

Title: Reporting quality of abstracts of randomized controlled trials related to implant dentistry

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Authorship contributions: *Max Clemens Menne:* Contributed to data acquisition, interpretation, first drafted and critically revised the manuscript; *Nikolaos Pandis:* Contributed to data interpretation, statistical analysis and critically revised the manuscript; *Clovis Mariano Faggion Jr:* Contributed to design, data acquisition, interpretation, draft of the manuscript, and critically revised the manuscript *All authors:* Gave their final approval and agreed to be accountable for all aspects of the work

Word count: 2947

Total number of figures: 1

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1111/jper.10867](https://doi.org/10.1111/jper.10867) AM COPY.

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Total number of tables: 3

Total number of references: 41

Running title: Reporting quality in implant dentistry

One-sentence summary: This study examined the reporting quality of RCTs abstracts in implant dentistry and predictors for improved reporting and suggests that there is room for improvement.

Abstract

BACKGROUND: Abstracts of scientific articles should be accurate and detailed in summarizing the information in the full-text because they are the first article section the reader examines. This study assessed the reporting quality of randomized controlled trials (RCTs) abstracts related to implant dentistry and examined associations between reporting quality and study characteristics.

METHODS: On the 17th of January 2021, we searched the PubMed database for abstracts of RCTs published in high-ranked periodontology and implant dentistry journals from 2016 to 2021. For each abstract, we assessed if the Consolidated Standards of Reporting Trials for abstracts (CONSORT-A) checklist items were reported completely, partially, or not reported. An Overall CONSORT Score (OCS) and relative score (OCS%) were calculated as a proxy to checklist adherence. Linear regression models were fitted to analyze associations between trial characteristics and completeness of reporting.

RESULTS: Four-hundred and thirty four of the 678 retrieved abstracts were eligible for inclusion. The mean OCS and OCS% were 6,23 (standard deviation [SD] = 1.56) or 41.5% (SD = 10.4), respectively. Items most frequently reported included the title (n = 434; 100%), intended intervention (n = 425; 98%) and conclusions (n = 430; 99%). Participant allocation, blinding, and trial registration were rarely completely reported with frequencies of 2%, 3% and 4%, respectively. We found that number of authors, continent, type of RCT, number of centers, report of ethical approval, funding, structure and length of the abstract were associated with better abstract reporting.

CONCLUSION: The reporting quality of abstracts in RCTs related to implant dentistry is suboptimal. Journals should start to incorporate and endorse the use of the CONSORT-A guidelines in their instructions to authors to enhance reporting quality.

Key words: systematic reviews; meta-analysis; methods; methodological study; evidence-based dentistry

Introduction

Randomized controlled clinical trials (RCTs) are considered the gold standard to assess the effectiveness and safety of an intervention¹. Accurate and transparent reporting is essential for the assessment of the quality of the evidence and for optimal use of research. With the aim to improve the reporting of RCTs, the Consolidated Standards of Reporting Trials (CONSORT) guidelines have been developed and published almost three decades ago² and they have been updated twice since then^{3,4}. The CONSORT guidelines have been endorsed by a large number of journals⁵ and empirical evidence suggests that adoption of the guideline has improved the quality of reporting⁶.

Several extensions of the standard CONSORT statement have been published to accommodate different trial designs and biomedical fields⁷. The CONSORT for abstracts (CONSORT-A) provides a guideline and checklist with essential items that are considered the minimum to be reported in any abstract of a scientific article or conference⁸. Since readers initially examine the abstract for relevance, it is important that the abstracts include sufficient information for the initial assessment of the publication.

The number of publications in implant dentistry has grown exponentially over the years⁹ making it difficult for the busy clinician to stay up to date. Therefore, the abstract will likely be the only source of information for many clinicians who have limited time to access and read the publication. Consequently, decisions in dental clinical practice may be guided only by the information reported in the abstract. A well-reported abstract should clearly reflect the

key elements of the study to allow the clinician to correctly identify relevant studies that she/he would like to further explore. Well-reported abstracts are also important during the systematic review process where investigators often need to screen large volumes of the literature based on predefined inclusion and exclusion criteria. Accurate reporting in the abstract facilitates this filtering process. There is evidence in the literature that submitted manuscripts may be further processed or not for peer reviewing based on the abstract and therefore, well-written abstracts may be favored¹⁰. In major general medical journals, reporting of abstracts has been suboptimal¹¹ but with improvements after the introduction and adoption of CONSORT-A¹². In oral health, the reporting quality of abstracts in various specialties has been examined and has been found to be problematic¹³⁻²³. In implant dentistry, there is limited empirical evidence available only up to 2016^{13,24,25}.

Therefore, the aims of this study were twofold: (1) to assess the reporting quality of a large sample of abstracts of RCTs related to implant dentistry, published between 2016 - 2021, and (2) to assess whether there was an association between reporting quality and study and journal characteristics.

Methods

Eligibility criteria

We included abstracts of full reports of RCTs related to implant dentistry published in high-ranked implant dentistry and periodontology journals. The term “related” means subjects that could be directly related to the use of dental implants such as guided bone regeneration. Only RCTs performed on living humans published in English were included. Abstracts of other study designs were excluded.

Search Strategy

First, we selected the following periodontology and implant dentistry journals ranked by impact factor (IF): *Journal of Clinical Periodontology*, *Journal of Periodontology*, *Clinical Oral Implants Research*, *Clinical Implant Dentistry and Related Research*, *Journal of Periodontal Research*, *European Journal of Oral Implantology*, *International Journal of Oral & Maxillofacial Implants*, *International Journal of Implant Dentistry*, *Journal of Periodontal and Implant Science*, *International Journal of Periodontics & Restorative Dentistry*, *Implant Dentistry*, and *Journal of Oral Implantology*. Then, on the 17th of January 2021, we searched the PubMed database with a combination of key-words and the International Standard Serial Numbers (ISSN) of the selected journals. We limited our search to publications from the last 5 years to get a large but up-to-date sample. The full search is reported in supplementary file S1.

Selection and data extraction

We selected abstracts strictly based on the eligibility criteria and abstracts not meeting these criteria were excluded with reasons recorded.

The following variables were extracted from the articles: year of publication, type of abstract, journal name, journal IF, number of authors, continent of the first author, journal type, dental specialty, type of RCT, length of the abstract, aim of the RCT, centres, type of intervention, report of conflict of interest (COI), report of ethical approval, and type of funding.

Furthermore, we checked if the journals promote the use of the CONSORT guidelines and its extensions, the journals word count limit for abstracts and the type of abstract (structured/non-structured) required.

The selection and data extraction processes were done in duplicate and independently by two reviewers (CMF, MCM) for 30 abstracts. Differences were discussed until agreement reached at least 80% and thereafter data extraction was done by one reviewer (MCM)²⁶.

CONSORT-A Items

For the assessment of the reporting quality of the included abstracts we used the CONSORT-A checklist⁸. The checklist contains items that are considered to be the minimum for authors reporting the main rationale, objectives, methods and results of a RCT (Table S2). Our evaluation criteria for each CONSORT-A checklist item are based on the CONSORT-A explanation and elaboration document²⁷. Checklist items were answered as complete (when all checklist criteria were met), partial (when some criteria were met), and non-report (when no criteria were met). The detailed description of our evaluation is reported in the supplementary file S3. We also descriptively compared the data reported in the full-text of the article to that reported in the abstract to investigate whether there was any deviation in reporting.

Data analysis

We calculated an Overall Consort Score (OCS) and relative score (OCS%) per RCT as a proxy to CONSORT adherence^{23,28-32}. For each item included in the CONSORT checklist, we counted the absolute number and calculated the relative frequencies of completely reported, partially reported, and not reported items. OCS and OCS% were calculated using the formula described in the supplementary file S4.

The OCS was normally distributed and a series of univariable models were fit to examine associations between RCT characteristics and OCS. The significant predictors from the univariable analyses were included in a final multivariable linear regression model. Statistical significance was set at 0.05 and all analyses were run using a statistical software^{‡1}.

Results

Selection process

^{‡1} Stata 16.1 (Stata Corp, TX, USA)

From the 678 PubMed records initially identified, 240 were excluded after screening of the abstract and title. Four additional publications were excluded after full-text assessment resulting in 434 included RCTs (Figure 1). The excluded studies with reasons (S5) and the included studies (S6) are reported in the supplementary files.

RCT characteristics

Table 1 reports the RCT characteristics. Most RCTs were published in 2017 (n = 102; 24%) and nearly all abstracts used a structured format (n = 407; 94%). In approximately a third of the publications 6 authors were involved (n = 154; 35.5%), the first author in more than half of the studies was located in Europe (n = 258; 59.4%) and two thirds of the RCTs were performed in single centers (n = 284; 65%). Two hundred and six (47%) RCTs did not specify the group design, but the most frequently reported design was the parallel group design (n = 164; 38%). The most common intervention was surgical (n = 248; 57%), most studies reported potential COI (n = 372; 86%) and almost three quarters reported an ethics committee approval (n = 309; 71%). Of the included RCTs, 213 (49%) were sponsored by for profit-organizations; 82 (19%) did not report any information about funding. The median IF of the included RCTs was 3.396 (Interquartile range (IQR) = 2.619 – 3.723) and the median number of citations was 9 (IQR = 3 – 22). The median abstract word count was 258 (IQR = 224 – 299).

Journal Characteristics

Of the 12 included Journals, *Clinical Oral Implants Research*, *Clinical Implant Dentistry and Related Research*, *Journal of Clinical Periodontology*, *European Journal of Oral Implantology*, *Journal of Periodontology* and *Journal of Periodontal Research* mentioned the CONSORT guidelines in their instructions, and only *Clinical Implant Dentistry and Related Research* mentioned the CONSORT extensions. The median word limit was 250 (IQR = 225

– 300) and 10/12 journals requested the authors to submit the abstract in a structured format (Table S7).

CONSORT-A items

Besides the title, that was identified as randomized in all RCTs, the conclusion and interventions were the most completely reported sections of the abstract (99% and 98%, respectively). Outcome and participants were the most often partially reported sections of the abstract (78% and 62%, respectively) and randomization was the least reported section of the abstract (98%). Trial registration was reported in 20 (5%) abstracts and 19 (4%) times on the first page. More than half of the cases did not report funding in the abstract nor on the first page ($n = 247$; 57%). The mean of OCS and OCS% were 6.23 (SD = 1.56) and 41.5% (SD = 10.4%), respectively. Table 2 reports the complete data.

In the full-text of the RCTs, 228 reported their design, while information on the trial design (group design or non-inferiority, equality, superiority, explained in S3) was only reported 113 times in the abstract (roughly 50% less reported in the abstract). In 352 of the included full-texts, the sponsor was reported, while only 187 abstracts or first pages reported the sponsor of the RCT.

Predictors of reporting quality

Multivariable regression analysis demonstrated that reports from America were associated with significantly lower CONSORT-A scores than reports from Europe (Coef. = -0.44; 95% confidence interval (CI) [-0.77 – -0.11]; $p = 0.01$). Reports that defined the type of RCT were also associated with higher scores compared to reports that did not define the type of RCT (Coef. = 0.65; 95% CI [0.39 – 0.90]; $p < 0.001$). Moreover, reports that did not provide information on ethical approval had significantly better reporting CONSORT-A scores than the ones which did report the ethical approval (Coef. = 0.61; 95% CI [0.15 – 1.08]; $p = 0.01$). In addition, RCTs that were sponsored by for-profit organizations attained higher scores

compared to RCTs sponsored by non-profit organizations (Coef. = 0.40; 95% CI [0.07 – 0.72]; $p = 0.02$). Lastly, for every 50 additional words in the abstract, the OCS improved significantly by 0.27 (95% CI [0.19 – 0.34], $p < 0.01$). The complete regression analysis results are reported in table 3.

Discussion

The aim of this study was to assess the reporting quality of abstracts of RCT reports related to implant dentistry. The reporting quality in our sample was suboptimal with some items of the checklist never or rarely reported. In our sample, only the CONSORT items title (100%), intervention (99%) and conclusion (98%) were fully reported in almost all publications.

The complete reporting of the title in our sample is easily explained since we filtered our search with 'randomized' or 'randomised' in the title. The completeness of reporting of the intended intervention for each group and the conclusions seem to vary in the dental literature from 55,6-100% and 88,3-100%, respectively^{13,17,19,21}.

Items that were not completely reported include *participants* (0%), *outcome (methods)* (12%), *randomization* (2%), *masking* (3%), *outcome (results)* (1%) and *trial registration* (5%). In 62% of the abstracts, the item *participants* reported partially, meaning that either the location or timeframe of the performed intervention was not reported. The CONSORT-A checklist requires the report of the result for each group together with the contrast between groups (effect size) and CIs. In our sample, 78% reported the outcomes partially, often missing the effect size and CIs. The reporting of randomization and blinding was comparable with other studies which found no report of randomization (0%) and blinding (0%) at all^{21,22}.

We found out that the number of authors was positively associated with better CONSORT-A scores. This association however was only observed in the univariable regression. Other

studies using the CONSORT-A checklist also reported that the numbers of authors was associated with improved reporting^{16,20,33,34}.

The regression analysis demonstrated that abstracts of authors based in America had lower CONSORT-A scores than those abstracts from authors based in Europe. These findings are consistent with results from several other studies^{14,16,19-21,23}. We also found that multicenter trials reported significantly more items than single center trials and in agreement with previous medical and dental studies^{12,14-16}. Furthermore, we found that for-profit funding was a predictor for better reporting of CONSORT-A items. One study assessing the reporting quality of abstracts presented at the annual SLEEP meeting³⁴ and another assessing psychiatric trials³⁵ found similar results.

The regression analysis showed an association between abstract length and reporting quality. For every 50 additional words in the abstract, the OCS increased. Several other studies also reported that an increase in the word count was associated with an improvement of abstract reporting quality^{21,23,36,37}. One might argue that the word count restrictions limit the number of items you can report in an abstract. The number of words that is considered sufficient for reporting of abstracts is 250 to 300⁸. Nine of the 12 (75%) journals included in the present sample allowed at least 250 words for the abstracts, but it is also important to note that journals often publish abstracts exceeding the word count limit in the final publication. We also compared the data reported in the full-text of the article to that reported in the abstract. Information on type of RCT was better reported in the full-text than in the abstract and it might influence the interpretation of findings if the reader only sees the abstract. For example, by knowing the type of RCT, readers will understand better whether the sample size chosen for that trial was appropriate. This is the case of parallel RCTs that usually require bigger sample sizes than split-mouth trials³⁸. Another important finding was the lack of

reporting of funding in the abstract. More than 50% of the abstracts had no information on funding reported in the abstract, although this information was reported in the full-text.

This finding may have an impact on the interpretation. For instance, in the case there is poor reporting of type of funding in the abstract. Evidence suggests that the results of trials sponsored by the pharmaceutical industry are more likely to favor the sponsor compared to non-sponsored trials³⁹.

Overall, the OCS% was 41.5% in our data sample. A similar value (40%) was reported in another recently published study in periodontology using the same formula²³. Another study in dentistry found higher values but only differentiated between 'reported' and 'not reported'¹⁹. This might lead to a higher OCS score. Reporting quality was also evaluated in four high ranked general medical journals and those reported an overall adherence of 67% to the CONSORT-A checklist⁴⁰. These journals endorse the use of the CONSORT-A checklist, and this endorsement also might be an explanation for higher rates of reporting^{33,35}.

The CONSORT-A guidelines promote the use of a structured abstract. In our sample, 94% of the abstracts were structured. This data is consistent with previously conducted research¹³ in high-ranked periodontology and implant dentistry journals which reported 95% structured abstracts. In the present study, structured abstracts were significantly associated with better reporting quality in the univariable analysis. This finding is consistent with findings of abstracts in the periodontology and psychiatry fields^{23,35}.

There were some improvements in abstract reporting when the present sample was compared to other studies published in implant dentistry. A sample of 183 abstracts, published before the publication of the CONSORT-A checklist¹³, reported a poorer reporting for the items title, outcome (materials and methods), numbers analyzed, trial registration and funding. It is important to emphasize that the study from 2012 involved both periodontology (83%) and implant dentistry (17%) abstracts. Another study²⁵ assessed a sample of 212 implant dentistry

abstracts published between 2014 and 2016. In this study, items such as randomization and masking were better reported than in our sample. However, the item harms was better reported in the present sample. Interestingly, for both studies, the median word count was exactly the same ($n = 258$). It should be emphasized that our study used a different methodology of assessment when compared to the other study²⁵ that could somewhat influence the comparison. We used three-level answers to the items to obtain OCS and OCS% scores in order to minimize information loss, while the other study²⁵ seemed to use a two-level answer to assess adherence to the checklist. Our study has some limitations. Our results are only from abstracts published in a limited number of dental journals and they may not be fully representative of all abstracts related to implant dentistry. Our sample also only included publications from the last five years, therefore our results are also only representative of more recent publications. Apart from that, this study has certain strengths. In contrast to other publications assessing the reporting quality in the dental field, we assessed a greater sample size that might be more representative to the dental specialty assessed. In comparison to our 434 included abstracts, the latest publications in dentistry only included between 162 and 249 abstracts^{20,21,23,25}. Also, in contrast to many publications evaluating reporting quality of abstracts, we differentiated between the complete, partial, report on the first page and non-report of checklist items to add more granularity. This allows for a more detailed view and differentiates this work from previous publication. To make the rationale transparent, we provided a list with criteria for each decision. Finally, we used peer-reviewed specialty journals with a high IF, a proxy for journal quality,⁴¹ and it can be argued that this sample might represent the best available evidence in the chosen field.

Conclusions

We found that the reporting quality of abstracts of RCT reports related to implant dentistry was suboptimal and there is still room for improvements. Dental journals should endorse the use of the CONSORT-A guidelines to improve the reporting quality of abstracts.

Conflict of interest statement: The authors declare no conflict of interest

Authorship contributions: *Max Clemens Menne:* Contributed to data acquisition, interpretation, first drafted and critically revised the manuscript; *Nikolaos Pandis:* Contributed to data interpretation, statistical analysis and critically revised the manuscript; *Clovis Mariano Faggion Jr:* Contributed to design, data acquisition, interpretation, draft of the manuscript, and critically revised the manuscript *All authors:* Gave their final approval and agreed to be accountable for all aspects of the work

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Table 1 - RCT Characteristics (N = 434)

Characteristics	n	%
Continent of first Author		
Europe	258	59,4%
Asia	79	18,2%
North America	54	12,4%
South America	29	6,7%

Africa	11	2,5%
Australia	3	0,7%
Year of Publication		
2021	3	1%
2020	99	23%
2019	83	19%
2018	85	20%
2017	102	24%
2016	62	14%
Main dental specialty		
Periodontology	20	5%
Implantology	413	95%
Both	1	0%
Abstract Type		
Structured	407	94%
Non-Structured	27	6%
Journal Type		
Implantology	331	76%
Periodontology	100	23%
Perio-Implant	3	1%
Intervention		
Non-Surgical	22	5%
Surgical	248	57%
Prothodontic	14	3%
Combined	147	34%
Other	3	1%

Group Design		
Parallel	164	38%
Split-Mouth	56	13%
Cross-Over	6	1%
Factorial	1	0%
Cluster	1	0%
No Information	206	47%
Number of Centres		
Single-Center	284	65%
Multi-Center	84	19%
No Information	66	15%
Conflict of Interest		
Reported	372	86%
Not Reported	62	14%
Ethics Boards Approval		
Reported	309	71%
Reported without Approval Number	83	19%
Not Reported	42	10%
Sponsor		
Non-Profit Organisation	74	17%
Profit Organisation	213	49%
Foundation in the Dental Field	33	8%
No Sponsor	32	7%
Not Reported	82	19%
Citations	Median	IQR
Median	9	3-22

IQR		
Impact-Factor		
Median	3,396	2,619 – 3,723
IQR		
Abstract Word Count		
Median	258	224 – 299
IQR		
Number of Authors		
Median	6	5-6
IQR		

Table 2 - Reporting of CONSORT for Abstracts Items (N = 434)

CONSORT – Item	Reported completely		Reported partially		Not reported	
	n	%	n	%	n	%
Title	434	100%	0	0%	0	0%
Trial Design	113	26%	0	0%	321	74%

Methods						
Participants	0	0%	267	62%	167	38%
Interventions	425	98%	6	1%	3	1%
Objective	167	38%	261	60%	6	1%
Outcome	54	12%	29	7%	351	81%
Randomization	7	2%	0	0%	427	98%
Blinding	12	3%	35	8%	387	89%
Results						
Numbers randomized	150	35%	7	2%	277	64%
Numbers analyzed	114	26%	5	1%	315	73%
Outcome	3	1%	338	78%	93	21%
Harms	90	21%	45	10%	299	69%
Conclusion	430	99%	0	0%	4	1%
	Reported		Not reported		Reported on first Page*	
	n	%	n	%	n	%
Trial registration	20	5%	395	91%	19	4%
Funding	42	10%	247	57%	145	33%

* Item is reported on the first page (sides or bottom of the page) of the report, but not directly in the abstract

Table 3 - Regression Analysis reporting the association between study and journal characteristics and the CONSORT-A scores

Predictor	Univariable			Multivariable		
	Coef.	95% CI	<i>P</i> value	Coef.	95% CI	<i>P</i> value
Number of authors						
1-3*	Reference					
4-6	0.25	(-0.22, 0.72)	0.29	0.16	(-0.25, 0.57)	0.44
7-20	0.93	(0.38, 1.48)	0.001	0.36	(-0.28, 0.85)	0.16
Continent						
Europe*	Reference					
Americas	-0.65	(-1.03, -0.27)	<0.01	-0.44	(-0.77, -0.11)	0.01
Asia & Other	-0.57	(-1.88, -0.42)	<0.01	0.02	(-0.32, 0.36)	0.9
Type of RCT						
Not reported*	Reference					
Reported	1.02	(0.74, 1.30)	<0.001	0.65	(0.39, 0.90)	<0.001
Number of Centers						
Single*	Reference					
Multicenter	0.87	(0.50, 1.24)	<0.001	0.23	(-0.12, 0.57)	0.2
No information	-0.31	(-0.72, 0.10)	0.14	-0.05	(-0.40, 0.31)	0.81
Ethical approval						
Reported*	Reference					
Not reported	1.55	(1.08, 2.03)	<0.001	0.61	(0.15, 1.08)	0.01
Funding						

Nonprofit*	Reference						
For-profit	0.66	(0.31, 1.01)	<0.001		0.40	(0.07, 0.72)	0.02
Not sponsored	0.40	(-0.20, 0.99)	0.2		0.03	(-0.5, 0.55)	0.92
No information	-0.37	(-0.80, 0.07)	0.01		-0.33	(-0.71, 0.05)	0.08
Type of Abstract							
Structured*	Reference						
Unstructured	-0.97	(-1.57, -0.37)	<0.001		-0.47	(-0.99, 0.05)	0.07
Abstract length (per 50)							
per unit	0.4	(0.33, 0.47)	<0.001		0.27	(0.19, 0.34)	<0.01
Year of publication							
per unit	0.80	(-0.03, 0.18)	0.14				
Impactfactor							
per unit	0.11	(-0.04, 0.25)	0.16				
Number of citations							
per unit	-0.01	(-0.01, 0.00)	0.25				
Type of journal							
Perio-implant*	Reference						
Perio	-0.25	(-2.05, 1.55)	0.78				
Implant	0.01	(-1.78, 1.79)	0.99				
Type of intervention							
Non-surgical*	Reference						
Surgical	0.08	(-0.59, 0.76)	0.81				
Prosthodontics	-0.08	(-1.12, 0.96)	0.88				
Other	0.54	(-0.15, 1.24)	0.13				
Conflict of Interest							

Reported*	Reference					
Non-reported	-0.07	(-0.49, 0.35)	0.74			

Figure Legend

Figure 1 – PRISMA Flow Diagram

