Statements, Recommendations, Proposals, Guidelines, Checklists and Scales Available for Reporting Results in Biomedical Research and Quality of Conduct. A Systematic Review

Declaraciones, Recomendaciones, Propuestas, Directrices, Listas de Verificación y Escalas Disponibles para Informar Resultados y Calidad Metodológica en Investigación Biomédica. Revisión Sistemática

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SUMMARY: Research reporting statements, recommendations, proposals, guidelines, checklists and scales can improve quality of reporting results in biomedical research. The aim of this study was to describe statements, recommendations, proposals, guidelines, checklists and scales available for reporting results and quality of conduct in biomedical research. Systematic review. All types statements, recommendations, proposals, guidelines, checklists and scales generated to improve the quality of the biomedical research results report were included. Data sources: EMBASE, HINARI, MEDLINE and Redalyc; in the libraries BIREME-BVS, SciELO and The Cochrane Library; in the meta-searchers Clinical Evidence and TRIP Database; and on the Websites of EQUATOR Network, BMC Medical Education and EUROPE PMC were used. The recovered documents were grouped as study design related to systematic reviews (SR) meta-analysis and meta-reviews, CT and RCTs and quasi-experimental studies, observational studies, diagnostic accuracy studies, clinical practice guidelines; biological material, animal and preclinical studies; qualitative studies; economic evaluation and decision analysis studies; and methodological quality (MQ) scales). The 93 documents were obtained. 19 for SR (QUOROM, MOOSE, AMSTAR, AMSTAR 2, PRISMA, PRISMA-Equity, PRISMA-C, PRISMA-IPD, PRISMA-NMA, PRISMA-RR, PRESS, PRISMA-Search, PRISMA-TCM, PRISMA-ScR, PRISMA-DTA, PRISMA-P, MARQ, GRAPH, ROBIS), 32 for CT and RCTs (CONSORT and it update, STRICTA, RedHot, NPT, CONSORT-PRO, CONSORT-SPI, IMPRINT, TIDieR, CT in orthodontics, "n-de-1", PAFS, KCONSORT, STORK, Protocol health data, SW-CRT, ADs, MAPGRT, PRT, TREND, GNOSIS, ISPOR RCT Report, Newcastle-Ottawa, REFLECT, Ottawa, SPIRIT, SPIRIT-C, SPAC, StaRI, TRIALS, ROBINS-I, ROB 2), 11 for observational studies (STROBE, STREGA, STROBE-nut, INSPIRE, STROME-ID, STROBE-Vet, RECORD, ORION, STNS, MInCir-ODS, GATHER), 10 for diagnostic accuracy studies (STARD and it update, ARDENT, QUADAS, QUADAS-2, QAREL and it update, GRRAS, TRIPOD, APOSTEL), 3 for clinical practice guidelines (AGREE, AGREE II, RIGHT), 10 for biological material, animal and preclinical studies (MIAME, REMARK, SQUIRE, SQUIRE 2.0, REHBaR, ARRIVE, GRIPS, CARE, AQUA, PREPARE), 5 for qualitative studies (COREQ, ENTREQ, GREET and it update, SRQR), and 3 for economic evaluations (NHS-HTA, NICE-STA, CHEERS). There are a great variety of statements, recommendations, proposals, guidelines, checklists with its extensions and scales available. These can be used to improve the quality of the report and the quality of conduct of scientific articles, by authors, reviewers and editors.

KEY WORDS: "Checklist"[Mesh]; "Research Report"[Mesh]; "Research Design"[Mesh]; "Evidence-Based Medicine"[Mesh].

BACKGROUND

Daily clinical decisions are usually based on personal experience and evidence available from scientific studies. It is therefore, imperative that publications provide not only precise information regarding the methodology used and the results obtained; published articles should also be structured to facilitate their reading comprehension.

The first experience with this model was the CONSORT statement, published in 1996 (Begg *et al.*, 1996), revised in 2001 (Moher *et al.*, 2001) and 2004 (Campbell *et al.*, 2004); and updated in 2010 (No authors listed, 2010); the objective in this model was to improve the quality of clinical trials (CT) and randomized clinical

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trial (RCT) report; becoming the example to follow, subsequently encouraging the motivation of various research groups to generate proposals aimed at improving the reporting of research results.

There are a number of reasons that recommendations, guidelines, checklists and scales for authors are needed. To begin with, authors are faced with the responsibility of persuading reviewers and scientific journal editors of the quality of their study. Undoubtedly in this process an adequate investigation is critical, though a proper report of the objectives, design, eligibility criteria, sample size and type of sampling among others, is no less important. These are some examples of information that will allow a reader to critically evaluate the study. Giving insufficiently information could be confusing the reader but giving too much information could overstate a vain problem.

On the other hand, there are some instruments aimed at evaluating quality methodological quality (MQ) or risk of bias of published articles.

The aim of our study was to describe statements, recommendations, proposals, guidelines, checklists and scales available for reporting results and quality of conduct in biomedical research.

MATERIAL AND METHOD

This manuscript was written following the PRIS-MA statement (Moher *et al.*, 2009).

Study Design. Systematic review (SR).

Eligibility criteria. All types of statements, recommendations, proposals, guidelines, checklists and scales to improve the quality of biomedical research results reporting, as of 1996 were included. No language restriction was considered. Exclusion criteria were not considered.

Data Source. A search was made in the databases EMBASE, HINARI, MEDLINE and Redalyc; in the libraries BIREME-BVS, SciELO and The Cochrane Library; in the meta-searchers Clinical Evidence and TRIP Database; and on the Websites of EQUATOR Network, BMC Medical Education and EUROPE PMC. The closing date was August 30, 2019.

Search. Sensitive search strategies were carried out in the available literature, without restriction of the year, language or state of the publication (published, unpublished, in process of publication). For this, MeSH or DeCS terms were used, free terms, Boolean operators AND/OR, truncation and limits. Full electronic search strategy for each data source are summarized in Table I.

Table I. Search strategies according to the source of information used.

Source of information	Search strategy	Documents found
EMBASE	('checklist':ab,ti OR 'statement':ab,ti OR 'initiative':ab,ti) AND 'quality of reports':ab,ti	75
HINARI	"listas de chequeo" "listas de verificación"	105
MEDLINE	(checklist OR Statement) AND "improvement quality of reports" Publication date from 1996/01/01 to 2019/08/30	520
Redalyc	checklist AND "quality of reports"	27
BIREME-BVS	(tw:(checklist AND "quality of report"))	38
SciELO	(("lista de verificación") OR (pauta de chequeo) OR (checklist)) AND (quality of report)	22
The Cochrane Library	(checklist OR statement) AND "improvement quality of reports"	1
Clinical Evidence	(checklist OR Statement OR Initiative) AND improvement quality of reports (all words) in full text, from Jan 1996 to August 2019	36
TRIP Database	(checklist OR Statement OR Initiative) AND "improvement quality of reports"	9
EQUATOR Network	checklist OR Statement OR Initiative	14
BMC Medical Education	(checklist OR Statement) AND improvement quality of reports	385
EUROPE PMC	(TITLE:"checklist OR Statement AND improvement quality of reports") AND (FIRST_PDATE:[1996-01-01 TO 2019-08-30])	1
T O T A L		**1233**

Publication selection. The process for selecting studies included identification, screening, eligibility, and final inclusion of primary studies in the SR.

Data collection process. The review of the articles was carried out in three stages, first the titles were reviewed, then the summaries and subsequently the complete texts. This process was carried out by two groups of three researchers each (Group 1: CM, GQ and PS. Group 2: TO, MM and NG). Disagrees were resolved by consensus between the two review groups. Articles that initially coincided with the inclusion criteria were selected for extensive review of the texts.

Data items. A data extraction form was used that included information on the name, year of publication, number of items, assigned score domains, versions, objective, type of study design and observations. The recovered documents were grouped by groups of study designs (systematic reviews (SR) meta-analysis and meta-reviews, CT and RCTs and quasi-experimental studies, observational studies, diagnostic accuracy studies, clinical practice guidelines; biological material, animal and preclinical studies; qualitative studies; economic evaluation and decision analysis studies; and MQ scales).

Summary measures. No statistical tools were used, because it is a qualitative SR.

Ethics. Names of authors and centers were masked.

RESULTS

The search made it possible to retrieve 1233 documents, 189 of which were duplicated between the sources selected. After reviewing the requirements, 93 documents were achieved that make up the population under study, as could be seen in the flow diagram (Fig. 1). These are described below and in further detail in Table II.

Systematic reviews, meta-analysis and meta-reviews. A total of 7 checklists, 11 extensions, and 1 update were obtained (n=19).

1. QUOROM Statement. Its objective was to create a tool for the reporting of SR results based on CT. Composed of 6 domains (title/summary, introduction, methods, results and meta-analysis discussion) and 18 items, which include a flow diagram (Moher *et al*., 1999).

2. MOOSE Proposal. Its objective was to develop an instrument with recommendations for the meta-analysis of observational studies. Composed of 35 items, grouped into 6 domains (Background, Search strategy, Methods, Results, Discussion, Conclusions) (Stroup *et al*., 2000).

3. AMSTAR Statement. It is a measurement tool to assess the methodological quality of SR that include 11 items (Shea *et al*., 2007). In 2017, the version AMSTAR 2 for SR that include randomized or non-randomized studies of healthcare interventions was published, including 16 items, with simpler response categories than the original AMSTAR (Shea *et al*., 2017).

4. PRISMA Statement. It is the QUOROM update (Stroup *et al*.). Its objective was to resolve conceptual and practical advances of SRs. Composed of 27 items, grouped into 7 domains (title/summary, introduction, methods, results, discussion and financing) (Moher *et al*., 2009). It comprises a series of extensions, including: PRISMA-Equity, published in 2012 (Welch *et al*., 2012) and updated in 2015 as PRISMA-E 2012, for SR and meta-analyses with a focus on health equity, defined as the absence of avoidable and unfair inequalities in health (Welch *et al*., 2016); PRISMA-C, published in 2014, as protocols for SR and meta-analyses of RCT or observational studies of newborn and child health research (Kapadia *et al*., 2016); PRISMA-IPD, an extension for SR and Meta-Analyses of individual participant data, published in 2015 (Stewart *et al*., 2015); PRISMA-NMA, an extension statement for SR incorporating network meta-analyses of health care interventions, published in 2015 (Hutton *et al*., 2015); PRISMA-RR, for report of rapid reviews, including those with analogous terminology (e.g. rapid evidence synthesis, rapid knowledge synthesis), published in 2015 (Stevens, 2015); PRESS, published in 2008-2010 an updated in 2016, as a guide to improve the peer review of electronic literature search strategies (McGowan *et al*., 2016); PRISMA-Search, for report literature searches in SR, published in 2016 (Rethlefsen *et al*., 2016); PRISMA-TCM, for report SR and meta-analyses of studies that evaluate chinese herb medicine or moxibustion, published in 2016 (Bian *et al*., 2016); PRISMA-ScR, for report SR and Meta-Analysis for scoping reviews, used to map the concepts underpinning a research area and the main sources and types of evidence available; was published in 2018 (Tricco *et al*., 2018); PRISMA-DTA, reported in 2015, for reports of SR and meta-analyses of diagnostic test accuracy studies (McInnes *et al*., 2018), and PRISMA-P, constituted by 17 items and 26 sub-items, published in 2015, with the objective of prepare SR protocols that summarize aggregate data from studies, especially evaluations of intervention effects (Moher *et al*., 2015)

5. MARQ Checklist. Its objective was to develop an instrument that evaluated the methodological quality of meta-reviews, to promote a transparent and consistent reporting of metareview methodology. It consists of 20 items grouped in 7 domains (Singh *et al*., 2012).

Table II. Summary of information collected by type of study designs.

Designs	Abbreviated name	nº items	nº Domains	Score assigned	Available in languages:
SR, Meta-analyses and meta-reviews	QUOROM	18	6	No	English, Spanish
	MOOSE	35	6	No	English
	AMSTAR	11	6	No	English, French, German
	AMSTAR 2	16	7	No	English
	PRISMA	27	7	No	English, Spanish, Italian, Chinese, French. Portuguese. Russian.
	PRISMA-Equity	32	27	No	English
	PRISMA-C	NR	7	No	English
	PRISMA-IPD	23	7	No	English
	PRISMA-NMA	32	7	No	English, Spanish
	PRISMA-RR	n/f	7	No	English
	PRESS	35	6	No	English
	PRISMA-Search	n/f	7	No	English
	PRISMA-TCM	n/f	7	No	English
	PRISMA-ScR	22	7	No	English
	PRISMA-DTA	27	7	No	English
	PRISMA-P	26	17	No	English
	MARQ	20	7	No	Spanish
	GRAPH	13	4	No	English
	ROBIS	24	5	No	English
CT, RCT, and Quasi-experimental studies	CONSORT	25	5	No	English, French, German, Italian, Russian, Spanish, Chinese, others
	STRICTA	31	5	No	English, Chinese, Korean, Russian
	RedHot	28	8	No	English
	NPT	10	5	No	English
	CONSORT-PRO	22	5	No	English
	CONSORT-SPI	34	5	No	English
	IMPRINT	37	6	No	English
	TIDieR	37	5	No	English, German, French, Italian
	CT in orthodontics	NR	NR	No	English
	"n-de-1"	14	5	No	English
	PAFS	36	7	No	English
	STORK	30	NR	No	English
	Protocol health data	NR	NR	No	English
	SW-CRT	40	26	No	English, Spanish
	ADs	24	16	No	English
	MAPGRT	35	NR	No	English
	PRT	41	NR	No	English
	TREND	21	5	No	English, Spanish
	GNOSIS	18	7	No	English
	ISPOR RCT Report	26	5	No	English
	Newcastle-Ottawa			No	
	REFLECT	22	5	No	English
	Ottawa	15	7	No	English
	SPIRIT	33	5	No	English, Spanish, Chinese, Italian, German. Japanese. Korean
	SPIRIT-C	NR	11	No	English, Chinese
	SPAC	19	4	No	English
	StaRI	27	9	No	English
	TRIALS	36	25	No	English
	ROBINS-I	7	3	No	English, German, Chinese
	ROB 2	7	6	No	English

NR: Not Reported.

Observational studies	STROBE	22	6	No	English, German, Chinese, Italian, Portuguese, Spanish, Greek, Others
	STREGA	4	NR	No	English
	STROBE-nut	24	6	No	English, Chinese
	INSPIRE	33	6	No	English
	STROME-ID	44	6	No	English
	STROBE-Vet	38	6	No	Spanish, French
	RECORD	13	NR	No	Chinese, French, German
	MInCir-ODS	19	4	No	Spanish
	ORION	22	5	No	English, Chinese
	STNS	30	3	Yes (0-30)	English
	GATHER	18	6	No	English, Spanish, Arabic, Chinese, French, Portuguese, Russian
Diagnostic accuracy studies	STARD	30	6	No	English, Chinese, German, French, Italian, Spanish,
	ARDENT	27	5	No	English
	QUADAS-2	7	4	No	English, Portuguese, Chinese, French
	QAREL	11	7	No	English
	GRRAS	15	6	No	English
	MInCir-D	10	4	Yes (7-60)	Spanish
	TRIPOD	22	6	No	English
	APOSTEL	9	9	No	English
Clinical practice guidelines	AGREE II	23	6	No	English, Italian
	RIGHT	28	5	No	English, German, Italian
Biological material, animal and preclinical studies	MIAME	70	6	No	English
	REMARK	20	4	Yes (up to 20)	English, Spanish
	SQUIRE 2.0	19	6	No	English, Italian, Spanish
	REHBaR	23	4	No	English
	ARRIVE	20	5	No	English, Chinese, Italian, Portuguese, Spanish, French, German, Others
	GRIPS	25	6	No	English
	CARE	13	NR	No	English, German, Italian
	AQUA	29	8	No	English, Spanish, French
	PREPARE	15	3	No	English
Qualitative studies	COREQ	32	3	No	English
	ENTREQ	21	5	No	English
	GREET	17	6	No	English
	SRQR	21	5	No	English
Economic evaluation and decision analysis	NHS-HTA	25	NR	No	English
	NICE-STA	46	7	No	English
	CHEERS	24	6	No	English, Spanish
MQ scales	MInCir-T	6	3	Yes (6-36)	Spanish, English
	MInCir-Pr1	25	6	Yes (6-125)	Spanish
	MInCir-Pr2	10	4	Yes (7-60)	Spanish

NR: Not Reported

6. GRAPH Recommendations. Its aim was to design and report heart rate variability studies in psychiatry and which will expand the ability to perform meta-analyses and meta-research in this area. It consists of 13 items distributed in 4 domains (Stevens *et al.*, 2016).

7. ROBIS tool. For assessing the risk of bias in SR. Was aimed at 4 broad categories of reviews mainly within health care settings: interventions, diagnosis, prognosis, and etiology. It is compound by 5 domains and 24 items presented as questions (Whiting *et al.*, 2016).

CTs, RCTs and quasi-experimental studies. A total of 12 checklists or statements, 17 extensions, 2 updates, and 1 protocol were obtained (n=32).

1. CONSORT Statements. Published in 1996 (Begg *et al.*) and updated in 2010 (No authors listed, 2010). Its objective was to improve the quality of the clinical trial report. Composed of 22 items grouped into 5 domains (title/summary, introduction, methods, results and discussion). It includes a series of extensions and supplements, among
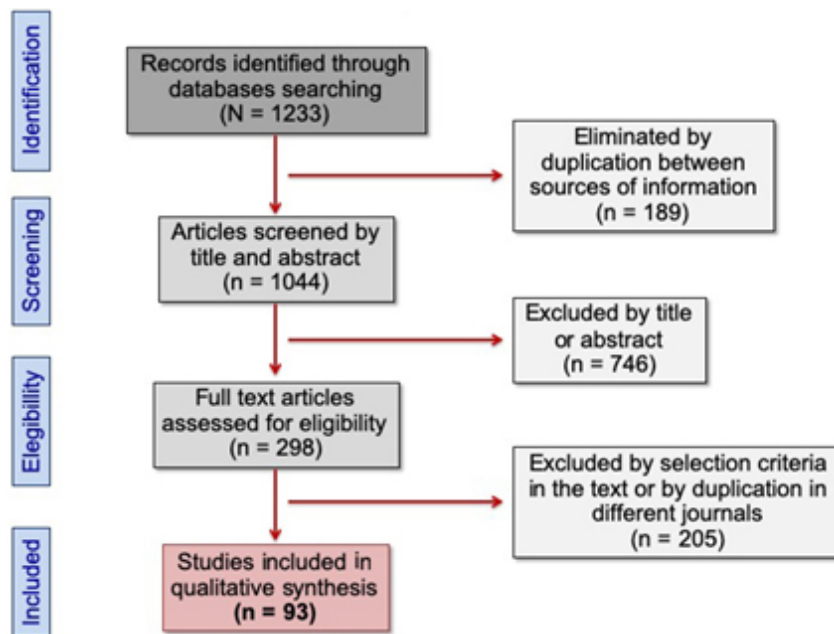
Fig. 1. PRISMA flowchart of participant studies.

which: STRICTA, published in 2001, with the objective of It aim was create a checklist for reporting RCT in acupuncture, with 6 items, applicable together with CONSORT statement (MacPherson *et al*., 2001); RedHot, whose objective was to create an instrument for reporting homeopathic treatments (Dean *et al*., 2007); NPT List, published in 2005 (Boutron *et al*., 2005) and updated in 2017. Its objective was to evaluate the quality of non-pharmacological treatment CTs. It consists of 10 items and 5 sub-elements, which are evaluated as: Yes, No, Not clear (Boutron *et al*., 2017). CONSORT-PRO, whose objective was to determine the results reported by the patients (PRO), which are usually inadequately reported, thus limiting the value of the data (Calvert *et al*., 2013); CONSORT-SPI, published in 2013 (Montgomery *et al*., 2013), and updated in 2018, for reporting randomized clinical trials (RCTs) of social and psychological interventions, extends 9 of the 25 items from CONSORT 2010 (CONSORT 2010), added a new item related to stakeholder involvement, and modified aspects of the flow diagram (Montgomery *et al*., 2018); IMPRINT, which seeks to improve CT information of infertility treatments (Harbin Consensus Conference Workshop Group *et al*., 2014); TIDIER checklist, for the report of interventions in evaluative studies, including CT (Hoffmann *et al*., 2014); adaptation to CT in orthodontics (Pandis *et al*., 2015); the "n-de-1", to evaluate the effectiveness of an intervention in a single patient (Vohra *et al*., 2016); PAFS, for the report of randomized pilot and feasibility trials, added 11 items grouped in 7 domains (Eldridge *et al*., 2016); KCONSORT (2009) renamed STORK standards (2016), to generate a standard for reporting results in

intervention studies where they were going to be used Kampo Products (Motoo *et al*., 2017); protocol for a scoping review to support development of a CONSORT extension for RCTs using cohorts and routinely collected health data, published in 2018 (Kwakkenbos *et al*., 2018); SW-CRT, published in 2018, for reporting of stepped wedge cluster RCT consist in 40 items grouped in 26 domains (Hemming *et al*., 2018); ADs, published in 2018, extension for adaptive design RCT, adjusting 24 items of 16 domains of the CONSORT 2010 (Dimairo *et al*., 2018); MAPGRT for reporting of Multi-Arm Parallel-Group RCT, expanding on 10 items of the CONSORT 2010 (Juszczak *et al*., 2019); PRT for reporting within person RCT, it extends 16 items of the CONSORT 2010 checklist and introduces a modified flowchart and baseline table (Pandis *et al*., 2019). None of them considers score allocation.

2. **TREND Statement.** Its objective was to generate a tool for CT analysis when it was not possible to perform random assignment. This was composed of 21 items, grouped into 5 domains (Des Jarlais *et al*., 2004).

3. **GNOSIS Guide.** Its objective was to standardize the neuro-oncology CT report of phase 1 and 2. It consists of 7 domains and 18 items (Chang *et al*., 2005).

4. **ISPOR RCT Report.** Published in 2005 (Ramsey *et al*., 2005) and updated in 2015. Its objective was to serve as an orientation guide for the design, implementation and presentation of cost-effectiveness analysis reports in the CT. It has 5 domains (design, information elements, database, analysis and report of results), which group 26 items. It does not contain a numerical rating scale (Ramsey *et al*., 2015).

5. **Newcastle-Ottawa Scale (NOS).** Its objective was to assess the quality of non-randomized trials in meta-analyses. Its evaluation is currently in progress (Stang *et al.*, 2010).

6. **REFLECT Statement.** Its objective was to improve the CT report related to "livestock and food safety". Composed of 5 domains and 22 items that include a flow diagram of the participants (Sargeant *et al.*, 2010).

7. **Ottawa Declaration.** Its objective was to provide guidelines for the ethics of design and CT control by conglomerates. It is composed of 7 domains (design, review by ethics committee, participants, informed consent, access controller, risk-benefit assessment, and protection of participant vulnerability) (Weijer *et al.*, 2012).

9. **SPIRIT Statement.** Its objective was to improve the quality of CT protocols. It consists of 33 items grouped into 5 domains (administrative information, introduction, methods, ethics and dissemination, and appendices) (Chan *et al.*, 2013). It have one developed extension: SPIRIT-C, for trials in Child Health, with 11 domians (Clyburne-Sherin *et al.*, 2015).

10. **SPAC Therapy Checklist.** Its objective was to develop a checklist for trials with alternative therapeutic interventions. It consists of 19 items that are answered with a Likert scale with scores of 1 (in disagreement), up to 9 (in agreement) (Kamioka *et al.*, 2013).

11. **StaRI Statement and Checklist.** Its aim was to create a statement for reporting implementation studies. Consists of 27 items grouped in 9 domains (Pinnock *et al.*, 2017).

12. **TRIALS Guidelines.** Its objective was to generate a checklist for reporting embedded recruitment trials. It consists of 36 items grouped into 25 domains (Madurasinghe *et al.*, 2016).

13. **ROBINS-I Tool.** It is the preferred tool to be used in Cochrane Reviews for non-randomized studies of interventions, currently available for cohort designs with adaptions underway for other study types such as case-control and interrupted time series. ROBINS-I overlap with RoB 2, the 'Risk of bias' 2.0 tool but include 3 additional domains: confounding, selection of participants into the study and classification at intervention (solid domain in clinical epidemiology are needed to use it) (Sterne *et al.*, 2016).

Observational studies. A total of 5 checklist or statements and 6 extension (n=11).

1. **STROBE Statement.** Its objective was to develop a checklist for the reporting of research results made with cohort studies, cases and controls; and of cross section. It consists of 6 domains (title/summary, introduction, methodology, results, discussion and others), and 22 items (von Elm *et al.*, 2007). Different versions are provided according to the design. It has an extension called STREGA, published in 2009 (Little *et al.*, 2009), whose objective was to provide own items of studies of genetic association (genotyping, the model of the haplotype, fundamentals for the selection of genes, etc.). Other extensions are: STROBE-nut: published in 2016, as a list of recommendations for reporting nutritional epidemiology and dietary assessment research (24 recommendations for nutritional epidemiology grouped in 6 domains, were added to the STROBE checklist) (Lachat *et al.*, 2016). INSPIRE Guideline: Published in 2016 (Cheng *et al.*, 2016), extension of the STROBE statements and the CONSORT Standards; for writing guidelines to improve the quality of reporting for simulation-based research. STROME-ID statement: Published in 2014 (Field *et al.*, 2014), for support scientific reporting of molecular epidemiological studies to inspire authors to consider specific threats to valid inference (20 items were added to the 22 item of the STROBE checklist). STROBE-Vet statement: Published in 2016 (Sargeant *et al.*, 2016), for reporting requirements for observational studies in veterinary medicine related to health, production, welfare, and food safety. Modifications or additions were made to 16 items of STROBE statements (only in 6 items of it, no modifications were applied). RECORD, to help researchers who use health data collected routinely (for research in clinical epidemiology), to comply with ethical obligations of complete and accurate reports. It consists of 13 items that complement or modify the items of STROBE (Nicholls *et al.*, 2016).

2. **ORION Statement.** Its objective was to raise the level of research and publication in hospital epidemiology related to nosocomial infections. Composed of 22 items, grouped into 5 domains (title/summary, introduction, methods, results and discussion), and a summary table (Stone *et al.*, 2007).

3. **STNS Score.** Its objective was to generate a proposal to evaluate the quality of reports of surgical interventions in the treatment of trigeminal neuralgia. Was partially based on STROBE. It consists of 30 items grouped into 3 domains; and assigns points to their items (0 to 30 points) (Akram *et al.*, 2013).

4. **MInCir-ODS Initiative.** Published in 2013 and updated in 2017 (Manterola & Otzen, 2017; Manterola *et al.*, 2018). Its objective was to build a checklist for the report of results with observational descriptive studies. Composed of 19 items, grouped into 4 domains: Introduction, methodology, results and discussion.

5. **GATHER Statement.** Created with the objective of define and promote good practice in reporting of global health estimates (decision makers and researchers). It comprised 18 items grouped in 6 domains (Stevens *et al.*, 2016).

Diagnostic accuracy studies. Six checklists or proposals, 1 extension and 3 updates were retrieved (n=10).

1. **STARD Guidelines.** Published in 2003 (Bossuyt *et al.*, 2003) and updated in 2015 (Bossuyt *et al.*, 2015). Its objective was to generate a standard for the report of studies of diagnostic accuracy. Composed of 30 items grouped in 6 domains (title/summary, introduction, methods, results and discussion), a flow diagram and score assignment. In 2015, an extension named ARDENT checklist was created to establish tools for standardized design and reporting of diagnostic accuracy studies of liver fibrosis tests. It consists of 27 items grouped in 5 domains (Boursier *et al.*, 2015).

2. **QUADAS Tool.** Published in 2003 (Whiting *et al.*, 2003), updated in 2011 (QUADAS-2) (Whiting *et al.*, 2011). Its objective was to generate a tool for quality assessment of diagnostic precision studies included in an SR. Based on original QUADAS and evidence on sources of bias and variation of studies of diagnostic accuracy. It is applied in 4 phases: summary of the question, adaptation to the study being analyzed, flow chart for the primary studies; and assessment of the risk of bias and applicability.

3. **QAREL Tool.** Published in 2010 (Lucas *et al.*, 2010), updated in 2013 (Lucas *et al.*, 2013). Its objective was to develop a reliability assessment tool for diagnostic test studies, which could also be used in SR diagnostic tests. Composed of 7 domains (spectrum of subjects, examiners, masking of theexaminer, interval between measurements, application and interpretation of the test, order of the examination and analysis of the data) and 11 items. It is applied based on questions of 3 answer alternatives "yes" (good quality), "no" (poor quality), "not clear"; and some articles include the option " not applicable ".

4. **GRRAS Guidelines.** Its objective was to develop a tool that would cover the information regarding reliability and agreement in measurements, especially in healthcare. Composed by 15 items grouped in 6 domains (Kottner *et al.*, 2011).

5. **TRIPOD Statement.** Its objective was to improve reporting transparency of a prediction model study for individual prognosis or diagnosis, regardless of the study methods used. It consists of 6 dimensions and 22 items (Collins *et al.*, 2015).

6. **APOSTEL** Recommendations. Its objective was to develop consensus recommendations for the presentation of results of optical quantitative tomography studies. It consists of 9 items (Cruz-Herranz *et al.*, 2016).

Clinical practice guidelines. Two checklists and 1 update were retrieved (n=3).

1. **AGREE Instrument.** Published in 2003 (AGREE Collaboration, 2003), and updated in 2010 as AGREE-II (Brouwers *et al.*, 2010). Its objective was to advance in the development, presentation of reports and evaluation of guidelines in health care through the generation of clinical practice guidelines. It consists of 23 items grouped into 6 domains (Scope and Objective, Participation of stakeholders, Rigor of preparation, Clarity of presentation, Applicability, and Editorial Independence).

2. **RIGHT Statement.** It objective was to generate an instrument for reporting Practice Guidelines in Health Care. Consist in 28 items grouped in 5 domains (Chen *et al.*, 2017).

Biological material, animal and preclinical studies. Nine guidelines and proposals, and 1 update were retrieved (n=10).

1. **MIAME Guidelines.** Its objective was to establish a standard to register and report gene expression database on microarrays, thus facilitating the establishment of databases and allowing the development of data analysis tools. Composed by 6 domains (experimental design, matrix, samples, hybridization, measurement, and normalization of controls) (Brazma *et al.*, 2001).

2. **REMARK Guideline.** Its objective was to generate recommendations for the publication of studies on tumor markers for prognostic models. Composed of 20 items grouped in 4 domains. Contemplate punctuation when applying the instrument; its maximum is 20 points (McShane *et al.*, 2005).

3. **SQUIRE Guidelines.** Published in 2008 and updated as SQUIRE 2.0 in 2016. Its objective was to improve the biomedical scientific information reports. Composed of 19 items, grouped into 6 domains (title/summary, introduction, method, results, discussion and others) (Ogrinc *et al.*, 2016).

4. **REHBaR Proposal.** Its objective was to develop a list of criteria to improve the quality of reporting results in homeopathy basic research. Composed of 23 items, grouped into 4 domains (Stock-Schröer *et al.*, 2009).

5. **ARRIVE Guidelines.** Its objective was to maximize the published information and minimize unnecessary studies in animals. Composed of 20 items grouped into 5 domains (Kilkenny *et al.*, 2010).

6. **GRIPS Statement.** Its objective was to improve the quality of the report of genetic risk prediction studies. Composed of 25 items, grouped into 6 domains. For each item, the specific type of information is described, as well as the minimum content that must be reported (Janssens *et al.*, 2011).

7. **CARE Guidelines.** Its objective was to implement a guide for the reporting of data analysis in case report. It consists of 13 items (Gagnier *et al.*, 2013).

8. **AQUA checklist.** Developed for reporting original anatomical studies. Consisted of 29 items divided into 8 domains (Tomaszewski *et al.*, 2017).

9. PREPARE Guidelines. Its objective was to reinforce the planning stage of animal experiments. It consists of three domains: formulation; dialogue between scientists and animal facilities; and quality control of the study components (Smith *et al*., 2018).

Qualitative studies. Four checklist or statements and one update were recovered (n=5).

1. COREQ Checklist. Its objective was to prepare a checklist for the report of the results of qualitative studies (interviews and focus groups). Composed of 3 domains (research and reflexivity team, design, and analysis of data and reports) and 32 items (Tong *et al*., 2007).

2. ENTREQ Statement. Its objective was to help researchers inform the stages associated with the synthesis of qualitative health research: search and selection of qualitative research, quality assessment and methods to synthesize qualitative findings. It consists of 5 domains and 21 items (Tong *et al*., 2012).

3. GREET Statement. Published 2013 (Phillips *et al*., 2013), updated in 2016 (Phillips *et al*., 2016). Its objective was to provide guidance for the reporting of educational interventions for evidence-based practice. It consists of 17 items grouped into 6 domains (descriptive, participants, intervention, content, evaluation and confusion), assigning 3 response possibilities (fully informed, partially informed, not informed).

4. SRQR Recommendations. Its objective was to improve the transparency of all aspects of qualitative research. It consists of 5 dimensions and 21 items (O`Brien *et al*., 2014).

Economic evaluation and decision analysis studies. Three documents were recovered (n=3).

1. NHS-HTA Recommendations. Its objective was to develop recommendations to increase the generalization of economic evaluations. It consists of: recommendations to report results of economic evaluations of CT (composed of 8 items); a checklist for evaluation of the generalization of CT-based studies (composed of 10 items); and other, for the evaluation of the generalization of modeling studies (composed of 7 items) (Drummond *et al*., 2005).

2. NICE-STA Report. Its objective was to provide a checklist to evaluate the quality of economic health reports, especially STA decision analysis models, incorporating elements for economic evaluation. Composed of 46 items, grouped into 7 domains (relevance to current technology, structure, clinical evidence, data utility, use of resources and cost data, uncertainty assessment and consistency); with 4 response options (yes, no, it does not appear and not clear) and comments (Zimovetz & Wolowacz, 2009).

3. CHEERS Statement. Its objective was to develop recommendations to facilitate the reporting of economic evaluation publications. It consists of 24 items grouped into 6 domains (title / summary, introduction, methods, results, discussion and others) (Husereau *et al*., 2013).

Finally, it can state that almost 64 guidelines, proposals and checklist are in develop process or in protocol phase (15 CT and CONSORT extensions, 12 observational studies and STROBE extensions, 10 SR and PRISMA extensions, 2 CT protocols and SPIRIT extensions; and 25 other study designs and clinical areas) (EQUATOR).

DISCUSSION

As a summary of the evidence, we think that there is an important number and a variety of checklists available for the reporting of results in biomedical research, which can be used by authors, reviewers and editors, all aimed to improve the quality of the report of scientific articles. These could be interesting and relevant to researchers, which need to know the various options for reporting their results according to the type of study.

The publication of the documents described above (Table II), underscores the current trend oriented toward adequate reporting of results in biomedical research, regardless of the type of designs used. Whether through the use of checklists, check-ups or verification, these are all instruments that include criteria to evaluate certain characteristics that represent the minimum quality features required for a manuscript.

As possible limitations of the study, it seems to us that, as it may occur in any SR, we think that this study could have risk of publication and reporting bias, as well as incomplete retrieval of identified research. For example, we know that there are at least 50 proposals and checklist in develop process or in protocol phase, only in Equator (Equator Network, 2020). And perhaps others we could not found in other data sources.

However, it is important to point out that checklists were not designed to assess MQ, only the compliance with some parameters; for the MQ construct (a concept that allows assessment of the different aspects of an article, such as type of design, population, methodology, report quality etc.), is evaluated with ad-hoc scales such as some of those previously mentioned, that could also be used as checklists.

As a conclusion, we can point out that there is an important number and a variety of checklists available for the reporting of results in biomedical research, which can be used by authors, reviewers and editors, all aimed to improve the quality of the report of scientific articles.

OTZEN, T.; MANTEROLA, T.; MORA, M.; QUIROZ, G.; SALAZAR, P. & GARCÍA, N. Declaraciones, recomendaciones, propuestas, directrices, listas de verificación y escalas disponibles para informar resultados y calidad metodológica en investigación biomédica. Revisión sistemática. *Int. J. morphol., 38(3)*:774-786, 2020.

RESUMEN: El uso de recomendaciones, propuestas, listas de verificación y escalas pueden mejorar la calidad del informe de resultados en investigación biomédica. El objetivo de este estudio fue describir las declaraciones, recomendaciones, propuestas, directrices, listas de verificación y escalas disponibles para informar resultados y calidad metodológica en investigación biomédica. Revisión sistemática. Se incluyeron todas las tipos de declaraciones, recomendaciones, propuestas, pautas, listas de verificación y escalas disponibles para informar resultados y calidad metodológica en investigación biomédica. Fuentes de datos: EMBASE, HINARI, MEDLINE y Redalyc; bibliotecas BIREME-BVS, SciELO y The Cochrane Library; metabuscadores Clinical Evidence y TRIP Database; sitios Web EQUATOR Network, BMC Medical Education y EUROPE PMC. Los documentos recuperados se agruparon por tipo de diseño de estudio: revisiones sistemáticas (RS), ensayos clínicos (EC), estudios cuasi experimentales, observacionales, de precisión diagnóstica, guías de práctica clínica (GPC); de material biológico, estudios animales y preclínicos; estudios cualitativos; estudios de evaluación económica y estudios de análisis de decisiones; y escalas de calidad metodológica (CM). se obtuvieron 93 documentos. 19 para RS (QUOROM, MOOSE, AMSTAR, AMSTAR 2, PRISMA, PRISMA-Equity, PRISMA-C, PRISMA-IPD, PRISMA-NMA, PRISMA-RR, PRESS, PRISMA-Search, PRISMA-TCM, PRISMA-ScR, PRISMA-DTA, PRISMA-P, MARQ, GRAPH, ROBIS), 32 para EC (CONSORT y su actualización, STRICTA, RedHot, NPT, CONSORT-PRO, CONSORT-SPI, IMPRINT, TIDieR, CT en ortodoncia, "n-de-1 ", PAFS, KCONSORT, STORK, datos de salud del protocolo, SW-CRT, ADs, MAPGRT, PRT, TREND, GNOSIS, ISPOR RCT Report, Newcastle-Ottawa, REFLECT, Ottawa, SPIRIT, SPIRIT-C, SPAC, StaRI , PRUEBAS, ROBINS-I, ROB 2), 11 para estudios observacionales (STROBE, STREGA, STROBE-nut, INSPIRE, STROME-ID, STROBE-Vet, RECORD, ORION, STNS, MInCir-ODS, GATHER), 10 para estudios de precisión diagnóstica (STARD y su update, ARDENT, QUADAS, QUADAS-2, QAREL y su update, GRRAS, TRIPOD, APOSTEL), 3 para GPC (AGREE, AGREE II, RIGHT), 10 para material biológico, animal y estudios preclínicos (MIAME, REMARK, SQUIRE, SQUIRE 2.0, REHBaR, ARRIVE, GRIPS, CARE, AQUA, PREPARE), 5 para estudios cualitativos (COREQ, ENTREQ, GREET y su update, SRQR), y 3 para evaluaciones económicas (NHS-HTA, NICE-STA, CHEERS). Existe una gran variedad de instrumentos disponibles. Estos pueden ser utilizados por autores, revisores y editores; para mejorar la calidad del informe y de la CM de artículos científicos.

PALABRAS CLAVES: "Checklist"[Mesh]; "Research Report"[Mesh]; "Research Design"[Mesh]; "Evidence-Based Medicine"[Mesh].

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