

Selective reporting bi
studies: findings from

OPEN ACCESS

Pooja Saini *research associate*[1], Yoon
Altman *professor*[4], Paula R Williamson

CMAJ September 28, 2004 vol. 171 no. 7 doi: 10.1503/cmaj.1041086

Research article

Outcome reporting bias in randomized trials funded by the Canadian Institutes of Health Research

An-Wen Chan, Karmela Krleža-Jerić, Isabelle Schmid, Douglas G. Altman

Results: We identified 48 trials with 68 publications and 1402 outcomes. The median number of participants per trial was 299, and 44% of the trials were published in general medical journals. A median of 31% (10th–90th percentile range 5%–67%) of outcomes measured to assess the efficacy of an intervention (efficacy outcomes) and 59% (0%–100%) of those measured to assess the harm of an intervention (harm outcomes) per trial were incompletely reported. Statistically significant efficacy outcomes had a higher odds than nonsignificant efficacy outcomes of being fully reported (odds ratio 2.7; 95% confidence interval 1.5–5.0). Primary outcomes differed between protocols and publications for 40% of the trials.

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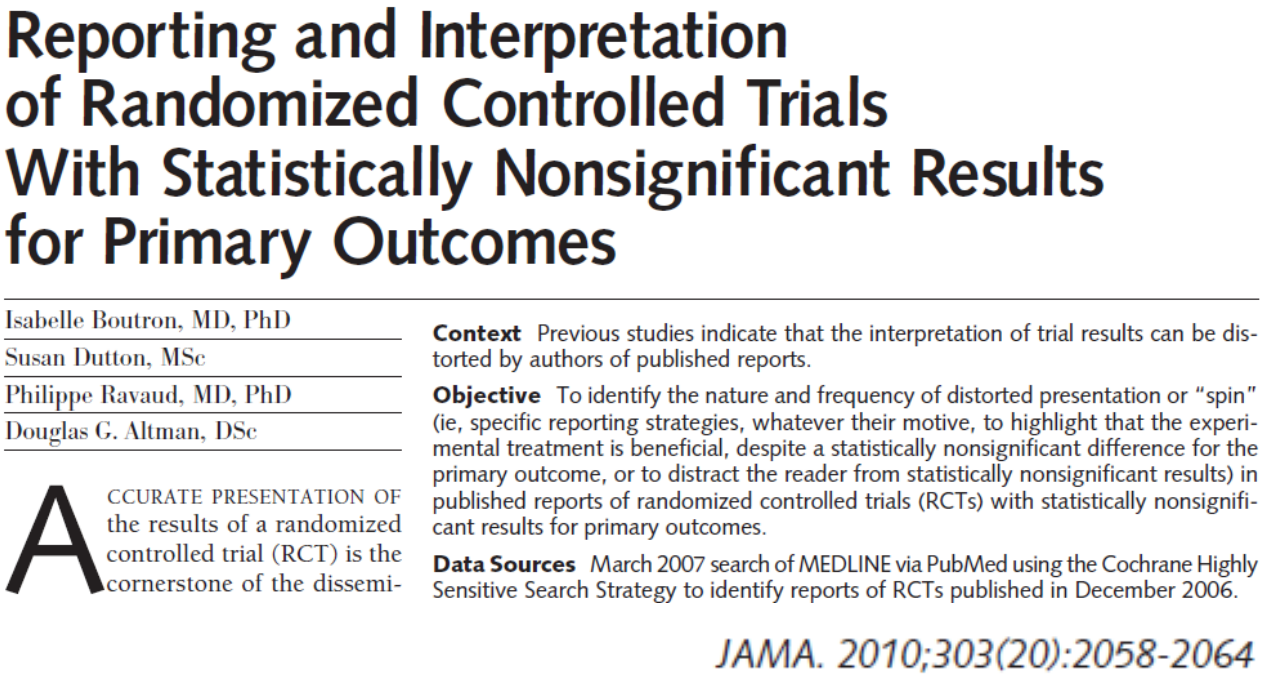
Misleading reporting

- "Spin"



Reporting and Interpretation of Randomized Controlled Trials With Statistically Nonsignificant Results for Primary Outcomes

Isabelle Boutron, MD, PhD
Susan Dutton, MSc
Philippe Ravaud, MD, PhD
Douglas G. Altman, DSc

ACCURATE PRESENTATION OF the results of a randomized controlled trial (RCT) is the cornerstone of the dissemi-

Context Previous studies indicate that the interpretation of trial results can be distorted by authors of published reports.

Objective To identify the nature and frequency of distorted presentation or "spin" (ie, specific reporting strategies, whatever their motive, to highlight that the experimental treatment is beneficial, despite a statistically nonsignificant difference for the primary outcome, or to distract the reader from statistically nonsignificant results) in published reports of randomized controlled trials (RCTs) with statistically nonsignificant results for primary outcomes.

Data Sources March 2007 search of MEDLINE via PubMed using the Cochrane Highly Sensitive Search Strategy to identify reports of RCTs published in December 2006.

JAMA. 2010;303(20):2058-2064

- "Specific reporting strategies, whatever their motive, to highlight that the experimental treatment is beneficial, despite a statistically nonsignificant difference for the primary outcome, or to distract the reader from statistically nonsignificant results)"

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Boutron et al, JAMA 2010: Evaluation of spin in 72 trials

- *Title*
  - 18% Title
- *Abstract*
  - 38% Results section of abstract
  - 58% Conclusions section of abstract
- *Main text*
  - 29% Results
  - 41% Discussion
  - 50% Conclusions

>40% had spin in 2+ sections of main text

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Deficiencies in research literature

- **Non-reporting (or delayed reporting) of whole studies**
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All of these are very common!

Consequences

- Low reliability of findings
- Impossible to replicate methods
- Impossible to reproduce findings
- Difficulties in implementing findings in practice (or just understanding the papers!)

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Reporting completeness

- **Reporting guidelines help** to improve completeness and transparency of research articles (**www.equator-network.org**)

Barnes *et al. BMC Medicine* (2015) 13:221
DOI 10.1186/s12916-015-0460-y

BMC Medicine

RESEARCH ARTICLE Open Access

CrossMark

Impact of an online writing aid tool for writing a randomized trial report: the COBWEB (Consort-based WEB tool) randomized controlled trial

Caroline Barnes[2,3], Isabelle Boutron[1,2,3*], Bruno Giraudeau[3,4], Raphael Porcher[1,2,3], Douglas G Altman[5] and Philippe Ravaud[1,2,3,6]

Abstract

Background: Incomplete reporting is a frequent waste in research. Our aim was to evaluate the impact of a writing aid tool (WAT) based on the CONSORT statement and its extension for non-pharmacologic treatments on the

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Common errors to avoid

- Title
  - Misrepresents / inadequately describes the article or study design
  - Includes unclear abbreviation, jargon
- Abstract
  - Information in abstracts does not correspond with the information in the full text (methods, results, conclusions, etc.)

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Common errors to avoid (2)

- Introduction
  - Does not describe the purpose and objective of the study
  - Contains material irrelevant to the study or belonging in other sections of the manuscript

Common errors to avoid (3)

- Methods
  - Reports on methods not used in the study
  - Described methods do not relate to reported results
  - Missing or inadequate description (preventing replication of the study):
    - For example description of study participants, interventions, randomisation in trials, etc.
  - Poor reporting of statistical methods

Common errors to avoid (4)

- Results
  - Incomplete reporting (data cannot be included in meta-analysis)
  - Inadequate reporting of harms
  - Selective reporting of outcomes and / or analyses (e.g. subgroups, alternative analyses)
  - Presenting results from another study
  - Text repeats what is show in tables and figures

Common errors to avoid (5)

- Discussion
  - Does not explain key results
  - Biased, fails to put results in the context of findings from other studies
  - Does not describe limitations of the study
  - Overstates conclusions from results (inflates the importance of the study)
  - Too expansive, lacks logic, includes irrelevant information

Common errors adapted from www.sfedit.net

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