



Systematic reviews in dentistry: Current status, epidemiological and reporting characteristics



Rafaela Bassani^a, Gabriel Kalil Rocha Pereira^a, Matthew J. Page^b, Andrea C. Tricco^{c,d}, David Moher^{e,f}, Rafael Sarkis-Onofre^{a,*}

^a Graduate Program in Dentistry, Meridional Faculty/IMED, 304 Senador Pinheiro Machado Street, 99070-220, Passo Fundo, Brazil

^b School of Public Health and Preventive Medicine, Monash University, 553 St Kilda Road, Melbourne, Victoria, 3004, Australia

^c Knowledge Translation Program, Li Ka Shing Knowledge Institute, St. Michael's Hospital, 209 Victoria Street, East Building, Toronto, ON, M5B 1T8, Canada

^d Epidemiology Division, Dalla Lana School of Public Health, University of Toronto, 6th Floor, 155 College Street, Toronto, Ontario, M5T 3M7, Canada

^e Centre for Journalology and Canadian EQUATOR Centre, Clinical Epidemiology Program, Ottawa Hospital Research Institute, Ottawa, K1H 8L6, Canada

^f School of Epidemiology and Public Health, Faculty of Medicine, University of Ottawa, Ottawa, K1H 8M5, Canada

ARTICLE INFO

Keywords:

Dentistry
Systematic reviews
Reporting
PRISMA

ABSTRACT

Objective: This study aimed to evaluate the epidemiological and reporting characteristics of systematic reviews (SRs) in dentistry indexed within PubMed during the year 2017.

Methods: We searched for SRs in dentistry indexed within PubMed in 2017. Study selection was undertaken by two reviewers independently. Data related to epidemiological and reporting characteristics were extracted by one of three reviewers. A descriptive analysis of the data was performed. Characteristics of SRs were analyzed considering all SRs included and subgrouped by dental specialties. In addition, we explored if the reporting of 24 characteristics of treatment/therapeutic SRs was associated with the self-reported use of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Statement calculating the risk ratio (RR) with a 95% confidence interval for each characteristic.

Results: 495 articles fulfilled the eligibility criteria. The main specialty considered was Oral Surgery numbering 75 articles. Brazil presented the highest contribution with 117 SRs (23.6%). The reporting quality was variable. Items such as, use of the term “systematic review”, or “meta-analysis” in the title or abstract was well reported. In contrast, the study risk of bias/quality assessment method was not reported in 40.5% of SRs. In addition, only four reporting characteristics were described more often in those SR that reported using the PRISMA Statement.

Conclusion: A large number of SRs were published in dentistry in 2017 and the reporting and epidemiological characteristics varied among dental specialties. There is a mandatory need to improve the quality of reporting and conduct of SRs in dentistry.

Clinical significance: Poor reporting and conduction of SRs could generate SRs with imprecise and biased results.

1. Introduction

The principal aim of systematic reviews (SRs) is to select and synthesize all studies addressing a specific question based on previously established criteria employing methods that minimize bias through a systematic, rigorous and replicable methodology [1,2]. SR is a useful methodology for identifying, appraising and integrating the findings of studies on a specific topic and, when well-designed, conducted and reported, is considered a gold standard for decision-making and an important step towards evidence-informed medicine [1,2].

Recent studies have demonstrated the rapidly increased number of

SRs being published. Ioannidis suggested that between 1986 and 2015, the PubMed filters identified 266,782 items as “SRs” [3]. Page et al. demonstrated that 22 SRs were published daily in 2014 corresponding to a three-fold increase over the previous ten years [4]. In addition, both studies highlighted that many SRs are poorly conducted, reported and/or unnecessary.

In dentistry, the same tendency exists. Saltaji et al. demonstrated that 1188 SRs were published between 1991–2012 and the characteristics varied across dental specialties [5]. Additionally, the authors observed that the increased volume of SRs may not necessarily reflect an improvement in methodological quality. El-Rabbany et al. suggested

* Corresponding author.

E-mail addresses: lela.bassani@gmail.com (R. Bassani), gabriel.pereira@imed.edu.br (G.K.R. Pereira), matthew.page@monash.edu (M.J. Page), triccoa@smh.ca (A.C. Tricco), dmoher@ohri.ca (D. Moher), rafael.onofre@imed.edu.br (R. Sarkis-Onofre).

<https://doi.org/10.1016/j.jdent.2019.01.014>

Received 15 December 2018; Received in revised form 18 January 2019; Accepted 23 January 2019

0300-5712/ © 2019 Elsevier Ltd. All rights reserved.

that 208 systematic reviews with meta-analysis of randomized controlled trials were published between 2000–2013 and highlighted that there is a room for improvement in the reporting and methodology of SRs [6]. In addition, recent study has demonstrated

that SRs in endodontics present variability in the methodologic and reporting quality [7].

Currently there has been no data available concerning a quantitative evaluation of SRs published in dentistry as well as details regarding the reporting/conduct of such reviews considering different SRs questions addressed (epidemiological, therapeutic, diagnostic, among others) and all dental specialties. In addition, there is no report in the literature considering the large number of SRs characteristics explored in this article. Thus, this study aimed to evaluate the epidemiological and reporting characteristics of systematic reviews (SRs) in dentistry indexed within PubMed during the year 2017.

2. Materials and methods

2.1. Protocol

We did not pre-register the protocol of this study, as, to date, there is no register for research of this nature. However, the protocol is available on request from the corresponding author.

2.2. Eligibility criteria

We included SRs that met the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols (PRISMA-P) definition of a SR [8], that is, articles that explicitly stated methods for identifying studies, study selection, and data synthesis. Studies were not excluded based on the type of methods used or level of details reported. Further, articles were included independent of the type of SR questions addressed (epidemiological, therapeutic, diagnostic, among others).

We considered a SR in dentistry, articles related to evaluation, diagnostic, prevention and/or treatment of diseases, disorders and/or conditions of the oral cavity, maxillofacial and/or adjacent area and associated structures independent of the type of study included.

Articles reported as narrative/non-systematic literature reviews, rapid reviews, overviews of reviews (or umbrella reviews), scoping reviews, methodology articles evaluating quality of studies, comments and protocols or summaries of SRs and those published in languages other than English were excluded.

2.3. Search

The search was performed in PubMed for SRs indexed in 2017 (from January 01 until December 31) and limited to articles written in the English language. The search strategy was created by one of authors (R.S-O) based on MeSH terms of PubMed and a specific filter (U.S. National Library of Medicine) to retrieve reports of SRs (Supplemental Material). We considered only SRs indexed in PubMed based on the study of Page et al. [4].

2.4. Screening

Study selection was undertaken using the EndNote program (EndNote X7, Thomson Reuters, New York, NY). Initially, we randomly selected 20 references to perform a pilot test of screening to ensure consistency between the two reviewers involved during that phase using Excel (Microsoft Office). Subsequently, two researchers (R.B. and R.S-O) identified, independently, articles by reviewing titles and abstracts for relevance. Retrieved records were classified as include, exclude or uncertain. The full-text articles of the included and uncertain records were selected for further eligibility screening by the same two reviewers. Discrepancies in screening of titles/abstracts and full-text articles were resolved through discussion. In the case of disagreement,

the opinion of a third reviewer was garnered (M.J.P.).

2.5. Data extraction

We created a standardized form using the Excel program (Microsoft Excel 2011) based on the data extraction form developed by Page et al. [4]. Initially, we performed a pilot data extraction on a random sample of 10 included SRs. The pilot test was carried out through a discussion between the reviewers (R.B, G.K.R.P, R.S-O) in order to consider all data for extraction. Subsequently, data from each SR were extracted by one of three reviewers (R.B, G.K.R.P, R.S-O). The following data were collected: number of SRs per journal, year of publication, dentistry specialty (e.g., periodontology, operative dentistry, prosthesis, public health, among others), details surrounding administrative information, study eligibility criteria, search methods, screening, data extraction, risk-of-bias assessment methods, outcomes, statistical methods, limitations, conclusion and funding. At the end of the data extraction phase, one author (R.S-O) verified the consistency of all data and in the case of doubt or inconsistency, the data were extracted again.

2.6. Data analysis

A descriptive analysis of the data was performed with data summarized as frequency for categorical items or median and interquartile range for continuous data. Characteristics of SRs were evaluated considering all SRs included and were grouped by dental specialties. We analyzed the reporting characteristics of included SRs related to administrative information, study eligibility criteria, search methods, screening, data extraction, risk-of-bias assessment methods, included/excluded studies and participants, outcomes, statistical methods, limitations, conclusions and funding subgrouped by dental specialties. The analyses were carried out with Stata 14.0 software (Stata Corp., College Station, TX, USA). We created a map considering the number of SRs by country of corresponding authors using the tool infogram.com.

In addition, we explored if the reporting of 24 characteristics of treatment/therapeutic SRs was associated with the self-reported use of the PRISMA Statement to guide conduct/reporting. These domains were selected because they are categorized dichotomously as “it was reported” or “it was not reported”. For this outcome, the proportion of SRs with adequate reporting of these items was calculated. Utilizing these proportions, we compared the completeness of reporting between SRs describing the use of the PRISMA Statement versus SRs not reporting the calculation of the RR with a 95% confidence interval for each characteristic. A RR greater than 1 indicated increased reporting of the item. The analysis was performed in Review Manager Software (RevMan Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2014). This analysis was not prespecified in the protocol and it was planned following the completion of data extraction.

3. Results

3.1. Search

The search of PubMed yielded a total of 1375 records and the study screening based on titles and abstracts resulted in the exclusion of 759 records. The remaining 616 studies were submitted to full-text analysis, leading to 495 articles included. Fig. 1 presents a flow diagram depicting the review process.

3.2. Epidemiological characteristics and prevalence of SRs

With regards to the prevalence of SRs published, Page et al. suggested that 8184 SRs are indexed by year [4]. We observed that in 2017, 495 SRs were published in dentistry, which suggests that at least 6.05% of published SRs would be from dentistry. Among the 495 studies, we identified only 13 Cochrane reviews, which corresponds to

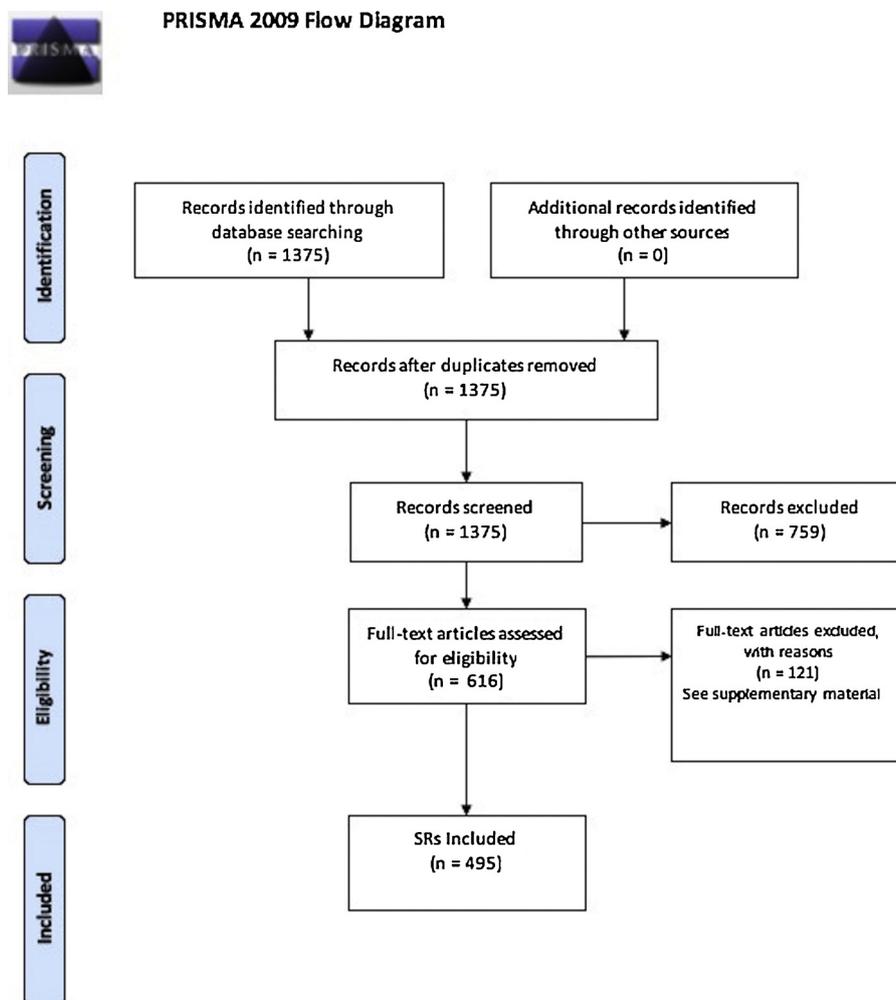


Fig. 1. Flow diagram of study selection.

2.6% of published SRs in dentistry. Besides this, the vast majority were original SRs, where only four updates were identified (0.8%).

Table 1 presents the epidemiological characteristics of all included studies and Table 2 features the data grouped by dental specialties. It was observed that the 495 SRs originated from 165 journals and that most journals published four or less SRs in 2017 (133–80.6%). The median number of authors was five (IQR: 3–6), and the median number of included studies was 14 (IQR: 8–25). Two hundred and fifteen (43.4%) SRs were classified as treatment/therapeutic. With respect to the country where those SRs were produced, 13 countries produced 77.4% of SRs published, where Brazil had the greatest contribution with 117 SRs (23.6%) followed by the USA with 53 (10.7%) SRs. Fig. 2 portrays a map considering the number of SRs by country of corresponding author.

Most SRs 362 (73.1%) were published in specialty journals, where the main specialty was Oral and Maxillofacial Surgery numbering 75 articles (15.1%), followed closely by Oral and Maxillofacial Pathology/stomatology at 71 articles (14.3%) and Implantology and Periodontology with 61 and 53 articles, respectively (12.3% and 10.7%). The four main specialties together are responsible for 52.4% of the published SRs. The other 47.6% are related to the following specialties: Radiology, Prosthodontics, Public Health, Pediatric Dentistry, Endodontics, Restorative and Esthetic Dentistry, Orthodontics and the remaining specialties that were categorized as Other. Two-hundred and twenty-one SRs (44.6%) synthesized statistically two or more studies and the Oral and Maxillofacial Surgery specialty was responsible for 34 of them. Only 22 SRs (10.7%) considered harms of intervention and

only 18 (5.6%) considered economic factors.

3.3. Reporting characteristics of SRs

Table 3 presents the reporting characteristics of all included SRs subgrouped by dental specialties divided into eight main categories:

3.4. Administrative information

The use of descriptive terms, such as “systematic review”, “meta-analysis” or both (when applied), in the title/abstract was not reported in 58 SRs (11.7%), and 241 (48.7%) made use of the term “systematic review” only. With regards to protocol registration, 152 (30.7%) of SRs mentioned it and only 76 (15.3%) were publicly available. Most SRs included (336 (67.9%)) reported using guidelines to either design/conduct or report it. The utility of Cochrane methods was mentioned in 168 SRs (33.9%) and was more frequent with the Oral and Maxillofacial Surgery specialty (29 SRs (17.3%)) followed by Orthodontics (24 SRs (14.3%)).

3.5. Study eligibility criteria

In 235 (47.5%) SRs, authors specified that only published studies were eligible for inclusion, whereas just 94 (19%) considered both published and unpublished data. 166 (33.5%) SRs did not report the publication status as eligibility criteria, whereas studies from Oral and Maxillofacial Surgery and Oral and Maxillofacial Pathology/

Table 1
Epidemiological characteristics of 495 SRs indexed in PubMed in 2017.

Characteristics	Category	Number (Percent)	
Total number of journals		165	
Number of SRs per journal	≤ 4	133 (80.6%)	
	5–9	21 (12.7%)	
	≥ 10	11 (6.7%)	
Number of authors		5 (3.6)	
Country of corresponding author	Brazil	117 (23.6%)	
	USA	53 (10.7%)	
	Australia	27 (5.4%)	
	China	26 (5.2%)	
	Spain	24 (4.5%)	
	United Kingdom	23 (4.6%)	
	Germany	22 (4.4%)	
	Iran	22 (4.4%)	
	Netherlands	16 (3.2%)	
	India	15 (3%)	
	Italy	14 (2.8%)	
	Saudi Arabia	13 (2.6%)	
	Switzerland	11 (2.2%)	
	Other (≤ 10 SRs, 35 countries and unclear)	123 (22.6%)	
	Focus of SR	Treatment/Therapeutic	215 (43.4%)
		Diagnosis	93 (18.8%)
		Prognosis	52 (10.5%)
		Other	46 (9.3%)
		Epidemiology	44 (8.9%)
Unclear		20 (4%)	
Prevention		19 (3.8%)	
Mixed		6 (1.2%)	
Dental specialties		Oral and Maxillofacial Surgery	75 (15.1%)
		Oral and Maxillofacial Pathology/stomatology	71 (14.3%)
	Implantology	61 (12.3%)	
	Periodontology	53 (10.7%)	
	Orthodontics	42 (8.5%)	
	Restorative and Esthetic Dentistry	41 (8.3%)	
	Endodontics	37 (7.5%)	
	Pediatric Dentistry	34 (6.9%)	
	Public Health	30 (6.1%)	
	Prosthodontics	26 (5.2%)	
	Radiology	13 (2.6%)	
	Other	12 (2.4%)	
	Cochrane review		13 (2.6%)

stomatology represented the greatest proportion of those (51 SRs (30.7%)). Most SRs (88.1%) reported eligible languages, with “English only” being the most common approach (219 (44.2%)). Only 186 SRs (37.6%) reported the eligibility/ineligibility criteria based on study design. Two-hundred and thirty-six SRs (47.7%) included randomized controlled trials and 88 (17.8%) included cohort studies. Considering dental specialties, Oral and Maxillofacial Surgery was the specialty with more SRs, including randomized controlled trials. One-hundred and thirty-seven SRs (27.7%) did not state the design of the included studies, or such information was unclear. Among them, the specialties of Oral and Maxillofacial Surgery and Implant Dentistry accounted for 48 SRs (35%).

3.6. Search methods

A median of three (IQR: 3–5) electronic databases was searched, although 31 SRs (6.33%) reported searching only one database. Eighty-four (17%) SRs reported no restrictions for years of coverage, while most SRs (298 (60.3%)) reported the start and end dates for all databases. A full Boolean search logic was reported for one or more databases in 204 SRs (41.7%), as was the use of only free-text words in 113 (23%). The employment of searching some trial registry was reported in

just 85 (17.2%) SRs.

3.7. Screening, data extraction, and risk-of-bias assessment methods

With respect to screening methods, the majority of SRs (308 (62.2%)) reported that “all titles/abstracts and full-text articles were screened by two reviewers independently”, and only 10 SRs (2%) reported that “titles/abstracts were screened by one reviewer, and a second reviewer screened a sample of records”.

The data extraction method used in 278 (56.8%) SRs was “two reviewers independently extracted data from all studies”, however almost a third (129 (26.4%)) did not report the data extraction method applied.

Risk of bias/quality assessment was reported in 365 SRs (73.7%), being more frequently reported for the Oral and Maxillofacial Surgery specialty (58 SRs (15.9%)). The most common approach for assessing the risk of bias/quality was “two reviewers independently” (176 SRs (48.2%)), although the lack of reporting the approach used was also common (148 SRs (40.5%)). The Cochrane risk-of-bias tool was the most common tool used (117 SRs (32%)), while the QUADAS-2 was less commonly used (9 SRs (2.5%)), with other tools being reported in 27.9% (102 SRs). The risk-of-bias/quality assessment was incorporated into the meta-analysis in 41.1% of SRs (81/202).

3.8. Included/excluded studies and participants

The majority of SRs (330 (66.7%)) presented a review flow that was reported in text/table and in a PRISMA-like flow diagram, 19.4% (96) reported only in a PRISMA-like flow diagram, and 40 SRs (8.1%) did not describe a review flow.

The majority of SRs (308/478 (64.4%)) noted the reasons for exclusion of studies in a PRISMA-like flow diagram or text/table. However, the number of SRs that did not report reasons for exclusion of full-text articles was also high (158 SRs (33%)). SRs that reported including grey literature were infrequent (90/491 (18.3%)).

In terms of reporting the total number of included participants, just 91 SRs presented such information. The median number of participants considered was 925 (IQR 335–3932). However, 41 of those SRs (45%) did not state the number of participants in the Abstract section, where no SR on the Radiology specialty presented such information. In 34 SRs (37.4%) only the number of participants included in at least one meta-analysis was reported.

3.9. Outcomes

Two-hundred and fifty-eight SRs (52.1%) reported at least one outcome in the methods, where the median number of outcomes observed was two (CI 95% 1–3). The majority of SRs (304 (63.3%)) did not state a primary outcome. Moreover, most primary outcomes were continuous (31.2%). The statistical significance of the intervention effect estimates for the primary outcome was reported as favorable and statistically significant in 53% of SRs.

3.10. Statistical methods

Two or more studies were synthesized statistically in 221 SRs (44.6%), and the use of a random-effects model (134 SRs (62%)) was more often reported than a fixed-effect model (21 SRs (9.7%)). Statistical heterogeneity was investigated in only 221 SRs, where this data inappropriately guided the choice of meta-analysis model (e.g., random-effects model selected if $I^2 > 50%$) in 115 SRs (61.2%).

More than a third of the SRs (364 (73.4%)) commented that publication bias was not assessed and just 85 (17.2%) declared that publication bias was assessed. The possibility of the existence of publication bias was discussed/considered in the Results, Discussion or Conclusion sections in only 88 SRs (17.8%), whereas just one SR reported such

Table 2
Epidemiological characteristics of 495 SRs indexed in PubMed in 2017, sub-grouped by dental specialties.

Characteristic	Dental specialties												
	All (n = 495)	Oral and Maxillofacial Surgery (n = 75)	Oral and Maxillofacial Pathology/stomatology (n = 71)	Implantology (n = 61)	Periodontology (n = 53)	Orthodontics (n = 42)	Restorative and Esthetic Dentistry (n = 41)	Endodontics (n = 37)	Pediatric Dentistry (n = 34)	Public Health (n = 30)	Prosthodontics (n = 26)	Radiology (n = 13)	Other (n = 12)
Journal type													
General	133 (26.9%)	17 (12.8%)	17 (12.8%)	13 (9.8%)	17 (12.8%)	15 (11.3%)	14 (10.5%)	10 (7.5%)	8 (6%)	10 (7.5)	6 (4.5%)	4 (3%)	2 (1.5)
Specialty	362(73.1%)	58 (16%)	54 (14.9%)	48 (13.26%)	36 (9.9%)	27 (7.5%)	27 (7.5%)	27 (7.5%)	26 (7.2%)	20 (5.5)	20 (5.5%)	9 (2.5%)	10 (2.8%)
Number of authors	5 (3-6)	5 (4-6)	5 (3-6)	5 (3-5)	5 (4-6)	5 (3-6)	5 (4-6)	4 (4-5)	5 (4-5)	4 (4-6)	4 (3-6)	5 (4-6)	5.5 (3.5-6.5)
Update of a previous SR	4 (0.8%)	2 (0.4%)	0 (0%)	0 (0%)	0 (0%)	2 (0.4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Number of included studies	14 (8-25)	11 (7-18)	16.5 (8.5-34.5)	11 (6-18)	19 (10-25)	9 (6-20)	17.5 (11-35.5)	15.5 (8-28)	12 (7-25)	14 (10-28)	23 (10-35)	23 (12-32)	30.5 (13-42)
Number of included participants*	924.5 (335-3932)	605 (157-986)	1753 (439-3616)	262 (188-535)	1724 (641-5345)	616 (315-1769)	4269 (604-113144)	1504 (955-3603)	9293.5 (4948.5-16707)	1328.5 (734-7563.5)	802 (448-5317)	NA	534 (534-534)
Empty reviews (no eligible studies)	1 (4.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (4.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Two or more studies synthesized statistically	221 (44.6%)	34 (6.9%)	24 (4.8%)	31 (6.3%)	29 (5.9%)	26 (5.2%)	19 (3.8%)	14 (2.8%)	19 (3.8%)	13 (2.6%)	6 (1.2%)	5 (1%)	1 (0.2%)
Number of studies included in the largest meta-analysis in each SR that included meta-analysis	8 (5-16)	7 (5-12)	9 (5-12)	8 (6-12)	10 (6-20)	5.5 (3-12.5)	11 (5-26)	12 (8-22)	9 (6-17)	8 (4-20)	10 (7-17)	24 (16-28)	3 (3-3)
Harms considered Economics considered#	22 (10.7%)	6 (27.3%)	3 (13.3%)	7 (31.8%)	2 (9%)	2 (9%)	1 (4.5%)	0 (0%)	1 (4.5%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	18 (5.6%)	3 (16.7%)	1 (5.6%)	2 (11.1%)	1 (5.6%)	3 (16.7%)	2 (11.1%)	1 (5.6%)	1 (5.6%)	1 (5.6%)	1 (5.6%)	1 (5.6%)	1 (5.6%)

Data reported as number (percent) or median (interquartile range); * considering 94 SRs; # considering if authors reported the outcome or planned collect the data.

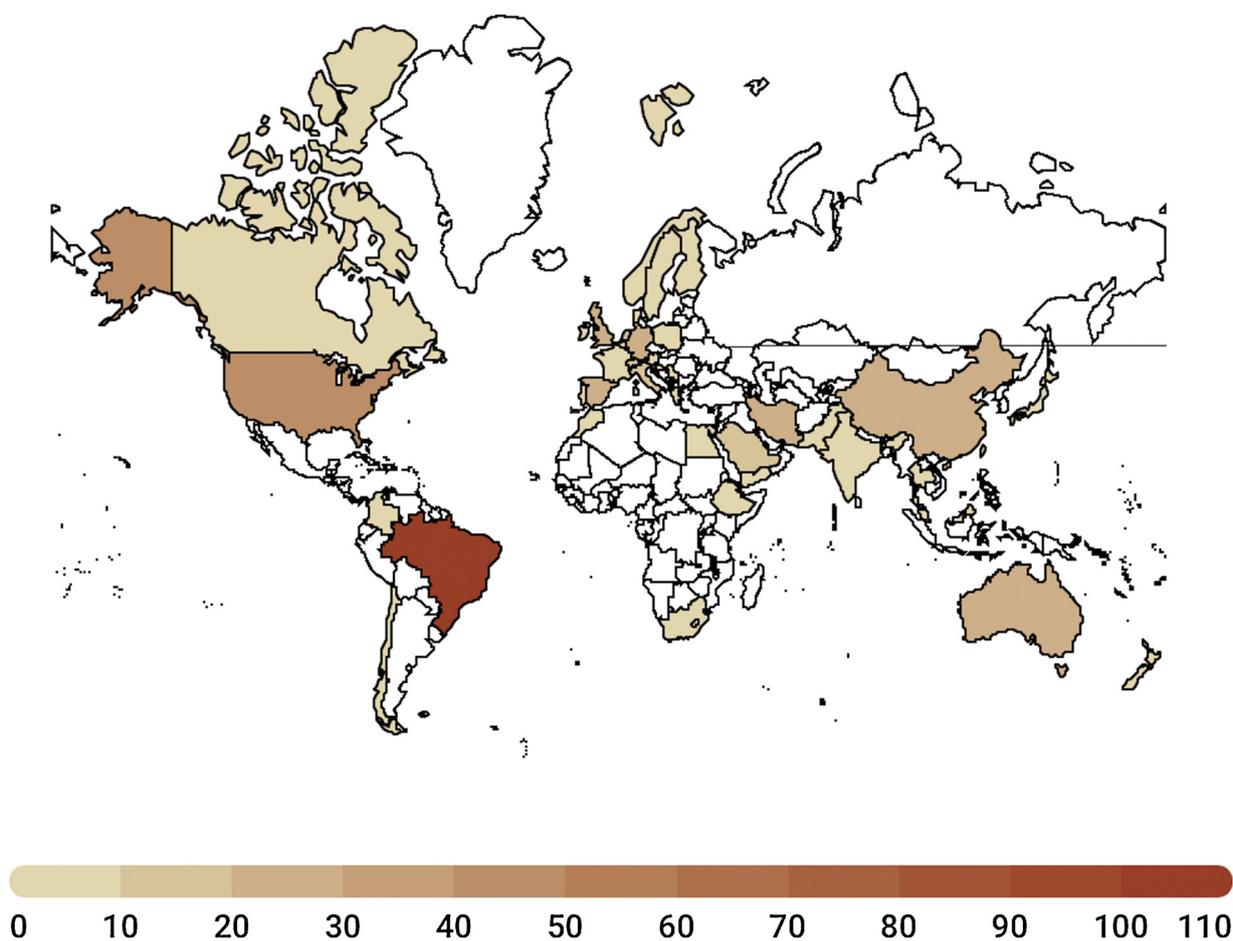


Fig. 2. Map considering the number of SRs by country of corresponding author. Dark colors represent countries with higher number of SRs.

considerations for the Prosthodontics and Radiology specialties. The use of additional analyses was noted in 221 SRs, where the subgroup analysis was the most frequent (68 SRs (30.8%)) and network meta-analysis was utilized in just two SRs (0.8%).

3.11. Limitations, conclusions, conflicts of interest and funding

Only a small proportion of SRs (44 (19%)) reported a GRADE assessment of the body of evidence. Most of the SRs (296 (59.8%)) did not note the existence of limitations, whereas the report of limitations at the study and review levels was seen in 95 SRs (19.2%). Further, the incorporation of information with regards to study risk-of-bias/quality/limitations in the Abstract conclusions section was only seen in 49 SRs (19.5%). The source of funding not was described in 192 (38.8%) of SRs, and 181 (36.6%) reported that the authors had no funding.

3.12. Association between self-reported use of the PRISMA Statement and reporting characteristics

Fig. 3 demonstrates that only four reporting characteristics were described statistically significantly in SR noting the use of the PRISMA Statement (SR or meta-analysis in title/abstract; eligible publication status reported; full Boolean search strategy; outcomes specified in Methods section) than SRs that did not.

4. Discussion

Our study is the first in the oral health literature to analyze 41 reporting characteristics of SRs and demonstrate that the reporting quality is highly variable. Items such as use of the term “systematic

review” or “meta-analysis” in the title or abstract, eligible languages and search terms were well reported. In contrast, just 30.7% of SRs mentioned the SR registration information and the study risk-of-bias/quality assessment methods were not reported in 40.5% of SRs, while the primary outcome was not stated in 63.3% of SRs. In addition, we estimated that almost 500 SRs were indexed in PubMed in 2017, a considerable increase compared to previous years [5].

Page et al. and Ioannidis reported the massive publication of SRs over the last years considering all subject areas. Our results demonstrate that in dentistry, the same tendency exists. The large number of published SRs reflects positive and more challenging results. Positive results include the recognition of the importance of SRs by stakeholders, including funding agencies requiring the use of SRs as references to justify applications [9] and the development of free software to perform meta-analysis [10]. In contrast, some of the challenging results are related to incentives by funding agencies and universities to increase publication rates and the fact that in certain countries, such as Brazil, a researcher’s promotions and appointments are based on number of published articles [11,12].

Comparing the results of Saljati et al. [5] and our, we can observe that in their results, the specialty with the highest number of SRs published was Periodontics, while in our study, the most abundant specialty was Oral and Maxillofacial Surgery. In both analyses, most SRs were published in specialty journals and the primary focus of SRs was treatment/therapeutic. In the other study, most SRs did not report the source of funding while in ours, 38.8% did not report it. In relation to the countries of the corresponding authors, between 1991 and 2012, the majority of corresponding authors were from the USA and United Kingdom, while Brazil appeared in 7th place, while our results show that Brazil has the most SRs followed by the USA. In addition, we can

Table 3
Reporting characteristics of 495 SRs indexed in PubMed in 2017, sub-grouped by dental specialties.

Category	Dental specialties ^a												
	All (n = 495)	Surg.	Pat/stomat	Imp.	Perio.	Orth.	Rest.	Endod.	Ped.	Public Health	Prosth.	Rad.	Other
Administrative information													
Terms in the title/abstract													
"Systematic review" and "meta-analysis"	168 (33.9%)	24 (4.8%)	15 (3%)	27 (5.4%)	22 (4.4%)	21 (4.2%)	16 (3.2%)	9 (1.8%)	17 (3.4%)	10 (2%)	3 (0.6%)	3 (0.6%)	1 (0.2%)
only "Meta-analysis"	28 (5.7%)	5 (1%)	7 (1.4%)	2 (0.4%)	2 (0.4%)	2 (0.4%)	0 (0%)	5 (1%)	0 (0%)	2 (0.4%)	1 (0.2%)	2 (0.4%)	0 (0%)
only "Systematic review"	241 (48.7%)	36 (7.3%)	38 (7.7%)	28 (5.7%)	25 (5%)	15 (3%)	18 (3.6%)	19 (3.8%)	12 (2.4%)	14 (2.8%)	18 (3.8%)	8 (1.6%)	10 (2%)
Neither	58 (11.7%)	10 (2%)	11 (2.2%)	4 (0.8%)	4 (0.8%)	4 (0.8%)	7 (1.4%)	4 (0.8%)	5 (1%)	4 (0.8%)	4 (0.8%)	0 (0%)	1 (0.2%)
SR registration mentioned (e.g., PROSPERO)	152 (30.7%)	18 (3.6%)	19 (3.8%)	16 (3.2%)	21 (4.2%)	17 (3.4%)	16 (3.2%)	10 (2%)	9 (1.8%)	10 (2%)	5 (1%)	6 (1.2%)	5 (1%)
SR protocol mentioned	76 (15.3%)	9 (1.8%)	11 (2.2%)	10 (2%)	9 (1.8%)	11 (2.2%)	9 (1.8%)	3 (0.6%)	1 (0.2%)	6 (1.2%)	3 (0.6%)	1 (0.2%)	3 (0.6%)
Protocol is publicly available	14 (2.8%)	1 (0.2%)	1 (0.2%)	2 (0.4%)	2 (0.4%)	1 (0.2%)	0 (0%)	2 (0.4%)	3 (0.6%)	1 (0.2%)	1 (0.2%)	0 (0%)	0 (0%)
Protocol mentioned but not publicly available													
Reporting guideline mentioned (e.g., PRISMA)	336 (67.9%)	56 (11.3%)	43 (8.7%)	48 (9.7%)	41 (8.3%)	27 (5.4%)	28 (5.7%)	20 (4%)	19 (3.8%)	22 (4.4%)	16 (3.2%)	8 (1.6%)	8 (1.6%)
Cochrane methods used	168 (33.9%)	29 (5.9%)	16 (3.2%)	22 (4.4%)	18 (3.6%)	24 (4.8%)	15 (3%)	9 (1.8%)	15 (3%)	9 (1.8%)	8 (1.6%)	1 (0.2%)	2 (0.4%)
Study eligibility criteria													
Eligible publication status													
Published and unpublished studies	94 (19%)	11 (2.2%)	7 (1.4%)	9 (1.8%)	14 (2.8%)	13 (2.6%)	12 (2.4%)	9 (1.8%)	7 (1.4%)	6 (1.2%)	4 (0.8%)	2 (0.4%)	0 (0.0%)
Only published studies	235 (47.5%)	38 (7.7%)	39 (7.8%)	36 (7.2%)	25 (5%)	13 (2.6%)	19 (3.8%)	11 (2.2%)	17 (3.4%)	14 (2.8%)	12 (2.4%)	5 (1%)	6 (1.2%)
Not reported	166 (33.5%)	26 (5.2%)	25 (5%)	16 (3.2%)	14 (2.8%)	16 (3.2%)	10 (2%)	17 (3.4%)	17 (3.4%)	10 (2%)	10 (2%)	6 (1.2%)	6 (1.2%)
Eligible languages													
All languages considered	170 (34.3%)	28 (5.7%)	15 (3%)	17 (3.4%)	16 (3.2%)	25 (5%)	17 (3.4%)	14 (2.8%)	14 (2.8%)	8 (1.6%)	6 (1.2%)	6 (1.2%)	4 (0.8%)
English only	219 (44.2%)	35 (7.1%)	35 (7.1%)	33 (6.7%)	22 (4.4%)	11 (2.2%)	14 (2.8%)	15 (3%)	15 (3%)	16 (3.2%)	13 (2.6%)	3 (0.6%)	7 (1.4%)
Language (s) other than English only	23 (4.6%)	3 (0.6%)	3 (0.6%)	2 (0.4%)	7 (1.4%)	0 (0%)	2 (0.4%)	1 (0.2%)	2 (0.4%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	0 (0%)
Mixed: English and other language	24 (4.8%)	2 (0.4%)	6 (1.2%)	2 (0.4%)	2 (0.4%)	3 (0.6%)	2 (0.4%)	2 (0.4%)	2 (0.4%)	1 (0.2%)	1 (0.2%)	0 (0%)	1 (0.2%)
Not reported	59 (11.9%)	7 (1.4%)	12 (2.4%)	7 (1.4%)	6 (1.2%)	3 (0.6%)	6 (1.2%)	5 (1%)	6 (1.2%)	4 (0.8%)	5 (1%)	3 (0.6%)	0 (0%)
Eligibility/ineligibility criteria based on studies designs reported	186 (37.6%)	36 (7.3%)	21 (4.2%)	26 (5.2%)	23 (4.6%)	18 (3.6%)	13 (2.6%)	12 (2.4%)	11 (2.2%)	11 (2.2%)	9 (1.8%)	2 (0.4%)	4 (0.8%)
Eligible studies designs													
Randomized controlled trials	236 (47.7%)	43 (8.7%)	26 (5.2%)	34 (6.9%)	29 (5.9%)	30 (6.1%)	22 (4.4%)	12 (2.4%)	13 (2.6%)	10 (2%)	11 (2.2%)	2 (0.4%)	4 (0.8%)
Observational - cohort studies	88 (17.8%)	14 (2.8%)	11 (2.2%)	10 (2%)	14 (2.8%)	8 (1.6%)	6 (1.2%)	4 (0.8%)	8 (1.6%)	8 (1.6%)	3 (0.6%)	1 (0.2%)	1 (0.2%)
Observational - case-control studies	68 (13.7%)	6 (1.2%)	13 (2.6%)	5 (1%)	11 (2.2%)	5 (1%)	4 (0.8%)	5 (1%)	6 (1.2%)	9 (1.8%)	3 (0.6%)	1 (0.2%)	0 (0%)
Observational - cross-sectional studies	54 (10.9%)	6 (1.2%)	5 (1%)	6 (1.2%)	11 (2.2%)	2 (0.4%)	3 (0.6%)	2 (0.4%)	7 (1.4%)	7 (1.4%)	4 (0.8%)	1 (0.2%)	0 (0%)
Observational - case studies or case series	37 (7.4%)	9 (1.8%)	5 (1%)	7 (1.4%)	3 (0.6%)	1 (0.2%)	1 (0.2%)	3 (0.6%)	4 (0.8%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	1 (0.2%)
Other controlled experimental studies	39 (7.9%)	9 (1.8%)	4 (0.8%)	7 (1.4%)	8 (1.6%)	2 (0.4%)	1 (0.2%)	3 (0.6%)	2 (0.4%)	1 (0.2%)	2 (0.4%)	0 (0%)	0 (0%)
Non-randomized controlled trials	22 (4.4%)	2 (0.4%)	0 (0%)	2 (0.4%)	2 (0.4%)	8 (1.6%)	2 (0.4%)	1 (0.2%)	2 (0.4%)	1 (0.2%)	1 (0.2%)	0 (0%)	1 (0.2%)
Quase-randomized controlled trials	11 (2.2%)	0 (0%)	1 (0.2%)	0 (0%)	1 (0.2%)	3 (0.6%)	3 (0.6%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	0 (0%)	0 (0%)	0 (0%)
Other	104 (21%)	14 (2.8%)	12 (2.4%)	17 (3.4%)	11 (2.2%)	6 (1.2%)	9 (1.8%)	14 (2.8%)	7 (1.4%)	8 (1.6%)	8 (1.6%)	3 (0.6%)	2 (0.4%)
Unclear/Not stated	137 (27.7%)	28 (5.7%)	17 (3.4%)	20 (4%)	14 (2.8%)	7 (1.4%)	5 (1%)	12 (2.4%)	7 (1.4%)	5 (1%)	11 (2.2%)	5 (1%)	6 (1.2%)

(continued on next page)

Table 3 (continued)

Category	Characteristics	Dental specialties ^a													
		All (n = 495)	Surg.	Pat/stomat	Imp.	Perio.	Orth.	Rest.	Endod.	Ped.	Public Health	Prosth.	Rad.	Other	
Search method	Number of databases searched	3 (3-5)	3 (3-4)	3 (2-4)	3(2-4)	3 (3-4)	5 (3-6)	3 (3-4)	4 (3-5)	4 (3-5)	4 (3-5)	3 (2-5)	3 (2-3)	3.5 (3-4)	3.5 (2.5-4.5)
	Only one database searched^b	31/490 (6.33%)	2 (0.4%)	6 (1.2%)	5 (1%)	1 (0.2%)	1 (0.2%)	4 (0.8%)	2 (0.4%)	1 (0.2%)	1 (0.2%)	5 (1%)	2 (0.4%)	0 (0%)	2 (0.4%)
	Years of coverage reported														
	No restrictions	84 (17%)	15 (3%)	11 (2.3%)	9 (1.8%)	9 (1.8%)	10 (2%)	11 (2.3%)	4 (0.81%)	3 (0.6%)	3 (0.6%)	8 (1.6%)	2 (0.4%)	0 (0%)	2 (0.4%)
	Not reported	60 (12.5%)	6 (1.2%)	3 (0.6%)	8 (1.6%)	11 (2.3%)	5 (1%)	5 (1%)	4 (0.81%)	4 (0.8%)	4 (0.8%)	5 (1%)	3 (0.6%)	4 (0.8%)	2 (0.4%)
	Partially - start and end dates are reported for only one of many databases, or only the end date is reported for all databases	52 (10.5%)	7 (1.4%)	6 (1.2%)	6 (1.2%)	5 (1%)	11 (2.2%)	3 (0.6%)	5 (1%)	2 (0.4%)	2 (0.4%)	1 (0.2%)	5 (1%)	0 (0%)	1 (0.2%)
	Start and end dates are reported for all databases	298 (60.3%)	47 (9.5%)	50 (10.1%)	50 (10.1%)	28 (5.7%)	16 (3.2%)	22 (4.4%)	24 (4.9%)	25 (5.1%)	16 (3.2%)	16 (3.2%)	16 (3.2%)	9 (1.8%)	7 (1.4%)
	Search terms reported														
	Full Boolean search logic was reported for one or more database	204 (41.7%)	33 (6.7%)	27 (5.5%)	25 (5.1%)	28 (5.7%)	21 (4.3%)	19 (3.9%)	11 (2.2%)	15 (3%)	11 (2.2%)	11 (2.2%)	8 (1.6%)	3 (0.6%)	3 (0.6%)
	Only free text words were reported	113 (23%)	18 (3.6%)	20 (4.1%)	13 (2.6%)	10 (2%)	4 (0.8%)	8 (1.6%)	13 (2.6%)	5 (1%)	8 (1.6%)	8 (1.6%)	6 (1.2%)	4 (0.8%)	4 (0.8%)
Only main index terms (e.g. MeSH) were reported	82 (16.7%)	10 (2%)	13 (2.6%)	15 (3.5%)	9 (1.8%)	4 (0.8%)	4 (0.8%)	3 (0.6%)	10 (2%)	2 (0.4%)	2 (0.4%)	6 (1.2%)	2 (0.4%)	4 (0.8%)	
Both main index terms and free text words were listed, but no full Boolean search logic was reported	43 (8.7%)	9 (1.8%)	7 (1.4%)	5 (1%)	3 (0.6%)	6 (1.2%)	3 (0.6%)	2 (0.4%)	0 (0%)	3 (0.6%)	3 (0.6%)	3 (0.6%)	2 (0.4%)	0 (0%)	
No search terms were reported	32 (8.5%)	3 (0.6%)	2 (0.4%)	3 (0.6%)	0 (0%)	4 (0.8)	4 (0.8%)	4 (0.8%)	3 (0.6%)	5 (1%)	5 (1%)	2 (0.4%)	2 (0.4%)	4 (0.8%)	
Readers are referred elsewhere for full search strategy	18 (3.7%)	2 (0.4%)	2 (0.4%)	0 (0%)	3 (0.6%)	3 (0.6%)	2 (0.4%)	4 (0.8%)	0 (0%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	0 (0%)	0 (0%)	
Trial registry searched (e.g., ClinicalTrials.gov)	85 (17.2%)	10 (2%)	8 (1.6%)	9 (1.8%)	10 (2%)	14 (2.8%)	14 (2.8%)	3 (0.6%)	5 (1%)	3 (0.6%)	3 (0.6%)	5 (1%)	4 (0.8%)	0 (0%)	
Number of other sources searched	1 (0-1)	1 (0-1)	1 (0-1)	1 (0-1)	1 (0-2)	1 (1-4)	1 (0-1)	1 (0-1)	1 (1-1)	0.5 (0-1)	1 (0-1)	1 (0-1)	1 (0-1)	1 (0-1)	
Screening method															
Screening, extraction, and risk of bias assessment methods	All titles/abstracts and full text articles were screened by two reviewers independently	308 (62.2%)	46 (9.3%)	39 (7.9%)	36 (7.3%)	39 (7.9%)	29 (5.9%)	25 (5%)	20 (4%)	25 (5%)	21 (4.2%)	15 (3%)	7 (1.4%)	6 (1.2%)	
	All titles/abstracts and full text articles were screened by one reviewer, and a second reviewer screened a sample of records	10 (2%)	1 (0.2%)	2 (0.4%)	2 (0.4%)	0 (0%)	0 (0%)	0 (0%)	1 (0.2%)	0 (0%)	2 (0.4%)	0 (0%)	0 (0%)	1 (0.2%)	1 (0.2%)
	All titles/abstracts and full text articles were screened by only one reviewer	21 (4.2%)	3 (0.6%)	2 (0.4%)	1 (0.2%)	2 (0.4%)	4 (0.8%)	2 (0.4%)	1 (0.2%)	0 (0%)	2 (0.4%)	2 (0.4%)	4 (0.8%)	0 (0%)	0 (0%)
	Different method applied to titles/abstracts and full text articles	6 (1.2%)	0 (0%)	0 (0%)	2 (0.4%)	0 (0%)	0 (0%)	1 (0.2%)	2 (0.4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (0.2%)	1 (0.2%)
	Two reviewers screened records for eligibility, but authors did not specify whether this method was applied independently to both titles/abstracts AND full text articles	30 (6.1%)	4 (0.8%)	6 (1.2%)	7 (1.4%)	2 (0.4%)	2 (0.4%)	3 (0.6%)	3 (0.6%)	2 (0.4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (0.2%)
	Not reported	86 (17.4%)	17 (3.4%)	19 (3.8%)	8 (1.6%)	6 (1.2%)	1 (0.2%)	5 (1%)	9 (1.8%)	2 (0.4%)	5 (1%)	5 (1%)	6 (1.2%)	5 (1%)	3 (0.6%)
	Other	34 (6.9%)	4 (0.8%)	3 (0.6%)	5 (1%)	4 (0.8%)	6 (1.2%)	5 (1%)	1 (0.2%)	5 (1%)	0 (0%)	0 (0%)	1 (0.2%)	0 (0%)	0 (0%)

(continued on next page)

Table 3 (continued)

Category	Characteristics	Dental specialties ^a																
		All (n = 495)	Surg.	Pat/ stomat	Imp.	Perio.	Orth.	Rest.	Endod.	Ped.	Public Health	Prosth.	Rad.	Other				
	Data extraction method																	
	Two reviewers independently extracted data from all studies	278 (56.8%)	44 (9%)	34 (6.9%)	35 (3.1%)	36 (7.4%)	26 (5.3%)	19 (3.9%)	15 (3.1%)	22 (4.5%)	20 (2.4%)	12 (2.4%)	8 (1.6%)	7 (1.4%)				
	Two reviewers extracted data from all studies, but authors did not state whether extraction was done independently	23(4.7%)	6 (1.2%)	3 (0.6%)	1 (0.2%)	1 (0.2%)	0 (0%)	4 (0.8%)	1 (0.2%)	1 (0.2%)	2 (0.4%)	4 (0.8%)	0 (0%)	0 (0%)				
	Other	59 (12.1%)	8 (1.6%)	9 (1.8%)	8 (1.6%)	4 (0.8%)	8 (1.6%)	9 (1.8%)	4 (0.8%)	4 (0.8%)	1 (0.2%)	2 (0.4%)	1 (0.2%)	1 (0.2%)				
	Not reported	129 (26.4%)	16 (3.3%)	25 (5.1%)	16 (3.7%)	11 (2.2%)	8 (1.6%)	8 (1.6%)	16 (3.3%)	7 (1.4%)	6 (1.6%)	8 (1.6%)	4 (0.8%)	4 (0.8%)				
	Study risk of bias/quality formally assessed	365/495 (73.7%)	58 (11.7%)	43 (8.7%)	48 (9.7%)	41 (8.3%)	38 (7.7%)	31 (6.3%)	26 (5.2%)	24 (4.8%)	23 (4.6%)	17 (3.4%)	10 (2%)	7 (1.4%)				
	Study risk of bias/quality assessment method																	
	Two reviewers assessed all studies, but authors did not state whether assessment was done independently	15/365 (4.1%)	2 (0.5%)	2 (0.5%)	1 (0.3%)	0 (0%)	1 (0.3%)	1 (0.3%)	1 (0.3%)	4 (1.1%)	0 (0%)	2 (0.5%)	0 (0%)	1 (0.3%)				
	Two reviewers independently assessed all studies	176/365 (48.2%)	23 (6.3%)	20 (5.5%)	25 (6.9%)	23 (6.3%)	22 (6%)	16 (4.4%)	8 (2.2%)	10 (2.7%)	12 (3.3%)	6 (1.6%)	7 (1.9%)	4 (1.1%)				
	Not reported	148/365 (7.9%)	29 (7.9%)	18 (4.9%)	19 (5.2%)	18 (4.9%)	11 (3%)	10 (2.7%)	14 (3.8%)	7 (1.9%)	10 (2.7%)	8 (2.2%)	2 (0.5%)	2 (0.5%)				
	Other	26/365 (7.1%)	4 (1.1%)	3 (0.8%)	3 (0.8%)	0 (0%)	4 (1.1%)	4 (1.1%)	3 (0.8%)	2 (0.5%)	1 (0.3%)	1 (0.3%)	1 (0.3%)	0 (0%)				
	Risk of bias/quality tool used																	
	Cochrane risk of bias tool	117/365 (32%)	21 (5.7%)	8 (2.2%)	17 (4.7%)	13 (3.6%)	16 (4.4%)	11 (3%)	7 (1.9%)	9 (2.5%)	4 (1.1%)	9 (2.5%)	0 (0%)	2 (0.5%)				
	Cochrane risk of bias tool and other	19/365 (5.1%)	1 (0.3%)	4 (1.1%)	6 (1.6%)	1 (0.3%)	3 (0.8%)	0 (0%)	3 (0.8%)	0 (0%)	0 (0%)	0 (0%)	1 (0.3%)	0 (0%)				
	Jadad Scale	12/365 (3.3%)	5 (1.4%)	2 (0.5%)	0 (0%)	2 (0.5%)	2 (0.5%)	1 (0.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)				
	Newcastle-Ottawa Scale	42/365 (11.5%)	5 (1.4%)	4 (1.1%)	4 (1.1%)	9 (2.5%)	3 (0.8%)	3 (0.8%)	1 (2.3%)	5 (1.4%)	6 (1.6%)	2 (0.5%)	0 (0%)	0 (0%)				
	QUADAS-2	9/365 (2.5%)	2 (0.5%)	1 (0.3%)	1 (0.3%)	0 (0%)	1 (0.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (1.4%)	0 (0%)				
	Reporting guideline	33/365 (9.4%)	10 (2.7%)	5 (1.4%)	6 (1.6%)	3 (0.8%)	1 (0.3%)	1 (0.3%)	1 (0.3%)	1 (0.3%)	2 (0.5%)	1 (0.3%)	1 (0.3%)	1 (0.3%)				
	Self-developed tool	6/365 (1.6%)	0 (0%)	1 (0.3%)	1 (0.3%)	1 (0.3%)	0 (0%)	2 (0.5%)	1 (0.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)				
	Other	102/365 (27.9%)	11 (3%)	13 (3.6%)	11 (3%)	11 (3%)	9 (2.5%)	7 (1.9%)	10 (2.7%)	7 (1.9%)	11 (3%)	5 (1.4%)	3 (0.8%)	4 (1.1%)				
	Not reported	25/365 (6.8%)	3 (0.8%)	6 (1.6%)	2 (0.5%)	1 (0.3%)	3 (0.8%)	6 (1.6%)	3 (0.8%)	1 (0.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)				
	Study risk of bias/quality assessment incorporated into meta-analysis^c	81/202 (41.1%)	8 (4%)	10 (4.9%)	12 (5.4%)	11 (5.4%)	10 (4.9%)	10 (4.9%)	7 (3.5%)	6 (3%)	3 (1.5%)	2 (1%)	3 (1.5%)	1 (0.5%)				
	Review flow reported																	
	Review flow was reported in text/table and in a PRISMA/QUOROM-like flow diagram	330/495 (66.7%)	53 (10.7%)	48 (9.7%)	39 (7.9%)	36 (7.3%)	27 (5.4%)	28 (5.7%)	25 (5%)	27 (5.4%)	14 (2.8%)	15 (3%)	8 (1.6%)	10 (2%)				
	Only reported in a PRISMA/QUOROM-like flow diagram	96/495 (19.4%)	15 (3%)	10 (2%)	11 (2.2%)	13 (2.6%)	10 (2%)	7 (1.4%)	5 (1%)	4 (0.8%)	12 (2.4%)	3 (0.6%)	5 (1%)	1 (0.2%)				

(continued on next page)

Table 3 (continued)

Category	Characteristics	Dental specialties ^a											
		All (n = 495)	Surg.	Pat/stomat	Imp.	Perio.	Orth.	Rest.	Endod.	Ped.	Public Health	Prosth.	Rad.
Review flow was only reported in text/table	29/495 (5.9%)	5 (1%)	6 (1.2%)	7 (1.4%)	1 (0.2%)	4 (0.8%)	0 (0%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	3 (0.6%)	0 (0%)	0 (0%)
	40/495 (8.1%)	2 (0.4%)	7 (1.4%)	4 (0.8%)	3 (0.6%)	1 (0.2%)	6 (1.2%)	6 (1.2%)	2 (0.4%)	3 (0.6%)	5 (1%)	0 (0%)	1 (0.2%)
Reasons for exclusion of full text articles reported	308/478 (64.4%)	43 (9%)	40 (8.4%)	41 (8.6%)	38 (7.9%)	34 (7.1%)	26 (5.4%)	22 (4.6%)	20 (4.2%)	17 (3.6%)	13 (2.7%)	6 (1.3%)	8 (1.7%)
	12/478 (2.5%)	3 (0.6%)	2 (0.4%)	1 (0.2%)	2 (0.4%)	0 (0%)	0 (0%)	1 (0.2%)	0 (0%)	2 (0.4%)	0 (0%)	1 (0.2%)	0 (0%)
Partially - reasons for exclusion of only some excluded full text articles were reported	158/478 (33%)	28 (5.9%)	26 (5.4%)	16 (3.3%)	11 (2.3%)	6 (1.3%)	15 (3.4%)	13 (2.7%)	12 (2.5%)	10 (2.1%)	12 (2.5%)	5 (1%)	4 (0.8%)
	90/491 (18.3%)	12 (2.4%)	11 (2.2%)	9 (1.8%)	12 (2.4%)	10 (2%)	8 (1.6%)	9 (1.8%)	6 (1.2%)	3 (0.6%)	5 (1%)	5 (1%)	1 (0.2%)
Grey literature included (e.g., conference abstracts)	924.5(335-3932)	605 (157-986)	1753 (439-3616)	262 (188-535)	1724.5 (641-5345)	616 (315-1769)	4269 (604-113144)	1504 (955-3603)	9293.5 (4948.5-16707)	1328.5(734-7563.5)	802 (448-5317)	NA	534 (534-534)
Total number of included participants reported in abstract	41/91(45%)	2 (2.2%)	4 (4.4%)	13 (14.3%)	8 (8.8%)	3 (3.3%)	2 (2.2%)	3 (3.3%)	2 (2.2%)	1 (1.1%)	3 (3.3%)	NA	0 (0%)
No number of participants reported	5/91 (5.5%)	0 (0%)	0 (0%)	1 (1.1%)	0 (0%)	0 (0%)	5 (5.5%)	1 (1.1%)	1 (1.1%)	0 (0%)	0 (0%)	NA	0 (0%)
Only the number of participants included in at least one meta-analysis	34/91 (37.4%)	1 (1.1%)	11 (12.1%)	8 (8.8%)	0 (0%)	2 (2.2%)	34 (37.4%)	4 (4.4%)	3 (3.3%)	0 (0%)	0 (0%)	NA	2 (2.2%)
Only the total number of participants summed across all studies in the systematic review	11/91 (12.1)	2 (2.2%)	2 (2.2%)	0 (0%)	0 (0%)	1 (1.1%)	11 (12.1%)	0 (0%)	0 (0%)	2 (2.2%)	0 (0%)	NA	0 (0%)
Both the total number of participants summed across all studies in the systematic review AND the number of participants included in at least one meta-analysis	258 (52.1%)	41 (8.3%)	35 (7.1%)	36 (7.3%)	31 (6.3%)	41 (8.3%)	18 (3.6%)	18 (3.6%)	23 (4.6%)	12 (2.4%)	12 (2.4%)	3 (0.6%)	6 (1.2%)
At least one outcome stated in methods	2 (1-3)	2 (1-3)	2 (1-2)	2 (2-4)	2 (1-2)	2 (2-4)	2 (1-3)	2 (1-3)	2 (1-2)	1 (1-2)	2 (1-2)	3 (1-4)	2 (1-4)
Number of outcomes stated	304/480 (63.3%)	42 (8.7%)	47 (9.8%)	38 (7.9%)	30 (6.2%)	22 (4.6%)	25 (5.2%)	24 (5%)	17 (3.5%)	22 (4.6%)	16 (3.3%)	12 (2.5%)	9 (1.9%)
Primary outcome stated	25/480 (5.2%)	3 (0.6%)	6 (1.2%)	3 (0.6%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	5 (1%)	4 (0.8%)	0 (0%)	1 (0.2%)	0 (0%)	0 (0%)
No but only one outcome reported	151/480 (31.5%)	28 (5.8%)	17 (3.5%)	18 (3.7%)	19 (4%)	19 (4%)	13 (2.7%)	6 (1.2%)	13 (2.7%)	8 (1.7%)	7 (1.5%)	1 (0.2%)	2 (0.4%)
Yes	55/176 (31.2%)	6 (3.4%)	9 (5.1%)	4 (2.3%)	11 (6.2%)	8 (4.5%)	4 (2.3%)	2 (1.1%)	4 (2.3%)	3 (1.7%)	2 (1.1%)	1 (0.6%)	3 (1.7%)
Type of primary outcome	35/176 (19.9%)	9 (5.1%)	4 (2.3%)	5 (2.8%)	1 (0.6%)	3 (1.7%)	2 (1.1%)	3 (1.7%)	6 (3.4%)	1 (0.6%)	1 (0.6%)	0 (0%)	1 (0.6%)
Continuous	27/176 (15.3%)	6 (3.4%)	3 (1.7%)	4 (2.3%)	2 (1.1%)	3 (1.7%)	4 (2.3%)	1 (0.6%)	1 (0.6%)	2 (1.1%)	1 (0.6%)	0 (0%)	2 (1.1%)
Dichotomous	21/176 (11.9%)	5 (2.8%)	3 (1.7%)	2 (1.1%)	2 (1.1%)	1 (0.6%)	0 (0%)	3 (1.7%)	2 (1.1%)	2 (1.1%)	1 (0.6%)	0 (0%)	2 (1.1%)
Dichotomous and continuous	Rate												

(continued on next page)

Table 3 (continued)

Category	Characteristics	Dental specialties ^a												
		All (n = 495)	Surg.	Pat/stomat	Imp.	Perio.	Orth.	Rest.	Endod.	Ped.	Public Health	Prosth.	Rad.	Other
Other	23/176 (13.1%)	3 (1.7%)	2 (1.1%)	5 (2.8%)	3 (1.7%)	3 (1.7%)	2 (1.1%)	2 (1.1%)	1 (0.6%)	1 (0.6%)	1 (0.7%)	2 (1.1%)	0 (0%)	0 (0%)
	15/176 (8.5%)	2 (1.1%)	2 (1.1%)	1 (0.6%)	1 (0.6%)	2 (1.1%)	2 (1.1%)	1 (0.6%)	3 (1.7%)	1 (0.6%)	0 (0%)	1 (0.6%)	0 (0%)	0 (0%)
Statistical significance of intervention effect estimates for primary outcome	28/151 (18.5%)	3 (2%)	7 (4.6%)	5 (3.3%)	3 (2%)	2 (1.3%)	1 (0.7%)	2 (1.3%)	2 (1.3%)	2 (1.3%)	1 (0.7%)	1 (0.7%)	1 (0.7%)	1 (0.7%)
	80/151 (53%)	15 (9.9%)	4 (2.6%)	10 (6.6%)	9 (6%)	13 (8.6%)	6 (4%)	3 (2%)	8 (5.3%)	3 (2%)	6 (4%)	3 (2%)	3 (2%)	6 (4%)
Unfavourable, non-statistically significant	17/151 (11.3%)	2 (1.3%)	2 (1.3%)	3 (2%)	1 (0.7%)	2 (1.3%)	2 (1.3%)	2 (1.3%)	0 (0%)	2 (1.3%)	1 (0.7%)	0 (0%)	0 (0%)	1 (0.7%)
	14/151 (9.3%)	3 (2%)	0 (0%)	2 (1.3%)	3 (2%)	1 (0.7%)	1 (0.7%)	1 (0.7%)	1 (0.7%)	1 (0.7%)	2 (1.3%)	0 (0%)	0 (0%)	2 (1.3%)
Unfavourable, statistically significant	12/151 (7.9%)	1 (0.7%)	3 (1.9%)	1 (0.7%)	4 (2.6%)	0 (0%)	1 (0.7%)	1 (0.7%)	2 (1.3%)	0 (0%)	0 (0%)	1 (0.7%)	0 (0%)	0 (0%)
	221 (44.6%)	34 (6.9%)	24 (4.8%)	31 (6.3%)	29 (5.9%)	26 (5.2%)	19 (3.8%)	14 (2.8%)	19 (3.8%)	19 (3.8%)	13 (2.6%)	6 (1.2%)	5 (1%)	1 (0.2%)
Statistical methods	Two or more studies synthesized statistically	3 (1.4%)	3 (1.4%)	3 (1.4%)	2 (0.9%)	0 (0%)	3 (1.4%)	2 (0.9%)	3 (1.4%)	2 (0.9%)	0 (0%)	1 (0.5%)	1 (0.5%)	0 (0%)
Meta-analysis model used	21/216 (9.7%)	15 (6.9%)	12 (5.6%)	21 (9.7%)	18 (8.3%)	20 (9.3%)	12 (5.6%)	7 (3.2%)	12 (5.6%)	10 (4.6%)	3 (1.4%)	3 (1.4%)	4 (1.8%)	0 (0%)
	134/216 (62%)	11 (5.1%)	6 (2.8%)	5 (2.3%)	9 (4.2%)	5 (2.3%)	2 (0.9%)	5 (2.3%)	3 (1.4%)	2 (0.9%)	2 (0.9%)	0 (0%)	0 (0%)	1 (0.5%)
Random-effects model for all meta-analyses	49/216 (22.7%)	0 (0%)	1 (0.5%)	0 (0%)	0 (0%)	0 (0%)	1 (0.5%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	2/216 (0.9%)	3 (1.4%)	0 (0%)	2 (0.9%)	0 (0%)	1 (0.5%)	1 (0.5%)	0 (0%)	1 (0.5%)	1 (0.5%)	1 (0.5%)	1 (0.5%)	0 (0%)	0 (0%)
Not reported	10/216 (4.6%)	3 (1.4%)	6 (2.7%)	3 (1.4%)	4 (1.8%)	4 (1.8%)	2 (0.9%)	1 (0.4%)	1 (0.4%)	2 (0.9%)	2 (0.9%)	3 (1.4%)	1 (0.4%)	1 (0.4%)
	31/221 (14%)	31 (14%)	18 (8.1%)	27 (12.2%)	25 (11.3%)	21 (9.5%)	17 (7.7%)	13 (5.9%)	18 (8.1%)	11 (5%)	3 (1.4%)	3 (1.4%)	4 (1.8%)	0 (0%)
Yes	188/221 (85.1%)	0 (0%)	0 (0%)	1 (0.4%)	0 (0%)	1 (0.4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	2/221 (0.9%)	23 (12.3%)	12 (6.4%)	17 (9%)	14 (7.4%)	12 (6.4%)	12 (6.4%)	8 (4.3%)	8 (4.3%)	5 (2.7%)	2 (1.1%)	2 (1.1%)	2 (1.1%)	NA
Heterogeneity of the studies was qualitatively assessed	Heterogeneity statistic	364 (73.4%)	57 (11.5%)	55 (11.1%)	45 (9.1%)	38 (7.7%)	25 (5%)	28 (5.7%)	29 (5.9%)	24 (4.8%)	22 (4.4%)	21 (4.2%)	9 (1.8%)	11 (2.2%)
	Inappropriately guided choice of meta-analysis model (e.g., random-effects model selected if I2 > 50%)	46 (9.3%)	5 (1%)	5 (1%)	7 (1.4%)	3 (0.6%)	8 (1.6%)	5 (1%)	1 (0.2%)	5 (1%)	1 (0.2%)	3 (0.6%)	2 (0.4%)	7 (1.4%)
Risk of publication bias assessed (or intent to assess)	Publication bias was not assessed	85 (17.2%)	13 (2.6%)	11 (2.2%)	9 (1.8%)	12 (2.4%)	9 (1.8%)	8 (1.6%)	7 (1.4%)	5 (1%)	7 (1.4%)	2 (0.4%)	2 (0.4%)	9 (1.8%)
	Not assessed, but authors planned to if they identified a sufficient number of studies	Yes, publication bias was assessed	85 (17.2%)	13 (2.6%)	11 (2.2%)	9 (1.8%)	12 (2.4%)	9 (1.8%)	8 (1.6%)	7 (1.4%)	5 (1%)	7 (1.4%)	2 (0.4%)	9 (1.8%)

(continued on next page)

Table 3 (continued)

Category	Characteristics	Dental specialties ^a													
		All (n = 495)	Surg.	Pat/stomat	Imp.	Perio.	Orth.	Rest.	Endod.	Ped.	Public Health	Prosth.	Rad.	Other	
Possibility of publication bias discussed/considered in results, discussion, or conclusion Additional analyses	Subgroup analysis	88 (17.8%)	13 (2.6%)	10 (2%)	8 (1.6%)	11 (2.2%)	14 (2.8%)	12 (2.4%)	3 (0.6%)	7 (1.4%)	4 (0.8%)	4 (0.8%)	1 (0.2%)	1 (0.2%)	
	Sensitivity analysis	68/221 (30.8%)	10 (4.5%)	6 (2.7%)	3 (1.4%)	9 (4.1%)	12 (5.4%)	9 (4.1%)	4 (1.8%)	8 (3.6%)	5 (2.3%)	2 (0.9%)	0(0%)	0 (0%)	0 (0%)
	Meta-regression	40/221 (18.1%)	3 (1.4%)	8 (3.6%)	1 (0.4%)	5 (2.3%)	8 (3.6%)	8 (3.6%)	2 (0.9%)	2 (0.9%)	2 (0.9%)	1 (0.4%)	0 (0%)	0 (0%)	0 (0%)
	Network meta-analysis	23/221 (10.4%)	0 (0%)	1 (0.4%)	4 (1.8%)	4 (1.8%)	6 (2.7%)	2 (0.9%)	2 (0.9%)	1 (0.4%)	3 (1.4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Other	2/221 (0.8%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (0.4%)	0 (0%)	0 (0%)	1 (0.4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	GRADE assessment reported in a summary of findings table or text	1/221 (0.4%)	1 (0.4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Limitations reported	44/231 (19%)	3 (1.3%)	6 (2.6%)	3 (1.3%)	3 (1.3%)	10 (4.3%)	2 (2.6%)	2 (0.9%)	4 (1.7%)	3 (1.3%)	4 (1.7%)	0 (0%)	0 (0%)	0 (0%)
	No limitations were reported	296 (59.8%)	53 (10.7%)	43 (8.7%)	40 (8.1%)	26 (5.2%)	18 (3.6%)	27 (5.4%)	29 (5.9%)	18 (3.6%)	14 (2.8%)	13 (2.6%)	8 (1.6%)	7 (1.4%)	
	Yes – both limitations at the study level and review level were reported	95 (19.2%)	8 (1.6%)	12 (2.4%)	8 (1.6%)	14 (2.8%)	14 (2.8%)	6 (1.2%)	4 (0.8%)	11 (2.2%)	10 (2%)	4 (0.8%)	1 (0.2%)	3 (0.6%)	
	Yes – only limitations at the review level were reported	28 (5.7%)	3 (0.6%)	4 (0.8%)	5 (1%)	4 (0.8%)	3 (0.6%)	2 (0.4%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	3 (0.6%)	1 (0.2%)	0 (0%)	
Yes – only limitations at the study level were reported	76 (15.3%)	11 (2.2%)	12 (2.4%)	8 (1.6%)	9 (1.8%)	7 (1.4%)	6 (1.2%)	3 (0.6%)	4 (0.8%)	5 (1%)	6 (1.2%)	3 (0.6%)	2 (0.4%)		
Study risk of bias/quality/limitations incorporated into therapeutic SR abstract conclusions	42/215 (19.5%)	4 (1.9%)	8 (3.7%)	9 (4.2%)	2 (0.9%)	9 (4.2%)	3 (1.4%)	3 (1.4%)	3 (1.4%)	0 (0%)	1 (0.5%)	NA	0 (0%)		
Source of funding	181 (36.6%)	32 (6.5%)	26 (5.2%)	24 (4.8%)	18 (3.6%)	20 (4%)	13 (2.6%)	11 (2.2%)	10 (2%)	9 (1.8%)	9 (1.8%)	7 (1.4%)	2 (0.4%)		
Authors specified there was no funding	3 (0.6%)	0 (0%)	0 (0%)	1 (0.2%)	1 (0.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
For-profit sponsor	4 (0.8%)	0 (0%)	1 (0.2%)	0 (0%)	1 (0.2%)	0 (0%)	1 (0.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (0.2%)	0 (0%)		
Mixed	115 (23.2%)	12 (2.4%)	20 (4%)	12 (2.4%)	18 (3.6%)	7 (1.4%)	11 (2.2%)	7 (1.4%)	11 (2.2%)	10 (2%)	3 (0.6%)	1 (0.2%)	3 (0.6%)		
Non-profit sponsor	192 (38.8%)	31 (6.3%)	24 (4.8%)	24 (4.8%)	15 (3%)	15 (3%)	16 (3.2%)	19 (3.8%)	12 (2.4%)	11 (2.2%)	14 (2.8%)	4 (0.8%)	7 (1.4%)		

Data reported as number (percent); a – Surg.: Oral and Maxillofacial Surgery; Pat/stomat.: Oral and Maxillofacial Pathology/stomatology; Imp.: Implantology; Perio.: Periodontology; Orth.: Orthodontics; Rest.: Restorative and Esthetic Dentistry; Endod.: Endodontics; Prosth.: Prosthodontics; Rad.: Radiology; b – 5 SRs did not report; c - considering only SRs that synthesize studies and assessed the risk of bias/quality of included studies.

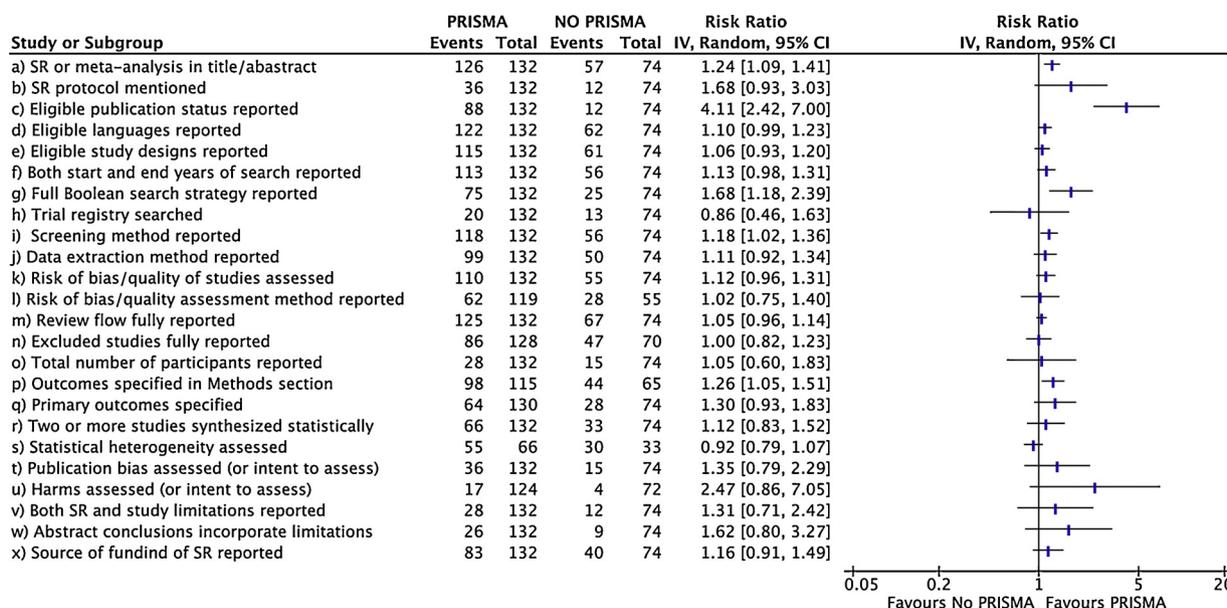


Fig. 3. Pooled relative risks across assessed reporting characteristics of treatment/therapeutic SRs with 95% confidence intervals comparing the completeness of reporting between SRs describing the use of the PRISMA Statement versus SRs not reporting.

observe in both studies the following factors: a small number of SRs were an update of previous study, small number of Cochrane reviews, similar number of included studies in the SRs and similar number of studies in largest meta-analysis.

Similar findings were reported in recent studies evaluating the reporting and methodologic quality of SRs in dentistry. El-Rabbany et al. evaluated systematic reviews with meta-analysis of randomized controlled trials published between 2000–2013 and demonstrated that the overall methodologic quality still needs improvement [6]. Nagen-drababu et al. assessed the reporting and methodologic quality of SRs in endodontics and the results presented a high variability. Items such as objectives, protocol registration and funding were poor reported. In contrast, use of the term “systematic review” or “meta-analysis” in the title or abstract and structured summary were well reported [7].

The substantially greater volume of SRs published in Brazil is probably owing to several reasons: 1) an increase in the number of graduate programs in dentistry; 2) SRs are low cost when compared to conducting some primary research, such as randomized trials; 3) the main Brazilian agencies (CAPES and CNPq) evaluate graduate programs and researchers based on the quantity of articles published over quality [11,13,14].

Our results demonstrated that just four reporting characteristics were described more often in SRs that reported the use of the PRISMA Statement and there are a few possible explanations for this. Researchers reporting the use of the PRISMA Statement based on previous publications, even without knowledge of its use. Furthermore, the use of the PRISMA Statement is considered suboptimal in dentistry [15,16] and the action taken by journals related to the PRISMA Statement varies – some journals only requiring following the PRISMA recommendations/checklist and others the editorial team reviewing the fulfilled checklist [16]. More dissemination and training surrounding reporting guidelines is necessary involving editors, researchers and students. In addition, novel approaches to improve the reporting should be encouraged and tested [17].

Other important topics evaluated in the present study is related to the conduct of SRs. Our results showed that conduct is variable with improvement in certain aspects but not others. Most of the SRs searched more than one database and assessed the risk of bias of included studies while, at the same time, most SRs did not search trials registry databases, use heterogeneity statistics inappropriately to guide the choice of meta-analysis model or assess publication bias. All these elements and

others could generate SRs with imprecise and biased results [12].

There are several limitations of our study. We searched one database and included only articles published in English, so the results may not be generalized to other databases and SRs published in other languages. The analysis was based on the report of the SR and it is possible that some SRs were carried out more rigorously than was specified in the report. We did not perform the data extraction in duplicate, however in order to minimize errors, one author reviewed possible data inconsistencies.

The results of this study provided evidence that there is room for improvement in the conduction and reporting of SRs in the field of dentistry. Several suggestions to address these problems include:

- 1 Researchers and students should be trained in all methodological aspects of SRs;
- 2 Editors, researchers and students should be trained to use the PRISMA Statement;
- 3 Funding agencies, governments and universities should encourage researchers and students to publish with a focus on quality, and consequently, not base a researcher’s promotions or appointments solely the quantity of published articles.

5. Conclusion

In conclusion, a massive number of SRs were published in dentistry in 2017 and the reporting and conduction characteristics varied among dental specialties which could generate in some situations imprecise and biased results. Based on this, there is an urgent need for improving the quality of reporting and conduct of SRs in dentistry.

Furthermore, although the use of PRISMA has been linked with some improvement in the completeness of SRs reports in the biomedical literature, this was not reflected in the present analysis confined to dentistry. More innovative and involved approaches to enhancing reported may therefore be required

Declarations of interest

DM lead the development of PRISMA, PRISMA-P, and was involved in the development of PROSPERO. The authors deny any conflicts of interest related to this study

Acknowledgements

GKRP and RSO are funded in part by Meridional Foundation (Passo Fundo – Brazil) and RSO is funded in part by Coordination for the Improvement of Higher Education Personnel (Capes – Brazil), MJP is supported by an Australian National Health and Medical Research Council (NHMRC) Early Career Fellowship (1088535), ACT is funded by a Tier 2 Canada Research Chair in Knowledge Synthesis. DM is supported in part by a University Research Chair, University of Ottawa. This study was conducted in a Graduate Program supported by CAPES, Brazil. The funders had no role in the study design, data collection and analysis, decision to publish or preparation of the manuscript.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.jdent.2019.01.014>.

References

- [1] D.J. Cook, C.D. Mulrow, R.B. Haynes, Systematic reviews: synthesis of best evidence for clinical decisions, *Ann. Intern. Med.* 126 (1997) 376–380.
- [2] M.H. Murad, V.M. Montori, Synthesizing evidence: shifting the focus from individual studies to the body of evidence, *JAMA* 309 (2013) 2217–2218.
- [3] J.P. Ioannidis, The mass production of redundant, misleading, and conflicted systematic reviews and meta-analyses, *Milbank. Q.* 94 (2016) 485–514.
- [4] M.J. Page, L. Shamseer, D.G. Altman, J. Tetzlaff, M. Sampson, A.C. Tricco, F. Catala-Lopez, L. Li, E.K. Reid, R. Sarkis-Onofre, D. Moher, Epidemiology and reporting characteristics of systematic reviews of biomedical research: a cross-sectional study, *PLoS Med.* 13 (2016) e1002028.
- [5] H. Saltaji, G.G. Cummings, S. Armijo-Olivo, M.P. Major, M. Amin, P.W. Major, L. Hartling, C. Flores-Mir, A descriptive analysis of oral health systematic reviews published 1991–2012: cross sectional study, *PLoS One* 8 (2013) e74545.
- [6] M. El-Rabbany, S. Li, S. Bui, J.M. Muir, M. Bhandari, A. Azarpazhooh, A quality analysis of systematic reviews in dentistry, part 1: meta-analyses of randomized controlled trials, *J. Evid. Based Dent. Pract.* 17 (2017) 389–398.
- [7] V. Nagendrababu, S.J. Pulikkotil, O.S. Sultan, J. Jayaraman, O.A. Peters, Methodological and reporting quality of systematic reviews and meta-analyses in endodontics, *J. Endod.* 44 (2018) 903–913.
- [8] D. Moher, L. Shamseer, M. Clarke, D. Ghersi, A. Liberati, M. Petticrew, P. Shekelle, L.A. Stewart, P.-P. Group, Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement, *Syst. Rev.* 4 (2015) 1.
- [9] D. Moher, P. Glasziou, I. Chalmers, M. Nasser, P.M. Bossuyt, D.A. Korevaar, I.D. Graham, P. Ravaud, I. Boutron, Increasing value and reducing waste in biomedical research: who's listening? *Lancet* 387 (2016) 1573–1586.
- [10] S. Brown, B. Hutton, T. Clifford, D. Coyle, D. Grima, G. Wells, C. Cameron, A microsoft-excel-based tool for running and critically appraising network meta-analyses—an overview and application of NetMetaXL, *Syst. Rev.* 3 (2014) 110.
- [11] R.C.B. Barata, Ten things you should know about the qualis, *Rev. Bras Pós-Grad.* 13 (2016) 13–40.
- [12] J.P.A. Ioannidis, S. Greenland, M.A. Hlatky, M.J. Khoury, M.R. Macleod, D. Moher, K.F. Schulz, R. Tibshirani, Increasing value and reducing waste in research design, conduct, and analysis, *Lancet.* 383 (2014) 166–175.
- [13] Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, (2019) (Accessed 09 November, 2018), <http://www.capes.gov.br>.
- [14] Conselho Nacional de desenvolvimento Científico e Tecnológico, (2019) (Accessed 09 November, 2018), <http://www.cnpq.br>.
- [15] F. Hua, T. Walsh, A.M. Glenny, H. Worthington, Surveys on reporting guideline usage in dental journals, *J. Dent. Res.* 95 (2016) 1207–1213.
- [16] R. Sarkis-Onofre, M.S. Cenci, D. Moher, T. Pereira-Cenci, Research reporting guidelines in dentistry: a survey of editors, *Braz. Dent. J.* 28 (2017) 3–8.
- [17] D. Koletsis, P.S. Fleming, R.G. Behrens, C.D. Lynch, N. Pandis, The use of tailored subheadings was successful in enhancing compliance with CONSORT in a dental journal, *J. Dent.* 67 (2017) 66–71.