Journal of Clinical Epidemiology 135 (2021) 136–157

REVIEW

Do not make clinical decisions based on abstracts of healthcare research: A systematic review

Dafne P. Nascimento[a,b,*], Raymond W.J.G. Ostelo[b,c], Maurits W. van Tulder[b,d], Gabrielle Z. Gonzalez[a], Amanda C. Araujo[a], Adriane A. Vanin[a], Leonardo O.P. Costa[a]

[a] *Masters and Doctoral Programs in Physical Therapy, Universidade Cidade de São Paulo, São Paulo, SP, Brazil*
[b] *Department of Health Sciences, Faculty of Science, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands*
[c] *Department of Epidemiology and Biostatistics, Amsterdam UMC, location VUmc and the Amsterdam Movement Sciences Research Institute, Amsterdam, The Netherlands*
[d] *Department of Physiotherapy & Occupational Therapy, Aarhus University Hospital, Aarhus, Denmark*

Accepted 3 March 2021; Available online 8 April 2021

Abstract

Objective: To summarize the reporting quality of healthcare abstracts and inconsistencies between abstracts and full texts.

Study design and Setting: This systematic review included overviews of randomized controlled trials (RCTs) and systematic reviews (SRs) that summarized data of healthcare abstracts on reporting of abstracts and consistency of abstracts with the full text. Searches were performed in PubMed, CENTRAL, Cochrane Library and EMBASE databases from 1900 to February 2019. Two authors screened the overviews and extracted the data. All analyses were descriptive and divided into two main groups: abstracts' reporting quality and abstracts' consistency with the full text. Abstracts were considered poorly reported and inconsistent with the full text if more than 5% of abstracts' information was not fully reported or not consistent with the full text.

Results: 27 overviews analyzing 5,194 RCTs and 866 SRs were retrieved for reporting quality of abstracts. A total of 22 overviews analyzing 2,025 RCTs and 551 SRs were included for consistency of abstracts with the full text. Abstracts across all healthcare areas presented poor reporting quality and were inconsistent with the full texts, with results and conclusions as the most inconsistent sections.

Conclusion: Abstracts of healthcare RCTs and SRs have shown a large room for improvement in reporting quality and consistency with the full text. Authors, journal editors and reviewers need to give the highest priority to this matter.

Keywords: Abstracts; Consistency; Interpretation; Reporting quality; Spin; Healthcare

1. Introduction

Within the framework of evidence-based practice, healthcare professionals mainly use evidence from randomized controlled trials (RCTs) and systematic reviews (SRs) for clinical decisions on interventions. [1,2] Often the abstract of a scientific article is the only available source of information for clinicians, due to lack of time and/or access to the full text. [3-5] Therefore, if the abstract is poorly reported or interpreted, clinicians do not make well-informed decisions, as well as it may disseminate misinterpreted research findings by academic press releases or media coverage of research. [6,7]

Common problems found in abstracts of RCTs and SRs in healthcare research are twofold: 1) Poor reporting quality, [3,5,8] which can be analyzed by the inclusion of all relevant information reported in the study. The abstract should have enough details and clarity that readers can assess study's validity and applicability. [9,10] For example, only 13% of abstracts in the field of oncology reported allocation concealment and blinding of participants in the methods section [11]. These findings could help readers to critically appraise the methodological quality of those studies; and 2) Inconsistencies between the information contained in the full text and corresponding abstract, which can be analyzed by comparing the reporting and

Competing Interest: None

Funding: This work was funded by a scholarship from the Sao Paulo Research Foundation (FAPESP), grant#2016/17853-4 and grant#2018/17932-7. The Foundation had no role in the study design, conduct, and reporting of the present work.

* Corresponding author. Dafne Port Nascimento, Masters and Doctoral Programs in Physical Therapy, Universidade Cidade de São Paulo. Rua Cesário Galeno 448, Tatuapé, São Paulo, SP Brazil, CEP 03071-000. Phone number: +55 11 994779119, Fax number: +55 11 38342827

E-mail addresses: dafnepn@yahoo.com.br (D.P. Nascimento), maurits.van.tulder@vu.nl (M.W. van Tulder).

https://doi.org/10.1016/j.jclinepi.2021.03.030
0895-4356/

interpretation of sections of the abstract with the corresponding information in the full text. [12] Assem et al showed that outcomes of surgery abstracts have three times the odds of showing statistically significant results comparing to the same outcomes reported in their corresponding full texts [13]. Therefore, the impact on important clinical decisions could be lead through such inconsistencies.

Spin is the term defined for the misinterpretation of study results, typically leading to overstating the results in a more favorable way. [14-16] Examples of spin in abstracts are: omission of primary outcome or adverse events; selective reporting of negative primary outcomes; focus on positive secondary outcomes; overstated interpretation of study results; recommendation of a treatment without a clinically important effect; and also conclusion of beneficial effect despite high risk of bias of outcomes analyzed. [14,16]

Researchers have been working on efforts to improve the quality, transparency, integrity and value of abstracts and papers published. Some examples of these efforts involves stricter editorial policies, stricter reporting guidelines endorsement, and better guidance on abstracts reporting guidelines [5,12]. Such guidelines are the Consolidated Standards of Reporting Trials for Abstracts checklist [9] (CONSORT-A) and the Preferred Reporting Items for Systematic Reviews and Meta-Analysis [10] (PRISMA-A). Also, efforts have been made on improving the awareness of the prevalence of spin by journal editors and reviewers [15], as well as training programs for authors, journal editors and peer reviewers. [17] Despite all mentioned efforts, it seems that abstracts still present inadequate reporting and inconsistencies with the full text. [8,12,15] It is also uncertain whether the reporting quality and inconsistency of abstracts are specific for certain fields of healthcare or general for healthcare. Previous studies have suggested that more specific changes should be made in journals' editorial policies, such as increasing the word limits for abstracts. [12,18,19] However, there is no consensus reported in literature on what measures should be taken.

In order to analyze how healthcare abstracts of RCTs have been reported, a SR was performed. [8] This SR [8] is now outdated and does not anymore provide a precise perspective of abstracts reporting quality after the creation of the CONSORT-A. [9] Another scoping review recently published analyzed inconsistencies between abstract and full text of primary studies, but included any study design and conference abstracts. [12] A concern in literature is related to the terminology describing 'inconsistencies' (or inaccuracy, or discrepancies) between abstracts and full texts, which seems to vary greatly between studies. [12] Both SRs mentioned above [8,12] point to the need for stricter journal editorial policies to improve abstracts reporting and inconsistencies with their full texts. However, it seems that recommendations have not been followed and it is unknown if such issues can be generalized to all healthcare areas. In order to explore those gaps in literature we designed this systematic review. Our primary objectives were: (1) to summarize the reporting quality of RCTs and SRs abstracts after the CONSORT-A [9] and PRISMA-A [10] release in all healthcare areas; and (2) to summarize the consistency between RCTs and SRs abstracts with their corresponding full text in terms of reporting and spin of study results.

2. Materials and methods

This systematic review has not been suitable for registration at the International Prospective Register of Systematic Reviews (PROSPERO), because they register only systematic reviews with a direct link to human health.

2.1. Inclusion criteria

This systematic review included overviews of research abstracts of RCTs and SRs in the field of healthcare that summarized reporting quality and consistency of abstracts with the full text. We called all these studies "overviews" in order to simplify the nomenclature of studies, even if they are so called "systematic reviews", "scoping reviews" or "surveys". There were no language restrictions. Grey literature (e.g. PhD thesis or unpublished work) was not considered for this systematic review. However, we checked the reference lists for any other overview that could be included in our study, and contacted authors when required. Inclusion criteria were:

1) Abstracts' reporting quality:

- RCTs: the overviews had to have used the CONSORT-A to analyze the abstracts. Such RCTs had to be published from 2008 onwards, as the CONSORT-A was published in 2008; [9]
- SRs: the overviews had to have used the PRISMA-A to analyze the abstracts. Such SRs had to be published from 2013 onwards, as the PRISMA-A was created in 2013; [10]

2) Abstracts' consistency with the full text:

- Overviews assessing the consistency of RCTs and SRs abstracts with the full text in terms of reporting and misinterpretation of study results (spin), without restriction for time period.
  - An example of reporting inconsistencies between abstracts and full texts is the lack of reporting of primary outcomes of an intervention in the abstract, while fully reported in the full text. A real example can be found in a study evaluating RCT abstracts of spine surgery [20]. The authors found that 75% of abstracts were inconsistent with the full texts. The primary outcome was adequately reported in only 22.5% of abstracts and 47.5% of full texts;

- An example of spin of study results: to focus on statistically significant results for within-group comparisons or secondary outcomes. A real example can be found in a study evaluating RCT abstracts of cardiovascular, surgery and other medical areas [21]. The authors found that around 68% of abstracts and 61% of full texts presented at least one section with spin.

2.2. Search strategy

We searched for potentially eligible articles on PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane Library (records of Cochrane Reviews and Methods Studies) and EMBASE databases from 1900 to March 2019. We narrowed our search to studies involving the analysis of abstracts and tried to avoid retrieving conference abstracts. Therefore, our full search strategy in each database was limited to title and abstracts, with the following keywords: (abstracts not conference* not congress* not meeting* not symposium not annual not convention* not reunion* not workshop* not poster* not presentation* not forum* not association*) [Title] and choosing the box "Abstracts" under "Limits" of the Advanced Search.

2.3. Study selection

Two authors conducted the searches, identified potentially relevant overviews and removed duplicates independently. Titles and abstracts were screened for assessment against the inclusion criteria and separated into two groups: Abstracts reporting quality; and Abstracts consistency with the full text. Eligible studies were retrieved in full and assessed in detail. Reasons for exclusion of full text studies were recorded. Any disagreements that arose between the reviewers at each stage of the study selection process were resolved through discussion, or with a third reviewer.

2.4. Data extraction

Two authors extracted data independently. Disagreements were discussed in a consensus meeting, and resolved by a third author if disagreements persisted. The selected overviews and data extracted were stored in a Microsoft Excel spreadsheet. The following data were extracted: first author; year of publication; healthcare field and/or disorders (described as reported in the included overview); number of primary research abstracts of RCTs and SRs included in the overviews; study design analyzed (RCTs or SRs); year range of primary research abstracts; terminology used to describe consistency; aim of the overview; methods used by the overviews to evaluate reporting and consistency of the RCTs or SRs abstracts; and main findings of the overviews.

Main outcomes extracted from the overviews were:

1) Reporting quality of abstracts of RCTs and SRs: the mean, median or percentage overall score (with any measure of variability) of fully reported items from the CONSORT-A [9] (mean CONSORT-Abstract score) and PRISMA-A [10] (mean PRISMA-Abstract score); and percentage of abstracts reporting each item from the checklists. We then calculated the standardized mean percentage of fully reported items for each overview, calculated by summing the percentage of each item, from the CONSORT-A [9] (mean CONSORT-Abstract score) and PRISMA-A [10] (mean PRISMA-Abstract score) divided by the total number of items. For overviews comparing the reporting quality of abstracts before- and after-release of the abstracts checklists, we collected and analyzed information regarding the after-period only. As abstracts should be fully reported (100.0%), in order to give a small margin of error, abstracts were considered poorly reported if more than 5% of abstracts' information was not fully reported;
2) Consistency of abstracts of RCTs and SRs with the full text: the standardized percentage of inconsistent abstracts for each overview, including those that reported only the odds ratio (OR). In this case, we divided the OR by one plus the OR (percentage = OR / 1 + OR). When only the percentage of inconsistencies per each item was reported, we calculated the standardized mean percentage of inconsistent abstracts for each overview, by summing the percentage of each item, divided by the total number of items. As abstracts should be completely consistent with the full text (100.0%), in order to give a small margin of error, we considered abstracts inconsistent with the full text if more than 5% of abstracts' information was not consistent with the full text.

Secondary outcomes were: the methodological quality of primary studies (the overall judgment or overall score, range and scale used by the primary studies, e.g. Cochrane risk of bias tool for RCTs [22] and SRs [23]); the number of words in the primary research abstracts (mean word count or range permitted in the journal of publication); associations found by the overviews between the primary research abstracts (e.g. abstracts reporting quality) and journal or study characteristics (e.g. journal impact factor); and recommendations given by the overviews that were related to improvements of abstracts reporting quality and consistency with the full text.

2.5. Data synthesis

All analyses were made descriptively for all studies and for subgroups of different healthcare fields.

3. Results

The searches were performed on July 5, 2018 and March 5, 2019. We found a total of 7,345 records indexed in all databases, with additional 12 identified throughout

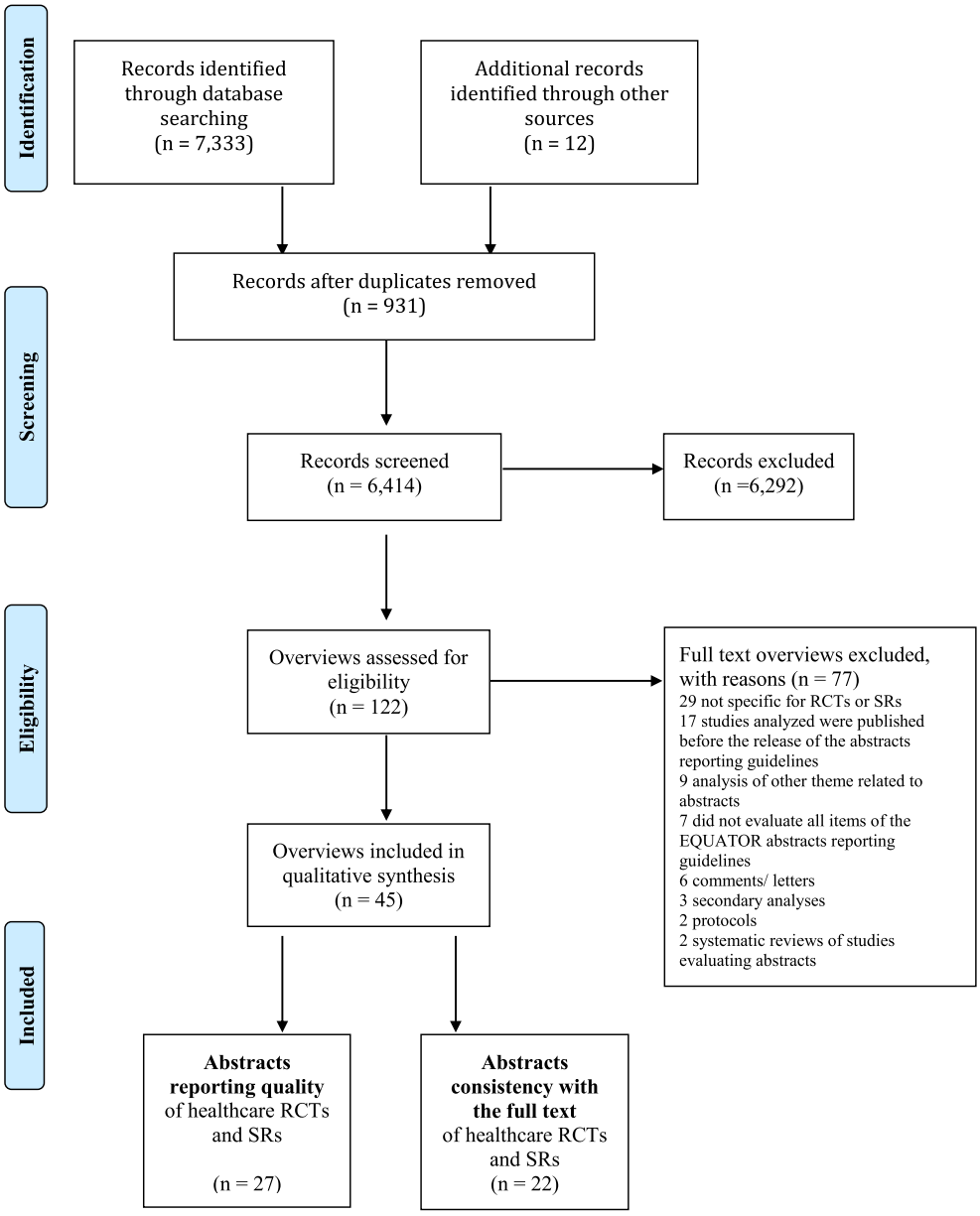

Fig. 1. Flow chart of the included overviews.

the references of the analyzed studies. 122 overviews were assessed for eligibility, from which 77 were excluded (APPENDIX A with reasons for exclusion for each article). Our final sample of 45 overviews was subdivided into abstracts' reporting quality of healthcare RCTs and SRs ($n = 27$); and into abstracts 'consistency with the full text ($n = 22$). The flow chart of the included overviews is presented in a PRISMA flow diagram [24] (Fig. 1). Four reviews were included in both groups. [25-28]

1) Abstracts' reporting quality

We included 27 overviews analyzing abstract's reporting quality of healthcare RCTs and SRs, [3,5,11,25-48] from which included 5,194 RCTs and 866 SRs. Main characteristics are presented in Table 1. The standardized mean percentage score of fully reported items varied across healthcare areas, and ranged from 28% to 73%. Abstracts across all healthcare areas presented poor reporting quality, with more than 5% of abstract's information not fully reported. Twenty overviews [3,5,11,25-29,32,35,36,38-41,43-47] investigated the relationship between journal and primary research characteristics with abstracts' reporting quality (Table 2). Higher abstract reporting quality was associated with a more recent publication date, [3,5,11,25,32,38,43,44,47] higher abstract word count, [3,5,26-28,45] higher journal impact factor, [26,27,29,32,35,38] multicenter design, [5,40,43,46,47] higher number of authors, [5,29,36] having a structured abstract, [3,5,32] reporting guidelines

Table 1. Description of overviews analyzing abstracts reporting quality of healthcare RCTs and SRs

First author. Year of publication Aim of overview	Healthcare field Methods	Number of abstracts (year range) Main findings of abstracts reporting quality
Bigna. 2016 [29] To assess abstracts reporting quality and to determine the factors associated with better reporting quality (before and after the release of the CONSORT-A).	Infectious diseases Data extracted using the original 17-item CONSORT-A: Mean CONSORT-Abstract score (scale 0-17; SD); Mean percentage score (95% CI); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: journal IF; structured abstract; CONSORT endorser journal; intervention type (pharmacological or non-pharmacological); number of authors; publication on behalf of a research group; journal field (infectious diseases or general medicine).	153 RCTs (2014-2015) Mean CONSORT-Abstract score: 7.7 (SD 4.0); Mean percentage score: 58.6% (95% CI 57.6, 59.7); Range of abstracts reporting items: 12.0% (Blinding) to 93.0% (Interventions). Factors associated with better abstract reporting: non-pharmacological intervention type; higher number of authors; higher journal IF*.
Bigna. 2016 [3] To assess abstracts reporting quality in journals with high IF and to determine the factors associated with better reporting quality (before and after the release of the PRISMA-A).	General medicine Data extracted using the 12-item PRISMA-A: Mean PRISMA-Abstract score (scale 0-12; SD); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: publication date; abstract word count; PRISMA endorser journal; structured abstract; publication on behalf of a group; number of authors.	120 SRs (2014-2015) Mean PRISMA-Abstract score: 2014 6.8 (1.6); and 2015 7.5 (1.6); Range of abstracts reporting items (2015): 11.5% (Information sources) to 100.0% (Synthesis of results and Interpretation). Factors associated with better abstract reporting: more recent publication date; higher abstract word count (2014 and 2015); structured abstract (2014)*. <300 words: 22.5% abstracts; equal or >300 words: 77.5% words.
Blair. 2014 [30] To assess abstracts reporting quality.	Pharmacy Data extracted using the modified 16-item CONSORT-A: Median CONSORT-Abstract score (scale 0-16; IQR); Median percentage score; Percentage of abstracts reporting each item.	63 RCTs (2009-2011) Median CONSORT-Abstract score: 9 (IQR 8 to 10); Median percentage score: 56.0% (IQR 50.0, 62.5); Range of abstracts reporting items: 0.0% (Registration and Funding) to 100.0% (Conclusions). Abstract word count range: 250-300.
Can. 2011 [31] To assess abstracts reporting quality (before and after the release of the CONSORT-A).	Anesthesia Data extracted using the modified 16-item CONSORT-A: Mean percentage score (with 95% CI); Percentage of abstracts reporting each item.	252 RCTs (2008-2009) Mean percentage score: 29.0% (95% CI 27.2, 30.2%); Range of abstracts reporting items: 0.0% (Funding) to 90.1% (Objective). Journals abstract word limit range: 150-400.
Chen. 2018 [32] To assess abstracts reporting quality and to determine the factors associated with better reporting quality (before and after the release of the CONSORT-A).	Dentistry Data extracted using the modified 16-item CONSORT-A: Mean CONSORT-Abstract score (scale 0-16; SD); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: journal IF; number of authors; abstract word count; structured abstract; publication date.	87 RCTs (2010-2016) Mean CONSORT-Abstract score 6.1 (1.3). Range of abstracts reporting items: 0.0% (Randomization and Funding) to 100.0% (Interventions and Conclusions). Factors associated with better abstract reporting: higher journal IF; structured abstract; more recent publication date*. <200 words: 12.6% abstracts; 200-250 words: 40.2% abstracts; 250-300 words: 33.3% abstracts; >300 words: 13.8% abstracts. Journals abstract word limit range: 250-400.
Chow; 2018 [25] To assess abstracts reporting quality and to determine whether there was an improvement over time.	Anesthesia Data extracted using the modified 16-item CONSORT-A: Median CONSORT-Abstract score (scale 0-16; IQR); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: publication date.	395 RCTs (2010 and 2016) Median CONSORT-Abstract score for 2016 6.0 (5.0-8.0); Range of abstracts reporting item (2016): 0.0% (Funding) to 91.0% (Conclusions). Factors associated with better abstract reporting: more recent publication date. Journals abstract word limit range: 250-400.
Faggion. 2012 [33] To assess abstracts reporting quality (before and after the release of the CONSORT-A).	Dentistry Data extracted using the modified 15-item CONSORT-A: Percentage of abstracts reporting each item.	209 RCTs (2009-2011) Range of abstracts reporting items: 0.0% (Funding) to 100.0% (Interventions and Conclusions).
Ghimire. 2012 [34] To assess abstracts reporting quality in four journals with high IF.	General medicine Data extracted using the original 17-item CONSORT-A: Percentage of abstracts reporting each item.	271 RCTs (2010) Range of abstracts reporting items: 11.8% (Randomization) to 99.3% (Participants and Registration).

(*continued on next page*)

Table 1 (*continued*)

First author. Year of publication Aim of overview	Healthcare field Methods	Number of abstracts (year range) Main findings of abstracts reporting quality
Ghimire. 2014 [35] To assess abstracts reporting quality and to determine the factors associated with better reporting quality (before and after the release of the CONSORT-A).	Oncology Data extracted using the modified 18-item CONSORT-A: Mean CONSORT-Abstract score (scale 0-18; 95% CI); Mean percentage score (with 95% CI); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: publication date; included journals (6 main journals and other); journal IF; continent of first author; number of authors; outcomes statistical significance (positive, negative or unclear); number of centers; structured abstract.	527 RCTs (2010-2012) Mean CONSORT-Abstract score: 9.9 (95% CI 9.7, 10.2); Mean percentage score: 55.2% (95% CI 53.8, 56.5); Range of abstracts reporting items: 6.8% (Randomization) to 100.0% (Interventions). Factors associated with better abstract reporting: trials published in the Lancet and Lancet Oncology; higher IF*.
Gómez-García. 2017 [36] To assess abstracts reporting quality and to determine if the PRISMA-A indirectly captures the methodological quality and the risk of bias in the full texts.	Psoriasis Data extracted using the 12-item PRISMA-A: Median PRISMA-Abstract score (scale 0-12; range); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: abstract word count; structured abstract; multiple affiliation and international collaboration (Cochrane or not); number of authors; funding source (academic, pharmaceutical or no funding); PRISMA endorser journal; journal IF; methodological quality.	139 SRs (2016-2017) Median PRISMA-Abstract score: 6.0 (2.0-11.0); Range of abstracts reporting items: 1.0% (Funding and Registration) to 95.0% (Objectives). Factors associated with better abstract reporting: higher number of authors; academic funding source; PRISMA endorser journal; higher methodological quality*. ≤300 words: 71.0% abstracts; >300 words: 29.0% abstracts.
Hays. 2016 [37] To assess abstracts reporting quality in journals with high IF.	General medicine Data extracted using the modified 19-item CONSORT-A: Mean percentage score (with 95% CI); Percentage of abstracts reporting each item.	463 RCTs (2011-2014) Mean percentage score: 67.0% (95% CI 66.0, 68.0). Range of abstracts reporting items: 8.0% (Randomization) to 99.0% (Conclusions).
Hua. 2015 [38] To assess abstracts reporting quality in journals with high IF and to determine the factors associated with better reporting quality (before and after the release of the CONSORT-A).	Dentistry Data extracted using the modified 16-item CONSORT-A: Mean CONSORT-Abstract score (scale 0-16; SD); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: journal IF; continent of first author; publication date; number of authors; reported P value; number of centers.	159 RCTs (2010-2012) Mean CONSORT-Abstract score: 4.5 (SD 1.7). Range of abstracts reporting items: 0.6% (Randomization and Funding) to 98.1% (Objective and Conclusions). Factors associated with better abstract reporting: higher journal IF; more recent publication date*. <200 words: 25.8% abstracts; 200-250 words: 39.0% abstracts; 250-300 words: 28.9% abstracts; >300 words: 6.3% abstracts.
Janackovic. 2018 [48] To assess abstracts reporting quality in seven journals with highest IF.	Anesthesia Data extracted using the 17-item CONSORT-A: Median percentage score (IQR); Percentage of abstracts reporting each item.	622 RCTs (2014-2016) Median percentage score 41.0% (IQR 35–53%); Range of abstracts reporting items: 0.2% (Funding) to 97.0% (Interventions). Journals abstract word limit range: 150-400.
Jin. 2016 [39] To assess abstracts reporting quality in journals with high IF and to determine the factors associated with better reporting quality.	Laser medicine Data extracted using the modified 16-item CONSORT-A: Mean CONSORT-Abstract score (scale 0-16; SD); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: 4 included journals; publication date; journal field (dentistry, dermatology, surgery or other); continent of first author; abstract word count; structured abstract; reported P value; outcomes statistical significance (positive or negative); number of centers; number of authors; sample size; funding source (yes or no); multiple affiliation and international collaboration.	129 RCTs (2014-2015) Mean CONSORT-Abstract score: 4.5 (SD 1.3). Range of abstracts reporting items: 0.0% (Recruitment, Primary outcomes results and Funding) to 98.4% (Objective). Factors associated with better abstract reporting: dermatology journal field*. <200 words: 5.4% abstracts; 200–250 words: 47.3% abstracts; 251–300 words: 31.8% abstracts; >300 words: 15.5% abstracts.
Kiriakou. 2014 [40] To assess abstracts reporting quality and to determine the factors associated with better reporting quality.	Dentistry Data extracted using the modified 21-item CONSORT-A: Mean percentage score (with 95% CI); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: 5 included journals; number of authors; continent of first author; outcomes statistical significance; number of centers.	163 RCTs (2008-2012) Mean percentage score: 58.6% (95% CI 57.6, 59.7); Range of abstracts reporting items: 0.0% (Registration) to 89.0% (Interventions). Factors associated with better abstract reporting: trials published in the European Journal of Oral Implantology; multicenter*.

(*continued on next page*)

Table 1 (*continued*)

First author. Year of publication Aim of overview	Healthcare field Methods	Number of abstracts (year range) Main findings of abstracts reporting quality
Kumar. 2018 [41] To assess abstracts reporting quality and to perform a bibliometric analysis.	Dentistry Data extracted using the modified 25-item CONSORT-A: Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: journal IF; abstract word count; number of authors; CONSORT endorser journal; continent of first author; structured abstract.	198 RCTs (2012) Range of abstracts reporting items: 0.0% (Funding) to 100.0% (Interventions). Factors associated with better abstract reporting: European countries of first author*. Abstract word count range: 48-569 (median 235, IQR: 205-269).
Kuriyama. 2017 [42] To assess abstracts reporting quality (before and after the release of the CONSORT-A).	Critical care Data extracted using the modified 18-item CONSORT-A: Percentage of abstracts reporting each item.	166 RCTs (2011-2012) Range of abstracts reporting items: 1.8% (Randomization) to 97.0% (Conclusions). Journals abstract word limit range: 250-350.
Mbuagbaw. 2014 [43] To assess abstracts reporting quality in journals with high IF (before and after the release of the CONSORT-A).	General medicine Data extracted using the original 17-item CONSORT-A: Mean CONSORT-Abstract score (scale 0–17; SD); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: publication date; number of centers; intervention type (pharmaceutical or not); sample size; outcomes statistical significance (negative or positive).	100 RCTs (2012) Mean CONSORT-Abstract score: 12.1 (SD 2.2); Range of abstracts reporting items: 13.0% (Randomization) to 100.0% (Registration). Factors associated with better abstract reporting: post-CONSORT year of publication date; multicenter*.
Nascimento. 2019 [26] To assess abstracts reporting quality and to determine the factors associated with better reporting quality.	Low back pain Data extracted using the modified 15-item CONSORT-A: Mean CONSORT-Abstract score (scale 0-15; SD); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: number of centers; continent of first author; language (English or not); journal IF; CONSORT endorser journal; abstract word count; structured abstract; methodological quality; spin in the abstracts; date of publication.	200 RCTs (2010-2015) Mean CONSORT-Abstract score 5.1 (2.4). Range of abstracts reporting items: 2.0% (Randomization) to 97.0% (Objective). Factors associated with better abstract reporting: higher journal IF; CONSORT endorser journal; higher abstract word count; higher methodological quality; less spin in the abstracts*. Abstract mean word count: 258.0 (SD 67.3). Methodological quality (PEDro) mean score: 5.8 (SD 1.6; scale 0-10).
Nascimento. 2020 [27] To assess abstracts reporting quality and to determine the factors associated with better reporting quality.	Low back pain Data extracted using the 12-item PRISMA-A: Mean PRISMA-Abstract score (scale 0-12; SD); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: PRISMA endorser journal; number of citations; journal IF; abstract word count; spin in the abstracts; methodological quality.	66 SRs (2015-2017) Mean PRISMA-Abstract score 4.9 (2.7); 4.1 (2.0) for non-Cochrane reviews and 9.9 (1.1) for Cochrane reviews. Range of abstracts reporting items: 3.0% (Eligibility criteria) to 87.7% (Title). Mean journals abstract word limit: Non-Cochrane 259.3 (SD 67.6); Cochrane 400.0. Methodological quality: 75.8% critically low; 10.6% low, 6.1% moderate (Cochrane only); 7.6% high (Cochrane only). Factors associated with better abstract reporting: higher journal impact factor, higher abstract word count; higher review methodological quality*. Median number of words: Non-Cochrane reviews 253.0 (IQR 716.0); Cochrane reviews 747.0 (IQR 514.0).
O'Donohoe. 2019 [44] To assess abstracts reporting quality in 8 journals with highest IF.	Neurosurgical Data extracted using the modified 13-item PRISMA-A: Mean percentage score (95% CI). Descriptive data to associate with abstracts reporting: publication date.	257 SRs (2007-2017) Mean percentage score 56.5% (95% CI 47.8-60.9). Factors associated with better abstract reporting: post-PRISMA publication date.
Richter. 2016 [45] To assess abstracts reporting quality.	Physical therapy Data extracted using the modified 20-item CONSORT-A: Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: word count.	150 RCTs (2009) Range of abstracts reporting items: 0.7% Randomization and Funding) to 100.0% (Trial design). Factors associated with better abstract reporting: higher word count.

(*continued on next page*)

Table 1 (*continued*)

First author. Year of publication Aim of overview	Healthcare field Methods	Number of abstracts (year range) Main findings of abstracts reporting quality
Seehra. 2013 [46] To assess abstracts reporting quality in seven journals with highest IF and to determine the factors associated with better reporting quality.	Dentistry Data extracted using the modified 21-item CONSORT-A: Mean percentage score (with 95% CI); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: 7 included journals; continent of first author; number of authors; number of centers; outcomes statistical significance (positive or negative).	228 RCTs (2008-2011) Mean percentage score: 62.5% (95% CI 61.9, 63.0); Range of abstracts reporting items: 0.0% (Title) to 99.6% (Conclusions). Factors associated with better abstract reporting: multicenter*. Journals abstract word limit range: 200-250.
Sivendran. 2015 [11] To assess abstracts reporting quality and to determine the factors associated with better reporting quality.	Oncology Data extracted using the modified 18-item CONSORT-A: Mean CONSORT-Abstract score (scale 0-18; SD); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: CONSORT endorser journal; placebo controlled (yes or no); intervention type (chemotherapy, targeted or other); funding source (industry or other); intervention approved for another indication (yes or no); publication date; outcomes statistical significance (positive or negative); open access.	174 RCTs (2009-2011) Mean CONSORT-Abstract score: 9.2 (SD 2.7); Range of abstracts reporting items: 13.0% (Randomization) to 100.0% (Interventions). Factors associated with better abstract reporting: studies that had interventions approved for another indication; positive outcomes statistical significance; more recent publication date*.
Song. 2017 [5] To assess abstracts reporting quality and to determine the factors associated with better reporting quality (before and after the release of the CONSORT-A).	Psychiatry Data extracted using the modified 18-item CONSORT-A: Mean CONSORT-Abstract score (scale 0-18; 95% CI); Mean percentage score (95% CI); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: publication date; intervention type (pharmacological, psychological, both or others); journal field (general medicine or psychiatry journals; journal IF; number of authors; funding source (government, industry, both or none); continent of first author; number of centers; outcomes statistical significance (positive, negative or unclear); structured abstract; sample size; CONSORT endorser journal; abstract word count.	214 RCTs (2012-2014) Mean CONSORT-Abstract score: 8.2 (95% CI 7.8, 8.5); Mean percentage score: 45.4% (95% CI 43.5, 47.3); Range of abstracts reporting items: 2.0% (Randomization) to 99.0% (Conclusions). Factors associated with better abstract reporting: post-CONSORT publication date; pharmacological intervention type; general medicine journals; higher number of authors; multicenter; positive or negative outcomes statistical significance; structured abstract; higher abstract word count*. Abstract word count limit of 250, higher or no word limit: 88.8% abstracts.
Sriganesh. 2017 [47] To assess abstracts reporting quality in five journals with high IF and to determine the factors associated with better reporting quality (before and after the release of the CONSORT-A).	Pain Data extracted using the original 17-item CONSORT-A: Mean CONSORT-Abstract score (scale 0–17; SD); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: publication date; CONSORT endorser journal; number of centers; intervention type (non-pharmacological or pharmacological); sample size; outcomes statistical significance (positive or negative); funding source.	125 RCTs (2013-2015) Mean CONSORT-Abstract score: 7.1 (SD 1.9); Range of abstracts reporting items: 0.0% (Funding) to 99.2% (Interventions). Factors associated with better abstract reporting: post-CONSORT publication date; CONSORT endorser journal; multicenter; pharmacological intervention type*.
Tsou. 2016 [28] To assess abstracts reporting quality.	General medicine Data extracted using the modified 15-item PRISMA-A: Mean PRISMA-Abstract score (scale 0-15; SD); Percentage of abstracts reporting each item. Descriptive data to associate with abstracts reporting: abstract word count.	200 SRs (2014) Mean PRISMA-Abstract score: 8.9 (SD 1.7). Range of abstracts reporting items: 1.0% (Funding) to 97.0% (Objectives). Factors associated with better abstract reporting: higher abstract word count. Mean abstract word count: 274.0 (SD 89.0).

Abbreviations: CI, Confidence Interval; SD, Standard Deviation; IF, Impact Factor; IQR, Interquartile Range; PEDro scale, Physiotherapy Evidence Database scale.

Misc: RCTs: Randomized Controlled Trials; SRs: Systematic Reviews; Mean CONSORT/PRISMA-Abstract score: mean number of items reported in all abstracts; Mean percentage score: mean percentage of items reported in all abstracts; CONSORT-A: Consolidated Standards of Reporting Trials for Abstracts checklist; PRISMA-A: Preferred Reporting Items for Systematic Reviews and Meta-Analysis for Abstracts checklist.

*There was no association between the remaining descriptive data.

Table 2. Factors affecting abstracts reporting quality of healthcare RCTs and SRs

Article Reference #	3	5	23	24	25	26	27	30	33	34	36	37	38	39	41	42	43	44	45	46
Factors																				
Continent		-		-					-		-	-	-	+				-		
Funding source		-								+		-							-	-
Intervention type		+					+								-				-	+
Journal field		+					-		+			+	+					-		
Journal Impact Factor		-		+	+		+	+	+	-	+			-						
Language				-																
Methodological quality				+	+					+										
Number of authors	-	+					+	-	-	+	-	-	-	-				-		
Number of centers		+		-					-	-	-	-	+		+			+		+
Number of citations					-															
Open access																			-	
Outcome statistical significance		+							-		-	-	-		-			-	+	-
Publication date	+	+	+	-				+	-		+	-			+	+			+	+
Publication on behalf of a research group	-						-													
Reporting guidelines endorsement	-	-		+	-		-			+				-					-	+
Sample size		-										-			-					-
Spin in abstracts				+	-															
Structured abstract	+	+		-			-	+	-	-		-		-						
Word count	+	+		+	+	+		-		-		-		-			+			

Abbreviations: RCTs, Randomized Controlled Trials; SRs, Systematic Reviews.

Misc: The symbol + means that the factor was associated with abstracts reporting quality by that reference number; on the other hand, the symbol - means no association. A blank cell means that the variable was not tested.

endorsement, [26,36,47] positive outcomes statistical significance, [5,11] higher methodological quality, [26,27,36] less spin in the abstracts, [26] European countries, [41] and academic funding source. [36] On the other hand, some studies have found different results for the same variables, showing no association of abstracts' reporting quality with: publication year, [26,35,39] abstract word count, [32,36,39,41] journal impact factor, [5,36,41] number of centers, [26,35,36,38,39] number of authors, [3,32,35,38,39,41,46,49] abstract format, [26,27,29,35,36,39,41] reporting guidelines endorsement, [3,5,11,29,41] outcomes statistical significance, [35,38-40,43,46,47] methodological quality, [27] continent of first author [5,26,35,38-40,46] and funding source. [5,11,39,47] The most common items not adequately reported (less than 50% of abstracts reporting) from the CONSORT-A were: randomization, blinding, funding, numbers analyzed, harms, authors, trial design, participants, primary outcomes results, registration, number randomized, clearly defined primary outcomes, recruitment status, conclusions, interventions and objectives. The most common items not adequately reported from the PRISMA-A were: risk of bias, strengths and limitations of evidence, funding, registration, information sources, and reporting of effect size.

2) Abstracts' consistency with the full text

Twenty-two overviews analyzing RCTs and SRs in terms of abstracts' consistency with the full texts were included, [13,20,21,25-28,50-63] from which included 551 systematic reviews and 2,025 RCTs. Main characteristics are presented in Table 3. The standardized percentage of inconsistent abstracts varied across healthcare areas, ranging from 7% to 98% in terms of reporting and spin.

Eight overviews [26,52,54,56,57,61,62,64] investigated the relationship between journal and primary research characteristics with abstracts presenting spin related to the primary outcomes or bias of adverse events (Table 4). Less spin in the abstract was associated with positive statistically significant outcomes, [26,56,57] higher methodological quality, [26,62] higher abstract word count, [26] multicenter design [26] and better abstracts reporting quality. [26] Factors not associated with spin in trial abstracts were: the number of centers, [62] journal impact factor, [26,57,62] funding source, [52,57,62] publication date, [26,62] type of conclusion, [62,64] setting, [57] sample size, [62] registration, [62] disclosure of financial conflict of interest, [61] structured abstract, [26] reporting guidelines endorsement, [26] language, [26] continent of first author, [26] intervention type, [52,54] and the use of a statistician. [52]

Abstracts showed more than 5% of inconsistency with the full text across all healthcare areas, with results and conclusions as the most inconsistent sections of abstracts (in comparison to the other sections of the abstract and full text) (Table 3). Agarwal et al [50] was the only overview

Table 3. Description of overviews analyzing abstracts consistencies with the full texts in healthcare RCTs and SRs

First author. Year of publication Aim of overview	Healthcare field Methods	Number of abstracts (year range) Main findings of abstracts inconsistencies with the full text
Agarwal. 2017 [50] To assess the extent of reporting of the most patient important outcomes in the abstracts and full texts of Cochrane and non-Cochrane reviews.	General medicine; Surgery Data extracted for each Cochrane abstract: percentage with beneficial outcomes judged as most patient-important outcome from the full text.	190 SRs, 96 Cochrane reviews and 94 Non-Cochrane reviews (2010) 24.5% abstracts were inconsistent with the full text. Results were similar between Cochrane and non-Cochrane SRs.
Altwairgi. 2012 [51] To assess differences between conclusions in the abstracts and full texts.	Oncology Data extracted for each abstract and full text: percentage of inconsistencies in the conclusions section.	114 RCTs (2004-2009) 10.0% abstracts presented inconsistent conclusions comparing to the full text.
Arunachalam. 2017 [52] To assess the presence of spin in high IF journals.	Surgery Data extracted: abstract results, abstract conclusions, full text results, discussion, and conclusions for the presence of spin. Data extracted to associate with spin in the abstract: funding source; use of statistician; trial phase; intervention type.	110 RCTs (2013-2015) 40.0% abstracts had spin in at least 1 section. 15.0% abstracts had spin in all sections. 17.0% abstract results and 27.0% abstract conclusions had spin. Spin was not statistically higher in abstracts compared with the full text*.
Assem. 2017 [13] To assess significant p-values reported in abstracts and full texts.	Surgery Data extracted for each abstract and full text: trial's outcomes and results with and without statistical significance for each outcome.	350 RCTs (from inception to May 2009) An outcome reported in an abstract had three times the odds of being statistically significant when compared to an outcome reported in the full text (OR 3.0; i.e. 75.0% of inconsistent abstracts).
Austin. 2018 [58] To assess the frequency of spin in abstracts.	Obesity Data extracted for each abstract: percentage of spin.	45 RCTs (2016-2017) 48.9% abstracts had spin. 37.8% abstracts results and 24.4% abstracts conclusions had spin.
Boutron. 2010 [21] To assess spin in abstracts and full texts with statistically non-significant results for the primary outcome.	Cardiovascular; Gynecology; Surgery; Psychology; Anesthesia; General medicine Data extracted for each abstract and full text: percentage of spin in the results, discussion and conclusion sections.	72 RCTs (2006-2007) 68.1% abstracts had spin in at least 1 section. 27.8% abstracts had spin in all sections.
Chow. 2018 [25] To assess the potential for inadequate abstract reporting distorting or spin of trial's results.	Anesthesia Data extracted using the modified 16-item CONSORT for abstracts checklist: each item was classified as reported in abstract, not reported in abstract but reported in full text or not reported in abstract or full text.	395 RCTs (2010-2016) The majority of items of 2016 trials that were not reported in the abstract were reported in the full text (range 24.0-100.0%; mean of 82.8% of inconsistent abstracts). Journals word limit range: 250-400.
Cooper. 2018 [59] To assess the frequency of spin in abstracts and to assess its association with funding source.	Otolaryngology Data extracted for each abstract: percentage of spin.	47 RCTs (2010-2017) 70.0% abstracts had spin. 53.0% abstracts results and 57.0% abstracts conclusions had spin.
Cordoba. 2010 [53] To assess the consistency of the composite outcomes, between the abstracts and full texts.	Cardiovascular; Nephrology; Gynecology Data extracted for each abstract and full text: percentage of inconsistent conclusions for all the components of the composite outcome.	40 RCTs (2008) 33.0% abstracts were inconsistent with the full texts.
Gewandter. 2015 [54] To assess 4 common types of spin in 6 major journals.	Pain Data extracted for each abstract: percentage of 4 types of spin in the results or conclusion sections. Data extracted to associate with types of spin: intervention types; sponsorship.	76 RCTs (2006-2013) 61.0% abstracts presented some type of spin in at least one section. 47.0% of abstracts results and 42.0% of abstracts conclusions presented some type of spin*.
Hernandez. 2013 [60] To assess spin in trials in which non-inferiority was inconclusive or not established.	HIV Data extracted: spin in the abstracts results and conclusions; spin in the full text results, discussion and conclusions.	42 RCTs (1960-2011) 23/42 studies were evaluated for spin: 43.5% abstracts results and conclusions (or conclusions only) had spin.

(*continued on next page*)

Table 3 (*continued*)

First author. Year of publication Aim of overview	Healthcare field Methods	Number of abstracts (year range) Main findings of abstracts inconsistencies with the full text
Lehmen. 2014 [20] To assess the prevalence of inconsistencies between abstracts and full texts.	Surgery Data extracted: percentage of items regarding inconsistencies or bias between the abstract and full text.	40 RCTs (2001-2010) 75.0% abstracts were inconsistent with the full texts and 10.0% abstracts conclusions were inconsistent with the full texts.
Lieb. 2016 [61] To assess whether non-financial conflicts of interest increase the risk of spin in the conclusions of the reviews.	Psychology Data extracted: percentage of spin in the abstracts evaluated by consistency between the abstract conclusion with results in the full text. Data extracted to associate with spin in the abstract: journals with disclosure of financial conflicts of interest (financial, non-financial and personal).	95 SRs (2010-2013) 28.0% abstracts had spin*.
Lockyer. 2013 [55] To assess the frequency of statistically significant and non-significant outcomes in abstracts.	Chronic wound Data extracted for studies with statistically non-significant differences for the primary outcome: spin in the abstract results and conclusions, and full text results, discussion and conclusions.	71 RCTs (2004-2009) 63.0% abstracts and 59.0% abstract conclusions had spin. 89.0% of the industry-funded trials had spin in the abstract conclusions. 60.0% of not-for-profit funded trials had spin in the abstract.
Mathieu. 2012 [56] To assess the prevalence of misleading conclusions in abstracts and to determine whether abstract conclusions are based on the primary outcome in the full text.	Rheumatology Data extracted: assessment of the results section of the full text, assessment of the abstract conclusions, and determining the existence of a misleading conclusion in the abstract. Data extracted to associate with misleading conclusions in the abstract: outcome statistical significance (positive, negative and inaccurate).	144 RCTs (2006-2008) 23.0% abstracts conclusions were misleading and 7.0% were inconsistent with the full text. Negative trial results were associated with misleading abstract conclusions (OR 9.6)*.
Nascimento. 2019 [26] To assess the frequency of spin in abstracts, consistency between abstracts and full text and association of spin with negative results.	Low back pain Data extracted: percentage of spin in each abstract and full text; consistency was calculated by evaluation of statistical difference between abstract and full text scores (for reporting and spin) and agreement for each item. Data extracted to associate with spin in the abstract: primary outcome statistical significance (positive or negative); abstracts reporting quality; number of centers; continent of first author; language (English or not); journal IF; CONSORT endorser journal; abstract word count; structured abstract; methodological quality; date of publication.	200 RCTs (2010-2015) 98.0% abstracts presented at least one item of spin. Abstracts reporting scores were inconsistent with the full texts and agreement for each item ranged from slight to moderate. Abstracts presented more spin than the full text and agreement for each item of spin ranged from fair to moderate between abstracts and full texts. Mean abstract word count: 258 (SD 67.3). Methodological quality (PEDro scale 0-10, the higher the better): 5.8 (SD 1.6). Less spin in the abstracts was associated with better abstracts reporting quality, positive primary outcome results, multicenter trials, higher abstract word count and higher methodological quality*.
Nascimento. 2019 [64] To assess the frequency of spin in abstracts, consistency between abstracts and full text and association of spin with the type of conclusion.	Low back pain Data extracted: percentage of spin in each abstract and full text; consistency was calculated by agreement between each item of spin between abstract and full text. Data extracted to associate with spin in the abstract: types of conclusions (positive, negative, neutral or indeterminate).	66 SRs (2015-2017) 80.3% abstracts had some type of spin. Most items of spin had fair to moderate agreement between the abstract and full text (Cochrane reviews were better than non-Cochrane). 75.8% of reviews presented critically low methodological quality, 10.6% low, 7.6% high and 6.1% moderate. High and moderate quality were all Cochrane reviews*.

(*continued on next page*)

of SRs that found no difference between Cochrane and non-Cochrane reviews in general medicine. Two other overviews of low back pain [27,64] showed better abstracts reporting and less spin in the abstracts of Cochrane reviews when compared to non-Cochrane reviews. Only a few overviews reported information regarding the methodological quality of the studies, which were higher for Cochrane reviews in comparison to non-Cochrane reviews. [27,64]

Table 3 (*continued*)

First author. Year of publication Aim of overview	Healthcare field Methods	Number of abstracts (year range) Main findings of abstracts inconsistencies with the full text
Nascimento. 2020 [27] To evaluate abstracts reporting consistencies with the full text.	Low back pain Data extracted using the 12-item PRISMA for abstracts checklist: consistency between abstract and full text scores by evaluation of statistical difference and agreement for each item.	66 SRs (2015-2017) Abstracts reporting scores were inconsistent with the full-texts scores, with similar results for both Cochrane and non-Cochrane reviews (mean of 69.7% of inconsistent abstracts). Most items had slight to moderate agreement between the abstract and full text. Median number of words: Total sample 259.0 (IQR 909.0); Non-Cochrane reviews 253.0 (716.0); Cochrane reviews 747.0 (514.0). 75.8% of reviews presented critically low methodological quality, 10.6% low, 6.1% moderate and 7.6% high. Moderate and high were all Cochrane reviews.
Patel. 2013 [62] To assess the prevalence of spin and possible associations with risk factors.	Gastrointestinal surgery Data extracted: spin in the abstracts and the full texts conclusions. Data extracted to associate with spin in the abstract: date of publication (1992-2003 or 2004-2012); journal IF; disease types; sample size; trial registration; number of centers; authors' conclusions; funding source (industry, nonindustry or not reported); items of methodological quality (adequate randomization, allocation concealment, blinding, intention-to-treat).	58 RCTs (1992-2012) 59.0% of abstracts had spin. Trials with adequate randomization were associated with an increased odds of spin (OR 0.3) and trials without an intention-to-treat analysis all had spin*.
Roest. 2015 [63] To assess publication bias, outcome reporting bias and spin in trials abstracts.	Anxiety disorders Data extracted: publication bias, outcome reporting bias and spin (abstract conclusion not consistent with full text results on primary outcome).	57 RCTs (1994-2008) 28.0% trials had publication bias, from those 19.0% had outcome reporting bias and spin in the abstract.
Tsou. 2016 [28] To assess the clarity of abstracts conclusions.	General Medicine Data extracted for each abstract: assessment of the use of potentially misleading language in the conclusions, based on statistical significance of the primary outcome and vague or wishful wording.	200 SRs (2014) 62.0% abstracts conclusions made clear statements. 38.0% abstracts conclusions were unclear. Mean abstract word count: 274 (SD 89).
Vera-Badillo. 2013 [57] To assess reporting bias of the primary outcome and adverse events and to guide readers in judging the credibility of the conclusions.	Oncology Data extracted: prevalence of bias or spin for the primary outcome and adverse events in the abstracts conclusion comparing to the results of the full texts. Data extracted to associate with spin of primary outcomes and bias of adverse events in the abstract: funding source; journal IF; setting of the trial; outcome statistical significance.	164 RCTs (1995-2011) Trials with non-statistically significant results for the primary outcome were associated with spin in the conclusion section of the abstract (OR 5.2; i.e. 84.0% of inconsistent abstracts). Trials with statistically significant results for the primary outcome were associated with bias of adverse events (OR 2.0)*.

Abbreviations: RCTs, Randomized Controlled Trials; SRs, Systematic Reviews; OR, Odds Ratio; SD, Standard Deviation; PEDro scale, Physiotherapy Evidence Database scale; CONSORT, Consolidated Standards of Reporting Trials; IF, Impact Factor

*There was no association between the variables extracted.

Also just a few overviews [26-28] reported the mean (or median) abstract word count, which varied between 258 and 747, the higher number being from Cochrane reviews abstracts. The most common terminology presented in the overviews was: 73% for spin, 68% mislead, 64% bias, 59% inconsistency/consistency, 45% for both misrepresentation and distortion, and 41% for both inaccuracy/accuracy and reporting bias. Other terminology less frequent was: comparison, discrepancy, misinterpretation, overemphasis, overestimate, deficiency, publication bias, interpretation bias, discordance/concordance, overstate, underestimate, wording, under-reporting, misinform, reporting mistakes, over-enthusiasm, directional bias, overrepresentation and restatement.

Table 4. Factors affecting abstracts spin or inconsistencies with the full texts in healthcare RCTs and SRs

Article Reference#	24	51	54	56	57	61	62	64
Factors								
Abstracts reporting quality	+							
Continent	-							
Disease types							-	
Financial conflict of interest						-		
Funding source		-			-		-	
Intervention type		-	-					
Journal Impact Factor	-				-		-	
Language	-							
Methodological quality	+						+	
Number of centers	+						-	
Outcome statistical significance	+			+	+			
Publication date	-						-	
Reporting endorser journal	-							
Sample size							-	
Setting of the trial					-			
Sponsorship			-					
Structured abstract	-							
Trial phase		-						
Trial registration							-	
Type of conclusion							-	-
Use of statistician		-						
Word count	+							

Abbreviations: RCTs, Randomized Controlled Trials; SRs, Systematic Reviews.
Misc: The symbol + means that the factor was associated with abstracts spin or inconsistencies with the full texts by that reference number; on the other hand, the symbol - means no association. A blank cell means that the variable was not tested.

4. Discussion

4.1. Abstracts reporting quality

The main finding is that even after the release of the CONSORT-A and PRISMA-A, the reporting quality of abstracts of RCTs and SRs still remains suboptimal with much room for improvement in all healthcare areas. Eleven overviews [3,5,29,31-33,35,38,42,43,47] that compared articles (RCTs or SRs) published before and after the release of such abstracts guidelines also presented only small improvements over time, sometimes showing a statistical significant change but the magnitude of change was not large enough to be considered sufficiently well reported. Abstracts reporting quality across all healthcare areas were poor, even if the reporting quality has varied across the same healthcare area (e.g. within dentistry one overview concluded that 62.5% of abstracts were fully reported items, [46] while another overview concluded that this percentage was 28.1% [38]). Factors that in multiple overviews have consistently been associated with higher abstracts' reporting quality were: more recent publication date, [3,5,11,25,32,38,43,44,47] higher abstract word count, [3,5,26-28,45] higher journal impact factor [26,29,32,35,38] and multicenter design; [5,40,43,46,47] as opposed to no association with the following factors: abstract format, [26,27,29,35,36,39,41] number of authors, [3,32,35,38,39,41,46,65] reporting guidelines endorsement, [3,5,11,27,29,41] outcomes statistical significance, [35,39,40,43,46,47] continent of first author [5,26,27,35,38-40,46] and funding source. [5,11,39,47] Important considerations in terms of abstract word count are stated by the CONSORT group, [66] in which 250 to 300 words are considered sufficient to address all of the items in the CONSORT-A while the PRISMA group has not suggested any word limit. [10] Our results suggest that reporting quality is better if the number of words of abstracts is higher than 300. Adequately reporting abstracts help researchers and clinicians to properly interpret the results of the study, which has an important impact on decision-making regarding effectiveness of treatment for healthcare. Most importantly, higher abstracts' reporting quality of RCTs has been associated with less spin (with high percentages of explained variability [26,27]), and higher reporting quality of SR abstracts has been associated with higher study methodological quality [36] (Cochrane reviews better than non-Cochrane reviews [27]).

4.2. Abstracts' consistency with the full text

All overviews showed that the abstracts' results and conclusion sections were the most inconsistent with the full text in terms of reporting and presence of spin. All overviews, regardless the healthcare area studied, presented more than 5% of inconsistencies between abstracts and full text. Interestingly, there was a wide variation within healthcare areas. For example, within oncology one overview [51] found 10% inconsistent abstracts while another overview reported this percentage to be 84%. [57]

The terminology presented in the overviews is in accordance with previous literature, which also found the terms 'inconsistency/consistency' and 'inaccuracy/accuracy' as the most frequently used. [12] However, the most prevalent terms we found were 'mislead', 'spin' and 'bias', all more related to interpretation rather than reporting.

The main factors associated with spin in abstracts seem to be related to selective reporting of primary outcome statistical significance, [26,56,57] which is in line with the findings of Chiu et al. [15] In order to avoid spin in abstracts, better checking of methodological and reporting guidelines, as well as more flexible word count should be made. Abstracts with spin disseminated in press releases and news coverage [7,67-69] might look more attractive to readers, but are most likely harming clinical decision-making. [14] This can have serious consequences for patients, if interventions that are not effective are incorrectly provided to patients. [51]

Several recommendations to journal editors and reviewers have been given by all included overviews to improve the quality of future research. The most common recommendations to the journal editors were: explicit journal endorsement and stricter adherence to the reporting checklist for abstracts (highlighted as one of the 'instructions for authors'); [3,5,11,13,21,26-35,37-47,50-54,56,57,59,60, better checking of abstracts' consistency of reporting and interpretation with the full text; [20,21,26-29,40-44,47,50,51,53-56,62,63, awareness of spin in the abstracts; [11,26,47,50,52,55,57,58,60-63] higher abstract word count; [26-28,38,40,44,45] and critical appraisal skills training for all users of research. [26,55,58,59,61,62] Recommendations were also directed to readers to not rely solely on abstracts for decision-making, but to read and interpret the corresponding full text. [13,20,26,51,52,54,55,62]

It seems that healthcare journal editors and reviewers are either unaware of the importance of avoiding inconsistencies between abstracts and full texts [70] or not sufficiently trained to detect interpretation or reporting mistakes in abstracts. [16,71-73] We advise journal editors and reviewers to take aside the author's conclusions and to interpret the RCTs and SRs results by themselves, taking into consideration items to evaluate spin across studies. [14-16] Other recommendations to journal editors were to promote full access to open data to improve results interpretation among researchers, lessen the pressure to publish 'positive' results, and be careful with dissemination of study results in the media. [15] Additionally, the same SR suggested further research on the development of a tool to assess spin of results in abstracts and full texts, [15] which is a very challenging task due to the subjectivity of terms to report the interpretation of study results (e.g. significant results vs. statistically significant results vs. clinically important results).

Ultimately, research e-training programs should be implemented not only for journal editors and reviewers, but also for researchers and students. [74] High quality and reliable abstracts are part of the research code of conduct for research integrity [75] and aspect of ethical principles on research. [76] Abstracts of RCTs and SRs can be the only available source for healthcare professionals [4,77,78] and decision makers, therefore they can be harmful if poorly reported or misled. [6,7] It is also important to avoid dissemination of such abstracts among academic press releases and media coverage of research. [6,7] Urgent measures should be taken by journal editors to change editorial policies in terms of improving the quality of abstracts, as some journals have already started to do. [79,80]

4.3. Strengths and limitations

Our systematic review has strengths in that we collected all overviews analyzing a large sample of abstracts in all healthcare areas and we did not include conference abstracts. Our main limitation is related to the possibility of duplicate studies included in the overviews, which could overestimate our results. Also a few studies analyzed [31,40,44,46] were published in the same year the reporting guideline was created, which might have not given enough time to adequate the report of the study to the reporting guidelines published in that same year. However, our results are mainly descriptive and doubtlessly abstracts of clinical research need improvement. Another limitation is due to the fact that it was not possible to evaluate the overviews methodological quality, as there is no guideline for assessing this type of study design. We would recommend the development of a guideline for assessing the methodological quality of this type of study.

5. Conclusion

The results of the overviews have shown that reporting quality and consistency with the full text of abstracts of healthcare RCTs and SRs need to be improved. Abstracts are the highest profile part of a research study and recommendations to authors, journal editors and reviewers need to be put into action as highest priority.

Credit Author Statement

The mentioned authors participated in the following relevant CRediT roles: Conceptualization (DPN; GZG; ACA; AAV; LOPC); Data curation (DPN; AAV); Formal analysis (DPN; RWJGO; MWT; AAV; LOPC); Funding acquisition (DPN; LOPC); Investigation (DPN; RWJGO; MWT; GZG; ACA; AAV; LOPC); Methodology (DPN; RWJGO; MWT; AAV; LOPC); Project administration (DPN; LOPC); Resources (DPN; RWJGO; MWT; LOPC); Software (DPN; AAV); Supervision (RWJGO; MWT; LOPC); Validation (DPN; RWJGO; MWT; GZG; ACA; AAV; LOPC); Visualization (DPN; RWJGO; MWT; GZG; ACA; AAV; LOPC); Roles/Writing – original Draft (DPN; GZG; ACA; AAV; LOPC); Writing – review & editing (DPN; RWJGO; MWT; GZG; ACA; AAV; LOPC).

Prior presentation(s)

None to declare.

Appendix A. Excluded reviews ($n = 77$)

First author	Title	Journal	Year	Reason for exclusion
Alamri	A corpus of potentially contradictory research claims from cardiovascular research abstracts	Journal of biomedical semantics	2016	Not specific for RCTs or SRs
Alasbali	Discrepancy between results and abstract conclusions in industry- vs nonindustry-funded studies comparing topical prostaglandins	American Journal of Ophthalmology	2009	Not specific for RCTs or SRs
Assadi	Evidence-based abstracts: what research summaries should contain to support evidence-based medicine	International journal of evidence-based healthcare	2012	Did not evaluete all items of the EQUATOR abstracts reporting guidelines
Baethge	Tracing scientific reasoning in psychiatry: Reporting of statistical inference in abstracts of top journals 1975-2015	International Journal of Methods in Psychiatric Research	2018	Did not evaluete all items of the EQUATOR abstracts reporting guidelines
Baulig	Reporting quality of randomised controlled trial abstracts on age-related macular degeneration health care: a cross-sectional quantification of the adherence to CONSORT abstract reporting recommendations	BMJ Open	2018	Studies analyzed were published before the release of the abstracts reporting guidelines
Baulig	Reporting quality of randomised controlled trial abstracts on age-related macular degeneration health care: A cross-sectional quantification of the adherence to CONSORT abstract reporting recommendations	BMJ Open	2018	Studies analyzed were published before the release of the abstracts reporting guidelines
Berwanger	The quality of reporting of trial abstracts is suboptimal: Survey of major general medical journals	Journal of Clinical Epidemiology	2009	Studies analyzed were published before the release of the abstracts reporting guidelines
Blake	Beyond genes, proteins, and abstracts: Identifying scientific claims from full-text biomedical articles	Journal of Biomedical Informatics	2010	Not specific for RCTs or SRs
Boutron	Impact of spin in the abstracts of articles reporting results of randomized controlled trials in the field of cancer: The SPIIN randomized controlled trial	Journal of Clinical Oncology	2014	Analysis of other theme related to abstracts
Buffel du Vaure	Reporting funding source or conflict of interest in abstracts of randomized controlled trials, no evidence of a large impact on general practitioners' confidence in conclusions, a three-arm randomized controlled trial	BMC Medicine	2014	Did not evaluete all items of the EQUATOR abstracts reporting guidelines
Cepeda	Use of adjectives in abstracts when reporting results of randomized, controlled trials from industry and academia	Drugs in R & D	2015	Analysis of other theme related to abstracts
Chen	Assessment of the quality of reporting in abstracts of randomized controlled trials published in five leading Chinese medical journals	PLoS One	2010	Studies analyzed were published before the release of the abstracts reporting guidelines
Chhapola	Reporting quality of trial abstracts-improved yet suboptimal: A systematic review and meta-analysis	Journal of Evidence Based Medicine	2018	Studies analyzed were published before the release of the abstracts reporting guidelines
Chhapola	Reporting quality of trial abstracts-improved yet suboptimal: A systematic review and meta-analysis	Journal of Evidence-Based Medicine	2018	Systematic review of studies evaluating abstracts

(*continued on next page*)

(*continued*)

First author	Title	Journal	Year	Reason for exclusion
Cohen	The structural and content aspects of abstracts versus bodies of full text journal articles are different	BMC Bioinformatics	2010	Not specific for RCTs or SRs
Cui	Does the CONSORT checklist for abstracts improve the quality of reports of randomized controlled trials on clinical pathways?	Journal of Evaluation in Clinical Practice	2014	Studies analyzed were published before the release of the abstracts reporting guidelines
Dijkers	Searching the literature for information on traumatic spinal cord injury: the usefulness of abstracts	Spinal Cord	2003	Analysis of other theme related to abstracts
Faggion	Assessment of the quality of reporting in abstracts of systematic reviews with meta-analyses in periodontology and implant dentistry	Journal of periodontal research	2014	Did not evaluete all items of the EQUATOR abstracts reporting guidelines
Fleming	Reporting quality of abstracts of randomized controlled trials published in leading orthodontic journals from 2006 to 2011	American Journal of Orthodontics and Dentofacial Orthopedics	2012	Studies analyzed were published before the release of the abstracts reporting guidelines
Fontelo	Comparing data accuracy between structured abstracts and full-text journal articles: Implications in their use for informing clinical decisions	Evidence-Based Medicine	2013	Not specific for RCTs or SRs
Froom	Deficiencies in structured medical abstracts	Journal of Clinical Epidemiology	1993	Not specific for RCTs or SRs
Gazni	Are the abstracts of high impact articles more readable? Investigating the evidence from top research institutions in the world	Journal of Information Science	2011	Analysis of other theme related to abstracts
Germini	Quality of reporting in abstracts of RCTs published in emergency medicine journals: A protocol for a systematic survey of the literature	BMJ Open	2017	Protocol
Ginsei	The distribution of probability values in medical abstracts: an observational study	BMC Research Notes	2015	Not specific for RCTs or SRs
Gøtzsche	Believability of relative risks and odds ratios in abstracts: Cross sectional study	British Medical Journal	2006	Not specific for RCTs or SRs
Gøtzsche	Are relative risks and odds ratios in abstracts believable	Ugeskr Laeger	2006	Secondary analysis
Graber	Do abstracts of articles in major journals contain the same information as the body of the paper?	Am Fam Physician	2013	Comment
Guo	Reporting quality for abstracts of randomized controlled trials in cancer nursing research	Cancer Nursing	2014	Studies analyzed were published before the release of the abstracts reporting guidelines
Harris	The accuracy of abstracts in psychology journals	The Journal of psychology	2002	Not specific for RCTs or SRs
Hartley	Clarifying the abstracts of systematic literature reviews	Bulletin of the Medical Library Association	2000	Did not evaluate all items of the EQUATOR abstracts reporting guidelines
Hernandez	Deficient Reporting and Interpretation of Non-Inferiority Randomized Clinical Trials in HIV Patients A Systematic Review	PLOS One	2013	Did not evaluete all items of the EQUATOR abstracts reporting guidelines
Hopewell	Effect of editors' implementation of CONSORT guidelines on the reporting of abstracts in high impact medical journals: interrupted time series analysis	BMJ	2012	Studies analyzed were published before the release of the abstracts reporting guidelines

(*continued on next page*)

(*continued*)

First author	Title	Journal	Year	Reason for exclusion
Isiguzo	Quality of pilot trial abstracts in heart failure is suboptimal: a systematic survey	Pilot and Feasibility Studies	2018	Pilot trials only
Johansson	Is qualitative research scientific, or merely relevant? Research-interested primary care and hospital physicians' appraisal of abstracts	Scandinavian Journal of Primary Health Care	2003	Not specific for RCTs or SRs
Kinder	Presence of 'spin' in the abstracts and titles of anaesthesiology randomised controlled trials	British Journal of Anaesthesia	2018	Letter
Kiriakou	Reporting quality of systematic review abstracts in leading oral implantology journals	Journal of dentistry	2013	Studies analyzed were published before the release of the abstracts reporting guidelines
Lazarus	Classification and prevalence of spin in abstracts of non-randomized studies evaluating an intervention	BMC Medical Research Methodology	2015	Not specific for RCTs or SRs
Li	A scoping review of comparisons between abstracts and full reports in primary biomedical research	BMC Med Res Methodol	2017	Systematic review of studies evaluating abstracts
Librero	[Abstruse comparisons in abstracts of clinical trials in Spanish medical journals]. [Spanish]	Medicina Clinica	2001	Not specific for RCTs or SRs
Marcelo	A comparison of the accuracy of clinical decisions based on full-text articles and on journal abstracts alone: A study among residents in a tertiary care hospital	Evidence-Based Medicine	2013	Not specific for RCTs or SRs
Maticic	Assessment of reporting quality of abstracts of systematic reviews with meta-analysis using PRISMA-A and discordance in assessments between raters without prior experience	BMC Medical Research Methodology	2019	Studies analyzed were published before the release of the abstracts reporting guidelines
McCoul	Do abstracts in otolaryngology journals report study findings accurately?	Otolaryngology - Head and Neck Surgery	2010	Not specific for RCTs or SRs
Mills	Professional medical writing support and the reporting quality of randomized controlled trial abstracts among high-impact general medical journals	F1000Research	2017	Secondary analysis
Nam	Structuralizing biomedical abstracts with discriminative linguistic features	Computers in Biology and Medicine	2016	Analysis of other theme related to abstracts
Ngai	A discourse analysis of the macro-structure, metadiscoursal and microdiscoursal features in the abstracts of research articles across multiple science disciplines	PLOS One	2018	Not specific for RCTs or SRs
Patel	Spin in Minimally Invasive Transanal Total Mesorectal Excision Articles (TaTME) An assessment of the current literature	Colorectal Disease	2018	Not specific for RCTs or SRs
Petticrew	Quality-assessed reviews of health care interventions and the Database of Abstracts of Reviews of Effectiveness (DARE)	International Journal of Technology Assessment in Health Care	1999	Not specific for RCTs or SRs
Pitkin	Accuracy of data in abstracts of published research articles	Journal of the American Medical Association	1999	Not specific for RCTs or SRs
Pitkin	Can the accuracy of abstracts be improved by providing specific instructions? A randomized controlled trial	Jama	1998	Not specific for RCTs or SRs

(*continued on next page*)

(*continued*)

First author	Title	Journal	Year	Reason for exclusion
Polychronopoulou	The reporting quality of meta-analysis results of systematic review abstracts in periodontology and implant dentistry is suboptimal	The journal of evidence-based dental practice	2014	Comment
Postma	The quality of analytical information contained within abstracts and papers on new analytical methods	Analytica Chimica Acta	1992	Not specific for RCTs or SRs
Rice	Reporting quality in abstracts of meta-analyses of depression screening tool accuracy: A review of systematic reviews and meta-analyses	BMJ Open	2016	Studies analyzed were published before the release of the abstracts reporting guidelines
Ries	Comparing frequency of content-bearing words in abstracts and texts in articles from four medical journals: an exploratory study	Medinfo	2001	Not specific for RCTs or SRs
Rinchuse	Scoping review of systematic review abstracts about temporomandibular disorders: Comparison of search years 2004 and 2017	American Journal of Orthodontics and Dentofacial Orthopedics	2017	Analysis of other theme related to abstracts
Ruano	Relationships between abstract features and methodological quality explained variations of social media activity derived from systematic reviews about psoriasis interventions	J Clin Epidemiol	2018	Studies analyzed were published before the release of the abstracts reporting guidelines
Scherer	Full publication of results initially presented in abstracts	Cochrane Database of Systematic Reviews	2018	Included conference abstracts
Schuemie	Distribution of information in biomedical abstracts and full-text publications	Bioinformatics	2004	Not specific for RCTs or SRs
Seehra	Reporting completeness of abstracts of systematic reviews published in leading dental specialty journals	European Journal of Oral Sciences	2013	Studies analyzed were published before the release of the abstracts reporting guidelines
Shin	Is there any quality improvement in the randomized controlled trial abstracts in the Korean Journal of Anesthesiology after the publication of the CONSORT abstract guidelines in 2008?	Korean J Anesthesiol	2015	Letter
Siebers	Data in abstracts of research articles. Are they consistent with those reported in the article?	British Journal of Biomedical Science	2002	Comment
Siebers	Data inconsistencies in abstracts in the New Zealand Medical Journal	N Z Med J	2002	Letter
Siebers	How accurate is data in abstracts of research articles?	New Zealand Journal of Medical Laboratory Science	2000	Not specific for RCTs or SRs
Snedeker	Completeness of reporting in abstracts from clinical trials of pre-harvest interventions against foodborne pathogens	Preventive Veterinary Medicine	2012	Studies analyzed were published before the release of the abstracts reporting guidelines
Sriganesh	Reporting quality of abstracts of trials published in top five pain journals: A protocol for a systematic survey	BMJ Open	2016	Protocol
Stang	Statistical inference in abstracts of major medical and epidemiology journals 1975-2014: a systematic review	European Journal of Epidemiology	2017	Not specific for RCTs or SRs
Taback	A survey of abstracts of high-impact clinical journals indicated most statistical methods presented are summary statistics	Journal of Clinical Epidemiology	2008	Not specific for RCTs or SRs

(*continued on next page*)

(*continued*)

First author	Title	Journal	Year	Reason for exclusion
Tfelt-Hansen	CONSORT recommendations in abstracts of randomised, controlled trials on migraine and headache	Journal of Headache and Pain	2011	Did not evaluete all items of the EQUATOR abstracts reporting guidelines
Tsujimoto	Physician characteristics associated with proper assessment of overstated conclusions in research abstracts: A secondary analysis of a randomized controlled trial	PLOS One	2019	Secondary analysis
Vinkers	Use of positive and negative words in scientific PubMed abstracts between 1974 and 2014: retrospective analysis	BMJ	2015	Not specific for RCTs or SRs
Wang	The reporting quality of abstracts of stepped wedge randomized trials is suboptimal: A systematic survey of the literature	Contemporary Clinical Trials Communications	2017	Studies analyzed were published before the release of the abstracts reporting guidelines
Wang	Quality of reporting of trial abstracts needs to be improved: using the CONSORT for abstracts to assess the four leading Chinese medical journals of Traditional Chinese Medicine	Trials	2010	Studies analyzed were published before the release of the abstracts reporting guidelines
Ward	Accuracy of abstracts for original research articles in pharmacy journals	Annals of Pharmacotherapy	2004	Not specific for RCTs or SRs
Westergaard	A comprehensive and quantitative comparison of text-mining in 15 million full-text articles versus their corresponding abstracts	PLoS Computational Biology	2018	Not specific for RCTs or SRs
Westergaard	A comprehensive and quantitative comparison of text-mining in 15 million full-text articles versus their corresponding abstracts	PLOS Computational Biology	2018	Not specific for RCTs or SRs
Yavchitz	A new classification of spin in systematic reviews and meta-analyses was developed and ranked according to the severity	Journal of Clinical Epidemiology	2016	Analysis of other theme related to abstracts
Yavchitz	Impact of adding a limitations section to abstracts of systematic reviews on readers' interpretation: a randomized controlled trial	BMC Medical Research Methodology	2014	Analysis of other theme related to abstracts
Yoneoka	Evaluating association between linguistic characteristics of abstracts and risk of bias: Case of Japanese randomized controlled trials	PLoS One	2017	Analysis of other theme related to abstracts

References

[1] Herbert R. Practical evidence-based physiotherapy, Butterworth-Heinemann: Elsevier; 2011. 2nd Edition ed.

[2] Sackett D. Evidence-based medicine how to practice and teach EBM, Edinburgh: Churchill Livingstone; 2000. 2a ed..

[3] Bigna JJ, Um LN, Nansseu JR. A comparison of quality of abstracts of systematic reviews including meta-analysis of randomized controlled trials in high-impact general medicine journals before and after the publication of PRISMA extension for abstracts: a systematic review and meta-analysis. Syst Rev 2016;5(1):174.

[4] Silva TM. What do physical therapists think about evidence-based practice? A systematic review. Man Ther 2014;20(3):388–401.

[5] Song SY. Assessing reporting quality of randomized controlled trial abstracts in psychiatry: adherence to CONSORT for abstracts: a systematic review. PLoS One 2017;12(11):e0187807.

[6] Haneef R. Interpretation of results of studies evaluating an intervention highlighted in google health news: a cross-sectional study of news. PLoS One 2015;10(10):e0140889.

[7] Yavchitz A. Misrepresentation of randomized controlled trials in press releases and news coverage: a cohort study. PLoS Med 2012;9(9):e1001308.

[8] Chhapola V. Reporting quality of trial abstracts-improved yet suboptimal: a systematic review and meta-analysis. J Evid Based Med 2018;11(2):89–94.

[9] Hopewel S. CONSORT for reporting randomized controlled trials in journal and conference abstracts: explanation and elaboration. PLoS Med 2008;5(1):201–9.

[10] Beller EM. PRISMA for Abstracts: reporting systematic reviews in journal and conference abstracts. PLoS Med 2013;10(4):e1001419.

[11] Sivendran S. Reporting quality of abstracts in phase III clinical trials of systemic therapy in metastatic solid malignancies. Trials 2015;16:341 [Electronic Resource].

[12] Li G. A scoping review of comparisons between abstracts and full reports in primary biomedical research. BMC Med Res Methodol 2017;17(1):181.

[13] Assem Y. The over-representation of significant p values in abstracts compared to corresponding full texts: a systematic review of surgical randomized trials. Contemp Clin Trials Commun 2017;7:194–9.

[14] Boutron I. Impact of spin in the abstracts of articles reporting results of randomized controlled trials in the field of cancer: the SPIIN randomized controlled trial. J Clin Oncol 2014;32(36):4120–6.
[15] Chiu K, Grundy Q, Bero L. Spin' in published biomedical literature: A methodological systematic review. PLoS Biol 2017;15(9):e2002173.
[16] Yavchitz A. A new classification of spin in systematic reviews and meta-analyses was developed and ranked according to the severity. J Clin Epidemiol 2016;75:56–65.
[17] Moher D, Altman DG. Four proposals to help improve the medical research literature. PLoS Med 2015;12(9):e1001864.
[18] Page MJ. Epidemiology and reporting characteristics of systematic reviews of biomedical research: a cross-sectional study. PLoS Med 2016;13(5):e1002028.
[19] Wang L. Quality of reporting of trial abstracts needs to be improved: using the CONSORT for abstracts to assess the four leading Chinese medical journals of traditional Chinese medicine. Trials 2010;11:75.
[20] Lehmen JA. Inconsistencies between abstracts and manuscripts in published studies about lumbar Spine surgery. Spine 2014;39(10):841–5.
[21] Boutron I. Reporting and interpretation of randomized controlled trials with statistically nonsignificant results for primary outcomes. JAMA 2010;303(20):2058–64.
[22] Higgins JP. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. BMJ 2011;343:d5928.
[23] Whiting P. ROBIS: a new tool to assess risk of bias in systematic reviews was developed. J Clin Epidemiol 2016;69:225–34.
[24] Moher D. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Int J Surg 2010;8(5):336–41.
[25] Chow JTY. The degree of adherence to CONSORT reporting guidelines for the abstracts of randomised clinical trials published in anaesthesia journals: a cross-sectional study of reporting adherence in 2010 and 2016. Eur J Anaesthesiol 2018:942–8.
[26] Nascimento DP. Abstracts of low back pain trials are poorly reported, contain spin of information and are inconsistent with the full text: an overview study. Arch Phys Med Rehabil 2019(14):1976–85 e18.
[27] Nascimento DP. Factors associated with the reporting quality of low back pain systematic review abstracts in physical therapy: a methodological study. Brazilian J of Phys Ther 2020;20(31117–5):S1413–3555.
[28] Tsou AY, Treadwell JR. Quality and clarity in systematic review abstracts: an empirical study. Res synthe meth 2016;7(4):447–58.
[29] Bigna JJ. Abstracts reporting of HIV/AIDS randomized controlled trials in general medicine and infectious diseases journals: completeness to date and improvement in the quality since CONSORT extension for abstracts. BMC Med Res Methodol 2016;16(1):138.
[30] Blair DA, Hughes PJ, Woolley TW. Pharmacy journal abstracts published in PubMed that abide by the Consolidated Standards Of Reporting Trials (CONSORT) guidelines. J of the Med Library Assoc: JMLA 2014;102(2):110–14.
[31] Can OS. Has the quality of abstracts for randomised controlled trials improved since the release of Consolidated Standards of Reporting Trial guideline for abstract reporting? A survey of four high-profile anaesthesia journals. European J of Anaesthesiol 2011;28(7):485–92.
[32] Chen J. Quality improvement in randomized controlled trial abstracts in prosthodontics since the publication of CONSORT guideline for abstracts: a systematic review. J Dent 2018:23–9.
[33] Faggion CM, Giannakopoulos NN. Quality of reporting in abstracts of randomized controlled trials published in leading journals of periodontology and implant dentistry: a survey. J Periodontol 2012;83(10):1251–6.
[34] Ghimire S. Assessment of adherence to the CONSORT statement for quality of reports on randomized controlled trial abstracts from four high-impact general medical journals. Trials 2012;13:77 [Electronic Resource].
[35] Ghimire S. Oncology trial abstracts showed suboptimal improvement in reporting: A comparative before-and-after evaluation using CONSORT for Abstract guidelines. J of Clin Epidemiol 2014;67(6):658–66.
[36] Gomez-Garcia F. Abstract analysis method facilitates filtering low-methodological quality and high-bias risk systematic reviews on psoriasis interventions. BMC Med Res Methodol 2017;17(1):180.
[37] Hays M. Reporting quality of randomised controlled trial abstracts among high-impact general medical journals: a review and analysis. BMJ Open 2016;6(7):e011082.
[38] Hua F. Reporting quality of randomized controlled trial abstracts: survey of leading general dental journals. J of the American Dental Assoc 2015;146(9):669–78 (1939).
[39] Jin L, Hua F, Cao Q. Reporting quality of randomized controlled trial abstracts published in leading laser medicine journals: an assessment using the CONSORT for abstracts guidelines. Lasers in Med Sci 2016;31(8):1583–90.
[40] Kiriakou J. Assessing the reporting quality in abstracts of randomized controlled trials in leading journals of oral implantology. The J of Evid Dent Pract 2014;14(1):9–15.
[41] Kumar S. Reporting quality of randomized controlled trials of periodontal diseases in journal abstracts-a cross-sectional survey and bibliometric analysis. J Evid Based Dent Pract 2018;18(2):130–41 e22.
[42] Kuriyama A, Takahashi N, Nakayama T. Reporting of critical care trial abstracts: a comparison before and after the announcement of CONSORT guideline for abstracts. Trials 2017;18(1):32.
[43] Mbuagbaw L. Improvement in the quality of abstracts in major clinical journals since CONSORT extension for abstracts: A systematic review. Contemp Clin Trials 2014;38(2):245–50.
[44] O'Donohoe TJ. Reporting quality of systematic review abstracts published in leading neurosurgical journals: a research on research study. Neurosurgery 2019;85(1):1–10.
[45] Richter RR, Sebelski CA, Austin TM. the quality of reporting of abstracts in physical therapy literature is suboptimal: cross-sectional, bibliographic analysis. Am J Phys Med Rehabil 2016;95(9):673–684.
[46] Seehra J. Reporting quality of abstracts of randomized controlled trials published in dental specialty journals. The J of Evid Dent Pract 2013;13(1):1–8.
[47] Sriganesh K. Quality of abstracts of randomized control trials in five top pain journals: a systematic survey. Contemp Clin Trials Commun 2017;7:64–8.
[48] Janackovic K, Puljak L. Reporting quality of randomized controlled trial abstracts in the seven highest-ranking anesthesiology journals. Trials 2018;19(1):591.
[49] Kiriakou J. Assessing the reporting quality in abstracts of randomized controlled trials in leading journals of oral implantology. J Evid Based Dent Pract 2014;14(1):9–15.
[50] Agarwal A. Authors seldom report the most patient-important outcomes and absolute effect measures in systematic review abstracts. J Clin Epidemiol 2017;81:3–12.
[51] Altwairgi AK. Discordance between conclusions stated in the abstract and conclusions in the article: analysis of published randomized controlled trials of systemic therapy in lung cancer. J Clin Oncol 2012;30(28):3552–7.
[52] Arunachalam L, Hunter IA, Killeen S. Reporting of randomized controlled trials with statistically nonsignificant primary outcomes published in high-impact surgical journals. Ann Surg 2017;265(6):1141–5.
[53] Cordoba G. Definition, reporting, and interpretation of composite outcomes in clinical trials: systematic review. BMJ 2010;341:c3920.
[54] Gewandter JS. Data interpretation in analgesic clinical trials with statistically nonsignificant primary analyses: an ACTTION systematic review. J Pain 2015;16(1):3–10.
[55] Lockyer S. "Spin" in wound care research: the reporting and interpretation of randomized controlled trials with statistically non-sig-

nificant primary outcome results or unspecified primary outcomes. Trials 2013;14:371.
[56] Mathieu S. Misleading abstract conclusions in randomized controlled trials in rheumatology: comparison of the abstract conclusions and the results section. Joint Bone Spine 2012;79(3):262–7.
[57] Vera-Badillo FE. Bias in reporting of end points of efficacy and toxicity in randomized, clinical trials for women with breast cancer. Ann Oncol 2013;24(5):1238–44.
[58] Austin J. Evaluation of spin within abstracts in obesity randomized clinical trials: A cross-sectional review. Clin Obes 2019;9(2): e12292.
[59] Cooper CM. Evaluation of spin in the abstracts of otolaryngology randomized controlled trials. Laryngoscope 2018.
[60] Hernandez AV. Deficient reporting and interpretation of non-inferiority randomized clinical trials in HIV patients: a systematic review. PLoS One 2013;8(5):e63272.
[61] Lieb K. Conflicts of interest and spin in reviews of psychological therapies: a systematic review. BMJ Open 2016;6(4): e010606.
[62] Patel SV. The use of "spin" in laparoscopic lower GI surgical trials with nonsignificant results: an assessment of reporting and interpretation of the primary outcomes. Dis Colon Rectum 2013;56(12):1388–94.
[63] Roest AM. reporting bias in clinical trials investigating the efficacy of second-generation antidepressants in the treatment of anxiety disorders: a report of 2 meta-analyses. JAMA Psychiatry 2015;72(5):500–10.
[64] Nascimento DP. Eight out of every ten abstracts of low back pain systematic reviews presented spin and inconsistencies with the full text: an analysis of 66 systematic reviews. J Orthop Sports Phys Ther 2019:1–34.
[65] Kiriakou J. Reporting quality of systematic review abstracts in leading oral implantology journals. J of dent 2013;41(12):1181–7.
[66] Hopewell S. CONSORT for reporting randomized controlled trials in journal and conference abstracts: explanation and elaboration. PLoS Med 2008;5(1):e20.
[67] Editorial. Incomplete reporting of research in academic press releases. Lancet 2009;373(9679):1920.
[68] Schwartz LM. Influence of medical journal press releases on the quality of associated newspaper coverage: retrospective cohort study. BMJ 2012;344:d8164.
[69] Sumner P. The association between exaggeration in health related science news and academic press releases: retrospective observational study. BMJ 2014;349:g7015.
[70] Lazarus C. Peer reviewers identified spin in manuscripts of nonrandomized studies assessing therapeutic interventions, but their impact on spin in abstract conclusions was limited. J Clin Epidemiol 2016;77:44–51.
[71] Hopewell S. Impact of peer review on reports of randomised trials published in open peer review journals: retrospective before and after study. BMJ 2014;349:g4145.
[72] Dwan K. Systematic review of the empirical evidence of study publication bias and outcome reporting bias - an updated review. PLoS One 2013;8(7):e66844.
[73] Wegwarth O. Do physicians understand cancer screening statistics? A national survey of primary care physicians in the United States. Ann Intern Med 2012;156(5):340–9.
[74] Galipeau J. A scoping review of competencies for scientific editors of biomedical journals. BMC Med 2016;14:16.
[75] Foundation, E.S., Fostering Research Integrity in Europe. 2010; Available at: http://archives.esf.org/fileadmin/Public_documents/Publications/ResearchIntegrity_report.pdf.
[76] World Medical A. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. JAMA 2013;310(20):2191–4.
[77] Maher CG. Challenges for evidence-based physical therapy: accessing and interpreting high-quality evidence on therapy. Phys Ther 2004;84(7):644–54.
[78] Bennett S. The value of an evidence database for occupational therapists: an international online survey. Int J Med Inform 2007;76(7):507–13.
[79] Heinemann AW, Chan L, Hoenig HM. Archives seeks to improve abstract reporting quality. Arch Phys Med Rehabil 2019;100(10):1990–1.
[80] Jette AM, Costa LOP. Protecting Against "Publication Spin" in Clinical Trials. Phys Ther 2019;99(9):1119–21.