بسم الله الرحمن الرحيم

NAPATA COLLEGE

SCHOOL OF DENTISTRY

The top 5 emergency drugs used in 2020 in dental practice; A systemic review

A research submitted for partial fulfillment for the award of the degree of Bachelor's in school of dentistry (DDS) in Napata College

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بسم الله الرحمن الرحيم

وقل رب زدني علما

"My Lord, increase me in knowledge."

(Qura'an 20:114)

Abstract:

Introduction: Although medical emergencies in dental practice is a rather uncommon occurrence in routine dental practice, however, life-threatening emergencies can and do occur at any moment. Certain drugs are used in such conditions. With that being said, the practicing dentist should be familiar with their indications, dosages, routes of administration and the side (adverse) effects. Methodology: This is an analytical, quantitative systematic review study (known to some as a review article) that was conducted in the Republic of the Sudan by students at the school of dentistry at Napata College. This review is meant to discuss the top 5 emergency drugs used in dental practice and their indications, dosages, routes of administration as well as their side effects. To write this paper, we inserted a plethora of keywords associated with the topic at hand. A number of researches were excluded as they were inaccessible to us, unrelated to the topic or because they were relatively anachronistic. Following this, we were left with a total of 9 papers, the findings of which are illustrated hereabouts. Results: the 5 most common recommended drugs are: Nitroglycerin (6), Salbutamol (6), Epinephrine (Adrenaline) (5), Oxygen (4), Aspirin (4), Oral glucose (4). The justification as to why more than 5 drug are listed is available in the full thesis. Conclusion: In conclusion, our research has indicated an alarming lack of training in dealing with emergencies, an alarming lack of preparedness for emergencies when and if they manifest themselves as well as a lack of availability of drugs that would aid in the management of these emergencies. Recommendation: 1) Introduction of emergency courses in higher education institutes teaching dentistry. 2) Introduction of legislation which requires dentists to possess, at the very minimum, the 5 aforementioned drugs in their practices as well as knowledge of how to use them. 3) Introduction of legislation which would require dentists see to it that the drugs they possess are not expired. 4) Introduction of legislature that would require dentists attend ‘emergency 101’ courses at least once every 5 years. 5) Introduction of an evaluation test in which dentists’ abilities to handle emergencies are evaluated. This test is to be taken whenever a dentist graduates and is about to practice and henceforth at least once every half a decade. 6) Requiring every conference of dentistry worldwide to have, at the very minimum, at least one poster discussing emergencies.

الملخص:

على الرغم من أن حالات الطوارئ الطبية في ممارسة طب الأسنان أمر نادر الحدوث في ممارسة طب الأسنان الروتينية ، إلا أن حالات الطوارئ التي تهدد الحياة يمكن أن تحدث في أي لحظة. يتم استخدام بعض الأدوية في مثل هذه الظروف. مع ذلك ، يجب أن يكون طبيب الأسنان الممارس على دراية بمؤشراتها وجرعاتها وطرق إعطائها والآثار الجانبية (الضارة). المنهجية: هذه دراسة مراجعة كمية منهجية تحليلية (يعرفها البعض بأنها مقالة مراجعة) أجريت في جمهورية السودان من قبل طلاب كلية طب الأسنان بكلية نبتة. تهدف هذه المراجعة إلى مناقشة أفضل 5 عقاقير للطوارئ مستخدمة في ممارسة طب الأسنان ودواعيها وجرعاتها وطرق إعطائها بالإضافة إلى آثارها الجانبية. لكتابة هذه الورقة ، أدخلنا عددًا كبيرًا من الكلمات الرئيسية المرتبطة بالموضوع المطروح. تم استبعاد عدد من الأبحاث لأنها لم تكن متاحة لنا ، أو لا علاقة لها بالموضوع أو لأنها كانت عفا عليها الزمن نسبيًا. بعد ذلك ، تركنا ما مجموعه 9 أوراق بحثية ، تم توضيح نتائجها هنا. النتائج: الأدوية الخمسة الأكثر شيوعًا الموصى بها هي: النتروجليسرين (6) ، السالبوتامول (6) ، الإبينفرين (الأدرينالين) (5) ، الأكسجين (4) ، الأسبرين (4) ، الجلوكوز الفموي (4). يتوفر المبرر لسبب إدراج أكثر من 5 أدوية في الأطروحة الكاملة. الخلاصة: في الختام ، أظهر بحثنا نقصًا مقلقًا في التدريب على التعامل مع حالات الطوارئ ، ونقصًا مقلقًا في الاستعداد لحالات الطوارئ عندما تتجلى عن نفسها ، وكذلك نقص الأدوية التي من شأنها أن تساعد في إدارة هذه الحالات الطارئة. . التوصية: 1) إدخال دورات الطوارئ في معاهد التعليم العالي التي تدرس طب الأسنان. 2) إدخال تشريعات تتطلب من أطباء الأسنان أن يمتلكوا ، على الأقل ، الأدوية الخمسة المذكورة أعلاه في ممارساتهم وكذلك معرفة كيفية استخدامها. 3) تقديم تشريع يلزم أطباء الأسنان بالتأكد من عدم انتهاء صلاحية الأدوية التي بحوزتهم. 4) إدخال تشريعات تتطلب حضور أطباء الأسنان دورات "الطوارئ 101" مرة واحدة على الأقل كل 5 سنوات. 5) إدخال اختبار تقييم يتم فيه تقييم قدرات أطباء الأسنان على التعامل مع حالات الطوارئ. يجب إجراء هذا الاختبار عندما يتخرج طبيب أسنان وهو على وشك الممارسة ومن الآن فصاعدًا مرة واحدة على الأقل كل نصف عقد. 6) اشتراط أن يحتوي كل مؤتمر لطب الأسنان في جميع أنحاء العالم ، على الأقل ، على ملصق واحد على الأقل يناقش حالات الطوارئ.

Dedication:

This work is dedicated to the late Dr. Khalda Absdelsallam whose untimely passing took place during our 4th year of education. Khalda was a colleague of the authors and was supposed to graduate at the same time as the authors. May she Rest In Peace.

Acknowledgments:

It is unfathomable to us to even commence to imagine this project coming into being without the immense efforts set forth by our supervisor, Dr. Abdelnaser G. Ahmed, DDS of Napata College which, itself has, through administrative efforts, hitherto undreamt of on the local level, seen to it that we become the best versions of ourselves that we can possibly be.

Without a shred of a doubt, the efforts set forth by the aforementioned are what have resulted in this project, in our graduation from university and, hopefully, in our future careers.

In short, we would like to say – thank you.

Contents:

List of figures and table:

List of Acronyms and Abbreviations:

DDS	**Doctor of Dental Surgery**
IHD	**Ischemic Heart Disease**
MI	**Myocardial Infarction**
USA	**United States of America**

CHAPTER 1:
INTRODUCTION

Body of the thesis:

1-1 Introduction

Merriam-Webster defines an emergency as ‘an unforeseen combination of circumstances or the resulting state that calls for immediate action’ [1]. These emergencies may manifest themselves in a number of occupancies. In this paper, we plan on addressing the medical emergencies manifesting in dental practice, specifically we plan on reviewing the 5 drugs hypothesized to be the most common in use.

Undoubtedly, researches of this nature are of immense value in influencing guidelines of practice as well as the numbers of mortality and morbidity. In addition, it is accepted that research of all kinds is one of the metrics by which we measure the advancements of nations. In interest of aiding, albeit slightly, in the advancement of the aforementioned factors as well as some unmentioned factors. Hopefully, this will manifest itself as a force for good in influencing the practice of dentistry in Sudan and across the globe. We also hope that this manifests itself as a cause of decreased morbidity and mortality in such emergencies.

1-2 Problem Statement:

Sudden life threatening conditions could occur during routine dental practice. In some of them, certain drugs must be used to control these occurrences. These scenarios, which necessitate the dentist to be familiar with them, require prompt action on part of the dentist. Unfortunately, most of the practicing dentists seem to have a lack of knowledge of such aspect.

1-3 Research question:

What are the top 5 drugs used in medical emergency conditions at dental office and what are their indications, dosages, routes of administration and sides effect?

1-4 Justification/Rationale

A lack of knowledge regarding these life-saving interventions seems to be prevalent. By performing this project, and eventually publishing it, we hope to influence dentists as well as keep them informed on these uncommon, yet life-saving interventions. In our humble opinion, there is no justification against this project.

1-5 Objectives

These are divided in the following manner:

1) General, and
2) Specific

General objective: To identify the top 5 emergency drugs used in dental practice.

Specific objectives: 1) To identify the indications of drugs used in medical emergency conditions at dental offices. 2) To identify the top 5 drugs used in medical emergency conditions at dental office. 3) To identify the dosage, route of administration and side effects of the top 5 drugs used in medical emergency conditions at dental office.

Chapter 2
Literature Review

Literature Review:

In this chapter, we will be illustrating the findings of a number of research articles published. Keep in mind that all of the upcoming papers are open-access and were published no earlier than 2010 (a decade prior to this publication).

Back in 2006, Professor Danie aas of the University of Toronto published a paper titled 'Management of Medical Emergencies in the Dental Office: Conditions in Each Country, the Extent of Treatment by the Dentist' [3]. In the paper, Professor Haas provided a table in which they outlined 6 essential drugs used in dentistry, the table was titled 'Essential Emergency Drugs', where they not only identified the drugs, but also their indications as well as their initial adult dose [3]. For purposes of this project, we will be illustarting the drugs illustrated by Haas; these are:

1) Oxygen
2) Epinephrine
3) Nitroglycerin
4) Antihistamine
5) Aspirin [3]

Oxygen, a very basic, cheap and available intervention – yet unfathomably effective. As per Haas, 'Oxygen is indicated for every emergency except hyperventilation.'. The methodology by which oxygen masks are administered should be very well-known to all medical personnel as well as, at least, a vast majority of laypeople. Haas recommends the storage of oxygen in an 'E' size cylinder (stores 600 liters) as it is sufficient to address acute emergencies. As per the aforementioned paper, 'If the typical adult has a minute volume of 6 liters per minute, then this flow rate should be given as a minimum. If the patient is conscious, or unconscious yet spontaneously breathing, oxygen should be delivered by a full face mask, where a flow
rate of 6 to 10 liters per minute is appropriate for most adults. If the patient is unconscious and apneic, it should be delivered by a bag-valve-mask device where a flow rate of 10 to 15 liters per minute is appropriate. A positive pressure device may be used in adults, provided
that the flow rate does not exceed 35 liters per minute.'

The 2nd drug on our list is epinephrine [3]. It is, as is well known to all medical personnel, the 'golden' drug for use in anaphylaxis. Such scenarios don't always occur, but are almost always fatal when they manifest. The most likely situations in which they might occur are when a) the patient and dentist are both unaware of the patient being allergic to a component of the dental operation, or b) the dentist didn't ask about allergies to drugs which they might administer. Either way, epinephrine is a must and should always be in a dentist's emergency kit. As per Haas, 'As a drug, epinephrine has a very rapid onset and short duration of action, usually 5 to 10 minutes when given intravenously' [3]. Of course, epinephrine is available in two formulations for emergency use, these are:

1) 1:1,000
2) 1: 2,000 [3]

A major risk manifests if the patient suffers from IHD. As per Haas, 'Concurrently, however, it can be a drug with a high risk if given to a patient with ischemic heart disease. Nevertheless, it is the primary drug needed to reverse the life-threatening signs and symptoms of anaphylaxis or persistent asthmatic bronchospasm.' [3]

The 3rd drug on our list is Nitroglycerin which is used for both MI and acute angina. As is famously known, nitroglycerin is available as sublingual tablets. An important note is that the tablet form of Nitroglycerin has a rather short shelf-life (~3 months) once the bottle has been opened [3]. As beautifully articulated by Haas, 'This supports the need for the dentist
to always having a fresh supply available.'. A highly important note to keep in mind is that a systolic blood pressure lower than 90 mmHg is a contraindication to the use of the drug.

Number 4 on our list is antihistamine, particularly injectable antihistamine. As is well known amongst the medical community, antihistamine is used to combat allergic reactions, different forms of antihistamine exist for different scenarios – for example, parenteral types which are used in emergency clinical manifestations.

Finally, we will be discussing Aspirin (acetylsalicylic acid), which, as per Haas 'has been shown to reduce overall mortality from acute myocardial infarction.'.

In their 2010 paper, Amirchaghmaghi and colleagues [4] reported that the most common emergency drug available to their population was either

oxygen or nitroglycerine (the paragraph read nitroglycerin, but the table stated oxygen). We have contacted the authors in an attempt to clear up this dilemma, but to no avail. The only drug written in Haas' paper that was not mentioned here is epinephrine. The paper also reported some rather discouraging results regarding dentist's preparedness in case of medical emergencies. As per the authors 'Our results revealed preparedness of specialist dentists about medical emergency was not favorite and self
evaluation of preparedness revealed that the dentists was not ready for recognition and management of medical emergencies.' [4]. Another frightening revelation by the authors was the following 'We should notice that about half of participants in this study, had controlled expire date of emergency drugs. So practically, emergency kits in 50% of specialist dental office were insufficient.' [4] 'None of participants in this study had excellent preparedness [for an emergency]' [4].
Back in 2015, Kumarswami and colleagues [5] reported some rather alarming findings as well, for starters the following was reported; 'Emergency kits were available with only 24% participants and the available kits were assessed for the availability of emergency drugs.' [5]. So, before even exploring the drugs in and of themselves, we have already come across a frightening finding. However, we continued reading through the paper and came across the following regarding the drugs (remember this is targeting only 24% of participants (those who had kits to begin with)).

1) Adrenaline: 90% of the participants had adrenaline in their kits
2) 55% had hydrocortisone (which could be used for allergies/asthma, but is not always the drug of choice)
3) 81.4% had oral glucose (very useful in hypoglycemia)
4) 78.3% had ammonia inhalant
5) 11% had glyceryl trinitrate (nitroglycerin)
6) 71.6% had epinephrine
7) 7% had salbutamol
8) 53.3% had atropine

As per the authors, 'the results of our study reflect an alarming situation about the capability of dentists to deal with such conditions [in reference to emergency situations].' [5].

In their paper, Becker [6] organized the drugs dentists should have in case of emergency in the following manner:

1) Drugs for allergy and asthma
2) Drugs for chest pain
3) Drugs for bradycardia/hypotension
4) Drugs for hypoglycemia
5) Reversal drugs

In their allergy and asthma part of the paper, the following drugs are mentioned:

1) Epinephrine
2) Diphenhydramine (less severe reactions)
3) Albuterol (salbutamol) [6]

In the angina (chest pain) part of the paper, Becker mentioned the following drugs:

1) Nitroglycerin
2) Aspirin [6]

In the bradycardia/hypotension part of the paper, the following drugs are mentioned:

1) Atropine (for bradycardia)
2) Ephedrine (in cases of hypotension + normal heart rate)

For hypoglycemia, Becker recommends the following:

1) 'Viscous glucose concentrate' [6]

As per Becker, 'Contrary to popular belief, glucose cannot diffuse through oral mucosa.' [6].

As far as 'reversal drugs' are concerned, the following is stated 'For offices providing sedation using regimens other than nitrous oxide, reversal drugs must be immediately available. Benzodiazepines are the principal agents used for this purpose, and their effects can be effectively reversed by flumazenil.' [6]. In addition, the following is also stated 'The use of opioids is not encouraged for oral sedation, but if they are included in any regimen naloxone must be available for reversal.' [6].

Back in 1997, Chapman published a beautifully written paper titled 'Medical emergencies in dental practice and choice of emergency drugs and equipment: A survey of Australian dentists' [7]. The survey reported that the 5 most common drugs kept by dentists were:

1) Oxygen
2) Adrenaline (Epinephrine)
3) Bronchodilator spray (Salbutamol)
4) Oral Glucose
5) Glyceryl nitrate, hydrocortisone and antihistamine* [7]

*= kept by an equal number of dentists.

Back in 2012, Alva and colleagues published a study titled 'Medical and dental emergencies and complications in dental practice and its management' [8]. In addition to the discussion on emergencies, the paper noted the following: 'The prime requisite in managing an emergency is maintenance of proper Position (P), Airway (A), Breathing (B), Circulation (C), and Definitive treatment (D).'. The following are the emergencies discussed in the paper:

1) Syncope
2) Airway obstruction
3) Anaphylaxis
4) Local anesthetic toxicity
5) Asthmatic attack
6) Chest pain
7) Hemorrhage
8) Seizure [8]

The following is illustrated in regards to managing syncope 'four sugar lumps may be given orally or intravenous 20 ml of 20-50% sterile glucose.' [8]. According to the authors, if this doesn't result in the episode resolving 'Meantime, hydrocortisone sodium succinate 200 mg IV should be given' [8]. This is, of course, in addition to asking for medical help.

The only drug mentioned in so far as airway obstruction is concerned is oxygen [8].

In regards to anaphylaxis, the following is stated: ‘administer oxygen, and the drug of choice being 0.5 ml of 1:1000 adrenaline IM or SC.’ [8].

In so far as local anesthetic toxicity is concerned, the following is stated: ‘Administer oxygen and in adverse cases administration of diazepam 5 mg slowly is advised’.

Albuterol (salbutamol) is recommended for asthma attacks as the drug of choice.

For chest pain, namely angina pectoris, the recommended management is nitroglycerine. If the chest pain is suspected to be a manifestation of acute MI, then the famous MONA approach is to be used.

For hemorrhage, the following is stated: ‘Tranexamic acid –500 mg in 5 ml by slow IV injection is the drug of choice.’ [8].

For seizures, management is supportive. For status epilepticus, however, the following is recommended ‘I.V. diazepam 5 mg IV/IM or by maintaining BLS till patient is shifted to emergency medical care.’ [8].

Most stated drugs?

As has been previously stated, our purpose is to illustrate the 5 most commonly used emergency drugs in dental offices. This is, again as previously illustrated, with the goal of positively influencing future guidelines. With that being said, we will be counting the mentions of emergency drugs here:

1) Oxygen was stated in a total of 4 studies
2) Epinephrine (adrenaline) was mentioned in 5 studies
3) Nitroglycerine was mentioned 6 times
4) Antihistamine was mentioned in 3 studies
5) Salbutamol was mentioned in 6 studies
6) Aspirin was mentioned in 4 studies
7) Hydrocortisone was mentioned in 2 studies
8) Oral glucose was mentioned 4 times
9) Ammonia inhalant was only mentioned once
10) Atropine was mentioned in 2 studies
11) Diphenhydramine was mentioned once
12) Ephedrine was mentioned once

Up and coming?

As is always the case in anything related to medicine, a plethora of researchers are taking place this very moment in which there exists no shortage of creativity and 'outside-the-box thinking'. A worthy mention related to our topic would be that of ozone therapy. In 2019, a study was published [9] in which the utility of ozone therapy in dentistry is investigated and beautifully discussed.

How are we preparing for better outcomes?

The state of Illinois in the USA manifested itself as the 1st state to legally require dentists to present a written medical emergency plan (enforced as of 01/01/2010) [5]. We were unable to determine whether other states or nations have implemented such litigation. But, it is definitely a step in the correct direction.

Chapter 3:
Methodology

Research methodology:

This is an analytical, quantitative systematic review study (known to some as a review article) that was conducted in the Republic of the Sudan by students at the school of dentistry at Napata College. In the upcoming paragraph, we will be discussing, in detail, the criteria we used to choose the data we need.

What we did was we conducted a search using PubMed, Google Scholar and Medline. The search was filtered in the following manner:

1) We searched the all the keywords associated with this topic
2) We combined the keywords in all possible comprehensible manners
3) We filtered for open access papers only
4) We filtered for researches and review articles published within a decade of our writing of this paper
5) Following this step, we concluded that the number of results that we came across that were relevant to our research was surprisingly low (only 2). Upon this, we decided to increase the timeline.
6) The relevant papers were downloaded, then they were read through and finally they were summarized (as shown in Chapter 2)
7) In addition, we took the data we had collected via reading through these papers and had them critically analyzed (discussed in the chapter 4).

Chapter 4:
Results

Results:

As mentioned in Chapter 2, the 5 most common recommended drugs are:

1) Nitroglycerin (6)
2) Salbutamol (6)
3) Epinephrine (Adrenaline) (5)
4) Oxygen (4)
5) Aspirin (4)
6) Oral glucose (4)

As you have probably noticed, there were 6 mentions as opposed to the previously promised 5. The reason is because of the fact that there were a number of 'ties' that had manifested themselves. We ascertained it as our duty to duly report our findings in an as accurate manner as possible, ergo the change that took place.

The following is a detailed count of the drugs mentioned in all of the studies

In so far as doses are concerned, there seems to be an agreement in line with what is internationally recommended and as stated in Haas' paper [3]. That is:

Drug	Dosage
Nitroglycerin	0.3-0.4 mg
Salbutamol	2 inhaled sprays
Epinephrine	0.3-0.5 mg IM
Oxygen	100%
Aspirin	160-325mg
Oral glucose	Until patient is awake

Table 4.1
As for Haas' [3] paper, the results were as follows:
A total of 6 drugs were recommended in certain doses by the expert, these are:

Drug	Dose	Use
Oxygen	100% inhalation	'almost any medical emergency' [3]
Epinephrine	0.1 mg IV or 0.3-0.5 mg IM	Anaphylaxis + unresponsive (to salbutamol) asthma
	1 mg IV	Cardiac Arrest
Nitroglycerine	0.3-0.4mg sublingual	Angina pain
Antihistamine	25-50 mg IV/IM	Allergic
Aspirin	160-325 mg	MI

Table 4.2
In regards to the paper by Amirchaghmaghi and colleagues [4], the distribution of results was as follows:

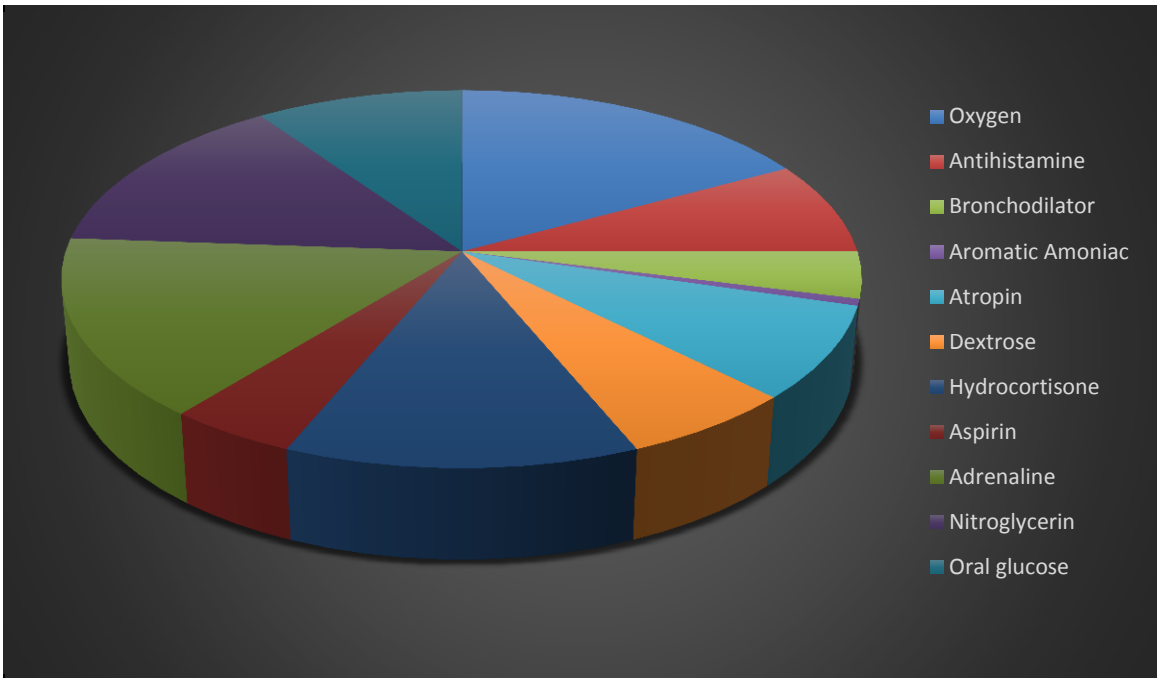

Fig. 4.1

Percentage	Drug
62.50%	Oxygen
29.20%	Antihistamine
14.60%	Bronchodilator
2.10%	Aromatic Amoniac
29.20%	Atropin
22.90%	Dextrose
45.80%	Hydrocortisone
16.70%	Aspirin
56.30%	Adrenaline
52.10%	Nitroglycerin
35.40%	Oral glucose

Table 4.3
In so far as the paper by Kumarswami and colleagues [5] is concerned, the data regarding drugs was as follows:

Drug	% of availability
Adrenaline	90
Hydrocortisone	55
Oral glucose	81.4
Ammonia inhalant	78.3
Glyceryl nitrate	11
Epinephrine	71.6
Salbutamol	7
Atropine	53.33

Table 4.4
As for the paper by Decker [6], the data was as follows:
The author states the drugs they believe, as per the data they collected as well as their experience, should be available in all dental practices. The drugs were the following:

1) Epinephrine (0.3 mg in adults and 0.15mg in children. IM)
2) Diphenhydramine (50mg for adults, 25 mg for children. Tablets or IM)
3) Albuterol (salbutamol)(inhaled)
4) Nitroglycerin (one tablet, 0.4mg. Sublingual)
5) Aspirin (300 mg. Chewing)
6) Atropine (0.5 mg. IM or sublingually)
7) Ephedrine (25 mg. IM or sublingually)
8) 'Viscous glucose concentrate' (for hypoglycemia) (placed in buccal vestibule)
9) Benzodiazepines
10) Flumazenil (0.2 mg IV)
11) Naloxone (0.4mg. All administration routes) [6]

These are the drugs suggested for basic emergency drug kits by the author.

Chapman's paper [7], although anachronistic by today's standards, provides valuable insight into our topic. These are the recommendations illustrated by Chapman as well as the percentage of experts who recommended each item as per there research:

Drug	% of experts
Oxygen	70
Adrenaline 1:1,000	34
Manual resuscitator	27
Oral glucose	13
Bronchodilator spray	13
Glyceryl trinitrate tablets/spray	12
Hydrocortisone injection	7
Antihistamine injection	7
Pocket mask	4
Diazepam injection	3
First aid kit	3
Atropine injection	2
Sphygmomanometer	2
CPR wall poster	1

Table 4.5

- This is an exact copy of the table illustrated in Chapman's paper [7].

Chapter 5:
Discussion

Discussion:

In our search, we have come across a common theme amongst the few researchers who were actually interested enough to write on the topic. This theme can be summarized in the following few points:

1) A vast majority of dentists are grossly and embarrassingly underprepared for medical emergencies that might manifest in their offices.
2) Very few dentists have the drugs necessary for them to successfully manage these emergencies if and when they manifest themselves in their offices.
3) Almost no dentist is prepared for all emergencies that might manifest in their office.
4) It seems as if very few dentists and/or Public health researchers are interested in this topic that might end lives if left unattended to.
5) Emergencies rarely occur, which is the only somewhat positive finding in our research.

A very frightening quote by Amirchaghmaghi and colleagues in their paper is 'We should notice that about half of participants in this study, had controlled expire date of emergency drugs. So practically, emergency kits in 50% of specialist dental office were insufficient.' [4], not only because it shines light on an issue that other researchers might have missed, ergo, indicating further dismal results, but also because it indirectly implies that many dentists may be falsely confident in their preparedness to address these emergency situations (which are, in every instance, unfathomably time sensitive) and will probably be 'caught by surprise' in the worst possible time.

In summary, the results have been abysmal, alarming and dismal to look at.

Chapter 6: Conclusion

Conclusion:

In conclusion, our research has indicated an alarming lack of training in dealing with emergencies, an alarming lack of preparedness for emergencies when and if they manifest themselves as well as a lack of availability of drugs that would aid in the management of these emergencies.

As the authors of one paper stated. ‘The best way to handle an emergency is to be prepared
in advance.’ [5]. We wholeheartedly agree with this notion, ergo, why we insist on the immediate ‘rising to the occasion’ by all those in the correct positions.

These results seem to be universal in nature and, ergo, require the upmost concern and attention from both legislatures and practicing dentists.

Chapter 7:
Recommendations

Recommendations:

1) Introduction of emergency courses in higher education institutes teaching dentistry
2) Introduction of legislation which requires dentists to possess, at the very minimum, the 5 aforementioned drugs in their practices as well as knowledge of how to use them.
3) Introduction of legislation which would require dentists see to it that the drugs they possess are not expired
4) Introduction of legislature that would require dentists attend 'emergency 101' courses at least once every 5 years
5) Introduction of an evaluation test in which dentists' abilities to handle emergencies are evaluated. This test is to be taken whenever a dentist graduates and is about to practice and henceforth at least once every half a decade.
6) Requiring every conference of dentistry worldwide to have, at the very minimum, at least one poster discussing emergencies.
7) For academic dentists to try to publish further research on this topic so that we may better localize the problematic areas and gauge our response to them.

Chapter 8:
References

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The authors hereby declare no conflicts of interest

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