

Chapter 1

An overview of the management of medical emergencies and resuscitation in the dental practice

INTRODUCTION

Every dental practice has a duty of care to ensure that an effective and safe service is provided for its patients (Jevon, 2012). The satisfactory performance in a medical emergency or in a resuscitation attempt in the dental practice has wide-ranging implications in terms of resuscitation equipment, resuscitation training, standards of care, clinical governance, risk management and clinical audit (Jevon, 2009).

The Resuscitation Council (UK) (2013) has updated its standards for clinical practice and training in resuscitation for dental practitioners and dental care professionals in general dental practice. All members of the dental team need to be aware of what their role would be in the event of a medical emergency and should be trained appropriately with regular practice sessions (Greenwood, 2009).

The aim of this chapter is to provide an overview of the management of medical emergencies and resuscitation in the dental practice.

LEARNING OUTCOMES

At the end of the chapter the reader will be able to:

- Discuss the concept of the chain of survival
- Discuss the incidence of medical emergencies in the dental practice
- Outline the General Dental Council guidelines on medical emergencies
- Summarise the Resuscitation Council (UK) standards
- Discuss the principles of safer handling during cardiopulmonary resuscitation (CPR)
- Outline the procedure for calling 999 for an ambulance
- Discuss the importance of human factors and teamwork in a medical emergency

CONCEPT OF THE CHAIN OF SURVIVAL

Survival from cardiac arrest relies on a sequence of time-sensitive interventions (Nolan *et al.*, 2010). The concept of the original chain of survival emphasised that each time-sensitive intervention must be optimised in order to maximise the chance of survival: a chain is only as strong as its weakest link (Cummins *et al.*, 1991).

The chain of survival (Figure 1.1) stresses the importance of recognising critical illness and/or angina and preventing cardiac arrest (both in and out of hospital) and post-resuscitation care (Nolan *et al.*, 2006):

- *Early recognition and call for help to prevent cardiac arrest*: this link stresses the importance of recognising patients at risk of cardiac arrest, dialling 999 for the emergency services and providing effective treatment to hopefully prevent cardiac arrest (Nolan *et al.*, 2010); patients sustaining an out-of-hospital cardiac arrest usually display warning symptoms for a significant duration before the event (Müller *et al.*, 2006).
- *Early CPR to buy time and early defibrillation to restart the heart*: the two central links in the chain stress the importance of linking CPR and defibrillation as essential components of early resuscitation in an attempt to restore life. Early CPR can double or even triple the chances of a patient surviving an out-of-hospital ventricular fibrillation (shockable rhythm) induced cardiac arrest (Holmberg *et al.*, 1998, 2001; Waalewijn *et al.*, 2001).
- *Post-resuscitation care to restore quality of life*: the priority is to preserve cerebral and myocardial function and to restore quality of life (Nolan *et al.*, 2010).

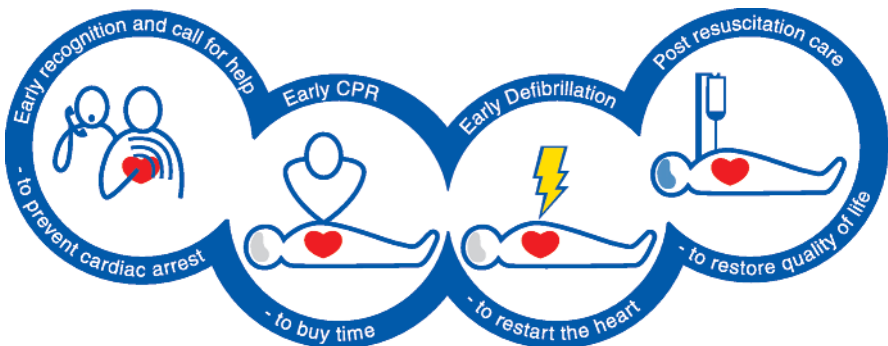


Figure 1.1 Chain of survival. Source: Laerdal Medical Ltd, Orpington, Kent, UK. Reproduced with permission.

INCIDENCE OF MEDICAL EMERGENCIES IN DENTAL PRACTICE

The incidence of medical emergencies in dental practice is very low. Medical emergencies occur in hospital dental practice more frequently, but in similar proportions to that found in general dental practice (Atherton *et al.*, 2000). With the elderly population in dental practices increasing, medical emergencies in the dental practice will undoubtedly occur (Dym, 2008).

A literature search for published surveys on the incidence of medical emergencies and resuscitation in the dental practice found the following.

Survey of dental practitioners in Australia

A postal questionnaire survey of 1250 general dental practitioners undertaken in Australia (Chapman, 1997) found that:

- one in seven (14%) had had to resuscitate a patient;
- the most common medical emergencies encountered were adverse reactions to local anaesthetics, grand mal seizures, angina and hypoglycaemia.

Survey of dentists in England

A survey of dentists (Girdler and Smith, 1999) (300 responded) in England found that over a 12-month period they had encountered:

- vasovagal syncope (63%) – 596 patients affected;
- angina (12%) – 53 patients affected;
- hypoglycaemia (10%) – 54 patients affected;
- epileptic fit (10%) – 42 patients affected;
- choking (5%) – 27 patients affected;
- asthma (5%) – 20 patients affected;
- cardiac arrest (0.3%) – 1 patient affected.

Survey of dental practitioners in a UK university dental hospital

Atherton *et al.* (2000) assessed the frequency of medical emergencies by undertaking a survey of clinical staff (dentists, hygienists, nurses and radiographers) at a university dental hospital. The researchers found that:

- fainting was the commonest event;
- other medical emergency events were experienced with an average frequency of 1.8 events per year;
- highest frequency of emergencies were reported by staff in oral surgery.

Survey of dentists in New Zealand

A total of 199 dentists responded to a postal survey undertaken by Broadbent and Thomson (2001) in New Zealand, with the following findings:

- Medical emergencies had occurred in 129 practices (65.2%) within the previous 10 years (mean – 2.0 events per 10,000 patients treated under local analgesia, other forms of pain control or sedation);
- Vasovagal events were the most common emergencies occurring in 121 (61.1%) practices within the previous year (mean 6.9 events per 10,000 patients treated under local analgesia, other forms of pain control or sedation).

Survey of dental staff in Ohio

A survey of dental staff in Ohio (Kandray *et al.*, 2007) found that 5% had performed CPR on a patient in their dental surgery.

Survey of dentists in Germany

A survey of 620 dentists in Germany (Müller *et al.*, 2008) found that in a 12-month period:

- 57% had encountered up to 3 emergencies;
- 36% had encountered up to 10 emergencies;
- Vasovagal episode was the most common reported emergency – average 2 per dentist;
- 42 dentists (7%) had encountered an epileptic fit;
- 24 dentists (4%) had encountered an asthma attack;
- 5 dentists (0.8%) had encountered choking;
- 7 dentists (1.1%) had encountered anaphylaxis;
- 2 dentists (0.3%) had encountered a cardiopulmonary arrest.

GENERAL DENTAL COUNCIL GUIDELINES ON MEDICAL EMERGENCIES

Standards for the Dental team (General Dental Council, 2013) emphasises that all dental professionals are responsible for putting patients' interests first, and acting to protect them. Central to this responsibility is the need for dental professionals to ensure that they are able to deal with medical emergencies that may arise in their practice. Such emergencies are, fortunately, a rare

occurrence, but it is important to recognise that a medical emergency could happen at any time and that all members of the dental team need to know their role in the event of one occurring.

The General Dental Council, in its publication *Principles of Dental Team Working* (General Dental Council, 2006), states that the person who employs, manages or leads a team in a dental practice should ensure that:

- There are arrangements for at least two people available to deal with medical emergencies when treatment is planned to take place;
- All members of staff, not just the registered team members, know their role if a patient collapses or there is another kind of medical emergency;
- All members of staff who might be involved in dealing with a medical emergency are trained and prepared to deal with such an emergency at any time;
- Members of the team practice together regularly in a simulated emergency so they know exactly what to do.

Maintaining the knowledge and competence to deal with medical emergencies is an important aspect of all dental professionals continuing professional development (General Dental Council, 2006). The above guidance has been endorsed by the Resuscitation Council (UK) (2013).

RESUSCITATION COUNCIL (UK) QUALITY STANDARDS

The Resuscitation Council (UK)'s Quality standards for cardiopulmonary resuscitation practice and training: primary dental care (2013) provides guidance and recommendations concerning the management of a cardiac arrest in the dental practice.

Topics covered include medical risk assessment, resuscitation procedures and the use of resuscitation equipment in the dental practice in general dental practice. It also includes topics such as staff training, patient transfer and post-resuscitation/emergency care.

The key recommendations in the statement are that:

- Every dental practice should have a procedure in place for medical risk assessment of their patients;
- Specific resuscitation equipment should be immediately available in every dental practice (this should be standardised throughout the United Kingdom);
- Every clinical area should have immediate access to an automated external defibrillator (AED);

- Dental practitioners and dental care professionals should receive training in CPR, including basic airway management and the use of an AED, with annual updates;
- Regular simulated emergency scenarios should take place in the dental practice;
- Dental practices should have a protocol in place for calling medical assistance in an emergency (this will usually be calling 999 for an ambulance);
- All medical emergencies should be audited.

For further information, access the Resuscitation Council (UK)'s website http://www.resus.org.uk/pages/QSCPR_PrimaryDentalCare.htm accessed 4 December 2013).

'A patient could collapse on any premises at any time, whether they have received treatment or not. It is therefore essential that ALL registrants are trained in dealing with medical emergencies, including resuscitation, and possess up to date evidence of capability'. General Dental Council 'Scope of Practice' 2013

ABCDE ASSESSMENT OF THE SICK PATIENT

Many people who suffer an out-of-hospital cardiac arrest display warning symptoms for a significant duration before collapse (Müller *et al.*, 2006). These symptoms could include:

- chest pain;
- dyspnoea (breathlessness);
- nausea/vomiting;
- dizziness/syncope. (Müller *et al.*, 2006)

The Resuscitation Council (UK) (2012) recommends the ABCDE approach to assess the sick patient (see Chapter 3). All dental professionals should be familiar with the approach because, not only will it help them to recognise the warning symptoms which many people exhibit prior to sudden cardiac arrest, but also it will help to establish whether the patient is sick or not. The logical and systematic ABCDE approach to assessing the sick patient incorporates:

- airway;
- breathing;
- circulation;
- disability;
- exposure.

When assessing the patient, a complete initial assessment should be undertaken, identifying and treating life-threatening problems first, before moving on to the next part of assessment. The effectiveness of treatment/intervention

should be evaluated and regular reassessment undertaken. The need to call for an ambulance should be recognised and other members of the multidisciplinary team should be utilised as appropriate so that patient assessment, instigation of appropriate monitoring and interventions can be undertaken.

MEDICAL RISK ASSESSMENT IN GENERAL DENTAL PRACTICE

Although any patient could experience a medical emergency in general practice, certain patients will be at higher risk. It is therefore important to identify these patients by undertaking medical and medication histories. The dental practitioner can then take measures to reduce the chance of a problem arising in dental practice.

History taking

Medical and medication histories should be obtained by the dental practitioner and should not be delegated to another member of the dental team; if a patient completes a health questionnaire it is only acceptable if augmented by a verbal history taken by the dental practitioner (Resuscitation Council (UK), 2012). For some patients, it may be necessary to modify the planned treatment or even refer them for treatment in hospital.

Risk stratification scoring system

A risk stratification scoring system, e.g. the American Society of Anaesthesiologists' classification, should be used routinely by the dental practitioner when assessing a patient for dental treatment, as it may help to identify those patients who are at greater risk of a medical emergency during dental treatment (Resuscitation Council (UK), 2012). It should trigger hospital referral for treatment if a certain level of risk is attained. It has been suggested that a risk stratification could be incorporated into the routine medical history questionnaire so that all patients are risk assessed (Resuscitation Council (UK), 2012).

Up-to-date patient details

It is recommended to update the patient's medical and medication histories on a regular basis (at least annually) or more frequently as required; it may be necessary to liaise with the patient's general practitioner (Resuscitation Council (UK), 2012).

Existing medical problem

Patients with certain existing medical problems are more likely to suffer a medical emergency in the dental surgery:

- **Angina:** if a patient has frequent episodes of angina following exertion or suffers from angina that is easily provoked, he or she may experience an episode of angina in the dental practice. If the patient suffers from angina episodes caused by anxiety or stress, he may benefit from being prescribed an oral anxiolytic drug, e.g. diazepam, before dental treatment. *Note:* prolonged drug treatment may lead to dependence (British Medical Association and The Royal Pharmaceutical Society, 2013). The patient should be considered at higher risk if he or she has unstable angina, angina episodes at night or has had a recent admission to hospital with angina. For these patients, in-hospital treatment may be prudent (Resuscitation Council (UK), 2012).
- **Asthma:** an asthmatic patient is more likely to have a severe asthma attack in the dental practice if he or she has had a previous near-fatal asthmatic episode, if he has been admitted to the emergency department with asthma in the previous 12 months, or if he has been prescribed three or more classes of medication, or if he regularly requires beta-2 agonist therapy (British Thoracic Society, 2008).
- **Epilepsy:** the patient will usually be able to provide the dental practitioner with a good indication of how well his condition is controlled. There is a greater risk of having a fit in the dental practice if his fits are poorly controlled or if his medications have recently been altered. It would be prudent to ascertain the timings of, and precipitating factors for, the patient's last three fits (Resuscitation Council (UK), 2012).
- **Diabetes:** a patient with Type 1 diabetes (on insulin) is more likely become hypoglycaemic in the dental practice than a patient with Type 2 diabetes (diet or tablet controlled); patients whose diabetes is poorly controlled or who have poor awareness of their hypoglycaemic episodes are more likely to develop hypoglycaemia (Resuscitation Council (UK), 2012).
- **Allergies:** it is important to ascertain whether the patient has any known allergies, particularly to local anaesthetic, antibiotics or latex. If the patient has a severe latex allergy, use latex-free gloves; he should either be treated in a hospital environment or in a latex-free dental environment where appropriate resuscitation facilities are at hand (Resuscitation Council (UK), 2012).

PRINCIPLES OF SAFER HANDLING DURING CARDIOPULMONARY RESUSCITATION

The Resuscitation Council (UK), in its publication *Guidance for Safer Handling during Resuscitation in Healthcare Settings* (2009), has issued guidelines concerning safer handling during CPR. Although specifically aimed at hospital staff, the

guidelines can be adapted for use when performing CPR in the dental practice. An overview will now be provided. Although the use of slide sheets is recommended when moving the patient, these are not usually available in the dental practice.

Cardiac arrest on the floor

- If the patient has collapsed on the floor, e.g. in the waiting room, perform CPR on the floor. If the area has restricted access, consider sliding the patient across the floor.
- Ventilation: kneel behind the patient's head ensuring the knees are shoulder-width apart, rest back to sit on the heels and lean forwards from the hips towards the patient's face.
- Chest compressions: kneel at the side of the patient, level with his chest, and adopt a high kneeling position with the knees shoulder-width apart; position the shoulders directly over the patient's sternum and keeping the arms straight compress the chest ensuring the force for compressions results from flexing the hips.

Cardiac arrest in the dental chair

- Remove any environmental hazards, e.g. mouthwash, dental instrument tray.
- Lower the chair into a horizontal position.
- Ventilation: to use the mask device, ideally sit on the dentist's stool at the head end of the chair. The person squeezing the bag should stand with their feet in a walk/stand position facing the patient; avoid prolonged static postures.
- Chest compressions: ensure the chair is at a height which places the patient between the knee and mid-thigh of the person performing chest compressions; stand at the side of the chair with the feet shoulder-width apart, position the shoulders directly over the patient's sternum and, keeping the arms straight, compress the chest, ensuring the force for compressions results from flexing the hips.

Cardiac arrest in a chair in the waiting room

- Lowering the patient to the floor: with two colleagues, slide the patient on to the floor; ideally a third person should support the patient's head during the procedure.

Cardiac arrest in the toilet

- Ensure the toilet door is kept open and access maintained.
- Lowering the patient to the floor: with two colleagues, slide the patient on to the floor; ideally a third person should support the patient's head during the procedure.

PROCEDURE FOR CALLING 999 FOR AN AMBULANCE

There are many emergency situations in the dental practice which will require an ambulance to be called, e.g. chest pain, difficulty with breathing, anaphylaxis and cardiopulmonary arrest. When calling 999 for an ambulance, the following is a suggested procedure:

- If available, obtain the ‘when dialling 999 information card’ that will have the dental practice’s address, telephone number and any specific instructions or guidelines if the practice is difficult to find. Reading from this card will make it easier for the person calling 999 for an ambulance and will help minimise the risk of incorrect information being given.
- Lift the telephone receiver or switch the phone on and dial 999 (when using a telephone in a dental practice it is usually necessary to access an outside line first, e.g. by pressing a specific key or pressing 9).
- When the telephone operator answers, he or she will ask which emergency service you require. Tell the operator that you need an ambulance and you will then be connected to the ambulance service. (It is important to remember that 999 (or 112) is used for other emergencies as well such as the fire service, police, mountain rescue, coastguard.)
- Once connected to the ambulance service, the ambulance control officer (Figure 1.2) will ask you where you would like the ambulance to come to, the telephone number of the phone you are calling from and details of the



Figure 1.2 Ambulance control centre. Source: West Midlands Ambulance Service. Reproduced with permission.



Figure 1.3 (a) Ambulance. Reproduced with kind permission from West Midlands Ambulance Service. (b) Paramedic on a motorcycle. Source: West Midlands Ambulance Service. Reproduced with permission.

emergency. Give accurate details of the address or location where help is needed. If there is a recognisable landmark, e.g. famous shop nearby, this information will be helpful. An ambulance or paramedic on a motorcycle will be dispatched (Figures 1.3a and 1.3b).

- If appropriate, stay on the line and continue to listen to important advice provided by the ambulance control officer.
- Confirm with the senior dental practitioner that an ambulance has been called.
- Note the time the 999 call was made.
- If possible, ask someone to wait outside the dental practice to attract the attention of the ambulance when it draws near (a patient may be willing to do this).

It is important to:

- stay calm;
- listen carefully to any questions the operator may ask;
- speak slowly and clearly; do not shout.

IMPORTANCE OF HUMAN FACTORS AND TEAMWORK

When managing a medical emergency, technical skills, e.g. administration of oxygen or using an AED are important if the patient's outcome is to be optimized. However, there is another group of skills, that are also important, that are becoming increasingly recognised in medicine – human factors or non-technical skills (Resuscitation Council (UK), 2011). These human factors can be defined as the cognitive, social and personal resource skills that complement technical

skills and contribute to safe and efficient task performance and these skills affect the individual's personal performance (Resuscitation Council (UK), 2012).

Deficiencies in the requisite human factors are a common cause of adverse incidents associated with medical emergencies (Norris and Lockey, 2012). Human factors play a major role in these shortcomings and that the medical performance depends on the quality of leadership and team-structuring (Hunziker *et al.*, 2010).

To help minimise the risk of human factors adversely affecting the performance of the team in a medical emergency, the Resuscitation Council (UK, 2011) recommends the following:

- **Situational awareness:** during a medical emergency, it is important for all team members to have a common understanding of current events (shared situational awareness)
- **Decision making:** the team leader (usually the senior dentist) should be making decisions and communicating these clearly and unambiguously to the team members
- **Team working, including team leadership:** clear team leadership is associated with more efficient co-operation in the team and with better task performance; leaders who participated “hands-on” in the emergency were less likely to be efficient leaders, and team performance usually suffers (Hunziker *et al.*, 2010). Attributes of a good team leader are listed in Box 1.1
- **Task management:** co-ordination of tasks undertaken during an emergency ensuring they are done, e.g. calling 999 for an ambulance

Box 1.1 Attributes of a good team leader

- Knows all team members by name
- Understands each team member's capability
- Accepts role of team leader
- Delegates tasks appropriately
- knowledgeable and credible
- Remains calm and focused in an emergency
- Keeps team focused and controls distractions
- Communicates effectively (both giving instructions and listening)
- Empathic towards the whole team
- Assertive and authoritative when appropriate
- Understanding/tolerant towards hesitancy or nervousness in an emergency
- Good situational awareness
- Following emergency, thanks team and supports both staff and relatives as required
- Completes documentation and ensures an adequate handover

Source: Resuscitation Council (UK) (2011).

CONCLUSION

Dental practitioners have a duty of care to ensure that an effective and safe service is provided for their patients. This chapter has provided an overview of the management of medical emergencies and resuscitation with specific reference to the standards for clinical practice and training in medical emergencies and resuscitation for dental practitioners and dental care professionals in general dental practice.

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