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FREQUENTLY ASKED QUESTIONS (FAQ) FOLLOWING THE RELEASE OF THE "NEW" ARC GUIDELINES (MARCH 2006)

FAQ 1

The guidelines now recommend that full CPR be given to all those requiring resuscitation. What about victims who may not be breathing but have a pulse?

To determine the need for only rescue breathing you would need to be able to check for a pulse. There is reasonable evidence that rescuers are no more likely to be able to correctly determine if a pulse is present than simply tossing a coin. Accordingly Resuscitation councils all around the world removed the pulse check in 2000. Epidemiological data would suggest that the vast majority of victims requiring resuscitation will be in cardiac arrest – thus requiring full CPR. Furthermore only about half of the victims requiring CPR get any resuscitation before and ambulance arrives. Thus it was considered of greater benefit overall that anyone who has no signs of life be given CPR rather than not receiving any compressions because the rescuer thought the victim had a pulse. This is very much the case as there is no reliable way of for the rescuer to detect a pulse. COMPRESSIONS ARE VITAL.

Will I do harm if I give chest compressions to someone with a beating heart?

There is very little data in this area however you are highly unlikely to do harm. One study has shown that patients who were defibrillated and had immediate CPR for 2 minutes after the shock, regardless of whether a pulse was present or not, were no more likely to have complications. In addition, it is recommended in paediatric resuscitation and common practice in critical care settings for CPR to be given to patients who have a slow heart rate. NO adverse effects have been reported. Based on the available evidence, it appears that the fear of doing harm by giving chest compressions to some who has no signs of life, but has a beating heart, is unfounded.

FAQ 2

Guideline 5 says we should check for signs of life after giving 2 initial rescue breaths, but this does not appear on the basic life support flow chat. Which is correct?

They are both correct. The flow chart outlines the general steps (DRABCD) of providing CPR with the specific details in the guideline. Once the rescuer has made the decision to start CPR, the initial rescue breaths are intended to inflate the lungs with oxygen and confirm that the airway is patent. After giving 2 initial rescue breaths, one should quickly move to commence compressions but review the patient's condition if any signs of life have returned (eg coughing, movement, normal breathing). The important thing here is not to delay commencing compressions while you look for signs of life.

FAQ 3

If unconscious and unresponsive are the same then why not just use "Unconscious, no movement, not breathing normally"?

The term "unconscious" means different things to different people and given that the rescuer is checking for response it was felt that the addition of the term "unresponsive" helps clarify the intent and need for CPR.

FAQ 4

How many hands should be placed on the chest when given chest compressions to a child? One or two?

Guideline 6 recommends that two fingers should be used to give chest compressions to an infant. (less than 1 year of age) In children where the size of the child and that of the rescuer can vary greatly it is impossible to make a clear recommendation. Guideline 6 recommends two hands for simplicity of BLS training in that one hand may not always be sufficient whereas two hands will always be. The important focus here is to ensure that the depth of chest compressions is adequate (ie about 1/3 of the chest depth). For some people that will require two hands, for others one hand will be sufficient. Furthermore, when using two hands the full weight of the rescuer may not need to be applied to achieve adequate depth of compressions. Training should focus on achieving adequate compression depth rather than when to use one or two hands for chest compressions in children. Providing adequate depth of chest compression is achieved the use of one hand is acceptable.

FAQ 5

Choking

Guideline 4 outlines the recommended procedure for choking. This is a controversial area mainly as there is a lack of any scientific evidence for making strong clinical guideline recommendations. The Consensus of Resuscitation Science identified that the combination of back blows, chest thrusts and abdominal thrusts could be used to relieve complete foreign body airway obstruction. Where the patient is unconscious then CPR should be used.

It is the use of the chest thrust which appears to be causing some confusion. Chest thrusts are applied:

- At the same point on the chest that is used when providing chest compressions during CPR.
- They are delivered sharper and slower than chest compressions during CPR.

In order to do chest thrusts you need to have the back of the patient supported. This can be achieved by either:

- Placing your other hand on the patients back.
- If the patient is sitting use your other hand to support the back of the chair.
- Have someone stand behind to provide support.
- Stand against a firm surface like a wall.
- Lie the patient down.

It is very hard to state categorically on how to achieve back support when using chest thrusts but the overall principle remains the same. Support the back any way you can.

Remember if chest thrusts cannot be applied continue with back blows. If the patient becomes unconscious commence CPR. The ARC does not recommend the use of abdominal thrusts as there is considerable evidence of harm caused by this procedure. For those interested there are two evidence based worksheets under Basic Life Support on the website www.c2005.org

The ARC has been made aware of a recent successful outcome in choking victim following the use of the chest thrust.

FAQ 6

Should CPR be done by one or two rescuers?

CPR should be performed by a single rescuer until other rescuers are available, then it may be performed by two rescuers (one performing chest compressions and one performing rescue breaths). There is less interruption to chest compressions if the work is shared between the two rescuers, rather than one person doing it all until tired. Frequent rotation of rescuers (especially the rescuer performing chest compressions) should be undertaken to reduce fatigue.

FAQ 7

SEQUENCE OF EVENTS (ALS FLOWCHART)

What is the role of the precordial thump?

The role of a precordial thump is controversial. It has certainly been reported, in a number of case series, to have successfully converted VF/pulseless VT. It is not without its own additional complications. It should be considered within the first 15 seconds of ventricular fibrillation or pulseless ventricular tachycardia (in a witnessed and monitored arrest) but only if a defibrillator is not immediately available.

What is the role of feeling for a pulse?

The assessment of a pulse is also controversial. This issue has previously been discussed in detail. It is reasonable for practitioners taught to feel a pulse to do so as part of the assessment for signs of life, but to limit the total time taken to 10 seconds.

Why is a single shock technique being advocated?

The default defibrillation technique is now to use a single shock technique rather than a salvo of up to three shocks. The main rationale for this approach is to minimise the interruptions to CPR, which have been shown to be associated with a rapidly decreasing diastolic blood pressure (and coronary perfusion pressure) and a decreased likelihood of successful defibrillation. The shock success for currently used defibrillators is actually very high for the initial shock, and the interruptions to CPR for the second and third shocks in succession are thought in most circumstances to be more detrimental than the incremental success from these subsequent shocks.

For what specific circumstances is the three-shock strategy being retained?

A three-shock strategy has been retained for the specific scenario for the first attempt of manual defibrillation where the arrest is witnessed by the cardiac arrest team, and a manual defibrillator is immediately available. This protocol would be of benefit only if the time required for rhythm recognition and for recharging the defibrillator is short (ie. <10 seconds). In these situations, such as in-hospital arrests, it would be expected to deliver the sequence of shocks (up to three) in no more than 30 seconds.

Why has the default energy level been increased?

The default energy level for defibrillation has been increased to 200J for Biphasic defibrillators, and 360J for monophasic defibrillators. The rationale for this change is to maximise the likelihood of successful defibrillation with each shock. There is no consistent evidence that these higher energy levels are harmful, and they may indeed be more successful. There is no evidence to support a “start low and increase” (escalating) approach to energy levels.

Why not assess for a rhythm and a pulse immediately after defibrillation?

The recommendation to immediately start CPR after a shock is based on the fact that the chance of developing a rhythm associated with an output in the first minute or so after defibrillation is extremely small. Starting CPR immediately after defibrillation, irrespective of the electrical success or otherwise, or the attempt at defibrillation, restores blood flow to the brain and heart and creates a milieu more conducive to return of spontaneous circulation. A period of at least 1-2 minutes of good CPR appears to be able to increase the likelihood of success of the next attempt at defibrillation. Obviously there is no need for CPR if signs of life return.

What is the exact protocol that should be followed for a persistent shockable rhythm?

The optimal sequence of events that should follow for a persistent shockable rhythm is not known. The sequence cannot be prescribed exactly but the general principles that should be followed are listed here.

- After an unsuccessful attempt at defibrillation (using either a single shock or a stacked shock regime), a 2-minute period CPR is recommended before the rhythm is reassessed.
- At this stage if a rhythm is present that should be associated with a pulse, then formal checking for signs of life (including a pulse check) should be performed. If there are no signs of life (including a pulse) then the sequence should start again.
- If VF persists, administer 1 mg adrenaline, and consider performance of at least 1-2 minutes of good CPR before repeat attempt at defibrillation. (Adrenaline should subsequently be administered at a rate of approximately 1 mg every three minutes until Return of Spontaneous Circulation. A period of at least 1-2 minutes of good CPR is recommended after each dose of adrenaline to help circulate the drug.)
- If the subsequent attempt at defibrillation is also unsuccessful, a 2-minute period of CPR is again recommended before the rhythm is reassessed.
- If VF is still present, consider administration of an anti-arrhythmic, followed by the performance of an additional 1-2 minutes of good CPR before a repeat attempt at defibrillation.

What about the new devices that evaluate CPR quality or the VF waveform?

New devices that evaluate quality of CPR and the defibrillation waveform offer promise in the management of cardiac arrests, but at this stage they need further study before any recommendations can be made.

FAQ 8

Should you use cold/ice packs or hot water for relieving the pain after bluebottle stings?

Recently the results of a randomised trial comparing hot water with ice packs for relieving pain after a Bluebottle sting was published in the Medical Journal of Australia.(1) The overall conclusion of the study was that hot water (45 degrees C) provided better pain relief than ice. As this study supports a treatment not currently recommended, the ARC is now undertaking a review of its current guideline (8.9.6 Jellyfish stings) in light of this new data. Until the guideline review for Jellyfish stings is completed the ARC continues to recommend ice packs for Bluebottle stings.

1. Loten C, Stokes B, Worsley D, Seymour JE, Jiang S, Isbister GK. A randomised controlled trial of hot water (45 degrees C) immersion versus ice packs for pain relief in bluebottle stings. *Med J Aust* 2006;184(7):329-33.

FAQ 9
'BEST INTERESTS' OF COLLAPSED VICTIMS

First-aiders and professionals endeavouring to render assistance to an incompetent person (eg: child, comatose adult) in need of assistance are sometimes faced with requests by family or others to refrain on the grounds that the person would not have wanted assistance or that the treatment proposed is burdensome.

When the situation applies to an incompetent adult (unable to communicate rationally) who has previously stated in writing their intention, the situation is quite clear and the person's desires must be followed. Of importance, is that spouses and relatives of incompetent adults do not normally have authority to decline treatment of their loved one unless this has been given force by an appropriate legal directive.

If a competent adult states that treatment is not wanted, this request should be followed since to do otherwise is ethically and legally wrong.

However, when the situation pertains to a child (an incompetent legal person), the child's parents or legal guardian have the right to refuse such treatment provided that this is in the 'best interests' of the child. However, medical practitioners, and presumably other professional healthcare personnel, also have a duty of care to always act in the 'best interests' of the child.

When conflict arises, the question arises: what is meant by 'best interests'?

Although used freely in medical and legal contexts, the term 'best interests' is a nebulous term. With respect to children, legally, Courts are directed to act in the 'best interests' of a child in section 68F of the Family Law Act 1975 (Clth). In determining what these might be, consideration must be given to current wishes of the child, relationships with parents and others, any changeable circumstances, the child's maturity, protection from physical and psychological harm and any other matters that the Court considers relevant.

From a practical viewpoint, 'best interests' may be defined from an examination of common law cases involving incompetent adults and children [1].

Essentially, 'best interests' may be defined as:

1. Avoidance of futile treatment. This is somewhat facile. It leads to the question of: What is futility? What may seem futile to one person is not to another, but from a legal common law perspective, it may be stated as actions that only serve to prolong death rather than save life.

2. A consideration of the burden versus benefit of treatment. This requires a consideration of the results of withholding treatment versus its application.

3. Consideration of the quality of life if treatment is given and survival ensues.

When faced with a situation in which it is unclear whether treatment should be given or withheld in the incompetent adult's 'best interests', it is justifiable to give treatment, otherwise a possible benefit may be foregone. If it so happens that treatment is later considered not be beneficial, it can be withdrawn since both ethically and legally, withholding and withdrawing treatment are identical.

1. Tibballs J. The legal basis for ethical withholding and withdrawing of life-sustaining medical treatment in children. (2006) 14 Journal of Law and Medicine 244.

FAQ 10

PAEDIATRIC COMPRESSION-VENTILATION RATIO DURING BASIC and ADVANCED CPR (BY HEALTHCARE RESCUERS)

The question sometimes arises: why is the recommended compression-ventilation ratio for infants and children different from adults?

A compression-ventilation ratio (external cardiac compression [ECM] + rescue breathing) of 30:2 for basic (one-rescuer) CPR was chosen in the Consensus on Science and Treatment Recommendations for all infants (except newborns, i.e. at birth) children and adults, but a ratio of 15:2 chosen for CPR performed by two healthcare rescuers for infants (except the newly-born) and children whenever a pause is required between compressions to deliver breaths [1,2]. These recommendations replace the previous recommendations of 5:1 for two-person rescue of adults, children and infants.

Unfortunately, no studies to determine the optimum compression-ventilation ratio during CPR have been performed in humans, so the recommendations are by extrapolation from studies done in animals, mannequins and computer simulations in which higher compression-ventilation ratios are favoured over lower ratios.

The rationale to recommend a new ratio higher than 5:1 is the following:

1. A ratio of 5:1 may provide unnecessary ventilation. Cardiac output during good CPR is only $^1/_4$ – $^1/_2$ of normal cardiac output so normal minute ventilation is unnecessary for adequate ventilation-perfusion matching in the lungs, and …
2. A ratio of 5:1 may obstruct venous return thereby limiting cardiac output
3. A ratio of 5:1 may excessively lower blood carbon dioxide levels thereby causing cerebral vasoconstriction, and …
4. A ratio of 5:1 frequently interrupts cardiac compressions, causing blood pressure to fall nearly to zero at each interruption, thereby failing to perfuse the cerebral and coronary vascular beds.

Several studies of the performance of adult CPR [3,4] showed that rescuers spent far too much time NOT giving external cardiac compression ('hands-off time') largely because of giving excessive ventilation instead. No equivalent studies have been examined paediatric CPR.

The ratio of 30:2 for adult CPR was chosen to encourage uninterrupted cardiac compression sequences and to decrease unnecessary ventilation.

However, children differ from adults in the following important ways:

1. The different choice of 15:2 ratio for CPR of infants and children is based largely on the requirement of infants and children for higher ventilation rates than adults, and to a lesser extent on the different aetiology of cardiac arrest in children. Of course, infants and children have a wide range of ventilation during illness, ranging from a normal rate, for example, of up to 60/min at 3 months of age, 40/minute at 1 year and up to 30 minute at 12 years of age. There is also a variability of heart rate among infants and children compared with adults but it is less variable than the respiratory rate. Thus while it is reasonable to choose a fixed cardiac compression rate to suit all infants, children and adults, it is less reasonable to choose a single respiratory rate for infants, children and adults. On the other hand, it is not practical to recommend specific rates of compression and ventilation for each child according to each age.

2. A much larger proportion of cardiac arrests due to the sudden onset of ventricular fibrillation occur in adults compared with children. In these victims, the lungs can be expected to contain a store of oxygen and thus ventilation is a lesser priority.

In children, the incidence of ventricular fibrillation in children who arrest in hospital is approximately 10% [5,6,7] whereas the majority are due to other rhythms (asystole, hypotensive bradycardia and electromechanical dissociation) which are usually the result of hypoxaemia or hypotension or both.

Consequently, the consensus of opinion among the paediatricians who participated in the 2005 evaluation of science on resuscitation was that ventilation should be emphasised as a prominent part of CPR for infants and children, and that a ratio of 30:2 would result in insufficient ventilation.

If 30:2 then provides insufficient ventilation for infants and children – what is the right ratio? The ratio of 15:2 was chosen because it had already been taught as a ratio for children (for single rescuer CPR), had been used successfully and thus would be less difficult to teach than a completely new ratio. Moreover, since healthcare rescuers are more likely to effect a smooth changeover from compressions to ventilation (and back to compressions) than the lay person rescuer, a 15:2 ratio may be a less severe interruption to compressions. It is realised however, that the ideal ratio remains unknown and the current recommendations need testing.

Companion questions are:

a) How much ventilation is recommended after intubation and:
b) How much ventilation is recommended when the circulation returns and ECM is not needed?

a) If ventilation is provided during use of an advanced airway (eg endotracheal tube, Laryngeal Mask Airway) – that is by healthcare rescuers - when no pause is required for ventilation, the ratio of 15:2, will provide excess ventilation because if compressions are given uninterrupted at 100/minute, a ratio of 15:2 would provide about 13-14 breaths per minute. That may be more than needed for ventilation-perfusion matching in the lungs, so in this circumstance, about 10 breaths per minute is the recommendation.

b) If some circulation returns during resuscitation, yet spontaneous ventilation remains inadequate, an imposed ventilation rate of 12-20/minute is recommended. If normal circulation returns, a normal ventilation rate for age should be given.

1. Consensus on science and treatment recommendations. Resuscitation 2005; 67: 271-291.
2. Australian Resuscitation Council. Guidelines 7; 12.2.
3. Wik L, Kramer-Johansen J, Myklebust H et al. Quality of cardiopulmonary resuscitation during out-of-hospital cardiac arrest. JAMA 2005: 293: 299-304.
4. Abella B, Alvarado JP, Myklebust H et al. Quality of cardiopulmonary resuscitation during in-hospital cardiac arrest. JAMA 2005; 293: 305-370
5. Samson RA, Nadkarni VM, Meaney PA et al. Outcomes of in-hospital ventricular fibrillation in children. NEJM 2006; 354: 2328-39.
6. Young KD, Seidel JS. Pediatric cardiopulmonary resuscitation: a collective review. Anna Emerg med 1999; 33: 195-205.
7. Tibballs J, Kinney S. A prospective study of outcome of in-patient paediatric cardiopulmonary arrest. Resuscitation 2006; 71: 310-318.

FAQ 11
COMPRESSION-VENTILATION RATIO FOR NEWBORNS

A frequently asked question is: Should a ratio of 3:1 or 15:2 be used for newborns?

The answer is: 3:1 at birth but 15:2 later in the neonatal period.

The term “newborn” in the chapter entitled "Neonatal resuscitation, part 7" in the document “Consensus on Science and Treatment recommendations” (CoSTR)(Resuscitation 2005; 67: 293-303; Circulation 2005; 112: 91-99) refers to infants just after birth, i.e. the "newly-born" or "just born", as do the Australian Resuscitation Council (ARC) guidelines 12.1 and 13.1 – in which both make it quite clear that the term "newborn" refers to the situation just after birth [1,2].

There is little good human data about any compression-ventilation ratio for any age group, except some limited data for adults. Recommendations therefore are based on historical practice and limited data from animal, mannequin and computer simulation studies.

Adults and children who need cardiopulmonary resuscitation are commonly in cardiac arrest and therefore compressions are the key to resuscitation. Newly-born infants who need resuscitation have respiratory depression but healthy hearts which are depressed by hypoxaemia. Therefore ventilation is the key to their resuscitation.

The vast majority of infants who need resuscitation at birth have apnoea, bradycardia, and very rarely asystole, because of hypoxia. Ventilation is therefore the main focus of their resuscitation. Usually, with effective ventilation, hypoxaemia improves and the heart rate increases rapidly. On the rare occasions that the heart rate is very slow and does not increase with ventilation a compression ventilation ratio of 3:1 should be used. This still ensures adequate ventilation but gives enough compressions to ensure a circulation which will carry oxygen from the lungs to the myocardium and brain stem.

An infant within the neonatal period (first 28 days) or infancy (up to one year of age) who is bradycardic often increases its heart rate in response ventilation alone - in this situation the issue of what ratio to use is not relevant. However, when a pulseless arrhythmia or bradycardia (<60/minute) persists after initial ventilation doesn't improve the heart rate, careful control of ventilation is needed. For example, an infant who has a cardiac arrest at 2 days of age secondary to infection, asphyxia or congenital heart disease should receive a compression-ventilation ratio of 15:2 if initial ventilation does not restore an adequate heart rate and circulation.

It is important to avoid excessive ventilation. Recall that the compression-ventilation ratio for cardiac arrest in adults was changed from 5:1 (two-person rescue) or 15:2 (single person rescue) to 30:2 for the following reasons:

1. With low ratios, e.g. 5:1, too much time is spent NOT giving external cardiac compression ("hands off") [3,4]
2. Low ratios frequently interrupt external cardiac compression causing the BP to fall to near zero at every interruption.
3. Low ratios provide too much ventilation in proportion to a limited cardiac output.
4. Low ratios may impede venous return (by excessive ventilation) and hence cardiac output.
5. Low ratios may cause hypocarbia (by excessive ventilation) and cerebral vasoconstriction.

Although it may be logistically & educationally more convenient to treat every infant, of say less than 28 days or still in hospital, as a “newborn”, this doesn't suit the infant's needs if cardiac output is absent or poor. Indeed, one could argue that a ratio of 3:1 would be harmful beyond the immediate new born period if the main problem is cardiac arrest.

In summary, the 3:1 ratio applies to the infant just after birth. After that the ratio of at least 15:2 applies if there is a cardiac arrest and initial ventilation does not restore adequate circulation.

1. Consensus on science and treatment recommendations. Resuscitation 2005; 67: 271-291.
2. Australian Resuscitation Council. Guidelines 7; 12.2.
3. Wik L, Kramer-Johansen J, Myklebust H et al. Quality of cardiopulmonary resuscitation during out-of-hospital cardiac arrest. JAMA 2005: 293: 299-304.
4. Abella B, Alvarado JP, Myklebust H et al. Quality of cardiopulmonary resuscitation during in-hospital cardiac arrest. JAMA 2005; 293: 305-370