

## Get the content right: Following reporting guidelines will make your research paper more complete, transparent and usable

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### Abstract

Substantial evidence demonstrates widespread shortcomings in the reporting of health research publications. Reporting guidelines represent an effective tool to help improve the completeness and transparency of published papers that are much needed for their future use. Examples of key reporting guidelines (CONSORT, STROBE, COREQ, ENTREQ, PRISMA, STARD, and SQUIRE) are introduced here together with other resources supporting the writing of high quality research publications that are provided by the EQUATOR Network ([www.equator-network.org](http://www.equator-network.org)).

**Keywords:** Reporting guidelines, Research publication, EQUATOR Network.

### Introduction

The writing up of a research study and transforming it into a good research manuscript is not an easy task. How do you ensure the paper is attractive and readable and yet it provides enough details about the study design, conduct and findings for the reader to be able to understand what you did? What information should you include in the article to allow easy and reliable retrieval of the study and its further use in research or clinical practice? The information provided in a good research article needs to satisfy the needs of a very broad group of readers, ranging from busy clinicians seeking succinct information relevant to their clinical practice, to systematic reviewers seeking a detailed description of all aspects of the study to allow them to appraise the study methodology and synthesise its findings across studies.

There are many good books and articles advising scientists on academic writing (my personal favourites are by G.M. Hall<sup>1</sup> and E. Wager<sup>2</sup>) and our writing skills improve over time with practice and with reading other people's writings.

Getting the content right is probably a more challenging task. Growing evidence<sup>3</sup> from research studies investigating the quality and usability of published papers highlights serious deficiencies in health research

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literature. Examples of the most common, yet very problematic issues, are listed in Box-1.

To avoid these problems and to help researchers in writing up their research studies, a number of reporting guidelines have been developed over the last 15 years. This article provides a brief overview of key generic guidelines for reporting the main types of clinical research studies and highlights other resources which are available on the EQUATOR Library.

### Reporting Guidelines

Reporting guidelines provide structured advice on what information needs to be included in an article (as a minimum requirement) to allow readers to assess the study methodology, its relevance, and the validity of the presented findings.<sup>4</sup> The EQUATOR Network's online Library for Health Research Reporting<sup>5</sup> currently lists over 200 reporting guidelines. Some of these are generic for different types of study designs (e.g. randomised trials, systematic reviews, observational studies) and should always be observed when reporting this type of study. The primary focus of these guidelines is on the description of the study methods and corresponding advice on reporting the study findings. The content of each of these guidelines has been very carefully

Box-1: Examples of common deficiencies identified in health research papers.

#### Non-reporting (or delayed reporting) of whole studies:

- ◆ Often studies with 'disappointing' results

#### Incomplete reporting:

- ◆ Omission of crucial aspects of research methods (study participants, interventions, randomisation in trials, etc.)
- ◆ Incomplete results: data cannot be included in meta-analysis
- ◆ Inadequate reporting of harms

#### Selective reporting:

- ◆ Patient outcomes
- ◆ Analyses, e.g. subgroups, alternative analyses

#### Misleading reporting:

- ◆ Misinterpretation of study findings "spin" (e.g. presenting study in more positive way; discrepancies between abstract and whole text, etc.)
- ◆ Misrepresentation of study design (e.g. study claiming is an RCT when is not)
- ◆ Unacknowledged discrepancies between sources
- ◆ e.g. publication conflicts with study protocol or information in the register.

considered by multidisciplinary groups of relevant experts and stakeholders and there is a strong rationale for each item of requested information. Items range from 'simple' requests such as the identification of study design in the title or abstract (necessary for the electronic identification of studies) to items focusing on specific aspects that might introduce bias into the research (e.g. details about how participants were selected for inclusion into the study). The majority of the guidelines listed on the EQUATOR website, however, are more specific, providing guidance relevant to a particular medical specialty (e.g. reporting trials in leukaemia) or a particular aspect of research (e.g. reporting of adverse events). These guidelines should be ideally used in conjunction with the generic methodology focused guidelines.

### Reporting guidelines for the main types of health research studies

The Consolidated Standards of Reporting Trials (CONSORT) Statement is probably the most used and most influential reporting guideline. CONSORT consists of a checklist of essential items to be included in a trial report and of a flow diagram designed to help document the flow of participants through a trial. The checklist was primarily developed to advise on reporting parallel group trials but several extensions have been developed to provide more specific guidance on specific trials designs (e.g. cluster, non-inferiority, and pragmatic trials), interventions (e.g. non-pharmacological, herbal, and acupuncture trials) and types of data (e.g. abstracts, harms). Full details of these guidelines can be found on the CONSORT website.<sup>7</sup> The EQUATOR website<sup>5</sup> also lists additional extensions developed by groups independent from CONSORT (e.g. CONSORT-EHEALTH) and new extensions that are being developed (e.g. reporting patient related outcomes or economic evaluations).

The CONSORT Statement has been widely endorsed by journals and influential research and editorial organisations. The recent Cochrane review<sup>8</sup> demonstrated that trials published in journals that endorse CONSORT report several key CONSORT items more completely than those published in non-endorsing journals or prior to endorsement in a given journal. The review confirmed the common sense truth that checklists are useful reminders and following them helps to improve reporting.

Although randomised trials are regarded as the gold standard method for the evaluation of treatment effects and evidence from trials sits high on the pyramid of evidence hierarchy, observational research forms a much larger proportion of published research studies. The STROBE (Strengthening the Reporting of Observational

Studies in Epidemiology) Statement<sup>9</sup> provides a minimum set of reporting recommendations for the three main types of analytical observational designs: cohort studies, case-control studies, and cross-sectional surveys. The STROBE guidance is summarised in a 22-item checklist, of which 18 items apply to all three study design and the remaining four are design-specific. The STROBE Statement has several extensions: STREGA recommendations for genetic association studies,<sup>10</sup> STROBE-ME for molecular epidemiology (biomarker) studies,<sup>11</sup> and a draft proposal for STROBE for abstracts for preparation of conference and journal abstracts.<sup>12</sup> The EQUATOR website also lists guidelines for case reports, adverse event reports, various types of surveys, genetic risk prediction studies, tumour marker prognostic studies and many other guidelines relevant to observational research.<sup>5</sup>

Two key reporting guidelines have been developed for reporting qualitative research. The COREQ (Consolidated Criteria for Reporting Qualitative Research) checklist provides recommendations for in-depth interviews and focus groups, the most common methods for data collection in qualitative health research.<sup>13</sup> The ENTREQ (Enhancing Transparency in Reporting the Synthesis of Qualitative Research) Statement<sup>14</sup> helps researchers to report the stages most commonly associated with the synthesis of qualitative health research: searching and selecting qualitative research, quality appraisal, and methods for synthesising qualitative findings.

The PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) Statement is a guideline facilitating reporting of systematic reviews that assess the benefits and harms of healthcare interventions.<sup>15</sup> The PRISMA Statement consists of a 27-item checklist and a four-phase flow diagram for documenting the numbers of studies considered for inclusion in a systematic review, from first identification to those finally included. Although the guideline's primary focus is on systematic reviews of randomised trials, most of its content is of generic applicability.

Finally, researchers involved in the evaluation of diagnostic tests will find the STARD (Standards for Reporting of Diagnostic Accuracy) Statement<sup>16</sup> useful for writing up their studies. The 25-items checklist and flowchart help authors to describe essential elements of the design and conduct of the study, the execution of tests, and the presentation of its results.

### Other/guidelines: EQUATOR Library for Health Research Reporting

The EQUATOR (Enhancing the QUALity and Transparency of health Research) Network is an international initiative

which aims to improve the reliability and value of the medical research literature by promoting transparent and accurate reporting of research studies. The EQUATOR online Library for Health Research Reporting<sup>5</sup> provides extensive resources to help scientists prepare high quality research manuscripts. Aside from the links to over 200 reporting guidelines, these include: guidance on scientific writing, guidelines for responsible research conduct and publication, guidelines for industry sponsored research, and other useful information such as resources facilitating the design of research studies. The resources are freely accessible and regularly updated to ensure the availability of the latest guidance.

### Concluding Remarks

Researchers should be aware of the general principles of good research reporting, requirements specific to their research study, and relevant reporting guidelines before they embark on their research project. The EQUATOR website is an essential resource for guidance on research reporting and related issues and can be of substantial help particularly to young researchers starting their careers. Adherence to reporting guidelines, such as the ones described in this article, can help authors to prepare their manuscript to a high standard, thus facilitating the peer review process and potentially increasing the chances of the manuscript being accepted by a relevant journal. More complete, accurate and transparent reporting of health research can provide better value to the future of research and to the improvement of patient care.

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