



# Rhetorical structure of systematic reviews published in dental journals: implications for teaching reading and writing in ESP courses

## *Estrutura retórica das revisões sistemáticas publicadas em revistas odontológicas: implicações para o ensino da leitura e da escrita em cursos de ESP*

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**Abstract:** Systematic reviews (SRs) are relevant for the dentistry community; however, a multidisciplinary literature review suggests that, to date, no linguistic study on the rhetorical structure of dental SRs in English has been carried out, a gap the present study hopes to partly fill. Integrating Swales' and Bhatia's models and the New Rhetoric approach to genre studies, we analyzed the rhetorical organization of 100 SRs in the field of dentistry. The results indicate that SRs follow a prototypical structure: Introduction–Method–Results–Discussion–Conclusion (IMRDC). It can be broken down into 18 moves, 14 of which could be considered obligatory. The template proposed could be a practical resource for oral health scholars, clinicians and students to not only raise genre-consciousness but also effectively write and publish SRs in international dentistry journals.

**Keywords:** Systematic review; rhetorical structure; academic writing; dentistry

**Resumo:** Embora as revisões sistemáticas (SRs) sejam importantes para a comunidade odontológica, uma revisão bibliográfica sugere que, até o momento, não foram realizados estudos linguísticos sobre a estrutura retórica das SRs odontológicas, em inglês. Este estudo contribui para preencher esta lacuna, seguindo uma abordagem integrada dos modelos de Swales e Bhatia e a abordagem da Nova Retórica. Para isso, coletamos e analisamos a organização retórica de 100 SRs no campo da odontologia. Os resultados indicam que os SRs seguem uma estrutura protótipo de Introdução-Método-Resultados-Discussão-Discussão-Conclusão (IMRDC). Isto pode ser dividido em 18 movimentos, dos quais 14 podem ser considerados obrigatórios. Esta proposta constitui um recurso empírico para acadêmicos, clínicos e estudantes de odontologia, aumentando a consciência do gênero discursivo, escrevendo e publicando efetivamente as SRs em revistas odontológicas internacionais.

Palavras-chave: Revisão sistemática; estrutura retórica; redação acadêmica; odontologia.

## 1 Introduction

Research based on genre analysis has grown considerably over the past three decades. It has approached a variety of disciplines, languages, and cultures, searching for the patterns and specific features of their respective discourse genres. Such an analysis has proven useful for teaching scientific writing in both native language contexts (HYON, 2016) and ESP contexts (TEJADA; CASTELLANOS; ROBAYO, 2017; PERDOMO, 2018), where students and novices, aiming to be included in discourse communities, need to properly approach and produce the genres accepted in such communities (SWALES, 1990).

The dentistry community has established itself as an independent knowledge community that has its own genres, which have recently become of interest for discourse analysts and ESP practitioners. Novice authors of dentistry articles need to manage detailed information about article structure, as well as the implicit and explicit rules of publishing, in order to be accepted and recognized as members of this community. That need has been acknowledged by faculty members at the Department of Research at the Universidad de Los Andes, Venezuela, who are expected to teach dentistry students to read and write different scientific genres in both Spanish and English (MORALES, 2014).

After Swales' (1990) seminal work defining discourse communities, genre studies have identified the distinctive cultural, disciplinary, and generic

features of various discourse genres. There is now ample scientific data supporting the claim that scientific discourse varies according to the contexts in which it is produced and used, that is, the discourse community (SWALES, 1990; SAMRAJ, 2013; GARDNER; NESI; BIBER, 2019).

The dentistry community has its own genre colony that differentiates it from other disciplines, each of which has its own rhetorical and discursive features. Recently, scientific output in dentistry has increased (KARAPETJANA; ROZINA, 2016), but oral health scholars, clinicians, and students often find themselves too short of time to read everything that is published. Because SRs compile and summarize the results of many studies in one article, this genre plays a key role in keeping readers abreast of a large amount of high-quality evidence (GARCÍA, 2017).

SRs are an evaluative genre that synthesizes academic contributions through the analysis and assessment of the best available research evidence (HYLAND; DIANI, 2009). Because they occupy a top rung in the hierarchy of Evidence-Based Dentistry (EBD), their quality has become a major issue for clinicians (LAVIS *et al.*, 2005). To this end, several sets of guidelines (or ‘statements’) for SRs have been published, the most noteworthy of which go by the acronyms PRISMA (MOHER *et al.*, 2009, 2015), ROBIS (WHITING *et al.*, 2016), COSMIN (PRINSEN *et al.*, 2018), and ROSES (HADDAWAY *et al.*, 2018). These protocols are not concerned with the quality of disciplinary evidence, but rather mainly address methodological issues.

Several discipline-based studies have analyzed the methodological quality of SRs (ZENG *et al.*, 2015; IOANNIDIS, 2016; WHITING *et al.*, 2016; POLLOCK *et al.*, 2017; KNOLL *et al.*, 2018). Based on these analyses, some scholars have recently claimed that it is necessary to improve the quality of dental SRs (BASSANI *et al.*, 2019). Despite the importance of SRs in dentistry—and the overwhelming predominance of English in dental research articles published by international journals—the study of the discourse structure of SRs has been largely neglected. Most studies have looked at traditional literature (i.e., non-systematic) reviews (AZAR; HASHIM, 2017) and in some cases compared traditional reviews with research articles (RUIYING; ALLISON, 2004).

Within this scenario, a study on the discourse features of English-language dental SRs seems to be a must. However, a review of the literature failed to turn up any such study. Hence, the goal of the present paper is to shed light on the structure of dentistry SRs published in high impact

international dentistry journals through a move analysis from the genre analysis perspective. Results could help dentistry scholars, students, and clinicians understand the rhetorical organization of SRs, thus making them better prepared to read, write, publish, and teach this discourse genre in English. Moreover, results are expected to be helpful to ESP teachers in the job of teaching reading and writing in this particular genre.

## 1.1 Theoretical background

### 1.1.1 SRs and Evidence-Based Dentistry (EBD)

SRs can be defined from two different perspectives, as a process or as a genre. In the former, SRs are considered a six-stage process to investigate primary studies (AL-RAMADHAN, 2011; JIA; LIU, 2018). In the latter, as used in the present research, SRs are defined as a type of review genre that uses systematic methods to collect, critically appraise, and synthesize previous primary studies, which represent the best available research evidence (HYLAND; DIANI, 2009; AL-RAMADHAN, 2011).

There are two types of SRs: qualitative SRs, when analysis is based on qualitative approaches, and quantitative SRs or meta-analysis, when statistical analyses are used to integrate the results of several independent clinical trials (AL-RAMADHAN, 2011). Due to their importance for decision-making by dental professionals, both should be approached in effective dentistry ESP courses.

SRs were introduced in the medical sciences as an alternative to traditional literature reviews, which were often criticized because of their biases and lack of reliability (MULROW, 1994). SRs go beyond traditional literature reviews because they apply scientific approaches to systematically gather, select, and synthesize the research that they review. This use of scientific approaches allows SRs to synthesize the best available evidence and minimize biases (MUNGRA, 2006; BETTANY-SALTIKOV, 2010; KUNG *et al.*, 2010; HIGGINS; GREEN, 2011; AL-RAMADHAN, 2011; BOTH *et al.*, 2016). According to Kung *et al.* (2010), SRs are the product of systematically reviewing all the research literature that is pertinent to a particular research question. Boell and Cecez-Kecmanovic (2015) highlight the 'standardized method' of SRs. They argue that it makes them replicable, transparent,

objective, unbiased, and rigorous. It is this methodological approach of very well-designed SRs that differentiates them from other reviews.

In medical and dental professional settings, SRs are very important because they offer clinicians the best empirical evidence available for clinical decision-making. Therefore, SRs have achieved a recognized status in the dental community due to their methodological rigor and the quality of the reported results. Mulimani (2017) claims that SRs may be extensive and methodologically accurate, but if they do not provide answers to clinical questions, they are essentially useless for practitioners because they have been conceived principally to inform clinical practice.

### **1.1.2 The rhetorical structure of SRs: a literature review**

A review of the literature on academic writing suggests that genre studies have mainly focused on research articles. The research article genre has been studied in a wide range of disciplines, such as literature (TANKÓ, 2017), law (TESSUTO, 2015), engineering (MASWANA; KANAMARU; TAJINO, 2015), and information systems (KWAN, 2017). In all these areas, one commonality for research articles is the Introduction, Method, Results, and Discussion (IMRaD) structure.

By contrast, SRs have received little attention in genre analysis contexts. Mungra (2006) reported the macrostructure and rhetorical moves of SRs in medicine. In line with Mungra (2006), other authors have found that medical SRs and meta-analyses are usually organized under the IMRAD structure (SANTULLI; AGOSTINI, 2012; WRIGHT, 2019). Recently, an additional rhetorical section (Conclusions) has been observed in Spanish-language dentistry SRs (MORALES *et al.*, 2014, 2020).

Other SR structure studies have been reported, but they are not based on linguistic analyses (PALMATIER; HOUSTON; HULLAND, 2018). Instead, they are mainly based on content analysis and were designed to offer writing proposals, mostly without disciplinary discourse evidence (VAN TULDER *et al.*, 2003; DE CRAEN *et al.*, 2005; MAJOR *et al.*, 2007; KOFFEL, 2015). Moher *et al.* (2015) claim that a clearly established protocol is an essential component of SRs because it guarantees that the study has been carefully planned and documented. That protocol should properly inform the article organization and, we may add, should be based on a sound genre analysis.

We have not been able to identify any comprehensive linguistic studies on the rhetorical sections of dental SRs in English. The few linguistic studies

on reported SRs have been conducted in other disciplines (e.g., MUNGRA, 2006; GRANT; BOOTH, 2009; SANTULLI; AGOSTINI, 2012).

## 2 Methodology

This study integrates Swales' (1990) genre analysis model, Bhatia's (1993, 2002a, 2002b, 2004) applied genre analysis model, and the New Rhetoric (BERKENKOTTER; HUCKIN, 1995) in investigating the rhetorical moves of dentistry SRs, that is, how different rhetorical moves are realized across their sections. In that vein, the study considered both textual and contextual analyses.

Textual analysis was performed through manual and computer-assisted examination of a corpus of dentistry SRs (which will be described in the following section) by three independent researchers. Each SR was analyzed in terms of its rhetorical structure, based on the moves analysis model (SWALES, 1990, 2004; SKELTON, 1994). We followed Skelton's (1994) criteria to classify a rhetorical section, move or step as obligatory or optional; in this sense, a cut-off frequency of 65% of occurrence was established to consider them mandatory.

Each SR was coded independently by the three researchers. After the coding process was finished, the correspondence among coding results was evaluated. In cases of disagreement, the discrepancies were examined and discussed to reach consensus. This situation occurred for just two papers. The coding data were then organized in a database in a Microsoft Excel® spreadsheet to calculate descriptive statistics.

Contextual analysis was also performed based on Swales (1990, 2004) and Bhatia (1993). These authors recommend that, after carrying out this sort of analysis, discourse analysts should consult specialist informants (i.e., typically established members of the discourse community) who can confirm, reject, validate, or correct the analysts' interpretation and provide them with useful supplementary information.

To this end, several members of the dental discourse community agreed to participate as specialist informants for the present study. These specialist informants were experts who had read, written, published, and taught about dentistry SRs. They were interviewed (face to face or via telephone and/or e-mail) about the process of writing, publishing, and using SRs for teaching and clinical practices. Their answers were used

to gain insights into how dentists, as members of the dental discourse community, construct, interpret, and use SRs to achieve their community goals (BHATIA, 2002c).

## 2.1 Corpus

The corpus analyzed in this study consisted of 100 English-language SRs published between 2010 and 2019, and altogether comprised 1,564 pages and 633,261 running words. These SRs were randomly selected from 10 international dental journals, very well positioned in Scimago ranking, which were also suggested by the specialist informants consulted. Table 1 describes the ten journals from which the corpus was obtained. For each one, the number of SRs, running words, country, and impact factor are given.

Table 1 – Description of the corpus

Journal	SR	Running words	Average	Average of authors	Country	SJR 2019
Clinical Oral Implants Research	8	31,540	3,942.5	4	Europe	2.2
Journal of Clinical Periodontology	9	35,275	3,919.44	5	Europe	2.48
Plos One	14	87,595	6,256.78	5	US	1.02
Journal of Dentistry	10	51,720	5,172	5	Netherlands	1.62
Journal of Dental Research	11	118,655	10,786.81	5	US	2.05
Dental Materials	8	38,195	4,774.37	5	Netherlands	1.85
Journal of Oral Rehabilitation	10	53,450	5,345	5	United Kingdom	0.89
Dental Press Journal of Orthodontics	12	94,620	7,885	5	Brazil	0.52
Odontology	10	67,230	6,723	4	Japan	0.61
Medicina Oral, Patología Oral y Cirugía Bucal	8	54,981	6,872.62	5	Spain	0.62

Source: Created by the authors.

The corpus size would seem to be large enough to yield reliable results, as it larger than other studies focused on articles published in English (MUNGRA, 2006; PHO, 2008; SANTULLI; AGOSTINI, 2012;

ENTRALGO *et al.*, 2014; TESSUTO, 2015; RAHIMI; FARNIA, 2017; MOHAMMAD; GOHARI, 2019). Moreover, the number of running words is remarkably higher than the minimum suggested by Fox (1999).

### 3 Data analysis and discussion

#### 3.1 Overview of the corpus analysis

Although, as noted above, publication dates for the SRs ranged from 2010 to 2019, 60% of the articles in the corpus were published after 2015. Of those published before 2015, 9% were published in 2014, 8% in 2013, 7% in 2012, 9% in 2011, and finally 7% in 2010. This suggests that the publication rate of SRs has been increasing over the last decade.

We found that the SR can be presented alone or combined with a meta-analysis. We observed that 76% of the articles were just SRs, while 24% combined an SR with a meta-analysis; therefore, “systematic review and meta-analysis” is frequently included in the title. An average of 56 references per article was observed. In most cases, citations were consistent with the Vancouver style (83%).

The SRs in the corpus were written in English by authors from different countries, with the largest numbers coming from Brazil (44%), Germany (10%), England (9%), and China (8%). Multiple author SRs were highly frequent, with the number of authors ranging from 2 to 9 (average = 5). The highest frequencies were found for five (36%), six (18%), and four authors (16%).

The majority of authors were affiliated with schools of dentistry (62%), followed by combinations of schools of dentistry and other schools (medicine, for example) (12%), and schools of dentistry and non-university public and private clinical practice (11%). Except for a small percentage (6%), most of the SRs included at least a one member of a school of dentistry as an author. Finally, with regards to financial support, we found that most of the studies (76%) had not received any special funding.

Judging by this corpus, multidisciplinary team research work seems to be a common practice in the dental community. Dentistry scholars conduct their research with scholars from other research centers with a variety of educational backgrounds (e.g., general dentists, dental specialties, or other disciplines, especially medical specialties). Similar findings have been reported for dentistry (MORALES *et al.*, 2020) and other communities



(SALAGER-MEYER; ARIZA, 2003; SALAGER-MEYER *et al.*, 2017). This might be explained, in the first place, by the awareness among dentistry authors that including co-authors from a variety of research backgrounds and perspectives can help to avoid biases. Secondly, the level of evidence that SRs represent in the context of EBD reflects the complexity of the task (i.e., analyzing a large number of studies to produce such highly qualified evidence), which is best performed in groups.

### 3.2 SR titles

The average length was 12.7 words, ranging between six and 22. In 96% of the titles, the text was identified as an SR (in some cases both; SR and meta-analysis). As observed in previous findings, two-unit titles were the most frequent syntactic structure (examples (1) and (2) below).<sup>1</sup> Their components were separated mainly by a colon (:). These findings are similar to those obtained by Morales *et al.* (2020); they are also consistent with the PRISMA and QUORUM statements for SRs and meta-analyses (MOHER *et al.*, 2009, 2015).

- (1) In vitro cytotoxicity of dental adhesives: A systematic review
- (2) Clinical efficacy of nano-hydroxyapatite in dentin hypersensitivity: A systematic review and meta-analysis

Based on the cross-cultural evidence, this pattern seems to be distinctive for dental SRs, as observed by Morales *et al.* (2020).

### 3.3 Abstracts

Abstracts were mainly identified with the heading ‘abstract’ (86 %); only 10 % were not titled and 4% were labeled ‘summary’. As expected, abstracts were independent texts providing concise information about the accompanying article. However, we noted that the rhetorical structure of abstracts was not representative of the structure of the accompanying papers they summarized. For example, no abstract had a discussion section even though 94% of the SRs included this section, a finding which differs from that seen in Vathanalaotha and Tangkiengsirisin (2018).

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<sup>1</sup> The examples have been included verbatim as they appear in the original texts.

Introduction or background sections were not very common in abstracts, occurring in only 20%. Instead, the ‘objective’ was treated as a separate section in most of the abstracts, a finding that is consistent with the results of Vathanalaoha and Tangkiengsirisin (2018). Methodology was identified using different headings, most often ‘method’, ‘methodology’, ‘study and sources’, or ‘study selection’. Results were identified as ‘results’ or ‘data’. All the abstracts showed a conclusions section titled ‘conclusions’, ‘conclusions and clinical significance’, or ‘significance’.

SR abstracts contained an average of 254.5 words, ranging from 121 to 600. Some of them (60%) presented statistical information, as found in a previous study on dental research paper abstracts (MORALES *et al.*, 2014). This suggests that not only SRs that include meta-analyses provide statistical information.

All the abstracts were followed by keywords. An average of 4.4 keywords, ranging from three to ten words, was documented. None of the SRs named its keywords as Medical Subject Heading (MeSH), as suggested by PubMed.

With regards to move sequence, 87% of the abstracts were structured; however, this structure showed essentially three variations, as detailed in Table 2.

Table 2 – Rhetorical structure of SR abstracts

Structures	%
OMRC: Objective (Purpose, Aim), Methods (Data, Study), Results (Data), Conclusions (Clinical significance).	53
IOMRC: Introduction (Background), Objective, Methods, Results, Conclusions.	12
IMRC: Introduction, Methods, Results, Conclusions.	5
Others	30
<b>Total</b>	<b>100</b>

Source: Created by the authors.

As can be seen, OMRC and IOMRC structures showed the highest frequencies. This finding is similar to that reported by Vathanalaoha and Tangkiengsirisin (2018) for English-language abstracts written for Thai and international dental journals, but the authors of that study include Discussion as well as Conclusions moves. However, as they regard Discussion and Conclusion as co-referential terms, their findings may in fact be fully consistent with our own. The omission of the Background section in most of the abstracts could be due to the need to report only the essence

of the review within the limited length of abstracts required by the journal author guidelines (VATHANALAOHA; TANGKIENG SIRISIN, 2018).

### 3.4 Rhetorical structure of systematic reviews

Table 3 summarizes the rhetorical structures of the analyzed SRs. Six different formats were identified. The IMRDC structure (Introduction, Method, Results, Discussion, and Conclusion) proved to be the dominant pattern, which is similar to the rhetorical structure of both Spanish-language dental SRs (MORALES *et al.*, 2020) and English research articles (KHANI; TAZIK, 2017).

Table 3 – Rhetorical structure of the SRs in the corpus

Nº	Structure		%
1	IMRDC	Introduction, Methodology, Results, Discussion, Conclusions	74
2	IMRD	Introduction, Methodology, Results, Discussion	17
3	IMRC	Introduction, Methodology, Results, Conclusions	4
4	IMD	Introduction, Methodology, Discussion	1
5	ICC	Introduction, Content, Conclusions	1
6	IMDC	Introduction, Methodology, Discussion, Conclusions	2
7	ICatC	Introduction, Categories, Conclusions	1
<b>Total</b>			<b>100</b>

Source: Created by the authors.

These results are also partially consistent with previous studies on English-language medicine SRs (MUNGRA, 2006; GRANT; BOOTH, 2009; SANTULLI; AGOSTINI, 2012) and dental research papers (KARAPETJANA; ROZINA, 2016), as well as with the protocol statements proposed for SRs and meta-analyses (VAN TULDER *et al.*, 1997, 2003; HIGGINS; GREEN, 2011; MOHER *et al.*, 2009). A Conclusions section appeared in 84% of the corpus articles. In concordance with Morales (2010) and Morales *et al.* (2020), dentistry scholars seem to regard the Conclusions as an independent section that is essential in the rhetorical structure of dental academic genres.

Our results do not support Karapetjana and Rozina's (2016) statement that the pre-eminence of the English language in scholarly publications has resulted in the anglicization and standardization of academic writing among the dentistry scientific community. Instead of following the academic writing

norms, it seems that dental scholars do not hesitate to modify the generic conventions, preferring to diversify and hybridize the rhetorical organization and move structures of SRs (KHANI; TAZIK, 2017).

The second most frequent structure was IMRD (17%). It is the format found in previous studies of SRs (MUNGRA, 2006; GRANT; BOOTH, 2009; SANTULLI; AGOSTINI, 2012) and the one established for SRs and meta-analyses by the PRISMA and QUORUM statements (VAN TULDER *et al.*, 1997, 2003; HIGGINS; GREEN, 2011; MOHER *et al.*, 2009). The third structure found was the IMRC format, which accounted for 4%. It omits the Discussion section, which was incorporated either in the Results section or in the Conclusions. Finally, the remaining structures accounted for 5%.

As shown in Table 4, Introduction, Methods, Results, Discussion, and Conclusions could be considered obligatory sections for dental SRs in English because they occur in over 65% of the corpus article (SKELTON, 1994). Acknowledgments and Conflict of interests, on the other hand, may be considered optional, though their presence was found to increase over time.

Table 4 – Frequency of occurrence of rhetorical sections in corpus SRs

Rhetorical section	%
Introduction	100
Methods	100
Results	97
Discussion	100
Results & Discussion	3
Conclusions	82
Acknowledgments	49
Conflict of interests	20

Source: Created by the authors.

- The Introduction section was present in all the SRs in two configurations: in 85%, the section was identified with the heading ‘Introduction’, while in 15% it had no heading.
- The Methods section was observed in 99% of the corpus SRs; one article identified it under the heading ‘Study selection’, a choice of terms which reflects the nature of the study (a systematic review).

- 95% of the articles included a Results section, appropriately labeled ‘Results’; 3% included the results within the section titled ‘Discussion’. The remaining two papers gave this rhetorical section other headings (‘Category’ and ‘Content’).
- 94% of the SRs included a Discussion section, explicitly titled ‘Discussion’.
- 82% of the articles had a section titled ‘Conclusions’. Two other headings for this section were observed: ‘Limitations, conclusions, and recommendations’, and ‘Conclusions and recommendations’.
- There were two additional sections before the references, Acknowledgments and Conflicts of interest, which were presented either separately or together; 49% included ‘Acknowledgments’, whereas 20% had a section to indicate whether the study involved any ‘Conflicts of interest’.
- Finally, 15% included supplementary information sections after the References, generally labeled ‘Appendixes’.

Regarding the move analysis, we detected a total of 18 moves: three for the Introduction, five for Methods, two for Results, five for Discussion, and three for Conclusions.

### **3.4.1 Move structure of the Introduction section (moves 1-3)**

All SRs had an Introduction section. All the introductions followed Swales’ (1990) CARS model whereby introductions first ‘establish a research territory’, then ‘establish the niche’, and finally ‘occupy the niche’. Similar findings have been obtained for medicine SRs (MUNGRA, 2006; SANTULLI; AGOSTINI, 2012), dentistry research papers (KARAPETJANA; ROZINA, 2016), and Spanish-language dentistry SRs (MORALES *et al.*, 2020).

Impersonal stance was an outstanding feature of this section. Similar findings have been reported in previous studies in medicine (MUNGRA, 2006; SANTULLI; AGOSTINI, 2012), dentistry (MORALES, 2010), and engineering (CONRAD, 2018).

#### ***Move 1: Establishing territory***

At the beginning of the introduction, authors usually state what is known (see example (3)), that is, they define the problem, highlight the importance or novelty of the clinical problem or the treatment, offer previously reported epidemiological data (see example (4)), and state other

useful information to delimit the problem. Karapetjana and Rozina (2016) reported similar findings for English dental research papers.

- (3) The etch-and-rinse strategy involves the prior application of phosphoric acid, which, at enamel, produces deep etch-pits in the hydroxyapatite (HAp)-rich substrate and, at dentin, demineralizes up to a depth of a few micrometers to expose an HAp-deprived collagen mesh.<sup>1,3</sup>
- (4) Orofacial myofunctional therapy (OMT) techniques and principles can be used either alone or in combination with other forms of therapy.<sup>1-7</sup> In combination with Orthodontics, OMT has been reported to be effective in the treatment of myofunctional disorders.<sup>2,5-11</sup>

### ***Move 2: Establishing the niche***

As observed by Wright (2019), the niche is established by three different steps: a) indicating the lack of previous published high quality and updated SRs that synthesized primary studies on the topic; b) highlighting that there are many primary studies that need to be critically appraised and synthesized to offer clinicians and scholars best empirical evidence available on which they can base their decisions; and c) emphasizing their clinical or epidemiological relevance. These findings agree with the rationale proposed in previous studies on SRs (MUNGRA, 2006; BETTANY-SALTIKOV, 2010; KUNG *et al.*, 2010; HIGGINS; GREEN, 2011; AL-RAMADHAN, 2011; BOTH *et al.*, 2016), and with Karapetjana and Rozina's (2016) findings for dental research papers. In example (5), inconsistencies or weaknesses in previous systematic reviews are shown; example (6) reports controversies in the literature; example (7) states the relevance of the study for designing forthcoming clinical studies.

- (5) The literature is vast on studies concerning different molar distalizing appliances in terms of application, function and effectiveness. However, it can be difficult for the orthodontist to interpret the outcomes of these studies because of the variety of study designs, sample sizes and research approaches.
- (6) It is noteworthy, however, that the aforementioned reviews [10,11] gathered data on Class I and II cavities simultaneously, and also included restorative materials that are rarely used or have been increasingly discontinued, which may have largely influenced the results.

- (7) Therefore, since preclinical animal experiments represent the final approval in order to design human studies, systematic reviews of animal investigations might provide important knowledge on how to design these trials and on how one can interpret the gathered data.

### ***Move 3: Occupying the niche***

This move was observed in 100% of the SRs in the corpus. It was represented by the statement of purpose. This move is characterized by four features: (a) with the subjects *study*, *research*, or *paper*, past tense verbs, such as *aimed* or *had*, are used, (b) with the subjects *purpose*, *objective*, *aim*, or *goal*, the verb *be* in present tense is used, (c) raising a research question, and (d) postulating the hypothesis (see examples (8)–(10)). This result agrees with Karapetjana and Rozina (2016), who reported similar findings in dental research papers.

- (8) Our aim was to perform a systematic review of intervention studies to answer the question of whether periodontal treatment affects the general health of diabetic patients by improving glycemic control compared with no periodontal treatment after at least 3-month follow-up.
- (9) Consequently, the objectives of this work are to systematically review the specific characteristics of the different methods used for clinical wear measurement of dental tissues and materials, their relevance and reliability in terms of accuracy and precision, and the performance of the different steps of the workflow taken independently.
- (10) Therefore, the aim of the present systematic review was to verify whether the presence of the monomer HEMA in the formulation of adhesive systems influences the clinical performance of non-carious cervical lesion (NCCL) restorations

In some cases, the niche and the way the authors planned to occupy it were set out in a single sentence (example (11)).

- (11) Considering the shortage of studies in this field and the limitations of the previous analyses, we performed a systematic review and a quantitative meta-analysis and meta-regression of root caries incidence and increment.

Sixty-three of the articles explicitly showed the phrase ‘systematic review’ or similar expressions in the statement of purpose to give the reader an immediate idea of the methodology (see examples (8)–(10) and (12)).

- (12) The aim of this review was to systematically analyze published literature on bonding of resin adhesives to CAD substrate by comparing their bond strength results.

This result is consistent with Santulli and Agostini (2012) and Morales *et al.* (2020). For the remaining percentage, the phrase ‘systematic review’ was mentioned not in the statement of purpose but immediately after it, as shown in the example (13).

- (13) Our objective was to determine, if possible, the efficacy of botulinic toxin A or B in the treatment of MPS and, if the contrary was true, to identify the degree of evidence for a recommendation. To that effect we carried out a systematic review of the medical literature.

In sum, all the SRs identify the genre explicitly in the statement of purpose or immediately after it. As the statement of purpose is located at the end of the introduction section, it functions as a link to the next section.

### 3.4.2 Move structure of the method section (moves 4-8)

Table 5 shows the different headings used to identify the methodology section. The most frequent was ‘Materials and methods’, even when what was described was not materials, but rather procedures for searching, selecting, and gathering data. The second most common title for this section was ‘Methods’. In both cases, the beginning of the name provides the ‘M’ for the IMRAD structure. This finding coincides with Morales *et al.* (2020) for systematic reviews in dentistry in Spanish.

Table 5 – Headings used to identify the methodology section

Headings	%
Materials and methods	57
Methods	38
Research design and methods	2
Search strategy	1
Data and sources	1
No heading	1

Source: Created by the authors.



SRs authors are expected to provide a comprehensive description of the methodology. In most cases, subtitles are used to identify each section. Among the subtitles we detected in the corpus were those in examples (14)-(17):

- (14) Data source and search strategy; inclusion criteria; study selection, quality assessment, and data extraction; statistical analysis.
- (15) Search strategy; study selection criteria; methodological study quality assessment; data extraction and statistical analysis.
- (16) Search strategy; selection, inclusion and exclusion criteria; data extraction; risk of bias assessment; data analysis.
- (17) Protocol; information sources and search strategy; study selection and data collection process; quality assessment.

Five moves were observed: study design, search strategies, study selection, data collection process, and evidence quality and bias assessment. This finding is similar to that found by Morales *et al.* (2020) for Spanish dentistry SRs as well as, to some extent, the findings of previous studies on medical SRs (MUNGRA, 2006; BETTANY-SALTIKOV, 2010; KUNG *et al.*, 2010; ARAUJO, 2011; HIGGINS; GREEN, 2011; AL-RAMADHAN, 2011; BOTH *et al.*, 2016). Note that this number of moves is lower than those recommended in the PRISMA and QUORUM statements (VAN TULDER *et al.*, 1997, 2003; HIGGINS; GREEN, 2011; MOHER *et al.*, 2009).

#### ***Move 4: Study design***

Fifty-eight percent of the SRs started this section by stating the study design (i.e., systematic review). This finding is in line with other studies (MUNGRA, 2006; SANTULLI; AGOSTINI, 2012; MORALES *et al.*, 2020). It seems that the authors were keen to differentiate their SRs from traditional literature reviews, which are often criticized because of biases, lack of reliability, and the low-quality evidence reported (MULROW, 1994; MORALES, 2010). Examples (18) and (19) are prototypical.

- (18) This descriptive qualitative systematic review was performed based on the PRISMA statement [15] and the handbook from the Office of Health Assessment and Translation (OHAT – NIH) for in vitro toxicological studies.

- (19) A systematic review of scientific literature was undertaken, following the habitual protocols to this effect, that include establishing study selection criteria, a search strategy, and a systemic data collection.

In some SRs (11%), the authors started the section by repeating the research question stated in the introduction and then explained the protocol followed, as in example (20).

- (20) This systematic review was conducted to answer the question “Does SRP lead to a decrease in glycosylated hemoglobin in patients with both PD and T1DM or T2DM?”

### ***Move 5: Search strategies***

‘Search strategies’ is the second move in this section (100%). This was executed in three different steps: a) specific information about databases and search engines, b) any limits and criteria for eligibility used, and c) keywords and MeSH combinations used (see example (21)); in some cases, subtitles were used to separate each step.

- (21) Systematic review of the literature conducted in PubMed, LILACS, SciELO, PsycINFO, Cochrane Database of Systematic Reviews and Google Scholar in April 2013 and without date limits or language restrictions. The search used the expression: (((Motivational interviewing or motivational interview))) AND (((((((((Oral health or dental health) OR (Oral health behaviors or oral health behavioral change)) OR (Dental hygiene or oral hygiene)) OR ((Sweet foods or sweet drinks or sweet beverages) and (consumption or intake))) OR (Dental caries or tooth decay or early childhood dental caries)) OR Dental plaque) OR (Gingival bleeding or bleeding on probing)) OR (Periodontal disease or periodontal pocket or periodontal probing depth or clinical attachment loss)).

### ***Move 6: Study selection***

The third move, ‘study selection’, was observed in 85% of the corpus articles. This move specifies study characteristics, as well as inclusion and exclusion criteria (example (22)).

- (22) Eligible studies were in vitro essays that quantitatively evaluated the color of CLVs regarding the influence of light-cured luting agents and other color-associated factors, such as the ceramic thickness, shade and type, as well as the influence of the substrate and aging. The exclusion

criteria were studies that evaluated crowns rather than CLVs, did not use light-cured resin luting agents, evaluated color using qualitative scales (e.g. Vita Classical) rather than quantitative systems (e.g. CIELAB), did not use instrumental and standardized methods for color measurement before and/or after cementation, and did not use or describe appropriate statistical analysis for color data.

### ***Move 7: Data collection process***

The fourth move, ‘data collection process’, was found in 100% of the texts. Here, the authors explained the processes followed to gather, analyze, and synthesize the information in order to create the categories needed to report the results (example (23)).

- (23) Data were divided in three groups according to type of restoration assessed. For two reports from the same group[17,18], data were collected and included in the table together because the studies had the same sample and follow-up time, only differing in the clinical outcome assessed for the same restorations.

### ***Move 8: Evidence quality and bias assessment***

Finally, we observed the move ‘evidence quality and bias assessment’ in 74% of the corpus SRs. Similar results were reported in previous studies in English-language medicine SRs (MUNGRA, 2006) and dentistry SRs in Spanish (MORALES *et al.*, 2020). For this move, two steps were observed: bias prevention and quality assessment. The former assesses the biases in the analyzed primary studies and in the SRs themselves (by controlling researcher effect). The latter implies quality assessment of the designs according to the selected methodological protocols. It may also imply intervention by independent researchers and an assessment of the quality of the protocol followed. See examples (24)-(26).

- (24) The quality assessment was done by one reviewer and was checked by the supervisors. The CASP checklist consists of three aim sections. ...
- (25) The ten eligible articles were submitted to an assessment of the inherent quality of toxicological data, based on the Tox R-Tool, employing an 18-point rating for in vitro studies. As shown in Table 2, all studies were considered reliable without restrictions (scoring over 15 points) and thus, no study was removed from the review due to high risk of bias.

- (26) Quality of the studies was assessed by the two reviewers using the modified Consolidated Standards of Reporting Trials (CONSORT) checklist [32].

### **3.4.3 Move structure of the Results section (moves 9 and 10)**

An independent Results section was observed in 95% of the articles, similar to previous findings (MOHER *et al.*, 2009; MORALES *et al.*, 2020). In some of the SRs the content was organized using sub-headings. This involved two moves, moves 9 and 10.

#### ***Move 9: Description of search outcomes***

This move was observed in all the SRs. Information was provided here about the results of database searches, including excluded and duplicated articles. See examples (27)-(29).

- (27) The search in EMBASE and Medline produced 38 references, of which 14 were duplicates between databases.
- (28) The electronic screening returned 140 entries and, after removal of duplicated studies, a total of 18 works was evaluated for eligibility.
- (29) A total of 7007 studies were identified via database screening. Of these, 6809 articles were excluded and full text articles retrieved for 198 studies.

Flowcharts were used very frequently (in 71% of the 95 papers that included an independent Results section) to illustrate the process and its results. Example (30) shows an anaphoric reference to the flow chart. This is consistent with Morales *et al.* (2020) and the PRISMA and QUORUM statements (VAN TULDER *et al.*, 1997, 2003; HIGGINS; GREEN, 2011; Moher *et al.*, 2009).

- (30) We screened a total of 3.424 records and finally included N=29 RCT's in the meta-analysis. Fig. 1 contains the flow chart of the study selection process.

#### ***Move 10: Synthesis of results***

The second move in this section is the synthesis of data, which in most cases (74%) was organized into categories. Tables were commonly used (94% out of the 95 papers presented a Results section) to summarize the reviewed studies in terms of size, follow-up period, sample, interventions,

outcomes, results, bias assessment, method and evidence quality, and other information regarding the sources of information. Tables were always accompanied by descriptions, comments, or explanations of the data.

#### **3.4.4 Move structure of the Discussion section (moves 11-15)**

This section was observed in 95% of the analyzed articles. It encompassed five moves: (1) restating the aim of the review, (2) summary of evidence, (3) comparing results with the literature, (4) practical and clinical implications, and (5) limitations of the study. This result is in line with Karapetjana and Rozina (2016), Basturkmen (2012), and Morales *et al.* (2020).

##### ***Move 11: Restating the aim, theory, or method***

Restating the aim and rationale of the review, theory, or method used in the study was observed in 55% of the articles (see example (31)). This percentage was smaller than that reported by Basturkmen (2012) and Morales *et al.* (2020) for SRs in Spanish.

- (31) The goal of this review was to assess the diagnostic validity of clinical tests for TMD classified as IDR or IDnoR relative to MRI. The review provides no evidence to support any one clinical test as a significant and conclusive predictor of the presence or absence of ID relative to MRI; however, there is evidence that certain tests may be of some relevance in helping to diagnose TMD.

##### ***Move 12: Summary of evidence***

This move, observed throughout the corpus, summarizes the main findings, including the strength of evidence for each main outcome reported (see example (32)).

- (32) In general, the present results demonstrated that the clinical performance of the two restorative materials assessed (GIC and CR) was similar for most clinical parameters analyzed (marginal discoloration, marginal adaptation, retention of restoration and wear of the restorative material) in Class II restorations in primary teeth.

##### ***Move 13: Comparing results with the literature***

In this move, main results are compared with previous studies. It was observed in 96% of the SRs (see example (33)).

- (33) The literature on clinical longevity of posterior composite restorations is extensive and has indicated a number of factors that could be associated with restoration failures, including socioeconomic level of the patient [15], type of dental service used [15], risk for caries or occlusal stresses [9], and operator who performed the restoration [36].

#### ***Move 14: Practical and clinical implications***

A discussion of the practical and clinical implications of the study appeared in 93% of the SRs. Authors explicitly indicated how the observed results would help clinicians to make clinical decisions. Example (34) illustrates an opening of this move. Some ideas for further research, like in examples (35) and (36), were also very common (93%).

- (34) The present findings allow professionals greater freedom of choice among the restorative materials most widely available for direct treatment.
- (35) Investigating the available literature on this topic, we found no RCTs. There is a need for additional studies that ideally randomize assignment to alternative treatments.
- (36) The comparative effectiveness of resin infiltrants and dental adhesives, sealants or other minimally invasive methods for proximal sealing is yet to be investigated. Furthermore their long term longevity remains unclear.

#### ***Move 15: Limitations of the study***

Finally, limitations of the study were indicated in 90% of the corpus articles, as observed in previous studies, such as Mungra (2006), Santulli and Agostini (2012), Wright (2019), and Morales *et al.* (2020). Example (37) illustrates the way authors identify the limitations of the study.

- (37) A potential limitation of this study may be the issue of the estimated risk of bias.

#### **3.4.5 Move structure of the Conclusions section (moves 16-18)**

Contrary to findings reported for medical SRs (MUNGRA, 2006; SANTULLI; AGOSTINI, 2012; WRIGHT, 2019) and research papers (PHO, 2008), 82% of the corpus articles included an independent Conclusions section after the Discussion. This is similar to what has

been found in Spanish-language SRs (MORALES *et al.*, 2020) and in other discourse genres in the dental community (MORALES, 2010). As reported in previous studies on dental academic writing (MORALES, 2010; MORALES *et al.*, 2020), this section is short and succinct. It was common to find a one-paragraph conclusion (see example (38)).

- (38) Based on the results we can conclude that non-pharmacological interventions may be beneficial for reducing mental distress in patients undergoing dental procedures and thus, could be considered as valuable adjunct to standard care. Although results are promising and significant positive effects on reducing mental distress were found for all types of non-pharmacological interventions, further high quality studies are needed to strengthen the evidence.

Three moves were found in the Conclusions section: 1) achievement of goals or verification of the hypothesis, 2) conclusions, and 3) implications and recommendations.

***Move 16: Goal achievement, hypothesis verification, or restatement of the method***

We found that 35% of the SRs started the Conclusions section by indicating the degree to which the goal of the review had been achieved or its initial hypothesis confirmed, as in examples (39) and (40). In some cases, authors referred to the methodological nature of the study to highlight the scope of the results (example (41)).

- (39) The current review provides the most accurate reflection of available literature to date to answer the question of whether periodontal treatment affects the general health of type 2 diabetic patients by improving glycemic control compared to no periodontal treatment after at least 3-month follow-up.
- (40) The hypothesis that needling therapies have specific efficacy (i.e., efficacy beyond placebo) in the treatment of myofascial trigger point pain is neither supported nor refuted by the research to date.
- (41) This systematic review showed that distinct shades and opacities of luting agent yield clinically visible color differences on CLVs, allowing excellent shade matching with adjacent teeth.

### ***Move 17: Conclusions***

Conclusions, as found in previous studies, provided a brief reference to the main findings and a general interpretation of the results in the context of other evidence (example (42)). Eighty-two percent of the corpus SRs showed this move.

- (42) Findings of the present review generally indicate a good clinical performance in the long-term (follow-up 3+ years) for anterior composite resin restorations, with annual failure rates varying from 0 to 4.1%.

### ***Move 18: Implications and recommendations***

This move was executed in two steps: ‘implications for future studies’ and ‘implication for clinical practice’, both of which appeared in 61% of the corpus papers. Examples (43) and (44) respectively illustrate the two types of implications.

- (43) This study encourages conducting further studies on human samples with the aim of increasing the power of evidence and to confirm our preliminary results.
- (44) Crowns made out of densely sintered zirconia, however, cannot be recommended as primary treatment option, due to an increased risk of chipping of the veneering ceramic and loss of retention ... Finally, the mechanically weaker ceramics like the feldspathic or silica glass-ceramics can only be recommended in anterior regions with low functional load.

### **3.4.6 Other sections**

Two additional optional rhetorical sections, Acknowledgments and a Conflicts of interest statement, were found in around 50% of the corpus articles. Supplementary information after the References section was also commonplace.

Acknowledgments (49%): a common genre in scholarly communication was found in half of the articles (HYLAND, 2003). This section provides information about organizations and individuals that significantly contributed to the study. In some cases, it includes information about funding (example (45)).



- (45) The research leading to this review has received funding from the European Union Seventh Framework Program (FP7/2007-2013) under grant agreement n°608197.

Conflict of interest statement (20%): here the authors indicate any relevant potential conflicts of interest and affiliations of interest in connection with the research (see example (46)). For instance, they may certify that they have neither affiliations nor involvement with any organization or entity with any financial interest associated with the subject matter studied in the SR in question. Though it is considered mandatory for most international journals, the conflict of interest statement showed low frequency in the corpus.

- (46) The authors received no financial support and declare no potential conflicts of interest with respect to the authorship and/or publication of this article.

Finally, supplementary information was included in an Appendix section, which comprised a list of journals, as shown in example (47), or lists of included or excluded articles.

- (47) Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.jdent.2018.05.012>.

## 4 Conclusions

The aim of this study was to analyze the rhetorical structure of dentistry SRs in international journals through a move analysis from the genre analysis perspective. Most of the corpus presented the IMRDC structure (i.e., Introduction, Methods, Results, Discussion, and Conclusions). Based on their frequency of occurrence, both these sections and their sequence seem to be considered obligatory for dentistry SRs in English.

Eighteen moves were observed: three for the Introduction section, five for Methods, two for Results, five for Discussion, and three for Conclusions. Table 6 shows that, considering the frequency of their occurrence in the analyzed corpus, 14 of these moves can be considered obligatory and the remaining four optional.

Although the overall rhetorical structure, sections, and moves seen in the SRs examined here are similar to the QUORUM and PRISMA

statements for SRs and meta-analyses, an additional Conclusions section was present in most of these SRs and the number of sections and moves found was lower than what is proposed in the aforementioned statements. This suggests that for dental scholars the QUORUM and PRISMA statements are merely taken as methodological recommendations. They do not regard them as mandatory requirements; instead, they feel free to diversify and hybridize the rhetorical organization and move structures of SRs.

On the basis of our analysis, the prototypical rhetorical structure of dentistry systematic reviews can be summarized in the template offered in Table 6.

Table 6 – Summary of the rhetorical structure of a dentistry SR

Section	Moves	Description	%
Introduction	1	Establishing the territory	100
	2	Establishing the niche	100
	3	Occupying the niche	100
Methods	4	Study design	58
	5	Search strategies	100
	6	Selection criteria	85
	7	Data collection process	100
	8	Evidence quality and bias assessment	74
Results	9	Description of search outcomes	100
	10	Synthesis of results	100
Discussion	11	Restating the aim, theory or method	55
	12	Summary of evidence	100
	13	Comparison of results with the literature	96
	14	Practical and clinical implications	93
	15	Limitations of the study	90
Conclusion	16	Goal achievement, hypothesis verification, or restating method	35
	17	Conclusions	82
	18	Implications and recommendations	61

Source: Created by the authors.

The present study may also raise genre awareness about the prototypical structure of this academic text, which could be helpful in ESP dentistry courses. Dentistry scholars and novice writers could use the descriptions of the rhetorical structure reported to improve their writing of

appropriate SRs. Furthermore, reading and writing teachers (including ESP practitioners) could use these results to inform their teaching. Moreover, the detailed and comprehensive template presented here could provide dental academic writing teachers with useful information for syllabus design and material development.

Nevertheless, further research on dentistry SRs is clearly needed on dentistry SRs. Future studies could analyze the linguistic patterns associated with the different rhetorical sections of SRs. From a cross-disciplinary perspective, similarities and differences of sections, moves, and steps between dentistry and other disciplines need to be analyzed.

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### **Authors' contribution**

Perdomo, B.: Conceptualization, formal analysis, data processing, investigation, writing original draft, writing review and editing, project administration, Funding acquisition

Morales, O.: Methodology, formal analysis, investigation, writing original draft and writing review and editing.

Cassany, D.: Investigation, supervision of formal analysis, writing original draft and writing review and editing.

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