

# Medical emergencies in dental practices in South Africa

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## SUMMARY

**Purpose:** Studies carried out in many countries have shown that dentists were not confident in managing medical emergencies, and that some did not have any emergency drugs and equipment in their practice or had never had any form of practical training. No studies on the prevalence of medical emergencies for dental practices in South Africa have been published.

**Method:** An email survey was carried out. Sample size was calculated to be at least 239, and 267 respondents participated. The questionnaire comprised demographics; equipment and drugs possessed; number of medical emergencies experienced over a 12 month period; self-evaluation on specific medical procedures; and opinions on the need for training of dentists in managing medical emergencies.

**Results:** The results in general agreed with those of similar surveys carried out in other countries, and gave rise to similar concerns, in that there are many practitioners who are clearly ill-equipped to deal with medical emergencies. Most respondents felt they required more formal training.

**Conclusions:** It is recommended that medical emergency courses should be part of all undergraduate curricula; that medical emergency courses should be included as part of CPD accreditation requirements; and that as there is no South African list of recommended equipment and drugs, this should be developed and regularly revised, most suitably by the South African Dental Association.

## INTRODUCTION

A medical emergency may occur at any time, and can be life threatening if left or incorrectly treated.<sup>1,2,3</sup> In patients with medical conditions, any stress and anxiety associated with a dental visit may increase their risk of having a medical emergency.<sup>4</sup> The ability of a dentist to recognise a problem quickly, and initiate treatment, reduces the risk of morbidity and mortality.

According to the American Dental Association (ADA), three out of four practitioners have experienced a medical emergency, and one in twenty general dental practitioners

will have a patient with a cardiac arrest in their lifetime.<sup>6</sup> Studies carried out in many countries have shown that dentists were not confident in managing medical emergencies, and that some dentists did not have any emergency drugs and equipment in their practice<sup>7,8</sup> or had never had any form of practical training in resuscitation.<sup>9</sup> In other studies, dentists agreed that there was a need for further training and that hands-on courses would improve their preparedness.<sup>10,11</sup>

However, a lack of information on the prevalence of medical emergencies can make it difficult to formulate continuous education courses for general dental practitioners.<sup>5,8</sup> A search of the literature revealed that there appear to have been no studies on the prevalence of medical emergencies for dental practices in South Africa. Elsewhere, a wide variety of emergency incidents has been reported with much variation as to the most prevalent. It has been pointed out that as the average age of patients is rising in many countries, and that these patients are likely to be on medication for cardiovascular, pulmonary and endocrine disorders, the risk of side effects and acute decompensation is increasing.<sup>12</sup>

Whatever the prevalence, emergency equipment and drugs should be available. Chapman in 1997<sup>7</sup> reported that 14% of dentists did not keep any emergency drugs or equipment and Müller *et al* in 2008<sup>8</sup> found that 5% of dentists had no equipment to treat emergencies.

Furthermore, a number of studies have shown that dentists did not feel prepared to handle all medical emergencies<sup>5,13,14,15</sup> and others have provided evidence of the need for ongoing training in medical emergencies.<sup>2,6,12,16</sup> The ADA recommended that as procedures and drugs are continuously being updated, dentists should undergo training at least once a year.<sup>6</sup>

It is clear from the above that dentists should have the appropriate drugs and equipment in their practices, and the skills to use them, but also need to undergo regular training, to effectively manage medical emergencies that may occur in a dental practice. It is not known to what extent dentists in South Africa conform to such requirements. The aims of this study were therefore to determine the prevalence of medical emergencies in a sample of dentists in private practice and to assess their capacity to deal with such emergencies.

## METHOD

A questionnaire\* was devised using previous studies, guidelines from the UK Resuscitation Council<sup>9</sup> and the Guide to Preparedness for Medical Emergencies from the ADA.<sup>6</sup> The latter required dentists to have numerous emergency drugs and equipment available in their dental practices, and this guide was used to draw up the list of

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emergency equipment and drugs for the questionnaire. Ethical approval was obtained from the Human Research Ethics Committee (M110410).

\*The Questionnaire is available from the authors on request.

After a pilot study to validate the questionnaire, it comprised the following parts:

1. Demographics.
2. Emergency drugs and equipment possessed.
3. Number of medical emergencies experienced over a 12 month period.
4. Self-evaluation on specific medical procedures.
5. Opinion on the need for training of dentists in managing medical emergencies.

Respondents were asked to record the number of medical emergencies that had occurred in their dental practices in the past 12 months.

The study population was dentists whose email addresses were provided by the South African Dental Association. There were 2,517 email addresses, the majority of which were in Gauteng. Although it has been reported that email surveys had a lower response rate when compared with postal surveys, time and financial considerations made this more favourable.<sup>16</sup> It also enabled a larger geographical area to be accessed with the use of minimum resources. Reminder emails were sent out on four occasions to all the dentists, to improve the response rate. Procedures for determining sample size for continuous and categorical variables using Cochran's formulae<sup>17</sup> were used to calculate the sample size based on a study population of 2,517. At a confidence level of 95% and a width of the confidence interval of 5, a sample size of 239 was required.

Inclusion criteria were dentists with a minimum of one year experience in private dental practice and dental specialists. Excluded were maxillo-facial and oral surgeons (it was assumed that they would have had extensive training during post-graduate studies) and dentists working in hospitals and clinics.

Descriptive statistics were used to summarise the demographics, incidence of medical emergencies occurring in private practice, as well as the equipment and drugs used by the dentists in medical emergencies. The average scores, in Part 4 of the questionnaire, were used to determine which statements were the most and least important in the need for training in emergency management.

## RESULTS

The final response was 10.5% or 267 respondents. Table 1 shows the location of the practices responding, and Table 2

**Table 1: Location of respondents' dental practices.**

Province	Number	Percentage
Gauteng	99	37
Western Cape	66	25
Kwa-Zulu Natal	67	25
Eastern Cape	11	4
Mpumalanga	9	3
Limpopo	7	3
North West	3	1
Free State	4	1
Northern Cape	1	1

**Table 2: Time period since primary dental qualification.**

Period qualified (years)	Number	Percentage
1 - <5 yrs	43	16
5 - 10 yrs	51	19
11 - 20 yrs	76	28
21 - 30 yrs	53	20
>30 yrs	44	17

the experience of the respondents. Eighty four percent (224) of the dentists had been practicing for longer than 5 years. Ninety three percent of respondents were general dental practitioners and 7% were specialists in oral medicine and periodontics (9), orthodontics (8), prosthodontics (7), and there was one community dentist, who was in private practice.

Figure 1 shows the percentages of the recommended emergency equipment which were available in the dental practices. Only three respondents (1%) stated they had all the equipment required in their practice, but 39 respondents (15%) had no equipment to treat medical emergencies. More than half of the respondents had sterile syringes (65%) and blood pressure meters (51%) in their practices. Only 10% (32 respondents) had at least half of the required equipment.

Less than 3% (8) reported that they had all the emergency drugs available in their practices (Figure 2) and 32% (66) had none. Half of the required emergency drugs were available in only 10% (26) of practices.

Table 3 shows the reported occurrence of a medical emergency over the previous 12 months. Nineteen percent (52) of respondents had encountered at least one medical emergency and 44% (117) having none. However, 37% (98) had experienced multiple emergencies over that period. Other reported medical emergencies encountered that were not in the questionnaire were tachycardia, uncontrolled hypertension, and post-operative bleeding.

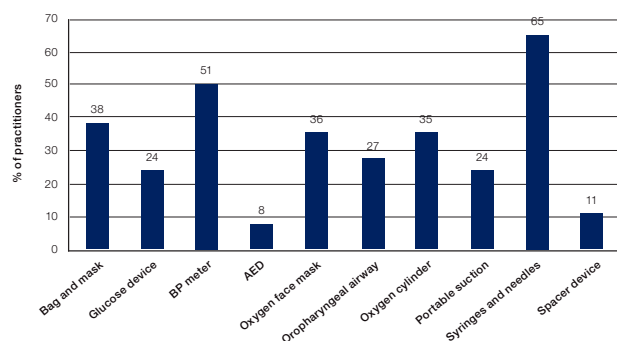


Figure 1: Emergency equipment

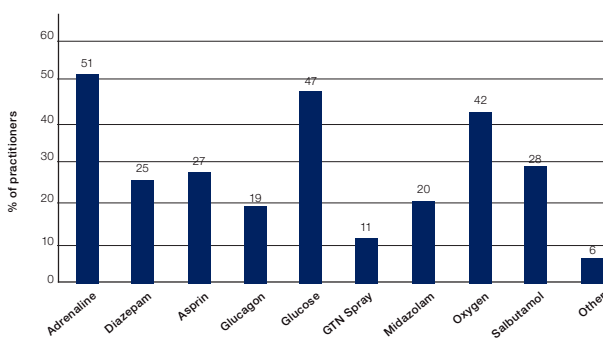


Figure 2: Emergency drugs

The respondents were given a list of 11 emergency management procedures and were asked to acknowledge whether they were competent in performing each specific procedure (Table 4). Only 9% were able to perform the procedures for Advanced Life Support. One respondent could not perform any of the procedures. In response to whether any respondents had undergone further training, 30% indicated that they had.

Finally, respondents were requested to rate statements relating to emergency training on a scale of 1 (strongly disagree) to 5 (strongly agree). Averages were then calculated for each statement as shown in Table 5. Scores between 2.5 and 3.0 indicate an overall response to the statement as being neutral, which applied to only four questions. The remaining statements produced an average score above 4.0, indicating that most participants were in agreement or strong agreement with those statements.

## DISCUSSION

In the USA, the UK and Australia, medical emergency management procedures are continuously updated by their Resuscitation Councils to ensure the provision of more efficient treatment to patients in a medical emergency. However, this process is not current in South Africa. The lack of a medical emergency programmes for dentists at a post-graduate level could account for the fact that only 30% of the respondents in this study had undertaken any further studies.

Most of the respondents (82%) had more than five years' working experience. It was therefore expected that they had adequate knowledge of practice management, as well as of what drugs and equipment should be kept in their practices. However, 15% had no emergency equipment which is similar to the 14% of Australian respondents.<sup>7</sup> A German study<sup>8</sup> showed that only 5% of respondents did not have any emergency equipment. Eight percent of current respondents did have a defibrillator, which was favourable in comparison with the German study<sup>8</sup> where only 2% owned a defibrillator. A defibrillator is vital for the treatment of patients with cardiac arrests, and South Africa has been ranked the 6th highest country regarding the incidence of cardiac arrest in patients.<sup>18</sup> Oxygen tanks (95%) and salbutamol inhalers (70%) were the most common equipment kept in dental practices in Great Britain<sup>19</sup> but only 40% of respondents in this South African survey had an oxygen tank.

The most common emergency drug available was adrenaline (51%) followed by glucose (47%) which reflected a much lower adherence than the 77% reported in Great Britain.<sup>21</sup> Glyceryltrinitrate spray was reported to have a high level of availability (80%) in Great Britain<sup>21</sup> compared with only 11% in South African respondents.

Overall, it appears that it is likely that dentists in South Africa have less emergency equipment and drugs when compared with dentists in Great Britain,<sup>21</sup> Australia<sup>7</sup> and Germany.<sup>8</sup> A lack of basic equipment and drugs places dentists at a high risk of having a mortality or serious morbidity in their dental practice.

The most common medical emergency was syncope, reported by 92% of the respondents, and this was also the most common emergency in Northern England,<sup>5</sup> Australia<sup>7</sup> and Japan<sup>1</sup> where the figures were 63%, 58% and 50% respectively. The next most common emergency experienced was the reaction to local anaesthetic (29%). Atherton *et al* in 1999<sup>20</sup> stated that 20% of medical emergencies occurred after the administration of local anaesthetics. Thus dentists

**Table 3:** Percentage of responders experiencing medical emergencies over the previous 12 months

Medical emergency	Number of responders	Percentage of responders
Vasovagal syncope	245	92
Reaction to local anaesthetic	77	29
Seizures	45	17
Hyperventilation	39	15
Swallowed objects	34	13
Anaphylaxis	18	7
Diabetic coma	17	6
Asthma attack	11	4
Angina Pectoris	9	3
Acute steroid insufficiency	5	2
Cardiac arrest	3	1
Stroke	3	1
Myocardial infarction	0	0
<b>Other:</b>		
Tachycardia	2	1
Uncontrolled hypertension	1	0
Post-operative bleeding	1	0

**Table 4:** Competence in emergency management

Specified procedure	Percentage able to perform
Pulse check	95
Chest compression	89
Measuring blood pressure	80
Applying oxygen via face mask	80
Basic life support	77
Bag mask ventilation	70
Measuring blood glucose	54
Establishing intravenous access	47
Inserting oropharyngeal tube	34
Defibrillation	25
Advanced life support	9

need to have appropriate resuscitative equipment in their practices. Seventeen per cent of the respondents experienced patients with seizures. This condition requires anti-epileptic drugs such as a midazolam for treatment which was stored by only 20% of the respondents.

Cardiac arrest of a patient was experienced by three of the respondents over the previous 12 months. All three dentists had blood pressure meters, sterile syringes and needles, and glucose but only one had the necessary additional equipment and drugs. Whilst 25% of respondents felt that they were able to perform defibrillation, only 8% had a defibrillator, which is the most important equipment required to restore a normal heart rhythm. If defibrillation is not provided, the patient can die within minutes.<sup>13</sup> Balmer in 2008<sup>21</sup> stated "Dental undergraduates must understand the different cardiac arrest rhythms and be trained in the safe use of an AED". An alarming statistic published by Louw *et al*<sup>22</sup> reported that less than half (49%) of general medical practitioners working in hospitals in the Western Cape knew the indications for defibrillation. Of concern also, is that procedures such as performing airway management (inserting an oropharyngeal tube) and establishing intravenous access were able to be carried out by only 34% and 25% respectively of respondents.

**Table 5:** Average score for each question relating to dentists attitude towards training.

Statement	Average score
Undergraduate training has prepared you to manage medical emergencies.	2.8
Dentists should have postgraduate training in emergency medicine.	4.3
Dentists should participate in a medical emergency course once a year.	4.0
Dental staff should undergo medical emergency training.	4.3
Medical emergency courses should be a requirement for CPD accreditation.	4.1
I can manage medical emergencies with the use of self-study material.	2.7
Dentists must be prepared to manage medical emergencies.	4.5
Dentists require hands-on training in emergency medicine.	4.4
There are adequate medical emergency courses available for dentists.	2.5
The costs of medical emergency courses are reasonable.	2.9
Emergency equipment and drugs must be available in every dental practice.	4.2
There should be an emergency flow chart in every dental practice.	4.4

Strongly disagree:1 - Disagree:2 - Neutral:3 - Agree:4 - Strongly agree:5

It was clear from the responses (Table 5) that the respondents felt they required more formal training. A New Zealand study stated that more than half their respondents were dissatisfied with the training they had received for medical emergencies as undergraduate students.<sup>11</sup> The results from this study, however, showed that the respondents were neutral to whether undergraduate training prepared them for medical emergencies.

The respondents clearly felt strongly about the need for being prepared to manage medical emergencies, and that training is an important part of ensuring continued success in treating patients in such circumstances. They were uncertain or neutral to the statements which implied that there are insufficient training courses available or that dentists are unaware of training courses that could prepare them for medical emergencies. Standardising and certifying emergency training would certainly improve the competency level of dentists and prepare their staff in managing such situations.

## CONCLUSION AND RECOMMENDATIONS

There were some limitations in this study, as there are in surveys of this nature, such as the uneven geographic distribution of the respondents, and the inherent biases in such a sample in that only those practitioners with access to email and interested enough in the topic would have responded. However, the results in general seem to agree with those of similar surveys carried out in other countries, and give rise to similar concerns as expressed in those studies, in that there are many practitioners who are clearly ill-equipped to deal with medical emergencies. The following recommendations are therefore made:

1. Medical emergency courses should be part of all undergraduate curricula
2. Medical emergency courses should be included as part of CPD accreditation requirements by the Health Professions Council of South Africa.

3. As there is no South African list of recommended equipment and drugs, this should be developed and regularly revised, most suitably by the South African Dental Association.

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