

ORIGINAL ARTICLE

# Reporting guidelines used varying methodology to develop recommendations

Michael M. Schlussek<sup>a,\*</sup>, Melissa K. Sharp<sup>b</sup>, Jennifer A. de Beyer<sup>a</sup>, Shona Kirtley<sup>a</sup>, Patricia Logullo<sup>a</sup>, Paula Dhiman<sup>a,c</sup>, Angela MacCarthy<sup>a</sup>, Anna Koroleva<sup>d</sup>, Benjamin Speich<sup>e</sup>, Garrett S. Bullock<sup>f,g</sup>, David Moher<sup>h</sup>, Gary S. Collins<sup>a,c</sup>

<sup>a</sup>UK EQUATOR Centre, Centre for Statistics in Medicine, Nuffield Department of Orthopaedics, Rheumatology & Musculoskeletal Sciences, University of Oxford, Oxford, UK

<sup>b</sup>Health Research Board Centre for Primary Care Research, Department of General Practice, Royal College of Surgeons in Ireland, Dublin D02 H638, Ireland

<sup>c</sup>National Institute for Health Research, Oxford Biomedical Research Centre, John Radcliffe Hospital, Oxford, UK

<sup>d</sup>LIMSI, CNRS, Université Paris-Saclay, Orsay, France

<sup>e</sup>CLEAR Methos Center, Division of Clinical Epidemiology, Department of Clinical Research, University Hospital Basel, University of Basel, Basel, Switzerland

<sup>f</sup>Centre for Statistics in Medicine, Nuffield Department of Orthopaedics, Rheumatology & Musculoskeletal Sciences, University of Oxford, Oxford, UK

<sup>g</sup>Department of Orthopaedic Surgery, Wake Forest School of Medicine, Winston-Salem, NC, USA

<sup>h</sup>Centre for Journalology, Clinical Epidemiology Program, Ottawa Hospital Research Institute, Ottawa, Ontario, Canada

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## Abstract

**Background and Objectives:** We investigated the developing methods of reporting guidelines in the EQUATOR (Enhancing the Quality and Transparency Of health Research) Network's database.

**Methods:** In October 2018, we screened all records and excluded those not describing reporting guidelines from further investigation. Twelve researchers performed duplicate data extraction on bibliometrics, scope, development methods, presentation, and dissemination of all publications. Descriptive statistics were used to summarize the findings.

**Results:** Of the 405 screened records, 262 described a reporting guidelines development. The number of reporting guidelines increased over the past 3 decades, from 5 in the 1990s and 63 in the 2000s to 157 in the 2010s. Development groups included 2–151 people.

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**Ethics Approval:** Not applicable.

**Data Availability:** The data used to produce the results presented in this publication are freely available at: <https://osf.io/j6ax9>. Requests for research collaborations are very welcome.

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substantial contributions to the interpretation of the findings; revised the manuscript; and approved the submitted version. SK designed the work; contributed to the data acquisition; made substantial contribution to the interpretation of the findings; revised the manuscript; and approved the submitted version. PL contributed to the data acquisition; revised the manuscript; and approved the submitted version. PD contributed to the data acquisition; made substantial contribution to the interpretation of the findings; revised the manuscript; and approved the submitted version. AM contributed to the data acquisition; revised the manuscript; and approved the submitted version. AK contributed to the data acquisition; revised the manuscript; and approved the submitted version. BS contributed to the data acquisition; revised the manuscript; and approved the submitted version. GSB contributed to the data acquisition; revised the manuscript; and approved the submitted version. DM made substantial contributions to the research conception; made substantial contributions to the interpretation of the findings; revised the manuscript; and approved the submitted version. GSC made substantial contributions to the research conception; designed the work; made substantial contributions to the interpretation of the findings; revised the manuscript; and approved the submitted version.

\* Corresponding author. UK EQUATOR Centre, Centre for Statistics in Medicine, Botnar Research Centre, Old Road, OX3 7LD Oxford, UK. Tel.: +44 01865 737916; fax: +44 01865 227966.

E-mail address: [michael.schlussek@ndorms.ox.ac.uk](mailto:michael.schlussek@ndorms.ox.ac.uk) (M.M. Schlussek).

Literature appraisal was performed during the development of 56% of the reporting guidelines; 33% used surveys to gather external opinion on items to report; and 42% piloted or sought external feedback on their recommendations. Examples of good reporting for all reporting items were presented in 30% of the reporting guidelines. Eighteen percent of the reviewed publications included some level of spin.

**Conclusion:** Reporting guidelines have been developed with varying methodology. Reporting guideline developers should use existing guidance and take an evidence-based approach, rather than base their recommendations on expert opinion of limited groups of individuals. © 2023 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

**Keywords:** Research quality; Reporting quality; Reporting standards; Research standards; Meta-Research; Research on research; Research waste

## 1. Background

As the main medium for disseminating science, research articles must be easily understood and used, whether to replicate studies, apply their methods, inform further research, include their findings in systematic reviews, or support clinical guidelines and policymaking. Reporting guidelines are tools to improve the completeness and transparency of these articles. Groups of academics, clinicians, journal editors, and other stakeholders typically work collaboratively to propose minimum sets of information that should be included in a research article and summarize these recommendations in reporting guidelines. Alongside other steps to achieve reproducible research such as data sharing and code sharing [1], a complete, transparent reporting is vital for ensuring results and conclusions can inform health care decision-making and reproducibility [2].

The EQUATOR (Enhancing the QUALity and Transparency Of health Research) Network is an international initiative aiming to increase the reliability and value of health research by promoting accurate reporting in published medical literature. It curates a comprehensive database of reporting guidelines for health research to help authors identify the most relevant resource when writing up their work. Established in 2008, its database includes all papers presenting a reporting guideline or guidance on reporting, regardless of guideline scope, development methods, or format.

Thirty-seven reporting guidelines were published between 1996 and 2006 [3], increasing to 81 published up to 2009 [4]. By June 2018, the EQUATOR database held over 400 guidelines, including updates, extensions, and applications of core reporting guidelines (see [Box 1](#) for definitions).

Authors struggle to find relevant reporting guidelines for their study design, methods, and field. These problems will only increase as more reporting guidelines are published. Reporting guidelines are of varying quality and level of detail, with many based on weak or unspecified methods [4], which may not be easily apparent to users. A review of 14 STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) extensions identified common weaknesses such as the inclusion of items that were not specific to the extension topic [9]. In 2010, the EQUATOR Network produced guidance for developers of health research reporting guidelines [10]. However, this guidance is more than a decade old and

was mainly based on the authors' experiences as reporting guideline developers.

Before changes can be made to how the EQUATOR database is run or the guidance for developers can be updated using evidence, we need an accurate picture of the reporting guideline landscape and development methods used. We conducted a review of reporting guidelines indexed in the EQUATOR Network database to examine how the guidelines were developed and their scope, presentation, and bibliographic data.

## 2. Methods

We conducted an audit of all reporting guidelines published in peer-reviewed journals included in the EQUATOR Network database up to October 2018. There were no exclusion criteria based on publication date. We excluded other document types, such as books and links to websites.

The EQUATOR Network information specialist (S.K.) downloaded a list of publications listed as reporting guidelines for health research in our database [11]. This database of reporting guidelines is regularly updated. [Supplemental File 1](#) describes the comprehensive search strategy used to curate the database until the end of 2016. [Supplemental File 2](#) describes the more specific search strategy in PubMed alone used since 2017. Authors of reporting guidelines now notify the EQUATOR Network of their publications, making a more comprehensive search less necessary.

The lead author (M.M.S.) retrieved the full publication for each database record and screened them to confirm that they were research articles in peer-reviewed journals.

One independent reviewer (M.K.S., S.K., J.A.B., C.S., P.L., P.D., A.M., A.K., B.J., G.S.B.) extracted data from the retrieved research articles using a standardized, piloted data extraction form developed for this study on Google Forms ([Supplemental File 3](#)). It comprised 65 questions covering aspects such as bibliometrics (e.g., number of authors and publication year), background (e.g., rationale for developing the guideline), scope (e.g., medical specialty), development methods (e.g., critical appraisal of the literature), presentation (e.g., publication copyright license), dissemination, implementation, and impact evaluation plans.

Extractors judged whether the article presented a reporting guideline. We initially used the definition: 'a checklist,

**What is new?****Key findings**

- Much of the guidance in the EQUATOR database does not meet the definition of a reporting guideline.
- Reporting guidelines used varying methodology to develop recommendations.

**What this adds to what is known?**

- Many reporting guideline developers do not follow current available guidance.

**What is the implication and what should change now?**

- Reporting guideline developers should take an evidence-based approach.
- A strict definition of reporting guideline could help users fulfill their needs.

flow diagram, or structured text, developed using an explicit methodology, to guide authors on the minimum level of detail to include in research articles reporting a specific type or aspect of medical research'. However, we reevaluated our definition after completing the first assessment round. We realized that the “methodology” criterion was unfair, as it retrospectively applied a new quality standard. We changed our definition to “a checklist, flow diagram, or structured text developed to guide authors on the minimum level of detail to include in research papers reporting findings or a specific aspect of medical research” and reassessed all records.

A second independent reviewer (M.M.S., M.K.S., S.K., J.A.B., C.S., P.L., P.D., A.M., A.K., B.J., G.S.B.) extracted data from articles agreed to be reporting guidelines using the same form. Disagreements on whether an article was a reporting guideline and in data extraction were resolved through consensus. A third senior researcher (G.S.C.) arbitrated disagreements when needed.

We characterized and described the development methods of the included reporting guidelines with descriptive statistics (i.e., means, medians, standard deviations (SDs), and ranges for continuous variables; absolute and relative frequencies for categorical variables).

The study was registered on the Open Science Framework's Metascience Registry on September 11, 2020, before full data extraction was completed [12].

**3. Results**

Of 405 records included in the EQUATOR Network database of reporting guidelines until October 01, 2018, 13 (3.2%) were excluded before data extraction as they were clearly not research articles in peer-reviewed journals. Another 130 publications (32.1%) were not reporting guidelines, as they did not present ‘a checklist, flow diagram, or structured text developed to guide authors on the minimum level of detail to include in research papers reporting findings or specific aspects of medical research. Figure 1 presents the reasons for excluding records at each stage.

Supplemental File 4 summarizes the 130 research articles that did not meet our definition of a reporting guideline. They were commonly guidance on data collection, management, analysis, and presentation ( $n = 29$ ); guidelines on research conduct ( $n = 25$ ); core outcomes terminology or definitions ( $n = 12$ ); and reporting guidance

**Box 1 Definitions of terms**

**Reporting guideline:** A publication describing a checklist, flow diagram, or structured text developed to guide authors on the minimum level of detail to include in research papers reporting the findings or specific aspects of medical research.

**Reporting guideline extension:** A publication describing how the original list of reporting items can be changed or appended for variations of basic study designs, such as the CONSORT extension for cluster trials [5], or study designs in certain specialties, such as STROBE-Nut for nutritional epidemiological studies [6].

**Reporting guideline application or elaboration paper:** A publication describing how to implement an existing reporting guideline for a certain specialty, without changing or adding to the original list of reporting items, though extra level of detail might be suggested for the original items (see Ardern et al. 2022 [7] and Blom et al. 2020 [8] for examples of application and elaboration papers, based on PRISMA and CONSORT, respectively).

**Reporting guideline update:** A publication describing updated recommendations for a previously published reporting guideline. Ideally, this publication will also include the reasoning for the updating the reporting guideline, and the process applied to convey the updated recommendations.

STROBE, Strengthening the Reporting of Observational Studies in Epidemiology; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; CONSORT, Consolidated Standards of Reporting Trials.

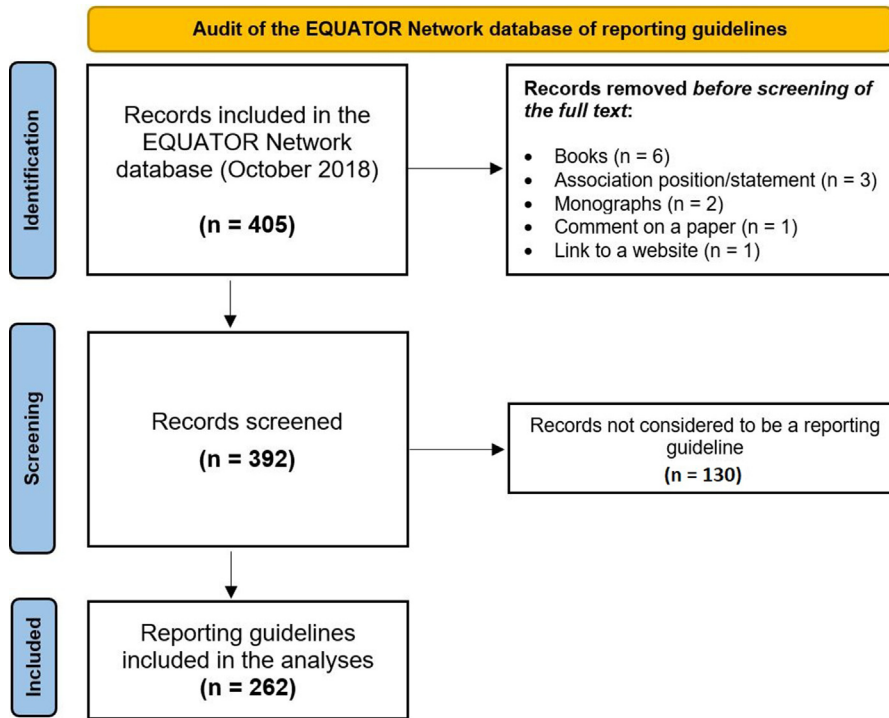


Fig. 1. Numbers of records excluded with reasons.

for clinical practice (n = 11). They often provided some limited guidance for reporting health research.

The remaining results in this article refer to the 262 publications (64.7%) describing the development, extension, update, or application of a reporting guideline.

### 3.1. Guideline characteristics

Table 1 summarizes the general characteristics of the included reporting guidelines. Most of the publications

(n = 172; 65.7%) described a new reporting guideline. The rest described extensions (n = 71; 27.1%), updates (n = 17; 6.5%), and application or elaboration papers (n = 6; 2.3%) (see Box 1 for definitions). Fifty percent of application papers, 52% of extensions, and all updates were “official” initiatives, endorsed by or involving one or more members of the main reporting guideline steering committee.

Most reporting guidelines (n = 225; 85.9%) structured their recommendations in a checklist. Eleven (4.2%)

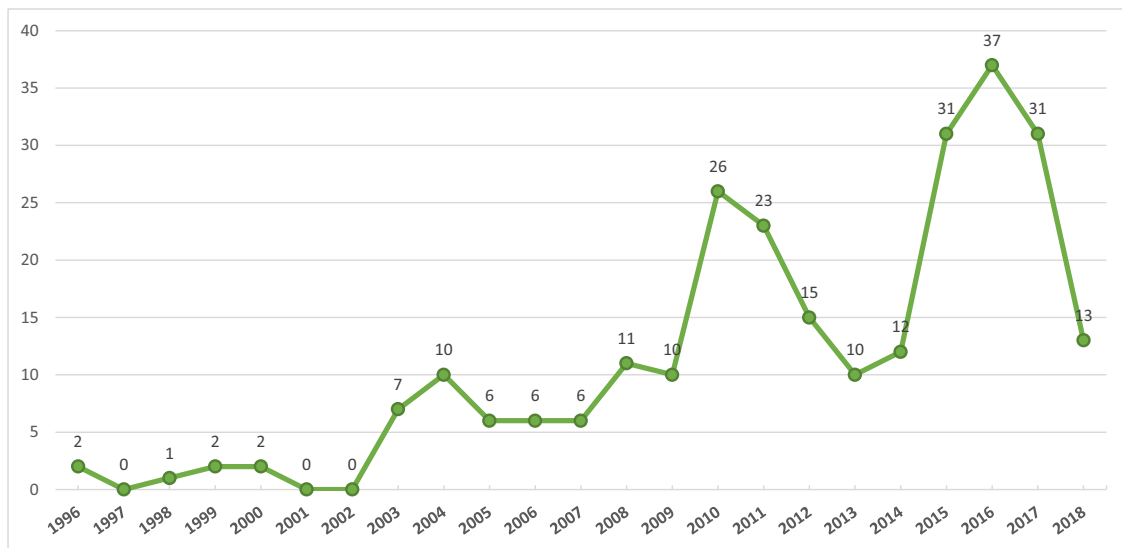


Fig. 2. Number of reporting guidelines published per year. Only the most recent version of a reporting guideline is included (e.g., CONSORT has been updated twice since it was first published in 1996, so only the second update published in 2010 is included in the figure). Only includes publications up to September.

**Table 1.** General characteristics of the 262 assessed reporting guideline publications

Reporting guidelines characteristics	<i>n</i>	%
Type of reporting guideline <sup>a</sup>		
Development	172	65.65 <sup>a</sup>
Extension	71	27.10 <sup>a</sup>
Official extension	34	47.89 <sup>b</sup>
Unofficial extension	37	52.11 <sup>b</sup>
Update	17	6.49 <sup>a</sup>
Official update	17	100 <sup>b</sup>
Unofficial update	0	-
Application	6	2.29 <sup>a</sup>
Official application	3	50.00 <sup>b</sup>
Unofficial application	3	50.00 <sup>b</sup>
Unclear	1	0.38 <sup>a</sup>
Research scope of the reporting guideline		
Results/findings	178	67.94
Specific part of research methodology or result	58	22.14
Research planning or related document	5	1.91
Other	20	7.63
Unclear	1	0.38
Specialty for which the RG was developed		
Generic (not restricted to a specific to a medical or health care specialty)	132	50.38
Specific medical or health care specialty	105	40.08
Other	25	9.54
Format of the reporting guideline <sup>a</sup>		
Checklist	233	88.93
Structured text	102	38.93
Flow-diagram	11	4.20
Study type covered by the reporting guideline <sup>a</sup>		
Randomized controlled trials	105	40.08
Observational studies	72	27.48
Systematic reviews	37	14.12
Diagnostic and prognostic studies	30	11.45
Case reports	27	10.31
Qualitative research	20	7.63
Mixed methods studies	17	6.49
Animal research	16	6.11
Economic evaluation	14	5.34
Quality improvement studies	13	4.96
Study protocols	10	3.82
Clinical practice guidelines	10	3.82
Reliability and agreement studies	5	1.91
Other	69	26.34

*Abbreviations:* RG, reporting guideline.

Official extensions, updates, and applications are those formally endorsed by the original guideline development group or that include a member of the reporting guideline steering group.

<sup>a</sup> Percentages do not add to 100%, as one record could feature in more than one category.

<sup>b</sup> Percentages refer to category total.

recommended that authors use a flow diagram to describe how they selected and worked with participants or data. Half ( $n = 132$ , 50.4%) were not focused on a particular

medical specialty, and 178 (67.9%) applied to papers reporting the conduct and findings of a study. The reviewed reporting guidelines covered a variety of study designs,

**Table 2.** Methodological aspects of the 262 assessed reporting guideline publications

Reporting guidelines development planning strategy	<i>n</i>	%
Reporting guideline development funded?		
Yes	130	49.62
No	48	18.32
Unclear	84	32.06
RG development group mentioned in the paper?		
Yes	109	41.60
No	153	58.40
RG development group named among author list?		
Yes	83	31.68
No	179	68.32
RG development registered?		
Yes	13	4.96
No, but protocol published	1	0.38
No	60	22.90
Unclear	188	71.76
RG development protocol available?		
Yes	23	8.78
No	70	26.72
Unclear	169	64.50
Composition of an independent steering/overseeing group?		
Yes	16	6.11
No	96	36.64
Unclear	150	57.25
Size of the independent steering/overseeing group		
10 or less	7	43.75
11–20	3	18.75
21 or more	3	18.75
Unclear	3	18.75
Justification for the reporting guideline development?		
Yes	242	92.37
No	20	7.63

Abbreviations: RG, reporting guidelines.

but mostly randomized controlled trials ( $n = 105$ ; 40.1%), observational studies ( $n = 72$ ; 27.5%), and systematic reviews ( $n = 37$ ; 14.1%).

Figure 2 shows how the number of published reporting guidelines has increased over the last 3 decades, with 7 in the 1990s, 82 in the 2000s, and 172 in the 2010s. The year 2016 saw the most new reporting guidelines, with 37 publications.

### 3.2. Development methods

Tables 2 and 3 describe the development methods of the assessed reporting guidelines. Approximately half were funded ( $n = 130$ ; 49.6%).

Most publications describing reporting guidelines were authored by 1 to 51 people ( $n = 260$ ; mean = 9.5; SD = 8.2). Although 109 publications (41.6%) mentioned a development group in the text or title, only 83 (46.5%) listed the development group as a publication author. Two

publications were attributed to reporting guideline development groups, not individual authors/contributors. Development groups included 6–153 members (mean = 26.3; SD = 26.2).

Thirteen (5.0%) publications mentioned registering their development project with the EQUATOR Network or another service. Twenty-three (8.8%) mentioned a protocol. Sixteen (6.1%) guidelines stated that an independent steering group oversaw the development work.

Twenty publications did not provide any reasoning or justification for the development of the reporting guideline (7.6%). Just over half (137; 52.3%) based their list of reporting items on a literature review. Of these 92 (67.2%) described their search methods in full, partially, or elsewhere, such as another publication describing review findings.

Less than half of the publications ( $n = 125$ ; 47.7%) described creating a preliminary list of reporting items when developing their reporting guideline, collecting a

**Table 3.** Methodological aspects of the 262 assessed reporting guideline publications (conduct)

Reporting guidelines development conduct strategy	<i>n</i>	%
Critical appraisal of the literature reporting completeness performed?		
Yes	137	69.47
No	45	17.18
Unclear	80	30.53
Preliminary list of reporting items as part of development process?		
Yes	125	47.71
No	46	17.56
Unclear	91	34.73
Delphi survey conducted?		
Yes	77	29.39
No	79	30.15
Unclear	106	40.46
Consensus meeting for defining the final list of reporting items?		
Yes	154	58.78
Remote/online consensus meeting	38	24.67 <sup>a</sup>
Face-to-face consensus meeting	68	44.16 <sup>a</sup>
Both remote and face-to-face consensus meeting	43	27.92 <sup>a</sup>
Consensus meeting format unclear	5	3.25 <sup>a</sup>
No	28	10.69
Unclear	80	30.53
External feedback or pilot of the final list of reporting items?		
Yes	77	32.30
Yes, external feedback	44	57.14 <sup>a</sup>
Yes, piloting	18	23.38 <sup>a</sup>
Yes, both piloting and external feedback	15	19.48 <sup>a</sup>
No	66	25.19
Unclear	119	45.42

<sup>a</sup> Percentages refer to category total.

median of 32 items for consideration (range: 5–350). Although 95 (76%) explained how this list was created, only 24 (19.2%) described their inclusion criteria for choosing the items.

Less than 30% of publications ( $n = 77$ ) described using a Delphi survey to gather external expert opinion on which items to include in the final reporting guideline, whether working from a preliminary list or not. They generally used two ( $n = 32$ ; 41.6%) or three ( $n = 24$ ; 31.2%) Delphi rounds.

The final list of items was usually developed in consensus meetings ( $n = 154$ , 58.8%), held face-to-face ( $n = 68$ ; 44.2%). Researchers ( $n = 107$ ; 69.5%), clinicians ( $n = 65$ ; 42.2%), and journal editors ( $n = 61$ ; 39.6%) were the most mentioned stakeholders involved in the consensus meetings.

Seventy-seven (32.3%) publications stated that their final list of recommended reporting items was piloted or externally revised before dissemination.

### 3.3. Guideline content

Table 4 summarizes information about presentation and evaluation plans. Seventy-two publications (27.5%) did not

use titles that identified the article as describing a reporting guideline.

Although 156 reporting guidelines (59.5%) stated where in the manuscript authors should include information about each recommended reporting item, only 95 (64.1%) provided examples of good reporting, either for some ( $n = 24$ ; 9.2%) or all ( $n = 71$ ; 27.1%) items.

Fifty-four publications (23%) mentioned a website for the reporting guideline they described. Forty-six (17.6%) mentioned a dissemination plan, 41 (15.7%) an implementation plan, and 18 (6.8%) an impact evaluation plan. Sixty-eight (26%) were published under a Creative Commons open-access license.

Table 5 summarizes information about the spin and conflicts of interest. Spin is the use of language to distort or bias how readers interpret a research article. Forty-eight publications (18.4%) included at least one of the three types of spin investigated. Thirty-five (13.4%) gave biased descriptions of the potential effect (i.e., overselling expected overall benefits of using the recommendations) of the reporting guideline. Twenty-six (9.95%) gave biased description of the utility of the guideline (i.e., overselling how the

**Table 4.** Presentation and evaluation aspects of the 262 assessed reporting guideline publications

Reporting guidelines presentation/evaluation strategy	n	%
Title clearly identifying publication as an RG?		
Yes	190	72.52
No	72	27.48
Indication of where to report each item in the manuscript?		
Yes, for all items	156	59.54
Yes, for some items	12	4.58
No	94	35.88
Example of good reporting for each reporting item?		
Yes, for all items	71	27.10
Yes, for some items	24	9.16
No	167	63.74
Reporting guideline website		
Yes	54	20.61
No/Not reported	208	79.39
Publication copyright license		
Creative Commons license	68	25.95
CC-BY	44	64.71 <sup>a</sup>
CC-BY-NC	15	22.06 <sup>a</sup>
CC-BY-NC-ND	7	10.29 <sup>a</sup>
CC-BY-ND	1	1.47 <sup>a</sup>
CC-BY-SA	1	1.47 <sup>a</sup>
Full copyright	171	65.27
Copyright held by the authors	27	15.79 <sup>a</sup>
Copyright held by the journal	16	9.36 <sup>a</sup>
Copyright held by the publisher	84	49.12 <sup>a</sup>
Copyright held by a society, institution, or funder	44	25.73 <sup>a</sup>
Unclear	23	8.78
Dissemination plan		
Yes	46	17.56
No	171	65.27
Unclear	45	17.18
Implementation plan		
Yes	41	15.65
No	170	64.88
Unclear	51	19.47
Impact evaluation plan		
Yes	18	6.87
No	192	73.28
Unclear	52	19.85

*Abbreviations:* RG, reporting guideline; CC-BY, Creative Commons Attribution; CC-BY-NC, Creative Commons Attribution-Noncommercial; CC-BY-NC-ND, Creative Commons Attribution-Noncommercial-NoDerivs; CC-BY-ND, Creative Commons Attribution-NoDerivs; CC-BY-SA: Creative Commons Attribution-Sharealike.

<sup>a</sup> Percentages refer to category total.

recommendations could be used by researchers). Eight (3.5%) gave biased descriptions of the robustness of the methods used in their development. Conflict of interest statements were present in 180 (68.7%) of the publications, of which 35.6% ( $n = 64$ ) covered aspects other than financial conflicts.

## 4. Discussion

Nearly half of the guidance in the EQUATOR database did not meet the current EQUATOR Network definition of a reporting guideline. Most of the reporting guidelines were core guidelines (rather than extensions, updates, or application papers) for writing papers reporting research findings, not focused on specific health care specialties, and provided their guidance in checklists. The methods used to develop these reporting guidelines were heterogeneous.

### 4.1. Methodological issues

Many of the methodological recommendations for reporting guideline developers [10] were overlooked, such as protocol registration, literature appraisal, external feedback, and development of explanatory documents with examples of good reporting for each recommended reporting aspect. Although some of the assessed publications predated the existing guidance, these methodological limitations were also observed for more recent reporting guidelines – even some of those that cite the recommendations. Possible reasons for developers not following the guidance include that the work has not been disseminated widely enough, the guidance is not sufficiently clear; or that developers chose alternative methods for pragmatic reasons (e.g., to expedite the development process) or for methodological reasons (e.g., they believe an alternative is more rigorous). Future work with reporting guideline developers could explore why they have not used the guidance. Updating the existing guidance for reporting guideline developers is an opportunity to speak with developers, expand on the recommendations and try new strategies to promote its dissemination and adoption.

Compounding this issue, many publications appeared to be based on a small group of experts' opinions or solicited input from a narrow range of people. For example, fewer than half of the reporting guideline publications mentioned a development group, suggesting that only the authors were involved in the development process. A third described any method to gather input and garner engagement from a wider stakeholder group on items for inclusion. Although two-thirds held consensus meetings to finalise their list of essential reporting items, they generally involved a small, homogeneous group of stakeholders, most commonly academics, clinicians, and journal editors. Policymakers,

**Table 5.** Spin and conflicts of interest in the 262 assessed reporting guideline publications

Reporting guidelines publication content	<i>n</i>	%
Overselling the robustness of development methods?		
Yes	8	3.54
No	254	96.95
Overselling the reporting guideline usefulness?		
Yes	26	9.92
No	236	90.08
Overselling the potential impact of the reporting guideline?		
Yes	35	13.36
No	227	86.84
Number of different types of spin		
No spin	214	81.68
Only one type of spin	28	10.69
Any two types of spin	19	7.25
All three types of spin	1	0.38
Conflict of interest statement present?		
Yes	180	68.70
No	82	31.30
Did CoI statement include nonfinancial items?		
Yes	64	24.23
No	116	44.27
N/A	82	31.30

research funders, regulators, patients, and public representatives were rarely involved.

We believe that input from a wider diversity of viewpoints enriches reporting guideline development and helps overcome barriers for reporting guideline use, such as researchers' difficulty in understanding terms, concepts, or checklist items [13–15]; development groups using poor dissemination strategies [16]; and experienced researchers feeling they do not need reminders of what to include in a paper [17]. Including research users such as policymakers and patients could help ensure resulting articles meet everyone's needs. Including medical writing professionals, scientific communication officers, and educators could promote more inclusive language in guidelines and help development groups prepare more effective dissemination strategies [18; 19].

#### 4.2. Dissemination issues

Few publications mentioned websites to collate related resources or formal plans for dissemination, implementation, or impact evaluation. These plans are recommended to increase guideline uptake and ensure guidelines work as planned [10]. Strategies to circumvent barriers for adherence to reporting guidelines could focus on this gap, promoting better feedback mechanisms [20], defining a clear timeline for revisiting and potentially updating the

guidelines [21], and promoting the adoption of research integrity and transparency practices as basic elements of research assessment [22,23].

Although reporting guideline developers are urged to consider open access and copyright when discussing implementation strategies [10], most reporting guidelines were published with full copyright retained by a journal, publisher, or other non-public entity, such as a medical society or funder, which usually entails being published behind a paywall. When a reporting guideline is not published open access, it cannot be used to its full potential [24]. Researchers may be forced to purchase reporting guideline papers if they do not have access to a journal subscription, which disproportionately affects researchers from under-resourced contexts.

Even when reporting guidelines under copyright are published 'free to read', issues remain. If published under a restrictive copyright licence, researchers must request permission to submit a reporting checklist or use part of the text, tables, or figures, such as recommended flow diagrams. Expecting researchers to request such permissions every time they submit a paper is unrealistic, particularly if payment is required. Research to develop and evaluate interventions to increase the use of reporting guidelines is also hampered by these restrictive use licences. Preprint servers might help to disseminate these writing resources freely and openly [25].

As reporting guidelines aim to increase research integrity and transparency, their publications should set an example. Our findings are consistent with previous research on spin in methodological research [26], showing a small proportion of this practice in such publications. However, the use of distorted or misleading language to describe the development methods, utility, or potential effects of reporting guidelines should be completely avoided. Likewise, statements of conflicts of interest should be standard practice in reporting guidelines publications, including aspects other than financial ones.

#### 4.3. Future work

Much of the guidance in the EQUATOR Network database that did not meet the definition for a reporting guideline included research conduct guidances, clinical guidelines, and methodological quality assessment tools. These papers often briefly mentioned important considerations when writing research papers, rather than structured guidance. The database's inclusive approach was acceptable when these snippets of reporting guidance were all that existed to help authors report their studies. Today, authors may struggle to sift through the hundreds of entries in the EQUATOR Network database.

Our findings support the need for the EQUATOR Network to apply a formal definition of a reporting guideline towards its database and search strategy. Much of the excluded guidance is still useful for authors, even if it is not a reporting guideline. It may be necessary for the

EQUATOR Network to reassess those entries judged not to be reporting guidelines, remove items that are not useful for users, and partition other useful guidance from reporting guidelines to help authors locate what they are looking for and distinguish between evidence-based and expert-opinion-based guidance.

#### 4.4. Limitations

This first comprehensive appraisal of reporting guidelines has some limitations. Rather than a sample identified with a search strategy developed for research, we used the EQUATOR Network's existing comprehensive database of reporting guidelines. This database is kept up to date with periodic search using an existing search strategy and direct submissions to our information specialist (S.K.) by reporting guideline developers. Although our sample may have missed some reporting guidelines published before data extraction, it is unlikely that they would change our conclusions.

The analyzed sample was taken from the EQUATOR database in October 2018. By January 2023, over 140 reporting guidelines had been added, all meeting our definition of a reporting guideline. Some of our findings may have varied if these guidelines were included. However, our audit provides a contemporary view of reporting guidelines at the time of the final search, before the COVID-19 pandemic. Newer reporting guidelines have been affected by the pandemic, for example using alternative consensus meeting formats to cope with restrictions, and many have been developed as extensions for COVID-19 related research. Future research could audit reporting guidelines produced during this period and compare them to our sample and those produced post pandemic.

## 5. Conclusion

Reporting guidelines have been developed with varying methodology. Several reporting guidelines reflect limited expert opinions. Reporting guideline developers should use existing guidance and take an evidence-based approach. The EQUATOR Network should apply a strict, formal definition of a reporting guideline towards its database to help users find the guidance they need.

## Declaration of Competing Interest

No author has any financial interests to declare. All authors are members of, or have collaborations with, The EQUATOR Network.

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## Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jclinepi.2023.03.018>.

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