IN BRIEF

- New basic life support guidelines for the management of adult and paediatric cardiopulmonary arrest have recently been recommended by the Resuscitation Council UK.
- Greater emphasis has been given to the delivery of chest compressions during basic life support.
- This paper will update the dental team about the management of cardiopulmonary collapse within dental practice and encourages widespread dissemination and discussion of these principles.

Adult and paediatric basic life support: an update for the dental team

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The aim of this paper is to review the current Resuscitation Council (UK) basic life support guidelines. The main changes made to the guidelines published in 2000 are that for adult basic life support no initial rescue breaths should be delivered before commencing chest compressions and that the compression to ventilation ratio should be 30:2 irrespective of the number of rescuers. For children over the age of one year, two rescuers should provide life support with a compression to ventilation ratio of 15:2. There is still a need to deliver rescue breaths before starting compressions in the child patient.

INTRODUCTION

Sudden cardiac arrest is a leading cause of death affecting approximately 700,000 people in Europe per year and has many causes (Fig. 1).[1] The aim of basic life support is to help maintain oxygenation of the vital tissues, particularly neural and cardiac tissue, and to try to maintain a shockable rhythm until electrical defibrillation can be attempted. Electrical defibrillation is the only effective therapy for cardiac arrest and the delay from collapse to delivery of the first shock is one of the most important factors in determining survival.

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Refereed Paper
Accepted 11 May 2006
DOI: 10.1038/bdj.2007.136

The International Liaison Committee on Resuscitation was established in 1992 and produced its first guidelines intended for global use in 2000. This committee has recently provided up to date evidence based guidelines on the management of cardiac arrest[2] which form the framework of the Resuscitation Council (UK) guidelines which will be adopted in the United Kingdom (UK). The principal change to the 2000 guidelines is the greater emphasis placed onto early and effective chest compressions during resuscitation. A UK study showed that in 90 cardiac arrests where compressions were counted, the median rate was 120 per minute but the average number delivered per minute was only 38.[3] Reasons for the difference included the delay in time taken to switch from compressions to ventilations (and vice versa) and to other delays and pauses by rescuers. The aim of this article is to provide the reader with an update of these new guidelines for basic life support. The full revised Resuscitation Council (UK) adult and paediatric basic and advanced life support guidelines can be found on the following website: www.resus.org.uk.

Hypoxia
Hypovolaemia
Hypo/ Hyperkalaemia
Hypothermia

Thromboembolism
Toxic/ Therapeutic disturbance
Tension Pneumotharax
Tamponade

Fig. 1 Causes of cardiac arrest (4H's and 4T's)

The new guidelines

The main thrust of the new guidelines for basic life support is to put greater emphasis on chest compressions. Evidence suggests that unnecessary interruptions often occur in the delivery of chest compressions.[4-6] This has led to the suggestion that a single compression-ventilation (CV) ratio of 30:2 is used by the single rescuer of an adult or child (over one year of age) outside of hospital, and for all adult cardiopulmonary resuscitation. This new ratio should help to reduce the previous interruptions between the delivery of rescue breaths and chest compressions. A single ratio will also help to facilitate teaching and skills retention as the

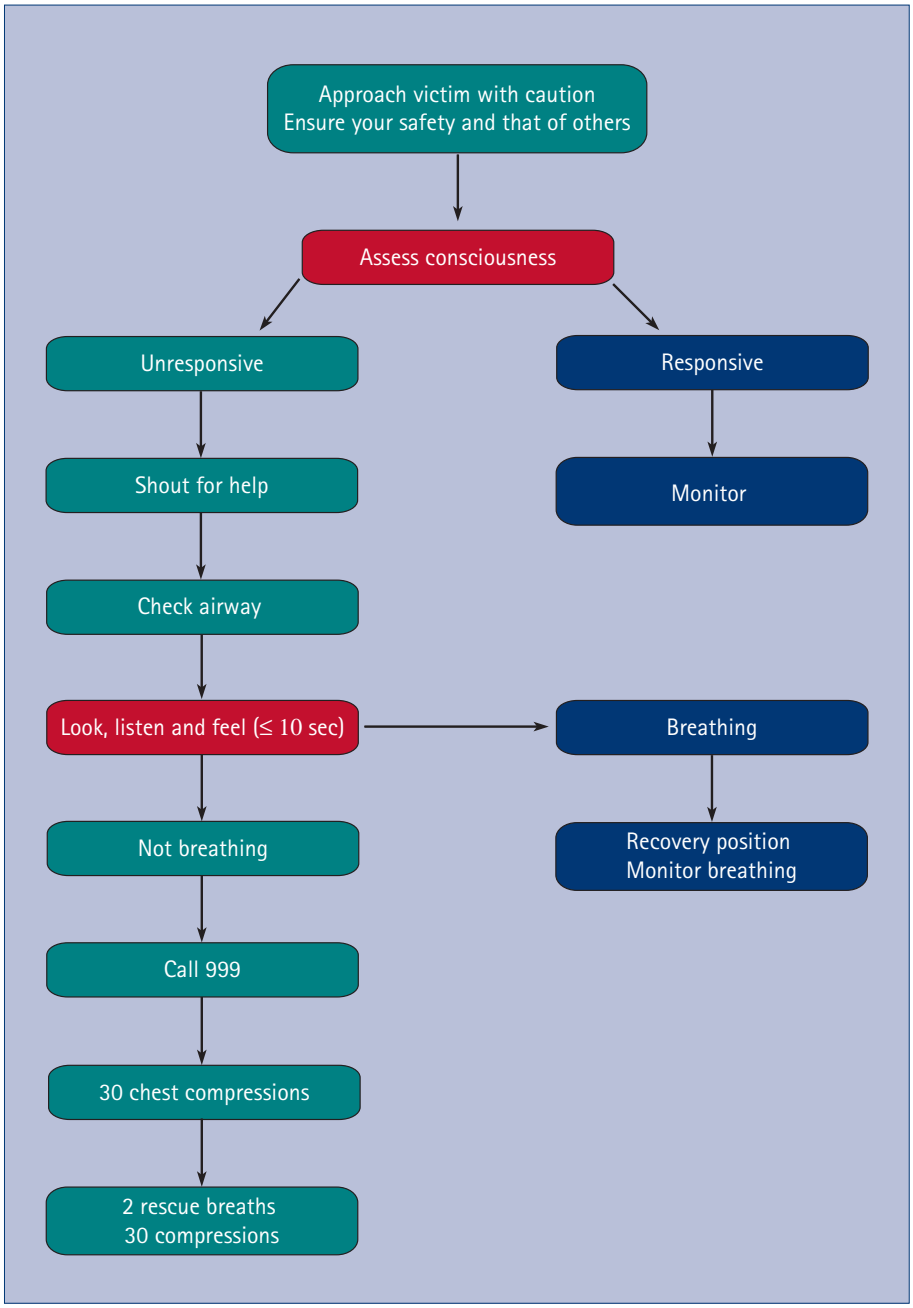

Fig. 2 Algorithm for adult basic life support

previous guidelines may have resulted in confusion.

Adult basic life support

Figure 2 summarises an algorithm for adult basic life support. Basic life support implies that no additional equipment is employed. As outlined in Figure 2 it should be ensured that the surrounding environment is safe before the victim is approached. If the victim is responding, reassure, try to establish what happened and call for help whilst monitoring their condition. If there is no response, a call should be made for help. If the patient is not breathing the emergency services should be called even if this means leaving the patient in the case of a single resuscitator. The victim should be turned onto his/her back and the patency of the airway maintained by using the head tilt and chin lift technique (Fig. 3). The look, listen and feel technique should then be used to assess breathing for no longer than 10 seconds (Fig. 4). During cardiac arrest victims can often take agonal breaths (infrequent, irregular breaths) and these should not be confused with normal breathing. If the victim is breathing normally, they are placed into the recovery position and help should be summoned. The new guidelines now state that if the patient is not breathing it should be assumed that cardiac arrest has occurred and this does not require further confirmation by checking for the carotid pulse. Evidence has found that reliance on the carotid pulse to diagnose cardiac arrest can be time consuming and unreliable.[7] Hence the circulation component of the acronym ABC has been discarded.

After summoning for help, the next phase should be to immediately begin chest compressions. Two initial rescue breaths should NOT be given as stated in previous guidelines. The greater emphasis on chest compressions has been suggested because evidence has shown that interruptions in chest compressions are common[8] and that this is associated with a poorer prognosis.[9] In addition, the blood oxygen levels immediately following an arrest are still relatively high making the maintenance of circulation the priority. The rescuer's hands should be placed in the centre of the patient's chest, rather than spending time in locating the xiphisternum as suggested in the previous guidelines. This can be carried out without removing the patient's clothing in the majority of cases (Fig. 5). This change has been suggested as it has been found that most people will locate the correct position in the centre of the chest instinctively and this saves valuable time.[10] The patient should be delivered 30 chest compressions at a rate equivalent to 100 times per minute. The resuscitator should be placed vertically above the patient's chest, with the arms straight, and should push down on the sternum 4-5 cm. After each compression, all pressure should be relieved from the chest without losing contact.

Following the initial 30 chest compressions, the airway should be opened using the head tilt and chin lift technique and two rescue breaths delivered, each being administered over one second. It is important to squeeze the patient's nose whilst giving these breaths and to ensure that the patient's chest rises. Following the two rescue breaths, there should be no delay in recommencing chest compressions and further rescue breaths at a ratio of 30:2. If for some reason rescue breaths cannot be delivered to the mouth (eg trauma), they can be delivered through the nose with equal effectiveness.

Resuscitation should not be paused to check for a pulse and should be continued until the patient starts breathing

normally or qualified help arrives. If there is more than one rescuer present, the second rescuer should take over chest compressions after two minutes in order to reduce resuscitator fatigue and maintain the quality of chest compressions.

A final change in the guidelines relates to resuscitators that are not prepared to give mouth-to-mouth resuscitation because of the risk of transmission of infection. As a last resort, chest-compression only CPR is recommended as it is effective at delivering oxygen to the vital tissues for approximately five minutes[11] which may be adequate time for professional help to arrive. If chest-compression only CPR is attempted, compressions should be at a rate of 100 per minute.

Paediatric basic life support

Figure 6 summarises the algorithm for basic paediatric life support. Akin to the new adult guidelines, the paediatric guidelines have also changed on the basis of new evidence. This should help simplify the protocol in order to aid training and the retention of skills. The protocol for the child patient (classified as being aged between one year and puberty) differs from the adult protocol primarily to reflect the fact that adult cardiac arrest is most commonly of cardiac origin whilst that of children is often secondary to hypoxia (eg epiglottitis, inhalation of foreign bodies, acute asthma).

As with adult patients, it is important to approach the victim with care and ensure the safety of all involved. The child's consciousness should be assessed by gentle stimulation and if there is no response a shout should be made for help. Next the patency of the airway should be checked by using the head tilt chin lift technique and the look, listen and feel principle should be used to assess for breathing. If the child is not breathing or giving agonal breaths, five rescue breaths should be delivered immediately. Next an attempt should be made to check for signs of circulation (≤ 10 seconds) which may include movement, coughing, normal breathing or a palpable carotid pulse (for trained personnel). If there are signs of a circulation, then rescue breaths should be continued if breathing is not normal, or the patient should be placed in the recovery position if breathing is normal. If there are no signs of circulation, chest compressions should be started. An easily made error during chest compressions is to compress the upper part of the abdomen in children. Therefore it is suggested that the compression point should be located by first identifying the xiphisternum, by finding the angle where the lowest ribs join in the middle, and compressing one finger's breadth above this point. Compression should be sufficient to compress the sternum approximately one-third of the depth of the chest at a rate of 100 compressions per minute. Lone rescuers should use a compression to rescue breath

Fig. 3 The head tilt and chin lift technique. One hand is placed on the forehead and extends the head backwards. The chin is lifted using the index and middle finger of the other hand

Fig. 4 The look, listen and feel technique. The rescuer looks for chest movement whilst listening and feeling for breathing

Fig. 5 Chest compression technique. The compression point in adults is located in the centre of the chest. In order to reduce fatigue, compressions should be delivered by leaning over the patient with straight arms. Body weight, rather than muscular effort, should be used to compress the chest

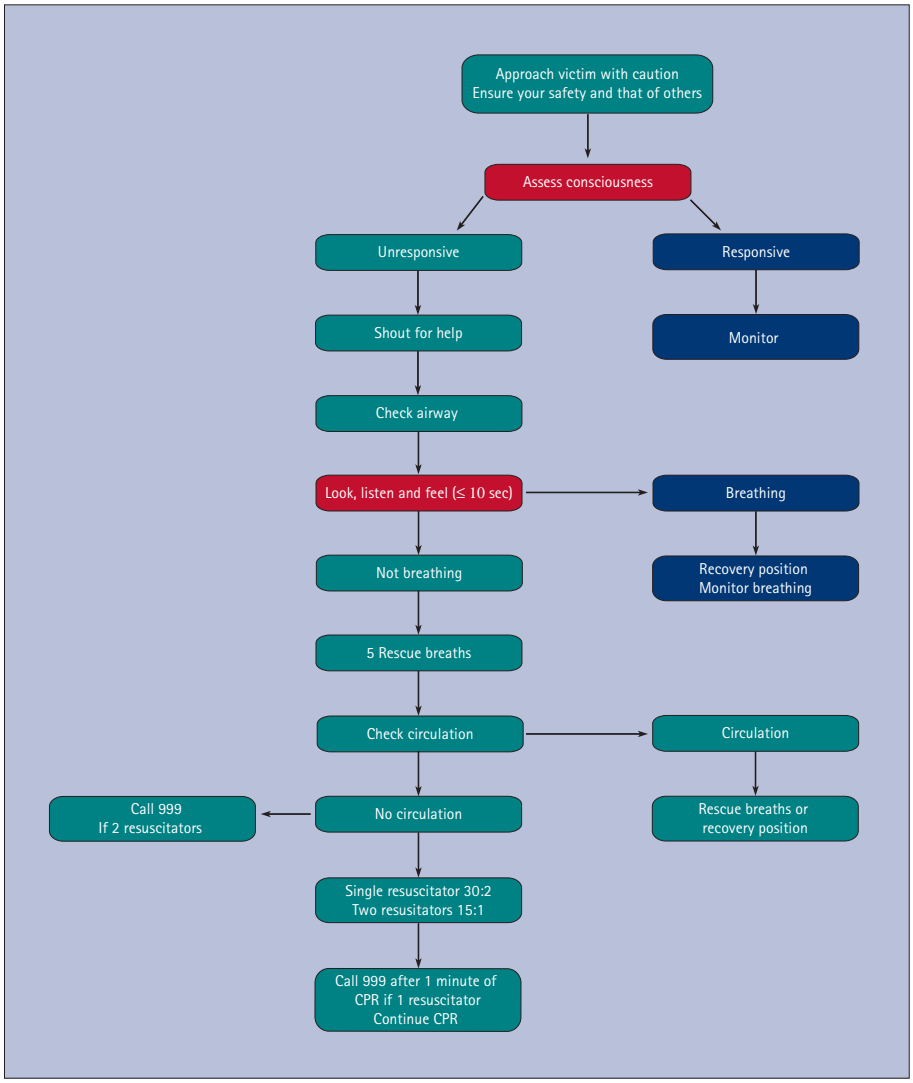

Fig. 6 Algorithm for basic paediatric life support

ratio of 30:2 and two rescuers should use the ratio 15:2. There is increasing evidence that 5:1 ratios deliver an inadequate number of compressions.[12,13] The adoption of a single compression to ventilation ratio for children of all ages renders the earlier guidelines regarding the division of children aged below and above eight years of age unnecessary. Basic life support should be continued until qualified help arrives or the child shows signs of life.

Ideally when two rescuers are present, one can go to call the emergency services whilst the other resuscitates. In the unfortunate situation where only one rescuer is present, resuscitation should be undertaken for one minute before leaving the victim to summon help. This will help to deliver some oxygen to the vital tissues. The only exception to this rule is if the single rescuer witnesses sudden collapse. Sudden collapse is most likely to be due to an arrhythmia and the child may benefit from defibrillation as soon as possible. In this case help should be summoned immediately, even if it means initially leaving the victim.

CONCLUSION

In this article the new guidelines for adult and paediatric basic life support have been described. Greater emphasis has been placed on the rapid initiation and maintenance of effective cardiac compressions during basic life support. Members of the dental team are encouraged to attend basic life support courses on a regular basis and rehearse emergency protocols at work.

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