Changing Guidelines of Cardiopulmonary Resuscitation and Basic Life Support for General Dental Practitioners and Oral and Maxillofacial Surgeons

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Abstract

Introduction Every general dental practitioner and oral and maxillofacial surgeon needs a thorough knowledge of the diagnosis and management of medical emergencies. Cardiopulmonary arrest is the most urgent of emergencies and diagnosis must be done as soon as possible.

Purpose This paper discusses the importance of the International Liaison Committee on Resuscitation which forms the guidelines for cardiopulmonary resuscitation (CPR), highlighting the important changes in the guidelines of CPR from the year 2000 to 2010, the basic sequence of performing CPR and also the role of defibrillation and the use of automated external defibrillators. Finally the five part chain of survival which is of utmost importance to dental health care professionals and oral and maxillofacial surgeons.

Conclusion All dental health care personnel and oral & maxillofacial surgeons should recognize the importance of the changes in the guidelines of CPR, be trained and allowed to use a properly maintained defibrillator, to respond to cardiac arrest victims.

Keywords CPR-Guidelines · Defibrillation · Dentistry-cardiac arrest · Basic life support

Introduction

All general dental practitioners and oral and maxillofacial surgeons have to deal with medical emergencies that may arise in their practice. Cardiopulmonary arrest (CPA) is fortunately a rare medical emergency, but it is important to recognise it. All members of the dental team also need to know their roles in the event [1]. The tolerance of the heart to anoxia is relatively high, but the central nervous system will show irreversible lesions if anoxia lasts for more than 3–4 min [2]. Though unusual, there are reports of deaths due to CPA in dental offices during dental treatment [3–5]. Little has been published about the competence of dentists to deal with CPA, or the occurrence of resuscitation emergencies in dental practice [6–9]. Cardiopulmonary resuscitation (CPR) is a vital skill which must be mastered by all health care professionals. Therefore the thorough knowledge of CPR and Basic Life Support is of utmost importance to the dentist. Oral and maxillofacial surgeons are the only ones to be summoned in case of an emergency in dental practice. Hence management of emergency situation created by other practitioners require learning of CPR and other emergency skills.

Definitions

Cardiopulmonary Resuscitation (CPR): An emergency procedure in which the heart and lungs are made to work by manually compressing the chest overlying the heart and forcing air into the lungs.

Basic Life Support (BLS): Basic Life Support implies that no equipment is employed other than a protective device [10].

Indications for CPR: When the patient shows no signs of life, unresponsive, not breathing properly and when the carotid pulse cannot be palpated within 10 s [11].

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Chain of Survival (Fig. 1)

International Liaison Committee on Resuscitation (ILCOR)

The International Liaison Committee on Resuscitation (ILCOR) was founded on November 22, 1992 and currently includes representatives from the American Heart Association (AHA), European Resuscitation Council (ERC), Heart and Stroke Foundation of Canada (HSFC), Australian and New Zealand Committee on Resuscitation (ANZCOR), Resuscitation Council of Southern Africa (RCSA), Inter American Heart Foundation (IAHF) and Resuscitation Council of Asia (RCA). Since the year 2000 researchers from the ILCOR members council have evaluated resuscitation science in 5-year cycles [12, 13].

Objectives of ILCOR:

- Provide a forum for discussion and for coordination of all aspects of cardiopulmonary and cerebral resuscitation worldwide.
- Foster scientific research in areas of resuscitation where there is a lack of data or where there is controversy.
- Provide for dissemination of information on training and education in resuscitation.
- Provide a mechanism for collecting, reviewing and sharing international scientific data on resuscitation.
- Produce as appropriate statements on specific issues related to resuscitation that reflects international consensus [14].

Activity of ILCOR

In 1999, the AHA hosted the first ILCOR conference to evaluate resuscitation science and develop common resuscitation guidelines. The conference recommendations were published in the International Guidelines 2000 for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care [14]. The most recent International

Table 1 Changes in the guidelines from 2000–2005 [15]

Variable of the guidelines	Guidelines in the year 2000	Guidelines in the year 2005
1. Delivery of chest compressions	Quality and rate of chest compressions, complete chest wall recoil, and need to minimize interruption of chest compressions were not emphasized	“Push hard and push fast.” Compression rate of about 100 compressions/min for all victims (except newborns). Allow recoil and minimizing interruptions
2. Compression to ventilation ratio	For adult CPR, a 15:2 and for infant and child CPR, 5:1 compression to ventilation ratio was recommended	Compression to ventilation ratio of 30:2 for lone rescuers to use for all victims from infants through adults
3. Rescue breath duration	Breaths to be delivered in 1 s	Each rescue breath should be given over 1 s
4. Defibrillation	For treatment of cardiac arrest with a “shockable” rhythm, rescuers delivered up to 3 shocks without any CPR between the shocks	All rescuers should deliver 1 shock followed by immediate CPR, beginning with chest compressions, checking the rhythm every 5 cycles of CPR
5. AED recommendations for their use in children	Not recommended for children in cardiac arrest 1–8 years old	Recommended for use in children 1 year of age and older

Consensus Conference was held in Dallas in February 2010. The changes in the guidelines are mentioned in Tables 1 and 2.

Fig. 1 Simplified adult basic life support

Table 2 Changes in the guidelines from 2005–2010 [16]

Variable of the guidelines	Guidelines in the year 2005	Guidelines in the year 2010
1. Emphasis on chest compressions	Does not provide different recommendations for trained and untrained rescuers	Chest compressions are emphasized for both trained and untrained rescuers. If a bystander is not trained in CPR, they should provide hands-only (compression-only) CPR with an emphasis to “push hard and fast” on the centre of the chest
2. Activation of emergency response system	The healthcare provider activated the emergency response system after finding an unresponsive victim. The provider then returned to the victim and opened the airway and checked for breathing or abnormal breathing	The healthcare provider should check for response while looking at the patient to determine if breathing is absent or not normal. The provider should suspect cardiac arrest if the victim is not breathing or only gasping
3. CPR sequence	A-B-C (airway, breathing and compressions)	C-A-B (compressions, airway and breathing)
4. Look, listen, and feel for breathing	“Look, listen, and feel for breathing” was used to assess breathing after the airway was opened	“Look, listen, and feel for breathing” was removed from the sequence for assessment of breathing after opening the airway
5. Chest compression rate	Compress at a rate of about 100/min	It is reasonable for lay rescuers and healthcare providers to perform chest compressions at a rate of at least 100/min
6. Chest compression depth	The adult sternum should be depressed 1–2 inches (approx 4–5 cm)	The adult sternum should be depressed at least two inches (5 cm)

Adult Basic Life Support Sequence [16]

Check the victim for a response:

- Gently shake the victims’ shoulders and ask loudly, ‘Are you all right?’

If he responds:

- Leave him in the position in which you find him provided there is no further danger.
- Try to find out what is wrong with him and get help if needed.

- Reassess him regularly.

If he does not respond:

- Call for emergency services.
- Turn the victim onto his back and then open the airway using head tilt and chin lift.
- Place your hand on his forehead and gently tilt his head back.
- With your fingertips under the point of the victim’s chin, lift the chin to open the airway.

Keeping the airway open, look, listen, and feel for normal breathing:

- Look for chest movement.
- Listen at the victim’s mouth for breath sounds.
- Feel for air on your cheek.

In the first few minutes after cardiac arrest, a victim may be barely breathing, or taking infrequent, noisy, gasps. This is often termed agonal breathing and must not be confused with normal breathing. Look, listen, and feel for no more than 10 s to determine if the victim is breathing normally. If you have any doubt whether breathing is normal, act as if it is not normal.

If he is breathing normally:

- Turn him into the recovery position
- Summon help from the ambulance service by mobile phone. If this is not possible, send a bystander. Leave the victim only if no other way of obtaining help is available.
- Continue to assess that breathing remains normal. If there is any doubt about the presence of normal breathing, start CPR.

If he is not breathing normally: Ask someone to call for an ambulance and bring an AED if available. If you are alone, use your mobile phone to call for an ambulance. Leave the victim only when no other options exist for getting help.

Start chest compression as follows:

- Kneel by the side of the victim.
- Place the heel of one hand in the centre of the victim’s chest (sternum).
- Place the heel of your other hand on top of the first hand.
- Interlock the fingers of your hands and ensure that pressure is not applied over the victim’s ribs. Do not apply any pressure over the upper abdomen or the lower end of the sternum.
- Position yourself vertically above the victim’s chest and with your arms straight, press over the sternum (5–6 cm).
- After each compression, release all the pressure on the chest without losing contact between your hands and the sternum. Repeat at a rate of 100–120 min⁻¹.

- Compression and release should take an equal amount of time.

Combine chest compression with rescue breaths:

- After 30 compressions open the airway again using head tilt and chin lift.
- Pinch the soft part of the victim's nose closed, using the index finger and the thumb of your hand on his forehead.
- Allow his mouth to open, but maintain chin lift.
- Take a normal breath and place your lips around his mouth and make sure you have a good seal.
- Blow steadily into his mouth whilst watching for his chest to rise; take about one second to make his chest rise as in normal breathing; this is an effective rescue breath.
- Maintaining head tilt and chin lift, take your mouth away from the victim and look for his chest to fall as air comes out.
- Take another normal breath and blow into the victim's mouth once more to give a total of two effective rescue breaths. The two breaths should not take more than 5 s. Then return your hands without delay to the correct position on the sternum and give a further 30 chest compressions.
- Continue with chest compressions and rescue breaths in a ratio of 30:2.
- Stop to recheck the victim only if he starts to show signs of regaining conscious such as coughing, opening his eyes, speaking, or moving and starts to breathe normally; otherwise do not interrupt resuscitation.

If the initial rescue breath of each sequence does not make the chest rise as in normal breathing, then before your next attempt:

- Check the victim's mouth and remove any visible obstruction.
- Recheck that there is adequate head tilt and chin lift.
- Do not attempt more than two breaths each time before returning to chest compression.

If there is more than one rescuer present, another should take over CPR about every 1–2 min to prevent fatigue. Ensure minimum delay during the change of rescuers and do not interrupt chest compressions. Continue resuscitation until qualified help arrives and takes over (Fig. 2).

Defibrillation

Definition: The use of a carefully controlled electric shock administered either through a device on the exterior of the chest wall or directly to the exposed heart muscle to normalize the rhythm of the heart or restart it [16].

Fig. 2 Automated external defibrillator

Electrical defibrillation is well established as the only effective therapy for cardiac arrest caused by ventricular fibrillation (VF) or pulseless ventricular tachycardia (VT). The scientific evidence to support early defibrillation is overwhelming; the delay from collapse to delivery of the first shock is the single most important determinant of survival. If defibrillation is delivered promptly, survival rates as high as 75 % have been reported. The chances of successful defibrillation decline at a rate of about 10 % with each minute of delay, basic life support will help to maintain a shockable rhythm but is not a definitive treatment.

Guideline Changes

An Automated External Defibrillator (AED) can be used safely and effectively without previous training and hence should not be restricted only to trained rescuers. However, training should be encouraged to help improve the time to shock delivery and correct pad placement. When using an AED minimise interruptions in chest compression and do not stop to check the victim, or discontinue cardiopulmonary resuscitation (CPR) unless the victim starts to show signs of regaining consciousness such as coughing, opening his eyes, speaking and starts to breathe normally.

Fig. 3 Different types of automated external defibrillator (AEDs)

Types of Automated External Defibrillators (AED)

AEDs are sophisticated, reliable, safe, computerised devices that deliver electric shocks to victims of cardiac arrest when the ECG rhythm is one that is likely to respond to a shock. Simplicity of operation is a key feature: controls are kept to a minimum, voice and visual prompts guide rescuers. Modern AEDs are suitable for use by both lay rescuers and health care professionals. All AEDs analyse the victim's ECG rhythm and determine the need for a shock. The semi-automatic AED indicates the need for a shock, which is delivered by the operator, while the fully automatic AED administers the shock without the need for intervention by the operator. Some semi-automatic AEDs have the facility to enable the operator to override the device and deliver a shock manually independently of prompts (Fig. 3).

Sequence of Actions When Using an Automated External Defibrillator

The following sequence applies to the use of both semi-automatic and automatic AEDs in a victim who is found to be unconscious and not breathing normally.

- Follow the adult BLS sequence as described and do not delay starting CPR unless the AED is available immediately.
- As the AED arrives: If more than one rescuer is present, continue CPR while the AED is switched on. If you are alone, stop CPR and switch on the AED.

- Follow the voice/visual prompts and attach the electrode pads to the patient's bare chest. Ensure that nobody touches the victim while the AED is analysing the rhythm.
- If a shock is indicated: Push the shock button as directed (fully-automatic AEDs will deliver the shock automatically). Minimise interruptions in chest compression. Continue to follow the AED prompts until qualified help arrives and takes over.

Storage and Use of AEDs

AEDs should be stored in locations that are immediately accessible to rescuers, they should not be stored in locked cabinets as this may delay deployment. While it is highly desirable that those who may be called upon to use an AED should be trained, however no inhibitions should be placed on any person to use an AED.

Conclusion

Immediate recognition of cardiopulmonary arrest (CPA) and quickly calling the Emergency Medical Services, early CPR, rapid defibrillation, effective advanced life support and integrated post-cardiac arrest care are of utmost importance. All dental health care personnel and oral and maxillofacial surgeons should recognize the importance of the changes in the guidelines of cardiopulmonary resuscitation (CPR), be trained and allowed to use a properly maintained defibrillator, to respond to cardiac arrest victims.

Conflict of interest None.

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