

### **Abstracts in Iranian dental journals: A linguistic analysis**

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This study investigated the rhetorical move structure of the dental sciences research article abstract (RAA) genre using Swales' (2004) model of move analysis, CARS (Create a Research Space), to find the frequency of rhetorical moves and steps in RAAs of the selected journals and also to examine the association between the frequency of moves and steps in the RAAs. To this end, 251 abstracts from articles published in 2018, 2019, and 2020 in four Iranian PubMed-indexed dentistry journals were selected and examined. The frequencies were counted and compared using the Chi Square statistic. The findings revealed that all of the abstracts included M3S4 and M3S5, and all but only one, included M3S1. Yet, M3S2 and M3S7 had not been used in the abstracts whatsoever, and M1S3 had been employed only once. It was also found that the RAAs in the *Journal of Dentistry* and the *Dental Research Journal* used the steps considerably more frequently than the RAAs in the *Journal of Dental Research* and *Frontiers in Dentistry*. The findings of this study can provide EAP instructors with practical insights into the needs and wants of dental students, and also serve as a complement to the guidelines for academic writing for dental researchers to produce more received RAAs.

**Keywords:** CARS Model; Dentistry Journals; EAP; Genre; Move Analysis; Research Article Abstract; Rhetorical Structure

### **1. Introduction**

Research article abstracts (RAAs) have received increasing attention in the academic world particularly in recent years since an abstract is believed to be "the gateway that leads readers to take up an article, journals to select contributions, or organizers of conferences to accept or reject papers" (Lorés, 2004, p. 281). In academic writing, abstracts play a fundamental role in disseminating the latest knowledge, in that they can open up and lay it out to

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the (prospective full-paper) readers as to whether the article is right for them and merits being read (Hyland, 2000). In effect, an RAA is “a lens through which research becomes available to larger audiences” (Doró, 2013, p. 119).

RAAs manifest “a well-defined and mutually understood communicative purpose” (Bhatia, 1993, p. 77), and researchers in every discipline need to obtain the knowledge and skills of writing abstracts for the assumed targeted audience in their fields which can be read and understood by their discourse community (Pho, 2008). It is not implausible to contend that a good number of research articles are not duly received and deservedly treated owing to their less-than-quality abstracts (Noguera, 2012). Ren and Li (2011) justly argue that for the abstracts of scientific manuscripts to obtain a communicative purpose, the information has to be well-defined and accurate in terms of content and rhetorical formation. Thus, linguists and applied linguists have recently turned their attention to the rhetorical construction and linguistic elements that improve the writing of RAAs contributing, in turn, to academic writing success (Wuttisrisiriporn, 2017).

Abstracts are derived text genres as they depend on formerly existing primary, original texts (Koltay, 2010). Genre, in layman’s terms, can be defined as a set of signals guiding our interpretation of texts (Frow, 2014). In effect, it is “a type of text or discourse designed to achieve a set of communicative purposes” (Swales & Feak, 2009, p. 1). The frameworks of genre analysis propose useful visions about particular aspects of language use in typical contexts (Bhatia, 2016). Genre analysis intends to make genre knowledge available to those beyond the circle of expert creators of the texts (Hyland & Shaw, 2016). It has remarkable pedagogical implications for the experts in the interactive English for Specific Purposes (ESP) and English for Academic Purposes (EAP) classrooms (Brett, 1994). A genre analysis approach to comprehend the text structure and to teach writing may result in better results for L2 learners.

Genre analysis explores the relationship between a text and its context by fragmenting the text into moves, which are small semantic units (Muangsamai, 2018). A common definition for a move is “a discursal or rhetorical unit that performs a communicative function in a written or spoken discourse” (Swales, 2004, p. 228-229), and every move can be recognized through a number of smaller rhetorical components referred to as steps (see Swales, 1990). A move indicates a text segment which has a communicative function, contributing to the universal function of an entire text (Kanoksilapatham, 2015). Each move adds to the general communicative purpose of genre while having its own purpose (Santos, 1996). Abstracts are mainly based on rhetorical activity that includes interactions between writers and readers (Cava, 2011). The genre-based approach is regularly used to

comprehend research articles (Maswana et al., 2015). The RAA genre has been one of the chief concerns of move analysis (Cotos et al., 2017). Move analysis is an effective tool in genre studies as moves are both semantic and functional elements of texts, which can be recognized due to their communicative purposes and linguistic limitations (Ding, 2007, p. 270).

The past three decades have witnessed a significant increase of scholarly interest in the structural and linguistic aspects of research articles (Lin & Evans, 2012). The linguistic aspects of RAAs and introductions have been examined considerably by Crookes (1986), Swales (1990), Bhatia (1993), Santos (1996), Hyland (2000), Samraj (2002), Lorés (2004), Pho (2008), and Suntara and Usaha (2013). There are three main approaches to genre analysis which are frequently used by researchers; first, the Create a Research Space (CARS) model presented by Swales (1990) which was essentially applied for investigating research article introductions and is also applicable to RAAs (Lorés, 2004). Second, the model proposed by Swales (1990), Introduction, Methods, Results, and Discussion (IMRD), which has been utilized chiefly to investigate RAAs. Finally, Hyland (2000) suggested a five-move structure named Introduction, Purpose, Method, Product, Conclusion (IPMPrC) model. Using these models, so far, RAAs from a great variety of disciplines have been examined in terms of rhetorical structure. For instance, studies have been conducted on abstracts in the fields of medicine (e.g., Anderson & Maclean, 1997; Busch-Lauer, 1995; Salager-Meyer, 1990; Zhao & Wu, 2013), biology (e.g., Samraj, 2005), biomedicine (e.g., Huckin, 2001), psychology (e.g., Hartley, 2003), applied linguistics (e.g., Doró, 2013; Pho, 2008; Santos, 1996; Tseng, 2011), and tentative and hard sciences (e.g., Stotesbury, 2003).

The significance of English RAAs in academic journals has led to broad attention being paid to how authors utilize the abstract to represent the latest knowledge to the academic discourse groups (Hyland, 2000; Lau, 2004; Swales, 1990). To simplify the reading and writing of RAAs, both native and non-native speakers of English need to know the rhetorical organization typically used in their fields of academic interest (Kanoksilapatham, 2005).

The current study focused on RAAs written in English by Iranian practitioners and researchers in the field of dental sciences. In order to analyze the abstracts, the current study employed genre analysis, an approach which nurtures “the study of situated linguistic behavior in institutionalized academic or professional settings,” (Bhatia, 1997, p. 181). As a result of the universal spread of English, researchers all over the world are required to become skilled in the Lingua Franca of the academia (Zibalas & Šinkūnienė, 2019). As dentistry is a discipline related to the well-being of the society, the findings can provide implications for dental researchers and practitioners and may in turn contribute to the quality of life.

## 2. Background

The research article is one of the key genres employed by scientific communities to communicate and disseminate knowledge, and research articles in English have now become one of the key channels for disseminating and advancing scientific knowledge among scholars internationally (Kanoksilapatham, 2005). In effect, English language has received special scientific attention over the past years (Donadio, 2019) as the knowledge of English language enables experts and researchers “to get access to the latest information in their fields and to effectively communicate with their colleagues throughout the world” (Yakhontova, 2003, p. 14). Within the domain of scientific publication, research articles play a central role in academic communities (Kanoksilapatham, 2007), and every day, numerous research articles in different disciplines are published in English all over the world. Research articles have now become very important in academia as through them, “people in the scientific community can keep up with the latest developments in their own fields and may build on the present research and make their own contributions to their fields” (Zhang & Zhang, 2014, p. 31).

Considering the significance of familiarity with academic genres, researchers in different disciplines have made efforts to investigate the rhetorical and discursive structures of various academic genres (Pashapour et al., 2018). Moreover, many researchers have investigated the abstract section of research articles in different disciplines since it is “generally the readers’ first encounter with a text, and is often the point at which they decide whether to continue and give the accompanying article further attention or to ignore it” (Hyland, 2002, p. 63)

In an attempt to explore the rhetorical moves of abstracts in the fields of applied linguistics and educational technology, as well as the linguistic realizations of moves and authorial stance in different abstract moves, Pho (2008) selected and examined 30 abstracts from three journals and found that there are three obligatory moves in abstracts in these two disciplines, namely (a) presenting the research, (b) describing the methodology, and (c) summarizing the results. Also, it was suggested that to differentiate moves in the abstracts, grouping some linguistic features including grammatical subjects, verb tense, and voice can be helpful. Al-Shujairi et al. (2016) explored the rhetorical moves in the abstracts of 59 published research articles selected from two disciplines (i.e., applied linguistics and teaching English as a second language) as well as the verb tense and the metadiscourse features in each move. They used the models proposed by Hyland (2000) and found that some rhetorical moves seemed to have higher occurrences than the others, and present tense was more preferable in writing abstracts.

Also, Suntara and Usaha (2013) investigated 200 abstracts using Hyland’s

(2000) model. They studied the rhetorical moves of abstracts in linguistics and applied linguistics. The results indicated that there were three and four conventional moves in abstracts in linguistics and applied linguistics, respectively. Bhatti et al. (2019) investigated the macro and micro structures in 40 linguistics and literature abstracts according to the CARS model (see Swales, 2004). The results revealed that there is no major difference between linguistics and literature abstracts at the macro level while the differences lie at the micro level.

Agathopoulou (2009) examined English abstracts in applied linguistics submitted to an international conference and identified nine moves as well as distribution of verb tense and hedging across moves. Tseng (2011) examined 90 RAAs in three applied linguistics journals in terms of the move structure features and the verb tense of each move. The results showed that the abstracts analyzed had a four-move framework. Additionally, the present tense commonly happened in the first, second, and fifth move, whereas the past tense was frequently found in the third and fourth moves.

Ren and Li (2011) investigated the rhetorical moves in 800 abstracts of Chinese Master's English theses and published research articles in applied linguistics applying Hyland's (2000) model. Their findings revealed that experts tend to be more selective in their use of moves while student writers tend to include all the moves to be more informative of the content and structure of their theses. Wang (2015) examined the rhetorical variation of abstracts written by experts and Chinese undergraduates by investigating 60 RAAs in applied linguistics using Santos's (1996) five-move model. The results showed that abstracts by the two groups of writers shared Move 2, 3 and 4. Andika and Harahap (2018) conducted a study on rhetorical structures and linguistic features of abstracts written by postgraduate students, national, and international authors in the field of applied linguistics. They found that the common moves were purpose, method, and results. They also came to the conclusion that the common linguistic features were active voice, present tense, and simple sentence. Also, Ebadi et al. (2019) intended to comparatively investigate the rhetorical differences and similarities in the abstracts and introduction sections of 60 MA theses produced by Iraqi and international students in the field of applied linguistics using Hyland's (2000) and Chen and Kuo's (2012) frameworks. Although both Iraqi and international students employed the moves with similar frequencies in their introduction, international students utilized various steps for the realization of Move 1 and Move 3.

Othman (2011) examined 39 abstracts from research articles found in English language departments at Sudanese universities utilizing the Bhatia's (2004) model. The rhetorical patterns proposed in the model were found in abstracts,

though not in the same order. Al-Zubaidi (2013) analyzed the rhetorical micro and macro structures of dissertation abstracts in linguistics using Swales' (1990), Bhatia's (1993), and Hyland's (2000) models. The rhetorical micro-analysis revealed four obligatory moves including study aims, hypotheses, results, and methodology, whereas the macro-analysis returned three obligatory moves including purpose, methodology, and result.

Saeew and Tangkiengsirisin (2014) used the Hyland's analytical framework on 200 RAAs and found that with the presence of all five moves, the structures of IPMPPrC and PMPPrC were the most prevalent in environmental science and applied linguistics, respectively. Utilizing Chen and Kuo's (2012) model for examining master's theses, Loan and Pramoolsook (2014) analyzed 24 TESOL master's theses written by Vietnamese students and showed the connection between abstracts and introductions. In practice, the writers faced an overlapping point to write the introductions and abstracts. Khansari et al. (2016) investigated 130 RAAs in linguistics journals utilizing Swales' (1990) model. The results showed that the IMRD framework was used in nearly three-fifths of the abstracts.

Jiang and Hyland (2017) explored the interactive and interactional functions metadiscursive nouns perform in the rhetorical moves of 240 research abstracts from six disciplines. The results showed how these nouns are frequently used to frame and coherently manage arguments. Can et al. (2016) looked into the structure of moves in 50 RAAs in applied linguistics. It was revealed that authors often violate the common move arrangements. Tankó (2017) scrutinized rhetorical moves and their linguistic realizations in 135 RAAs. The results showed that literary RAAs have a non-hierarchical eight-move structure with four fixed moves, whose roles are to display 'background', 'purpose', 'methodology', and 'results'. El-Dakhs (2018) conducted a research on 200 abstracts in more and less prestigious journals using Hyland's (2000) model. It was found that in the less prestigious journals, abstracts commonly include longer moves for introduction, purpose and method, while in the more prestigious journals, abstracts contain significantly lengthier results.

Loan (2018) explored both the rhetorical structures and the grammatical and interactional metadiscourse features using 584 English abstracts of empirical articles. The results showed that there were informative, indicative and combinatory types of abstracts; also, there was a major presence of active voice, future tense, and the scanty use of interactional meta-discourse devices across the moves. Omidian et al. (2018) explored instances of conformity in 5910 abstracts of hard and soft sciences. It was found that members of different academic domains have different priorities for demonstrating their research in academic abstracts. Kosasih (2018) analyzed the move structure

of 40 English abstracts of students' theses in four disciplines with Bhatia's (1993) four-move structure and Swales and Feak's (2004) five-move structure. The study revealed that aim-method-result (IMR) move structure was the most frequent abstract move structure, and the present tense and past tense were used in each move across the four disciplines.

Twenty-nine semi-randomly selected online RAAs taken from three Middle East and North Africa (MENA)-based journals in applied linguistics using Hyland's (2000) move structure were analyzed by Briones (2018). It was found that the most common moves across the corpora of two of the three journals were the purpose, method, and product moves. Moreover, only three abstracts featured the complete and sequenced IPMPPrC structure. Gráf (2018) presented 120 English abstracts written by Czech linguists on the basis of rhetorical move analysis and found that many of these abstracts fail to include moves which are generally considered obligatory.

Adopting Hyland's (2000) model, Viera (2019a) investigated 80 RAAs published in native and non-native English-speaking countries in terms of rhetorical structure. It was found that M2, M3, and M4 were predominantly used in the abstracts. Also, a comparative study was conducted by Viera (2019b) on the rhetorical structure and linguistic features of 120 English and Spanish abstracts in humanities and science. The findings illustrated that abstracts from four disciplines published in Ecuadorian and North American journals focused on purpose, method, and product. Moreover, present and past tense and hedges were the most frequent categories. Likewise, Li (2020) explored the differences in rhetorical preferences between 108 English and Chinese RAAs. Results suggested that product and method are much more common in English RAAs compared with their Chinese counterparts.

Annuai (2019) compared the rhetorical structure of 60 RAAs in the information and communications technology field using Hyland's (2000) model. It was revealed that the frequency of occurrence of the conclusion move was different and the present simple tense was the most frequent choice. Zibalas and Šinkūnienė (2019) scrutinized the rhetorical organization of RAAs and conference abstracts in the field of linguistics. They found that the moves background, purpose, methods, and results are distributed similarly across the two types of abstracts.

In order to examine whether the Scopus journal quartile influences the rhetorical structure and linguistic realizations of applied linguistics RAAs from Scopus-indexed journals, Kurniawan et al. (2019) studied 28 abstracts from journals in the field of applied linguistics using Hyland's (2000) model. The findings revealed that journal quartile does not essentially influence the display of each move and step.

In the Iranian context, Talebinezhad et al. (2012) used Swales' (1990) model to compare the structural variations in 64 abstracts translated from Persian into English, with abstracts originally written in English in the field of medical sciences published in international journals. They found that the translated abstracts meet the established criteria for scientific writing while the original texts often ignore the criteria. Marefat and Mohammadzadeh (2013) investigated 90 English and Persian abstracts written in the field of literature utilizing IMRD and CARS models. They found that literature abstracts generally matched the CARS model more than IMRD.

Zand-Moghadam and Meihami (2016) conducted a rhetorical move analysis of 300 thesis abstracts in Teaching English as a Foreign Language (TEFL) based on Hyland's (2000) rhetorical move framework. The findings indicated a move from purpose-method-product to introduction-purpose-method-product-conclusion. Investigating RAAs written in English and Persian in the law discipline based on Hyland's (2000) five-move structure model, Ghasempour and Farnia (2017) found that all moves were considered as obligatory in English RAAs, while move one and move two served as obligatory in Persian abstracts. They also analyzed verb tenses according to Tseng (2011) and discovered that the present tense was the preferred tense in all moves in English and the past tense in the method section in Persian abstracts.

Noorizadeh-Honami and Chalak (2018) investigated the abstracts of 60 articles in English and Persian according to the IMRD framework (Swales, 1990). IMRD and IMR were identified as the most frequent patterns used in both groups. A rhetorical move analysis method to analyze 4214 research abstracts of the scientometrics journal based on Hyland's (2000) model was conducted by Rashidi and Meihami (2018). The results indicated that most of the information provided by the research abstracts was on method and results of the studies. Paydari and Paramasivam (2019) analyzed rhetorical move analysis in 120 political science RAAs in English in Iranian journals. Findings revealed that political science writers of Iranian journals seldom used Move 1 (introduction), Move 4 (product) and Move 5 (conclusion).

Disciplinary genre analysis studies examining RAAs are on an increase. Yet, analyses of abstracts in PubMed-indexed journals are still scant. Also, limited studies have already investigated English abstracts written by Persian writers in prestigious Iranian journals; whereas numerous studies have investigated RAAs in the field of applied linguistics, RAAs in some disciplines including medical sciences, and particularly dentistry, have received little and rare attention. Therefore, the current study scrutinized dentistry RAAs written in English by Persian native speakers published in prestigious Iranian journals. Specifically, it is a twofold effort, firstly to examine the frequency of rhetorical

moves and steps in the RAAs of prestigious Iranian journals of dentistry based on the CARS model, and second to investigate the association between the frequency of moves and steps used in the selected journals of dentistry according to the CARS model.

### 3. Method

#### 3.1. The corpus

The corpus of this study consisted of 251 dentistry RAAs written in English by Persian native speakers. Following consultations with an expert in the field, nine specialized journals in this field (publishing researches in the specific branches of dentistry) and 14 general dentistry journals (covering all aspects of dentistry and related topics) were identified. From the nine specialized journals, seven journals publish articles in the Persian language: *Journal of Craniomaxillofacial Research* (pISSN: 2345-5489, eISSN: 2345-6213); *Journal of Oral Health and Oral Epidemiology* (eISSN: 2322-1372); *Iranian Journal of Orthodontics* (pISSN: 1735-5087, eISSN: 2383-3491); *Journal of Advanced Periodontology and Implant Dentistry* (eISSN: 2645-5390); *Journal of Dental Materials and Techniques* (pISSN: 2322-4150; eISSN: 2252-0317); *Journal of Dentomaxillofacial Radiology, Pathology and Surgery* (ISSN: 2251-7847); *Journal of Dental Biomaterials* (pISSN: 2383-3971, eISSN: 2383-398X). Two of the specialized journals publish articles in the English language: *Iranian Endodontic Journal* (eISSN: 2008-2746), and *Iranian Journal of Pediatric Dentistry* (pISSN: 1735-8434, eISSN: 1735-8434).

General dentistry journals publishing English articles included *FiD* (eISSN: 2676-296X); *Journal of Dentistry* (pISSN: 2345-6485, eISSN: 2345-6418); *Dental Research Journal* (ISSN: 2008-0255); *Journal of Dental Research, Dental Clinics, Dental Prospects* (ISSN: 2008-210X, eISSN: 2008-2118); *Journal of Islamic Dental Association of Iran* (eISSN: 2383-3041); *Caspian Journal of Dental Research* (pISSN: 2251-9890, eISSN: 2322-2395); *Journal of Research in Dental and Maxillofacial Sciences* (pISSN: 2588-4166, eISSN: 2383-2754); *Journal of Dental School* (eISSN: 2645-4351); *Avicenna Journal of Dental Research* (ISSN: 2008-7659, eISSN: 2423-7582); *Journal of Shahid Sadoughi Dental School of Yazd* (pISSN: 2008-112X). Journals publishing only Persian articles included the *Journal of Dental Medicine* (pISSN: 1024-641X, eISSN: 2008-2444); *Journal of Isfahan Dental School* (pISSN: 1735-255X, eISSN: 2008-6989); *Journal of Mashhad Dental School* (pISSN: 1560-9286, eISSN: 2008-2347); *Journal of Research in Dental Sciences* (eISSN: 2228-7353).

Due to the peculiarities that articles (and their abstracts) in specialized journals might have, we decided to select the RAAs from the general dentistry journals. From among the 14 general dentistry journals, the ones which were indexed in PubMed and also publish articles in English were included for the

selection of RAAs. Four journals passed these criteria: *Dental Research Journal (DRJ)*, *Frontiers in Dentistry (FiD)*, *Journal of Dental Research (JoDR)*, and *Journal of Dentistry (JoD)*.

The RAAs published in 2018, 2019 and 2020 (until the end of October) were randomly selected from these four journals. Altogether, 65 RAAs from *DRJ*, 68 from *FiD*, 52 from *JoDR* and 66 from *JoD* were selected. The difference in the number of selected abstracts from the four journals has two reasons: First, based on the purpose of the study, the RAAs from the articles written by non-Iranian authors were removed from the corpus. Second, at the end of October 2020, when the RAAs were selected, the number of RAAs published in 2020 was different in the selected journals.

### 3.2. Rhetorical analysis framework

A checklist containing the frequency of occurrence of rhetorical moves was used to analyze the corpus in the study. Swales' (2004) CARS model, which is a revision of his previous model (Swales, 1990), was employed as the basis of analysis to identify the moves. The detailed explanation of the models is shown in Table 1 below.

Table 1  
*The CARS Model by Swales (2004)*

Move	Step
M1: Establishing Research Territory	S1 Claiming centrality and/or
	S2 Making topic generalizations and/or
	S3 Reviewing items of previous research
M2: Establishing a Niche	S1A Indicating a gap
	S1B Adding to what is known
	S2 Presenting positive justification
M3: Presenting Present Research	S1 Announcing present research purposively/descriptively
	S2 Presenting research questions/hypotheses
	S3 Definitional clarification
	S4 Summarizing methods
	S5 Announcing principle outcomes
	S6 Stating the value of present paper
	S7 Outlining structure of paper

The model consists of three moves including (1) establishing research territory, expressing that the general area of research is important; (2) establishing a niche, making a strong argument that the particular piece of

research is important; and (3) presenting present research, announcing the means by which the study will contribute new knowledge compared to prior studies.

### 3.3. Procedure

In order to identify the rhetorical moves of RAAs, the present study adopted Swales' (2004) CARS model. The unit of move analysis was phrase. The corpus was scanned thoroughly and coded by two raters for the move structure. Each sentence was given a move label. The raters scrutinized the abstracts and highlighted each move in a different color. In effect, data analysis was carried out in two stages. In the first stage, the researchers encoded the rhetorical structures of 251 RAAs in each corpus following the CARS (2004) model. In the second phase, based on the model and the patterns used by the writers in their abstracts, the expected patterns of RAAs were compared.

### 3.4. Data analysis

The present effort was a corpus-based study. Corpus-based methods employ corpora of texts, in the written or spoken form (Scott & Tribble, 2006). After the data were collected and the corpus was obtained, the frequencies of moves occurrence were counted by the raters to obtain the information about the rhetorical features. The frequencies were counted and compared using the Chi-Square statistic in *SPSS* to examine whether there is any association between the frequency of moves and steps in the selected journals of dentistry according to the CARS (2004) model.

## 4. Results

This study investigated 251 RAAs of four Iranian PubMed-indexed dentistry journals using the CARS framework for move analysis by Swales (2004). The first aim of the research was to find the frequency of rhetorical moves and steps in the RAAs of the selected journals of dentistry according to the model. As can be seen in Table 2 (below), most of the steps were used in the abstracts. All of the abstracts included M3S4 and M3S5 (summarizing methods and announcing principle outcomes, respectively), and all of them but one included M3S1 (announcing present research purposively/descriptively). Interestingly, M3S2 and M3S7 (presenting research questions/hypotheses and outlining structure of paper, respectively) had not been used whatsoever in the abstracts, and M1S3 (reviewing items of previous research) had only been used once.

Among other steps used, three steps had been frequently used including M2S2 (presenting positive justification) with the frequency of 98, M1S2 (making topic generalizations) with 47 occurrences and M1S1 (claiming

centrality) which occurred 36 times. Yet, four steps had seldom been utilized by the writers, namely M2S1 A (indicating a gap), M3S3 (definitional clarification), M2S1 B (adding to what is known) and M3S6 (stating the value of present paper) with the frequencies of 28, 17, 13, and 7, respectively.

Table 2  
*Frequency and Percentage of Move/Step in the Dentistry RAAs*

Move/Step	Frequency (X/251)	Percent (%)
M1S1	36	14.3
M1S2	47	18.7
M1S3	1	.4
M2S1 A	28	11.2
M2S1 B	13	5.2
M2S2	98	39
M3S1	250	99.6
M3S2	0	0
M3S3	17	6.8
M3S4	251	100
M3S5	251	100
M3S6	7	2.8
M3S7	0	0

While Table 2 illustrates the frequency and percentage of each move/step in the RAAs, Table 3 (below), and the descriptions that are presented, explain the implementation of each move/step in the four journals separately in order to examine the probable associations between the frequency of moves and steps used in the selected journals of dentistry according to CARS (2004) model.

As indicated in Table 3 (below), only 14.3 % ( $n = 36$ ) of the RAAs had the Step 1 of Move 1 in the model, while 85.7% of the abstracts ( $n = 215$ ) did not enjoy such an inclusion. When checking the cross-tabulation table for the percentage of the abstracts in different journals encompassing Step 1 in Move 1, a clear difference was found between the majority of them, with *DRJ* standing first with a rate of 38.9%, *JoD* ranking second with a rate of 30.6%, *JoDR* standing third with a rate of 22.2%, and *FiD* standing last with a rate of 8.3%. The result of the Chi-square test for independence of the observation indicated a significant difference between the four journals in the inclusion of this step in their published abstracts,  $X^2(3, n = 251) = 8.53, p = .04$ , Cramer's  $V = 0.18$  (large).

Table 3  
*Frequency and Percentage of Moves and Steps in the Dentistry RAAs*

			<i>f</i>	%	Valid %	Cumulative %
M1S1	Valid	0	215	85.7	85.7	85.7
		1	36	14.3	14.3	100.0
		Total	251	100.0	100.0	
M1S2	Valid	0	204	81.3	81.3	81.3
		1	47	18.7	18.7	100.0
		Total	251	100.0	100.0	
M1S3	Valid	0	250	99.6	99.6	99.6
		1	1	.4	.4	100.0
		Total	251	100.0	100.0	
M2S1 A	Valid	0	223	88.8	88.8	88.8
		1	28	11.2	11.2	100.0
		Total	251	100.0	100.0	
M2S1 B	Valid	0	238	94.8	94.8	94.8
		1	13	5.2	5.2	100.0
		Total	251	100.0	100.0	
M2S2	Valid	0	153	61.0	61.0	61.0
		1	98	39.0	39.0	100.0
		Total	251	100.0	100.0	
M3S1	Valid	0	1	.4	.4	.4
		1	250	99.6	99.6	100.0
		Total	251	100.0	100.0	
M3S2	Valid	0	251	100.0	100.0	100.0
M3S3	Valid	0	234	93.2	93.2	93.2
		1	17	6.8	6.8	100.0
		Total	251	100.0	100.0	
M3S4	Valid	1	251	100.0	100.0	100.0
M3S5	Valid	1	251	100.0	100.0	100.0
M3S6	Valid	0	244	97.2	97.2	97.2
		1	7	2.8	2.8	100.0
		Total	251	100.0	100.0	
M3S7	Valid	0	251	100.0	100.0	100.0

As shown in Table 3 below, only 18.7% ( $n = 47$ ) of all RAAs had included the Step 2 of Move 1 in the model, while 81.3% ( $n = 204$ ) had not. According to the cross-tabulation table for the percentage of the abstracts in different journals encompassing Step 2 in Move 1, there is a clear difference between them, with *JoD* standing first with a rate of 53.2%, *DRJ* ranking second with a

rate of 23.4%, *FiD* standing third with a rate of 12.8%, and *JoDR* standing last with a rate of 10.6%. The result of the Chi-square test for independence of the observation indicated a significant difference between the four journals in the inclusion of this step in their published abstracts,  $X^2(3, n = 251) = 23.27, p = .00$ , Cramer's  $V = 0.30$  (large).

According to Table 3 above, only .4% ( $n = 1$ ) of all RAAs had the Step 3 of Move 1 in the model, while 99.6% ( $n = 250$ ) did not. As shown in Table 3, only 11.2% ( $n = 28$ ) of the RAAs had the Step 1 A of Move 2 in the model, while 88.8% ( $n = 223$ ) did not. Based on cross-tabulation, Step 1 A in Move 2 could be found in *JoD* with a rate of 57.1%, then in *DRJ* with a rate of 25.0%, next in *JoDR* with a rate of 10.7%, and finally in *FiD* with a rate of 7.1%. The result of the Chi-square test for independence of the observation indicated a significant difference between the four journals in the inclusion of this step in their published abstracts,  $X^2(3, n = 251) = 17.57, p = .00$ , Cramer's  $V = 0.27$  (large). As can be seen in Table 3 above, only 5.2% ( $n = 13$ ) of all the abstracts includes the Step 1 B of Move 2 in the model, while 94.8% ( $n = 238$ ) did not enjoy such an inclusion.

The cross-tabulation table indicated that Step 1 B in Move 2 was frequently used in three of the journals, namely *JoD* (53.8%), *DRJ* (30.8%), and *JoDR* (15.4%). However, *FiD* did not include this step at all. The result of the Chi-square test for independence of the observation indicated a significant difference between the four journals in the inclusion of this step in their published abstracts,  $X^2(3, n = 251) = 7.99, p = .05$ , Cramer's  $V = 0.18$  (large). As indicated in Table 3, 39% ( $n = 98$ ) of the RAAs had the Step 2 of Move 2 in the model, while 61% ( $n = 153$ ) did not.

The cross-tabulation table for the percentage of the abstracts in different journals comprising Step 2 in Move 2 showed that *JoD* stood first with a rate of 36.7%, *JoDR* ranked second with a rate of 26.5%, *FiD* graded third with 19.4%, and *DRJ* stood last with 17.3%. The result of the Chi-square test for independence of the observation indicated a significant difference between the four journals in the inclusion of this step in their published abstracts,  $X^2(3, n = 251) = 17.35, p = .00$ , Cramer's  $V = 0.26$  (large). As shown in the Table 3 above, 99.6% ( $n = 250$ ) of the abstracts included the Step 1 of Move 3 in the model, while only .4% ( $n = 1$ ) did not. The above table (Table 3) showed that 100% ( $n = 251$ ) of all the RAAs did not include the Step 2 of Move 3 in the model. Only 6.8% ( $n = 17$ ) of all the abstracts had the Step 3 of Move 3 in the model, whereas 93.2% ( $n = 234$ ) did not (see Table 3).

According to cross-tabulation, Step 3 in Move 3 was available in all the journals with different rates. *JoD* stood first with a rate of 35.3%, *DRJ* ranked second with a rate of 29.4%, *FiD* was third with a rate of 23.5%, and *JoDR* stood last with a rate of 11.8%. The result of the Chi-square test for

independence of the observation indicated a significant difference between the four journals in the inclusion of this step in their published abstracts,  $X^2(3, n = 251) = 1.44, p = .70$ , Cramer's  $V = 0.08$  (small). In Table 3 above, it is shown that 100 % ( $n = 251$ ) of all the abstracts had the Step 4 of Move 3 in the model. As can be seen in Table 3, 100 % ( $n = 251$ ) of all RAAs did include the Step 4 of Move 3 in the model. As specified in Table 3 above, only 2.8 % ( $n = 7$ ) of all RAAs included the Step 6 of Move 3 in the model, while 97.2% ( $n = 244$ ) did not.

After checking the cross-tabulation table, it was found that Step 6 in Move 3 happened in three journals including *DRJ* standing first with a rate of 57.1%, *JoD* ranking second with 28.6%, and *FiD* standing third with a rate of 14.3%. However, this step was not observed in *JoDR*. The result of the Chi-square test for independence of the observation indicated a significant difference between the four journals in the inclusion of this step in their published abstracts,  $X^2(3, n = 251) = 4.66, p = .20$ , Cramer's  $V = 0.14$  (medium). As seen in Table 3 above, 100 % ( $n = 251$ ) of all the abstracts did not include the Step 7 of Move 3 in the model.

Table 4  
*Ranking of Journals Based on Each Move/Step*

Move/Step	<i>DRJ</i>	<i>JoD</i>	<i>FiD</i>	<i>JoDR</i>
M1S1	1	2	4	3
M1S2	2	1	3	4
M1S3	-	-	-	-
M2S1 A	2	1	4	3
M2S1 B	2	1	4	3
M2S2	4	1	3	2
M3S1	-	-	-	-
M3S2	-	-	-	-
M3S3	2	1	3	4
M3S4	-	-	-	-
M3S5	-	-	-	-
M3S6	1	2	3	4
M3S7	-	-	-	-
Total	14	9	24	23

The second concern of the study was to see if any association could be found between the frequency of moves and steps used in the selected journals of dentistry according to the CARS (2004) model. As seen in Table 4, all of the

journals employed M3S4 and M3S5 as well as M3S1 (except one RAA). Nonetheless, none of the abstracts in the four journals included M3S7 and M3S2 as well as M1S3 (except one). Therefore, the journals had a similar trend towards using the six steps. Generally, all of the journals had most of the steps in their abstracts. However, *JoD* and *DRJ* used the steps considerably more frequently than the other two viz *JoDR* and *FiD*. Accordingly, *JoD* ranked first among the four journals in using different moves/steps, followed by *DRJ*, *JoDR*, and *FiD*, respectively.

## 5. Discussion and conclusion

The findings of Bhatti et al. (2019) who investigated the structures in linguistics and literature abstracts according to CARS model showed that there is no major difference between the linguistics and literature abstracts based on this model. Both disciplines had a similar trend towards using the moves. Besides, they found that M3S5 was available in all abstracts, while M1S2 was frequently used in both disciplines. Also, M1S3, M2S1 A, M2S1 B, M2S2, M3S2, M3S3, M3S4, and M3S7 were not used at all. The current study revealed a similar pattern in a hard science (i.e., dentistry). Our findings displayed that M3S5 happened in all of the abstracts while M1S3, M3S2, and M3S7 could not be found in the abstracts of the four dentistry journals (except in one case, in M1S3). Therefore, it can be argued that presenting a brief summary of key findings (M3S5) seems to be essential in the selected linguistics, literature, and dentistry abstracts. Yet, synthesizing prior researches (M1S3), presenting research questions or hypotheses (M3S2), and summarizing the structure of the paper (M3S7) were not equally welcome in the three different disciplines.

Additionally, Marefat and Mohammadzadeh (2013) investigated English and Persian abstracts written in the field of literature utilizing IMRD and CARS models. They analyzed Persian research articles written by Persian native speakers, English articles written by Persian native speakers, and English articles written by English native speakers in the field of literature and found that the three groups incorporated M1 and M3 into the abstracts frequently while M2 was seldom used. They did not investigate each step separately. The results of the present study, however, show that all of the moves were frequently found in the abstracts of four dentistry journals.

After analyzing the moves and steps in the selected abstracts, we found that in six cases, two moves had been embedded, one nested within the other, corroborating Samraj (2005), who contends that “a sentence may sometimes be a realization of more than one move” (p. 146). Also, Pho (2008) suggests that a sentence in an abstract can articulate two or three functions at the same time, so the sentence is coded as dual or more moves. In one of the

abstracts (from *JoDR*, No. 3, 2019), for instance, the sentence “diseases of the paranasal sinuses are very prevalent in East Azerbaijan Province, Iran” contains two moves at the same time, namely M1S1 and M2S2. The term prevalent denotes the importance of the topic and provides evidence to support why the topic is significant (M1S1), and at the same time, it expresses the justification for conducting the study (M2S2).

Furthermore, in six cases, the categorization of abstract sections was found to be unsuitable including the cases in *DRJ*, No. 2, 2018 and No. 2, 2020; *JoDR*, No. 1, 2018, and No. 3, 2018; and *JoD*, Issue 1, 2020 and Issue 3, 2020. In *JoD*, Issue 3, 2020, for instance, the ‘purpose’ section contains a part of ‘introduction’. The sentence “It was believed that the presence of B-cells and plasma cells in the sub-epithelial inflammatory infiltrate, rules out the diagnosis of OLP” is part of the introduction section which is improperly placed in the purpose section.

Based on the results, all of the moves had been utilized in the RAAs. Moreover, most of the steps had been used in the abstracts while all of the abstracts included summarizing methods (M3S4) and announcing principle outcomes (M3S5), and all except one included announcing present research purposively/descriptively (M3S1). Nonetheless, presenting research questions/hypotheses (M3S2) and outlining structure of paper (M3S7) were not used whatsoever in the abstracts, and reviewing items of previous research (M1S3) had only been employed once.

From among the other steps used, three steps were applied frequently including presenting positive justification (M2S2), making topic generalizations (M1S2) and claiming centrality (M1S1). Yet, four steps were rarely utilized by the abstract writers that are indicating a gap (M2S1 A), definitional clarification (M3S3), adding to what is known (M2S1 B), and stating the value of present paper (M3S6). All in all, although *JoD* and *DRJ* used the steps considerably more than *JoDR* and *FiD*, the journals seem to follow a relatively similar trend towards using the six steps

The findings of the study revealed that the corpus generally followed the model in the use of the main moves including ‘establishing research territory’ (M1), ‘establishing a niche’ (M2) and ‘presenting present research’ (M3). However, describing the aim of the research in terms of what the study is going to do or achieve (M3S4), presenting a summary of major findings (M3S5), as well as explaining the objectives of the study in a clear language (M3S1) seemed to be critical in writing the abstracts of the selected journals in the field of dentistry and dental sciences. Therefore, the three moves, namely M3S4, M3S5 and M3S1, account for the overall communicative purposes of the selected dentistry RAAs.

Nonetheless, raising key questions about the outcomes of gaps in prior research that will be investigated in the study (M3S2), declaring how the rest of the study will be organized (M3S7), and stating what has been discovered with who has discovered it (M1S3) did not constitute a concern in the dentistry RAAs. Also, it is noteworthy that in six cases, two moves were embedded one within the other, and in six cases, the categorization of abstract sections by the writers was not suitable.

This study examined the rhetorical move analysis of dentistry RAAs using CARS model, yet other studies can be carried out on RAAs in other disciplines using the same model. Further studies can also be conducted using other frameworks such as IMRD by Swales (1990) or IPMPrc by Hyland (2000). Future studies can also examine other sections of research articles in the field of dentistry, including introduction, methodology, results, discussion, and conclusion. In future studies, it would be worthwhile to expand the research to further journals to better recognize what the dentistry professional community does in writing abstracts. The findings of this study can benefit dental students, researchers, and practitioners, as well as EAP instructors in dentistry, and also researchers in other disciplines (particularly in medical sciences) to write better abstracts for their specialized community.

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