REVIEW ARTICLE

REVIEW OF BASIC LIFE SUPPORT FOR ADULTS: AN IMPERATIVE REQUISITE FOR DENTAL PRACTITIONERS

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ABSTRACT:
Introduction: Life-threatening emergencies can and do occur anytime in the dental clinic. There are certain factors which minimize the development of life threatening situations. These include physical evaluation of every patient, detailed medical history, proper physical examination and possible modifications in dental treatment to minimize medical risks. Cardiopulmonary arrest is one of the most emergency condition and the diagnosis and immediate treatment should be given as soon as possible. Purpose: This paper discusses to the importance and knowledge of Basic Life Support (BLS) / Cardiopulmonary Resuscitation (CPR) among general dental practitioners & other health care providers. Conclusion: To ensure better and safer health care, it is essential for all dental practitioners and oral and maxillofacial surgeons to have adequate knowledge of CPR/BLS. Immediate and early recognition of cardiopulmonary arrest (CPA) and quickly calling the Emergency Medical Services, early CPR, rapid defibrillation, effective advanced life support (ALS) and integrated post-cardiac arrest care are of utmost importance in adult and paediatric patient.
Key words: Basic Life Support (BLS), Cardiopulmonary Resuscitation (CPR) Guideline, Automated External Defibrillator (AED)

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INTRODUCTION

Life-threatening emergencies are not uncommon in dental clinic. These can happen to anyone - a patient and their attendant, doctors, clinic staff. Some factors minimize the development of life threatening situations. These include physical evaluation of every patient, detailed medical history, proper physical examination and possible modifications in dental treatment to minimize medical risks.[1]

It has been estimated that due to proper implementation of stress reduction procedures, approximately 10% of these life threatening situations in the dental office can be prevented.[2] In dental clinics the most frequent medical emergency occurs after drug administration like local anaesthetics, parenteral administration of antibiotics, analgesics and sedatives. The mostly drug-related emergency like anaphylactic shock can occur in the dental office[3], emergencies can also occur at dental chair as the patients have anxiety and fear of dental treatment. Unfortunately, the occurrence of new cases of cardiopulmonary arrest increasing in dental clinics day by day. It can also occur due to problem in airway obstruction during dental treatments.[4]

Cardiac diseases are commonly occurring diseases worldwide due to the change in the lifestyle and food habits[5]. World Health Organization reported that cardiovascular disease causes 12 million deaths in the world each year, and 27% of deaths are due to cardiovascular problems in India.[6]

The American Heart Association (AHA) and the National Academy of Sciences National Research Council in May, 1973 cosponsored a National Conference on standards of cardiopulmonary Resuscitation (CPR) and Emergency Cardiac Care,

which was the first presented standardized procedure for basic and advanced life support.[8] In 1979, 1985, 1992 and 1999 subsequent conferences were held to update these standards.[9,10] All general dental practitioners and oral and maxillofacial surgeons have to deal with medical emergencies that may occur in general practice. Cardiopulmonary arrest (CPA) is a rare medical emergency, but it is important to recognise these conditions. All members of the dental team should be familiar with these conditions and know their roles in these conditions.[11]

Basic Life Support (BLS) is a life saving measure in cases of medical emergencies such as sudden cardiac arrest, drowning, choking and trauma and Cardiopulmonary Resuscitation (CPR) is the technique of chest compressions combined with rescue breathing. The purpose of CPR is to temporarily maintain a circulation sufficient to preserve brain function until specialised treatment is available[12]. Cardiopulmonary resuscitation (CPR) is a vital skill which must be mastered by all dental practitioners.

Sudden cardiac death (SCD) is thought to be a cause of one fourth of the human deaths. Out of the various causes of sudden cardiac death, ventricular fibrillation is found to be the most common.[13] Therefore the thorough knowledge of CPR and Basic Life Support is of importance to the dentist and dental staff.

There are very few articles available which describe the management of medical emergencies in dental office. Keeping this fact in mind, this article will emphasise, describe and review the recent available protocols for Basic life support. Also this article aims at making a dentist aware of protocols for initial stabilization of victims until definitive care is provided.

CHAIN OF SURVIVAL

Introduction to the Adult chain of survival

The American Heart Association (AHA) suggested five links in the adult Chain of Survival for resuscitation[3]. It includes (Figure 1):

1. Immediate recognition of cardiac arrest and activating the emergency medical services.
2. Delivering Cardiopulmonary Resuscitation (CPR) with an emphasis on chest compressions.
3. Shock delivery with a defibrillator
4. Effective advanced life support.
5. Post resuscitation care by healthcare organisations.

- Immediate recognition of cardiac arrest and activating the emergency medical services.

Step 1: Assessment and scene safety-

Scene safety is of utmost importance; as it ensures, safety of non ambulatory patient, proper positioning of health care provider and effective delivery of required resuscitation. First of all gently tap the victim's shoulder and shout, "are you all right?" If he responds, it signifies that he is conscious and his airway is patent. Then try to find out the problem and get assistance if needed. Keep reassessing the patient at regular intervals.

Step 2: Activation of emergency response system

In case of no response, look for breathing. It should be assessed for 2-3 seconds. In cases of no breathing or agonal gasping, one should seek for help and ask assistant dental staff to activate emergency response system. Also if available, get the Automated External Defibrillator (AED).

Step 3: Carotid Pulse assessment

It should be checked within 10 seconds. If carotid pulse is not palpated within 10 seconds then chest compression should be started.

Figure 1: Adult Chain survival

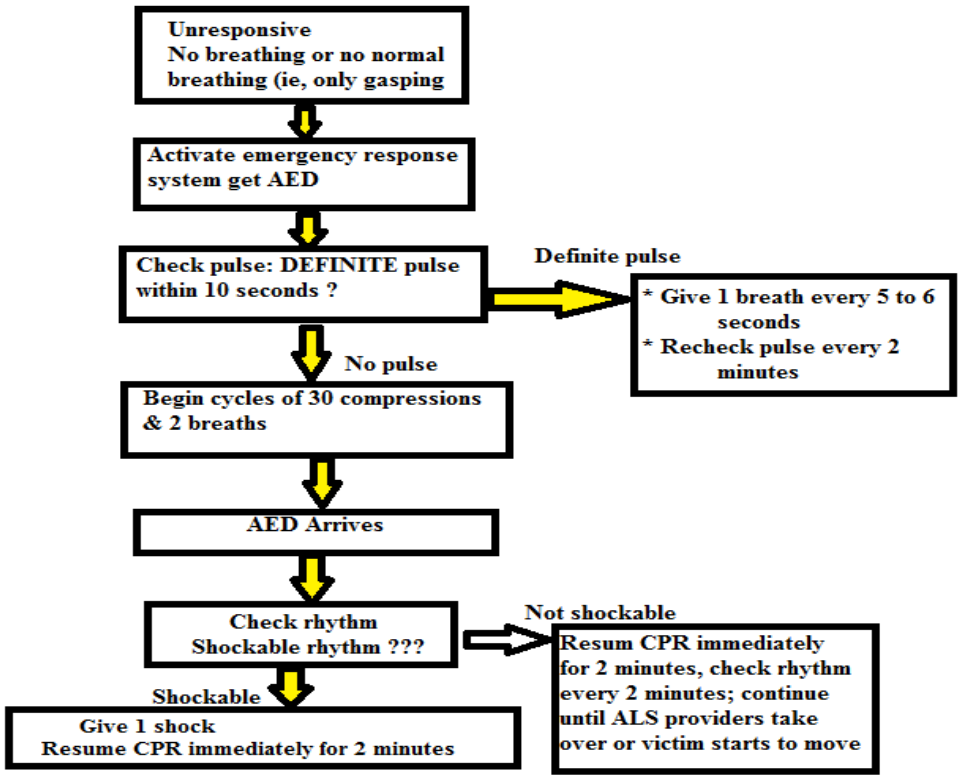

Figure 2: Adult BLS Algorithm for Healthcare providers

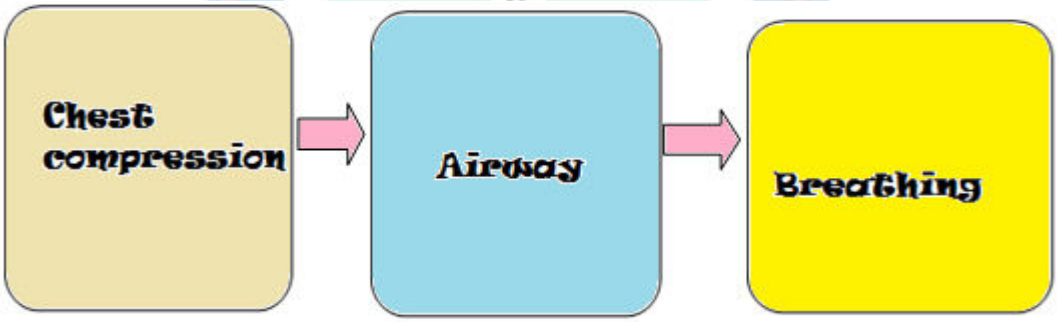

Figure 3: (C-A-B Not A-B-C)

Step 1: Position yourself at the side of victim

Step 2: Make sure patient is laying faced up on firm, flat surface. If patient is on dental chair then he should be made to lie on ground, as effective CPR cannot be delivered on dental chair.

Step 3: Put heel of one hand on centre of victim's chest on lower portion of sternum.

Step 4: Put heel of other hand on top of first hand.

Step 5: Straighten your arm and position your shoulder directly over your hand.

Step 6: Push hard and fast; Press done at least 5cm/2inch with each compression. Deliver compression in smooth fashion at the rate of at least 100 per minute.

Step 7: At the end of each compression, make sure you allow the chest to re expand completely. Chest compression and chest relaxation time should be approximately equal.

Step 8: Minimize interruptions.

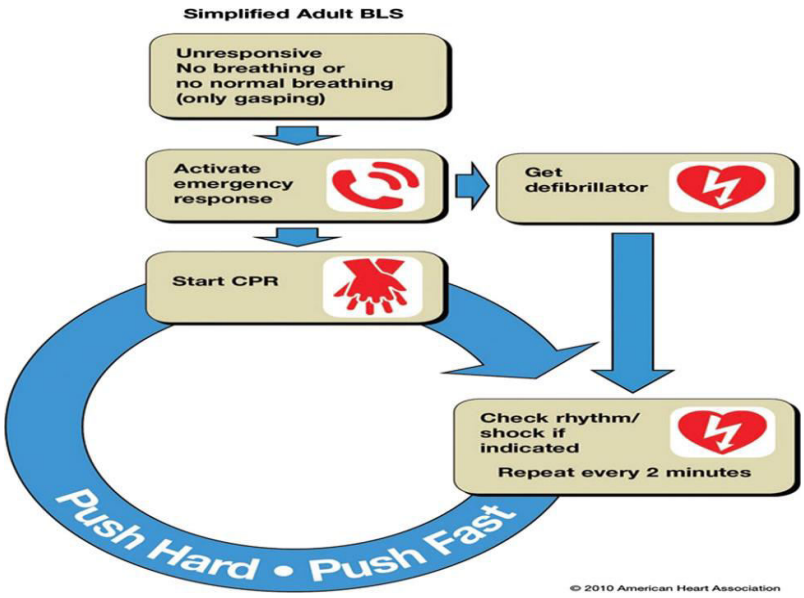

Figure 4: Simplified Adult Basic Life Support

Foundational facts about chest compression – chest compressions pump the blood in the heart to the whole body. If a firm surface is present under the victim, the force used will be more likely to compress the chest and heart and it will create blood flow rather than simply push the victim into the mattress or other soft surface.

Figure 5: Delivering Cardiopulmonary Resuscitation (CPR) with an emphasis on chest compressions.

Opening the airway for breaths- Basically there are two methods for opening the airway to provide breaths-

1. Head tilt and chin lift
2. Jaw thrust- it is use to prevent tongue obstructing the upper airway. Jaw thrust is basically use in cases when we suspect any head or neck injury.

   Foundational fact about giving breath-
   - Giving mouth to mouth breathing.
   - Mouth to barrier device breathing.
   - Mouth to nose breathing.
   - Bag masks ventilation.

- Use a compression to breath ratio of 30:2 (1 cycle)
- If 2 rescuers present switch duties with the first rescuer every 5 cycles or about 2 minutes.

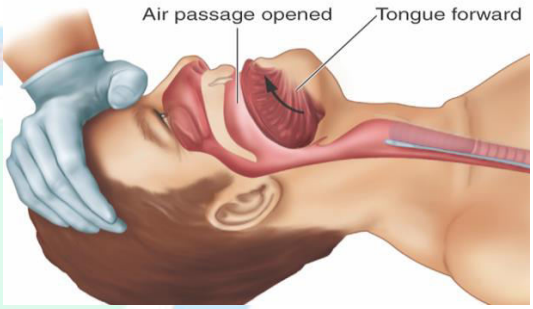

Figure 6: Opening the airway for breaths

According to the AHA guidelines, a rescue breath must extend over a period of 1 second. The adequacy of the rescue breath is assessed on the basis of its ability to produce a noticeable rise of the chest. Very forceful breaths should be avoided because they can cause gastric inflation. It can cause aspiration, regurgitation, and restriction of lung movement and reduced respiratory compliance.[14]

3. Automated External Defibrillator

They are computerised device that can recognize cardiac rhythm that needs a shock and they can then deliver the shock. There are 4 universal steps for operating an AED.

Figure 7: Automated External Defibrillator

- Follow the adult BLS sequence as described earlier and do not delay starting CPR unless the AED is available immediately.
- As the AED arrives: If more than one rescuer is present, continues 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.

Facts about AED pad:

- First AED pad should be placed on victim's upper right chest (Directly below the collar bone)
- Second pad should be placed to the side of left nipple, with top edge of AED pad placed few cm below the armpit
- Health care provider should start CPR until the AED machine is ready for use.
- In patient with Cardiac pacemakers, AED pad should be placed to either side of implanted device and normal steps to operate AED device are followed
- In case of trans-dermal medication patch, AED electrodes should not be placed directly over it, as it may block the transfer of energy from the electrode to heart.

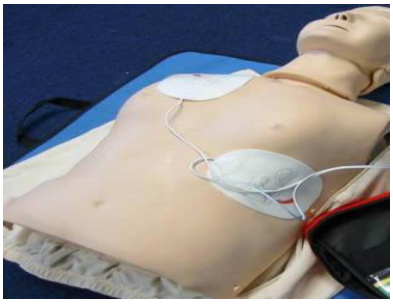

Figure 8: Placement of AED

- Effective advanced life support – If bag-mask ventilation is adequate, providers may defer insertion of an advance airway (advance airway equipments are the laryngeal mask airway, the laryngeal tube, the esophageal- tracheal tube and the ET tube). Healthcare provider should make the decision to place an advanced airway during the advanced life support survey.
- Post resuscitation care by healthcare organisations- Cardiovascular & hemodynamic derangements are common when return of spontaneous circulation returns (ROSA) after cardiac arrest. These abnormalities include hypovolemic shock, cardiogenic shock & the vasodilatory shock associated with the systemic inflammatory response syndrome (SIRS).

Table 1: Summary of steps of CPR for adult (AHA 2010)

Component	Recommendation
	Adult
Recognition	Unresponsive
	No breathing or no normal breathing (i.e. only gasping)
	No pulse felt within 10 seconds
CPR sequence	Chest compression, Airway, Breathing (C-A-B)
Compression rate	At least 100/min
Compression depth	At least 5 cm/2inch
Chest wall recoil	Allow complete recoil between compressions, Rotate compressors every 2 min.
Compression interruptions	Minimize interruptions in chest compressions, Attempt to limit interruptions to less than 10 seconds
Airway	Head tilt chin lift (Suspected trauma : Jaw thrust)
Compression ventilation ratio	30 :2 1 or 2 rescuer
Ventilation with advanced airway	1 breath every 6 – 8 seconds Asynchronous with chest compressions About 1 second per breath Visible chest rise
Defibrillation	Attach and use AED as soon as available Minimize interruptions in chest compressions before and after shock Resume CPR beginning with compressions immediately after each shock.

DISCUSSION

In general, medical emergency may occur in any dental set up. Since it is encountered rarely, the dental practitioner need to find a way to be sure and knowledgeable in resuscitation skills. Medical emergency management training is not provided to most of the dentists at undergraduate or even at the postgraduate platform in dental school. Proper training and routine update on life saving interventions is mandatory. Also the supporting staff should be well trained in basic training in life support and dental office should be well equipped with emergency equipments. Also proper method of delivery is of crucial importance. Inability or lack of knowledge of a dentist to provide BLS will cause severe setback to the possibilities of survival of a patient. To deliver proper BLS, step by step description has been explained.

CONCLUSION

Dentistry is a specialised branch and has made immense progress. To ensure better and safer health-care, it is essential for all dental practitioners to have adequate knowledge of CPR/BLS. Since prior CPR training and clinical exposure influence the retention of knowledge there is need for all dental practitioners to have some standard of CPR/BLS training and assessment. Immediate and early recognition of cardiopulmonary arrest (CPA) and quickly calling the Emergency Medical Services, early CPR, rapid defibrillation, effective advanced life support (ALS) and integrated post-cardiac arrest care are of utmost importance. Delivery of effective BLS stabilizes the patient and buys crucial time period for patient until emergency healthcare professionals take over. In conclusion, we recommend that CPR/BLS should be a core competency across all dental and other health care professional programs. Also every health care provider should be updated about regular amendments in protocol of BLS.

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Conflict of interest: None declared

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