

Anafilaxia: conhecimento entre cirurgiões bucomaxilofaciais

Anaphylaxis: knowledge among oral and maxillofacial surgeons

Anafilaxia: conocimiento entre cirujanos orales y maxilofaciales

Recebido: 26/07/2020 | Revisado: 01/08/2020 | Aceito: 10/08/2020 | Publicado: 15/08/2020

Amanda Freire de Melo Vasconcelos

ORCID: <https://orcid.org/0000-0003-1466-3828>

Universidade Federal de Pernambuco, Brasil

E-mail: afmvodonto@gmail.com

Romeyka Karinny Almeida de Freitas

ORCID: <https://orcid.org/0000-0001-9852-7107>

Universidade de Pernambuco, Brasil

E-mail: romeyka_karinny@hotmail.com

Éwerton Daniel Rocha Rodrigues

ORCID: <https://orcid.org/0000-0003-1969-8288>

Universidade de Pernambuco, Brasil

E-mail: ewertondaniel27@hotmail.com

Belmiro Cavalcanti do Egito Vasconcelos

ORCID: <https://orcid.org/0000-0002-6515-1489>

Universidade de Pernambuco, Brasil

E-mail: belmirovasconcelos@gmail.com

Emanuel Sávio Cavalcanti Sarinho

ORCID: <https://orcid.org/0000-0003-3331-6274>

Universidade Federal de Pernambuco, Brasil

E-mail: emanuel.sarinho@gmail.com

Resumo

O objetivo do presente estudo foi avaliar o conhecimento sobre a conduta e o manejo adequado da anafilaxia por parte dos cirurgiões bucomaxilofaciais. Uma avaliação quantitativa foi realizada através de uma pesquisa cognitiva sobre o assunto. A amostra foi composta por 104 especialistas e que participaram da Conferência Brasileira de Cirurgia e Traumatologia Oral-Maxilofacial. Um total de 31,7% dos entrevistados desconhecia qualquer protocolo para anafilaxia. Entre aqueles com informações sobre o assunto, a maioria (78,8%) relatou que a

adrenalina é o principal medicamento para o tratamento da anafilaxia, mas 50% desses indivíduos não sabiam a dosagem correta e apenas 35,6% relataram que a administração intramuscular era a via adequada. Apenas 12,5% relataram ter testemunhado um caso de anafilaxia e todos esses casos foram resolvidos com um resultado favorável. Um número considerável de cirurgiões (34,6%) relatou não ter nenhum medicamento para atendimento de emergência em seus consultórios, mas a maioria (71,2%) relatou ser capaz de administrar tais medicamentos. Esses achados revelaram um desconhecimento por parte de muitos cirurgiões bucomaxilofaciais sobre reações anafiláticas e seu tratamento.

Palavras-chave: Anafilaxia; Cirurgiões bucomaxilofacial; Epinefrina.

Abstract

The aim of the present study was to evaluate knowledge regarding the conduct and adequate management of anaphylaxis on the part of oral-maxillofacial surgeons. A quantitative evaluation was performed through a cognitive survey on the subject. The sample was composed of 104 specialists and who participated in the Brazilian Oral-Maxillofacial Surgery and Traumatology Conference. A total of 31.7% of the interviewees were unaware of any protocol for anaphylaxis. Among those with information on the subject, the majority (78.8%) reported that adrenaline is the main drug for the treatment of anaphylaxis, but 50% of these individuals did not know the correct dosage and only 35.6% reported that intramuscular administration was the proper route. Only 12.5% reported having witnessed a case of anaphylaxis and all such cases were resolved with a favorable outcome. A considerable number of surgeons (34.6%) reported not having any drug for emergency care in their offices, but the majority (71.2%) reported being capable of administering such drugs. The present findings revealed a lack of knowledge on the part of many oral-maxillofacial surgeons regarding anaphylactic reactions and treatment.

Keywords: Anaphylaxis; Oral and maxillofacial surgeons; Epinephrine.

Resumen

El objetivo del presente estudio fue evaluar el conocimiento sobre la conducta y el manejo adecuado de la anafilaxia por parte de los cirujanos orales y maxilofaciales. Se realizó una evaluación cuantitativa a través de la investigación cognitiva sobre el tema. La muestra consistió en 104 especialistas que participaron en la Conferencia Brasileña de Cirugía y Traumatología Oro-maxilofacial. Un total de 31.7% de los encuestados no conocía ningún protocolo para la anafilaxia. Entre aquellos con información sobre el tema, la mayoría

(78.8%) informó que la adrenalina es el medicamento principal para el tratamiento de la anafilaxia, pero el 50% de estos individuos no conocía la dosis correcta y solo el 35.6% informó que la administración intramuscular fue la ruta adecuada. Solo el 12.5% informó haber presenciado un caso de anafilaxia y todos estos casos se resolvieron con un resultado favorable. Un número considerable de cirujanos (34,6%) informó que no tenía ningún medicamento para atención de emergencia en sus consultorios, pero la mayoría (71,2%) informó que podía administrar dichos medicamentos. Estos hallazgos revelaron una falta de conocimiento por parte de muchos cirujanos maxilofaciales sobre las reacciones anafilácticas y su tratamiento.

Palabras clave: Anafilaxia; Cirujanos orales y maxilofaciales; Epinefrina.

1. Introduction

Anaphylaxis is a severe, life-threatening, systemic allergic reaction (Maher, et al., 2014; Muraro, et al., 2014). It is estimated that 0.05 to 2% of the world's population has an anaphylactic reaction at some time in life (Fineman, et al., 2013). Anaphylactic reactions may be precipitated by a variety of commonly used or prescribed therapeutic agents found in the practice of dentistry. This is considered a clinical emergency and dentists should be familiarized with its management (Maher, et al., 2014; Muraro, et al., 2014).

For the diagnosis of an anaphylactic reaction, there needs to be an acute onset (minutes/hours) of two or more of the following factors: involvement of the mucosa or skin (hives, angioedema), airway impairment (wheezing, dyspnea) and/or reduced blood pressure,(González-Pérez, et al., 2010) as well as associated symptoms, such as hypotonia, syncope and a temporal relation with the potential causal agent (González-Pérez, et al., 2010; Maher, et al., 2014).

Health professionals are expected to be prepared to recognize anaphylaxis and manage it properly. However, some articles have demonstrated that dentists are not prepared for this situation (Arsati, et al., 2010; Çetinkaya, et al., 2011; Girdler & Smith, 1999; Müller, et al., 2008). Therefore, the aim of the present study was to evaluate knowledge on the part of oral-maxillofacial surgeons regarding the conduct and adequate management of anaphylaxis. To the best of our knowledge, no previous studies have addressed this subject.

2. Methodology

A quantitative assessment was carried out through a cognitive survey on the topic anaphylaxis. The data collection instrument was a questionnaire developed by the researchers containing questions about the management of anaphylaxis. A descriptive, cross-sectional study was conducted (Pereira, et al., 2018) with a convenience sample of oral-maxillofacial surgeons and residents who participated in the Brazilian Oral-Maxillofacial Surgery and Traumatology Conference in September 2017. A cognitive survey was performed.

This study received approval from the Human Research Ethics Committee of the Federal University of Pernambuco (certificate number: 82643518.2.0000.5198) and was conducted in accordance with the ethical precepts stipulated in the Declaration of Helsinki. All participants read and signed the statement of informed consent. The questionnaire had 20 items addressing general knowledge on anaphylaxis.

The data were analyzed descriptively. Categorical variables were expressed as absolute and relative frequencies. To test associations between two categorical variables, we used Pearson's chi-square test or Fisher's exact test, when appropriate. A p-value < 0.05 was considered indicative of statistical significance. The chi-square test of equality of proportions in a single population was used for the hypothesis of equal proportions between the categories of the variables. The margin of error for the decision on the statistical tests was 5% and 95% confidence intervals were calculated. The data were entered onto an EXCEL spreadsheet and IMB SPSS was used for the data analysis.

3. Results

Most participants were male (82.7%). The age of the respondents ranged from 21 to 65 years (mean: 33.89 years). The most prevalent age group was 21 to 39 years. The majority (65.4%) was composed of specialists and the rest were residents. Among the specialists, the largest portion (29.6%) corresponded to those with one to five years in the specialty, followed by six to 15 years (23.1%). As you can see in Table 1.

Table 1 – Characteristics of sample.

Variable	n	%
TOTAL	104	100.0
Sex		
Male	86	82.7
Female	18	17.3
Age group (years)		
21 to 29	42	40.4
30 to 39	42	40.4
40 to 65	20	19.2
Status of specialist		
Specialist	68	65.4
Resident	36	34.6
Time in specialty (years)		
1 to 5	28	26.9
6 to 15	24	23.1
16 to 37	16	15.4
Is not specialist	36	34.6
Educational institution		
UFPE	6	5.8
UPE	41	39.4
ASCES	1	1.0
UFPB	2	1.9
UEPB	1	1.0
Hospital Geral de Cuiabá	6	5.8
São Leopoldo Mandic	1	1.0
UFPI	1	1.0
UFC	1	1.0
Santa Casa de Piracicaba	2	1.9
Faculdade de Odontologia de Araraquara	1	1.0
UNIOESTE	1	1.0
PUC-RS	1	1.0
USP	6	5.8
Not informed	33	31.7
Postgraduate degree		
Master's	31	29.8
Doctorate	12	11.5
Post-doctorate	4	3.8
No postgraduate degree	57	54.8

Source: Authors

In Table 2 it is possible to observe that approximately two-thirds (66.3%) of the participants reported having read some protocol for anaphylaxis. Eighty-two participants (78.8%) correctly stated the main drug used to treat the condition, but only 24% correctly stated the proper dose (0.3 to 0.5 mg). Fifty-two (50%) state the incorrect dose and 27 (26%) did not inform the dose. A total of 35.6% of the respondents correctly stated the administration route (intramuscular), whereas others incorrectly stated the intravenous route (29.8%) and subcutaneous route (26.9%) and 1.9% did not inform the route. When asked if they knew another drug of secondary use, 68.33% answered affirmatively and 23.1% of these respondents correctly stated corticoid + antihistamine, followed by the incorrect answers

corticoid (22.1%), antihistamine (13.5%) and other drugs (7.7%). Only 23.1% reported having heard of a self-injected drug protocol and 16.3% of these respondents correctly stated the name of the drug (adrenaline) (Table 2).

Table 2 – Answers to questions about anaphylaxis: “Have you ever read a protocol about anaphylaxis?”, “Main drug in treatment of anaphylaxis?”, “Dose”, “Administration route”, “Knowledge of other drug of secondary use?”, “Have you ever heard of self-injectable drug protocol and what drug”.

Variable	N	%
TOTAL	104	100.0
Have you ever read a protocol about anaphylaxis?		
Yes	69	66.3
No	33	31.7
Not informed	2	1.9
What is the main drug for the treatment of anaphylaxis?		
Adrenaline (correct)	82	78.8
Corticoid	11	10.6
Antihistamine	7	6.7
No answer	4	3.8
Proper dose?		
Correct (0.2 to 0.5 ml)	25	24.0
Incorrect	52	50.0
Not informed	27	26.0
Administration route?		
Intramuscular (Correct)	37	35.6
Intravenous	31	29.8
Subcutaneous	28	26.9
Oral	2	1.9
Not informed	6	5.8
Know other drug of secondary use?		
Yes	71	68.3
No	15	14.4
Not informed	18	17.3
If yes, what drug of secondary use?		
Corticoid	23	22.1
Antihistamine	14	13.5
Corticoid + antihistamine (correct)	24	23.1
Other	8	7.7
Does not know other drug of secondary use	15	14.4
Not informed	20	19.2
Ever heard of self-injectable drug protocol?		
Yes	24	23.1
No	78	75.0
Not informed	2	1.9
If yes, what medication?		
Adrenaline (correct)	17	16.3
Other	4	3.8
Had never heard	78	75.0
Not informed	5	4.8

Source: Authors

It is shown in Table 3 that thirteen participants (12.5%) reported having treated cases of anaphylaxis. Among these participants, eight reported having treated only one case, two reported having treated two cases, two reported having treated several cases and one did not inform the number of cases. Regarding the medication used in cases of anaphylaxis, six cited three drugs (adrenaline + corticoid + antihistamine), three cited adrenaline + corticoid, two cited only corticoid, one cited only adrenaline and one cited corticoid + antihistamine. All 13 reported favorable outcomes. Twelve reported having identified the symptoms and six reported having referred the patient to an allergist (Table 3).

Table 3 – Data on treatment of cases of anaphylaxis.

Variable	N	%
Have you ever treated a case of anaphylaxis?		
Yes	13	12.5
No	91	87.5
TOTAL	104	100.0
If yes, how many cases?		
One	8	61.5
Two	2	15.4
Several	2	15.4
Not informed	1	7.7
What drug was used on the occasion?		
Adrenaline	1	1.0
Corticoid	2	1.9
Adrenaline + corticoid + antihistamine	6	5.8
Adrenaline + corticoid	3	2.9
Corticoid + antihistamine	1	1.0
Patient outcome		
Cure	13	12.5
Never treated case of anaphylaxis	91	87.5
Identification of symptoms		
Yes	12	11.5
No	1	1.0
Never treated case of anaphylaxis	91	87.5
Referred patient to allergist?		
Yes	6	5.8
No	7	6.7
Never treated case of anaphylaxis	91	87.5

Source: Authors

Just over half of the respondents (52.9%) reported having medications for emergency use at their offices. When asked what medications they had, the most common answer was adrenaline + corticoid + antihistamine (26.0%), followed by adrenaline + corticoid (8.7%) and adrenaline + antihistamine (5.8%). In contrast, 34.06% had no type of drug at the office. The majority (71.2%) stated feeling capable of administering drugs in cases of anaphylaxis.

Among those who answered negatively, 16.3% reported that the reason was a lack of practice, 4.8% reported never having needed to administer such drugs and 7.7% did not give a reason. When asked if they would suggest something for this subject, 29.8% answered affirmatively and the most cited suggestion was continuing education (11.5%). As you can see in table Table 4.

Table 4 – Answers to questions “Have drugs for treatment of anaphylaxis at office”, “Feel prepared to administer drugs in cases of anaphylaxis?”, “What do you suggest on the subject?”

Variable	n	%
Do you have drugs for emergency use at your office?		
Yes	55	52.9
No	36	34.6
Not informed	13	12.5
TOTAL	104	100.0
What drugs?		
Adrenaline	4	3.8
Corticoid	4	3.8
Antihistamine	1	1.0
Adrenaline + corticoid + antihistamine	27	26.0
Adrenaline + corticoid	9	8.7
Adrenaline + antihistamine	6	5.8
Corticoid + antihistamine	2	1.9
Not informed	15	14.4
Does not have these drugs for emergency use at office	36	34.6
Feel prepared to administer drugs in cases of anaphylaxis?		
Yes	74	71.2
No	30	28.8
If not, give reason		
Never needed to administer	5	4.8
Lack of practice	17	16.3
Not informed	8	7.7
Feels prepared to administer	74	71.2
Suggest something about subject?		
Yes	31	29.8
No	61	58.7
Not informed	12	11.5
If yes, what suggestion?		
Better undergraduate education	1	1.0
Better post-graduate education	6	5.8
Continuing education	12	11.5
Other	12	11.5
Did not suggest	61	58.7
Not informed	12	11.5

Source: Authors

Table 5 displays the associations between the question “Have you ever read a protocol about anaphylaxis?” and the characteristics of the sample. The largest percentage differences

among those who had read a protocol occurred between those with 16 to 37 years of the specialty (50%) and those with one to five years of the specialty (82.1%); between those with a doctoral/post-doctoral degree (81.3%) and those with a master's degree (56.7%); and between those in the 40-to-65-year-old age group (50%) and those in the 21-to-39-year-old age group (73.2%). However, for a fixed margin of error (5%), no significant associations were found ($p > 0.05$) between the answer to the question and the characteristics of the sample.

Table 5 – Answer to question “Have you ever read a protocol about anaphylaxis?” according to characteristics of sample.

Variable	Have you ever read a protocol about anaphylaxis?						p-value
	Yes		No		Total		
	n	%	N	%	n	%	
Age group (years)							$p^{(1)} = 0.166$
21 to 29	30	73.2	11	26.8	41	100.0	
30 to 39	29	70.7	12	29.3	41	100.0	
40 to 65	10	50.0	10	50.0	20	100.0	
Group total	69	67.6	33	32.4	102	100.0	
Sex							$p^{(1)} = 0.394$
Male	56	65.9	29	34.1	85	100.0	
Female	13	76.5	4	23.5	17	100.0	
Group total	69	67.6	33	32.4	102	100.0	
Status of specialist							$p^{(1)} = 0.233$
Specialist	48	71.6	19	28.4	67	100.0	
Resident	21	60.0	14	40.0	35	100.0	
Group total	69	67.6	33	32.4	102	100.0	
Time in specialty							$p^{(1)} = 0.072$
1 to 5	23	82.1	5	17.9	28	100.0	
6 to 15	17	73.9	6	26.1	23	100.0	
16 to 37	8	50.0	8	50.0	16	100.0	
Group total	48	71.6	19	28.4	67	100.0	
Postgraduate degree							$p^{(1)} = 0.635$
Yes	30	65.2	16	34.8	46	100.0	
No	39	69.6	17	30.4	56	100.0	
Group total	69	67.6	33	32.4	102	100.0	
What postgraduate degree							$p^{(1)} = 0.211$
None	39	69.6	17	30.4	56	100.0	
Master's	17	56.7	13	43.3	30	100.0	
Doctorate/Post-doctorate	13	81.3	3	18.7	16	100.0	
Group total	69	67.6	33	32.4	102	100.0	

(1) Pearson's chi-square test.

Source: Authors

No significant associations were found ($p > 0.05$) between the characteristics of the sample and the answers to the question “What is the main drug for the treatment of

anaphylaxis?”. Likewise, no significant associations were found ($p > 0.05$) between the characteristics of the sample and the answers to the question “What is the dose indicated for the treatment of anaphylaxis?”.

The associations between the administration route and the characteristics of the sample. The relative percentage of the intramuscular category (correct answer) was lowest in the 40-to-65-year-old age group (22.2%) and ranged from 41% to 41.5% in the other two age groups. However, no significant associations ($p > 0.05$) were found between the route indicated for the administration of adrenaline and the characteristics of the sample.

The largest percentage difference among those who had never heard of the self-injectable drug protocol occurred between those with a doctoral/post-doctoral degree (43.8%) and those with a master's degree (16.7%). However, no significant associations ($p > 0.05$) were found between this question and characteristics of the sample. No significant associations ($p > 0.05$) were found between the answer to the question “Have you ever treated a case of anaphylaxis?” and the characteristics of the sample.

4. Discussion

Although the incidence of anaphylaxis is low, health professionals should be trained and equipped to manage this emergency situation (Arsati, et al., 2010; Krishnamurthy, et al., 2018). The concern regarding knowledge on the part of dentists stems from the irreversible harm to the patient that inadequate management could cause. In the present study, less than two-thirds (66.3%) of the participants stated having read a protocol on anaphylaxis, which is considered a low number. This finding suggests an inadequate education among these oral-maxillofacial surgeons during their undergraduate or postgraduate studies.

Among the participants who had treated cases of anaphylaxis, the majority reported having identified the symptoms in the early phase of the condition and all reported that the cases were resolved with a favorable outcome following the correct action taken in a timely manner. In a review of 593 cases of anaphylaxis, the most common findings were hives and angioedema (87%), wheezing and shortness of breath (59%) and arterial hypotension (33%) (Webb, et al., 2004). According to Keet (2011), gastrointestinal symptoms are more prevalent when anaphylaxis is induced by foods. Early diagnosis and proper conduct are essential to avoiding a fatal outcome. Fineman, et al. (2013) state that a flawed diagnosis is one of the barriers to the proper treatment of anaphylaxis. A precise diagnosis stems from a good educational background, the continual search for knowledge and clinical practice so that a

health professional can correctly and quickly identify this condition. Inadequate management can lead to a fatal outcome.

In a study conducted in the United States, adrenaline as the first choice of treatment for anaphylaxis was cited with rates of 81 to 98% by physicians in different specialties. (Altman, et al., 2015) In a study conducted by Çetinkaya, et al. (2011) on knowledge among dentists regarding anaphylaxis, only 55.6% knew that adrenaline was the drug of choice and only 31.5% knew that intramuscular administration was the correct route. Evaluating the practice of allergists, Fineman, et al. (2013) found that 99% of the interviewees reported prescribing adrenaline. In the study by Girdler and Smith, (1999) more than half of the interviewees (62%) reported not feeling prepared to manage an anaphylactic reaction. Krishnamurthy, Venugopal & Leburu (2018), found that only 68% of interviewees cited adrenaline as the drug of choice for the treatment of anaphylaxis and only 28% knew the administration route. Similar results were found in the present investigation, as only 35.6% of the respondents cited the correct administration route (35.6%).

Although the majority of respondents in the present study stated that adrenaline was the drug of choice for the management of anaphylaxis, only 32.5% knew the correct dose. More than half stated an incorrect dose, which is concerning, especially when 71.2% stated being capable of administering the drugs. This is a contradiction in relation to the two previous questions, the results of which indicated inexperience among these health professionals in the treatment of anaphylaxis. Çetinkaya, et al. (2011) report even worse findings, as only eight of a total of 86 dentists knew the proper dose of epinephrine to be administered to an adult weighing 70 kg during an anaphylactic episode. A higher level of knowledge regarding the drug and correct administration route may still not be enough. In an article published by Droste & Narayan, (2014) only 32% of the physicians who participated in the study knew the correct dose of adrenaline to use in a case of anaphylaxis.

In the present study, the participants were asked if they had knowledge regarding the self-injectable adrenaline protocol and 78% reported that they had never seen or heard of this protocol. According to Muraro et al. (2014), there are absolute indications for the prescription of self-injectable adrenaline, such as previous anaphylaxis with foods, exercise-induced anaphylaxis and idiopathic anaphylaxis. Ribeiro, et al. (2017) report that the use of auto-injectors is high in the United States. The infrequent prescription and unawareness of self-injectable adrenaline may be due to the non-availability in the domestic market of some countries and the cost of importation. This product is not yet available in Brazil (Solé, et al., 2013). For oral-maxillofacial surgeons who work with several drugs that can cause an

anaphylactic reaction, self-injectable adrenaline would be a good option for the treatment of this condition due to its practicality, especially for inexperienced dentists.

Maintaining the patient in observation after an episode of anaphylaxis is crucial to avoiding a fatal outcome due to a biphasic reaction, which consists of a second episode of anaphylaxis (Ben-Shoshan & Clarke, 2011). Regarding care and follow-up after an episode of anaphylaxis, the participants were asked about referring the patient to an allergist and the results revealed that only 6% of individuals affected by this condition were sent for a more detailed investigation of the cause and possible antigens related to the episode. Manuyakorn, et al, (2015) and Jones, et al., (2015) state that greater knowledge regarding the causes of anaphylaxis could contribute to better management of the condition and the authors stress the importance of referring the patient to an allergist to investigate the exact causes and possible associations with other antigens that may also cause such a reaction. The low number found in this study may be due to a lack of orientation of the health professionals regarding the conduction of such cases.

5. Final Considerations

The purpose of this study was to show the importance of anaphylaxis and how adequate management by well-trained professionals can save the life of a patient. Another purpose was to alert health professionals and administrators regarding the need for knowledge on this potentially fatal clinical condition. It is essential for health professionals to recognize the symptoms of anaphylaxis and know that intramuscular adrenaline should be administered immediately. Although the divulgation of the protocol is well-established, health professionals use this measure little in their clinical practice. This survey was fundamental to determining the need for better training in both undergraduate and postgraduate programs to ensure adequate conduct and the prevention of a fatal outcome. This responsibility should be distributed among educational institutions and health professionals, who should always be seeking further knowledge and updating courses to be prepared for any situation.

Thus, it is of fundamental importance in future works to carry out a georeferenced analysis not only of the knowledge of maxillofacial surgeons but also of dentists about the treatment of anaphylaxis. So that educational measures can be taken to spread knowledge about this medical emergency

References

- Altman, A. M., Camargo, C. A. Jr., Simons, F. E., Lieberman, P., Sampson, H. A., Schwartz, L. B., et al. (2015). Anaphylaxis in America: a national physician survey. *J Allergy Clin Immunol*, 135, 830-3
- Arsati, F., Montalli, V. A., Flório, F. M., Ramacciato, J. C., da Cunha, F. L., Cechinho, R., et al. (2010). Brazilian dentists' attitudes about medical emergencies during dental treatment. *J Dent Educ*, 74(6),661–6.
- Ben-Shoshan, M., & Clarke, A. E. (2011). Anaphylaxis: past, present and future. *Allergy*, 66,1–14.
- Çetinkaya, F., Sezgin, G., Aslan, O. M. (2011). Dentists' knowledge about anaphylaxis caused by local anaesthetics. *Allergol Immunopathol (Madr)*, 39(4),228–31.
- Droste, J., & Narayan, N. (2012). Anaphylaxis: lack of hospital doctors' knowledge of adrenaline (epinephrine) administration in adults could endanger patients' safety. *Eur Ann Allergy Clin Immunol*,. 44,122-127.
- Fineman, S., Dowling, P., & O'Rourke, D. (2013). Allergists' self-reported adherence to anaphylaxis practice parameters and perceived barriers to care: An american college of allergy, asthma, and immunology member survey. *Ann Allergy, Asthma Immunol*, 111(6),529–36.
- Girdler, N. M., & Smith, D. G. (1999). Prevalence of emergency events in British dental practice and emergency management skills of British dentists. *Resuscitationj*, 41(2),159–67.
- González-Pérez, A., Aponte, Z., Vidaurre, C. F., & Rodríguez, L. A. G. (2010). Anaphylaxis epidemiology in patients with and patients without asthma: A United Kingdom database review. *J Allergy Clin Immunol*, 125(5),1098–105.

Jones, C., Llewellyn, A., Frew, A., du Toit, G., Mukhopadhyay, S., & Smith, H. (2015). Factors associated with good adherence to self-care behaviours amongst adolescents with food allergy. *Pediatr Allergy Immuno.*, 26,111-8.

Keet, C. (2011) Recognition and management of food-induced anaphylaxis. *Pediatr Clin North Am*, 58(2),377–88,

Krishnamurthy, M., Venugopal, N. K., Leburu, A., et al. (2018) Knowledge and attitude toward anaphylaxis during local anesthesia among dental practitioners in Chennai – a cross-sectional study. *Clin Cosmet Investig Dent*, 10:117–121.

Maher, N. G., De Looze, J., & Hoffman, G. R. (2014). Anaphylaxis: An update for dental practitioners. *Aust Dent J*, 59(2),142–8.

Manuyakorn, W., Benjaponpitak, S., Kamchaisatian, W., Vilaiyuk, S., Sasisakulporn, C., Jotikasthira, W. (2015). Pediatric anaphylaxis: triggers, clinical features, and treatment in a tertiary-care hospital. *Asian Pac J Allergy Immunol*, 33, 281-8.

Müller, M. P., Hänsel, M., Stehr, S. N., Weber, S., & Koch T. (2008). A state-wide survey of medical emergency management in dental practices: Incidence of emergencies and training experience. *Emerg Med J*, 25(5), 296–300.

Muraro, A., Roberts, G., Worm, M., et al. (2014). Anaphylaxis: guidelines from the European Academy of Allergy and Clinical Immunology. *Allergy*, 69,1026–45.

Pereira, A. S., et al. (2018). *Methodology of scientific research*. [e-Book]. Santa Maria City. UAB / NTE / UFSM Editors. Retrieved from https://repositorio.ufsm.br/bitstream/handle/1/15824/Lic_Computacao_Metodologia-Pesquisa-Cientifica.pdf?sequence=1.

Ribeiro, M. L. K. K., Chong Neto, H. J., & Rosario Filho, N. A. (2017). Diagnosis and treatment of anaphylaxis: there is an urgent needs to implement the use of guidelines. *Einstein*, 15(4),500–506.

Solé, D., Ivancevich, J. C., & Cardona, V. (2013). Knowledge of anaphylaxis among Ibero-American physicians: results of the Ibero-American Online Survey for Physicians on the management and treatment of anaphylaxis (IOSPTA) - Latin American society of Allergy, Asthma & Immunology (LASAAI). *J Investig Allergol Clin Immunol*, 23(6),441-3.

Webb, L., Green, E., & Lieberman, P. (2004). Anaphylaxis: a review of 593 cases. *J Allergy Clin Immunol*, 113,S240.

Porcentagem de contribuição de cada autor no manuscrito

Amanda Freire de Melo Vasconcelos – 20%

Romeyka Karinny Almeida de Freitas– 20%

Éwerton Daniel Rocha Rodrigues– 20%

Belmiro Cavalcanti do Egito Vasconcelos– 20%

Emanuel Sávio Cavalcanti Sarinho– 20%