Basic Life Support: Understanding BLS practice from an evidence-based perspective

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Disclosures

Julie Considine

- Deputy Editor of the Australasian Emergency Nursing Journal so receives an annual honorarium from College of Emergency Nursing Australasia
Prevention

Timely recognition of, & response to, deteriorating patients

(Smith, 2010)
Basic Life Support

DRS ACBD

- check for Danger
- check for Response
- Send for help
- open the Airway
- check Breathing
  - no need to deliver two rescue breaths
- perform 30 Compressions
  - if unresponsive & not breathing normally, followed by 2 breaths
- attach an AED as soon asap
Danger

Current recommendations

- move collapsed or injured victims
  - to ensure safety: rescuer & victim
  - extreme weather or difficult terrain
  - take care of airway, breathing, and circulation
  - control severe bleeding

- positioning
  - unconscious persons breathing normally = on their side
  - roll face-down unresponsive victims into supine position
    - assess airway / breathing
    - initiate resuscitation
  - concern for protecting the neck should not hinder the evaluation process or life saving procedures
Response

Current recommendations

- assess victim's response to verbal & tactile stimuli
  - ‘talk and touch’
- if unconscious & breathing, turned onto the side to
  - establish & maintain a clear airway
  - facilitate drainage & reduce the risk of inhaling foreign material

- ‘signs of life’ have been removed from all ARC guidelines
- unresponsive and not breathing normally are now the indicators for resuscitation

(ARC guideline 3)
Send for Help

Current recommendations

- send for help formally included in BLS flowchart
- need to make a judgement about fall first vs call fast
- trained rescuers should stay with the victim & send others to seek assistance

(ARC guideline 2)

Different systems in different contexts

- call an ambulance (dial 000)
- call for additional resources & skills (eg. MICA)
- Code Blue / Cardiac Arrest Team
- Medical Emergency Team
Airway

Current recommendations

- indications for airway management
  - unconscious
  - obstructed airway
  - needs rescue breathing
- in unconscious victims, care of the airway takes precedence over any injury
  - including the possibility of spinal injury
- no need to routinely roll victim on their side
  - can assess airway with victim supine (or in position in which they have been found) = ↓ time & avoids movement
- except if submersion injury or if airway is obstructed
Airway

Current recommendations

- adults & children
  - head tilt / chin lift
- infants
  - neutral head position
  - do not use maximum head tilt = may cause airway compression
- finger sweep
  - no need for routine use
  - may be considered in unconscious patients only if solid material visible in oro-pharynx
Airway: choking

Current recommendations

- **Assess Severity**
  - **Severe airway obstruction**
    - Ineffective Cough
      - Unconscious
        - Call ambulance (000)
        - Commence CPR
      - Conscious
        - Call ambulance (000)
        - Give up to 5 back blows
        - *If not effective*
        - Give up to 5 chest thrusts
    - **Effective Cough**
      - Mild airway obstruction
        - Encourage coughing
          - Continue to check victim until recovery or deterioration
          - Call ambulance (000)
Breathing

Current recommendations

- assess breathing
  - **LOOK** for movement of the upper abdomen or lower chest
  - **LISTEN** for the escape of air from nose & mouth
  - **FEEL** for movement of the chest & upper abdomen
- if unresponsive & not breathing normally
  - clear airway
  - commence chest compressions
  - followed by 2 rescue breaths
Breathing

Current recommendations
▪ rescue breathing
  ▪ maintain patent airway
▪ options
  ▪ mouth to mouth / nose / mask / neck stoma
  ▪ bag-valve-mask
▪ look for rise of the victim’s chest during each inflation
▪ if the chest does not rise, consider
  ▪ airway obstruction (inadequate head tilt, chin lift, tongue or foreign material)
  ▪ insufficient air being blown into the lungs
  ▪ inadequate air seal
Breathing

Current recommendations

- ‘if unwilling / unable to perform rescue breathing, then perform compression only CPR’ has been included in all BLS guidelines

- permissive statement
  - aims to increase bystander CPR rates

- standard CPR remains the gold standard & should be the standard for healthcare professionals
  - rescue breathing & chest compressions
Breathing

Evidence review

- during 1st 5 minutes of cardiac arrest
  - adults maintain an oxygen saturation > 80–85%
  - ventilation is not important
  - more important to provide uninterrupted chest compressions

- after 5 minutes following arrest ventilations become more important
  - amount of passive ventilation from chest compressions decreases as the diaphragm runs out of energy (ATP)
Breathing

Evidence review

- cardiac arrest is not a normal physiological state
  - no need to 'normalise' breathing during CPR
- during cardiac arrest
  - ↓ blood flow
  - ↓ metabolism
  - ↓ CO2 production
  - even if metabolism continues in some tissues, low flow state will ↓ CO2 transport to the lungs
Breathing

Evidence review

- over-ventilation common during CPR
  - hyperventilation / excessive tidal volumes particularly if using bag-valve-mask

- effects of over-ventilation
  - ↑ intrathoracic pressure
  - ↓ venous return (blood coming back to heart)
  - ↓ cardiac output (blood leaving the heart)
  - ↓ cerebral & coronary perfusion
  - ↓ survival
Breathing

Current recommendations

- if available, consider using a barrier device
- risk of disease transmission is very low
- initiating rescue breathing without a barrier device is reasonable

Evidence review

- no human studies have addressed the safety, effectiveness, or feasibility of using barrier devices to prevent victim contact during rescuer breathing
  - three studies showed that barrier devices can decrease transmission of bacteria in controlled laboratory settings
Compressions

Current recommendations

- should be commenced in all persons who are unresponsive & not breathing normally
- pulse check is unreliable
  - should not be used to confirm need for resuscitation
- site
  - compress on lower half of sternum
  - no need for measurement, caliper methods etc.
Compressions

Current recommendations

- **technique**
  - place victim on hard surface
  - infants = two fingers to minimise transfer time from compression to ventilation
  - children = either 1 or 2 hand technique
  - adults = 2 hand technique
  - allow complete recoil of the chest after each compression

- **depth**
  - compress ~ 1/3 depth of the chest
  - adults & children ~ 5 cm
  - infants ~ 4 cm
Compressions

Current recommendations

▪ rate
  ▪ compress at a rate of 100 per minute in all ages
  ▪ you will not deliver 100 compressions per minute as need to pause for rescue breathing
  ▪ no evidence that a compression rate over 120 / minute offers any advantage

▪ quality control
  ▪ change rescuers every 2 minutes where possible
  ▪ rescuer fatigue = ↓ compression quality, particularly depth
  ▪ consider use of CPR feedback devices

▪ risks
  ▪ rib fractures & other injuries are common but acceptable consequences of CPR
Compressions

Evidence review

- chest compressions can generate
  - 25% to 30% of normal cardiac output
  - systolic BP 60 to 80 mm Hg

- organ perfusion during CPR
  - cerebral blood flow is 30% - 40% of normal
  - coronary blood flow is 10% to 20% of normal

(Kern, 2000 Clin Anaesthiol)

- rationale for increased focus on chest compressions
  - the heart needs a continuous supply of ATP
  - more compressions → ↑ myocardial blood flow → ↑ ATP
  - ventricular fibrillation becomes more coarse → ↑ chance of successful defibrillation
Evidence review

- coronary perfusion pressure has direct correlation with ROSC
  - 100 patients in cardiac arrest
  - no ROSC if CPP < 0 mm Hg
  - all pts with ROSC had CPP > 15 mm Hg
    (Paradis et al. 1990)

- coronary perfusion pressure
  - ↑ during chest compressions
  - ↓↓ when compressions are stopped
  - is cumulative, needs multiple compressions
Evidence review

Compressions

CPP = chest compressions

Time

(Berg et al. 2001)

thanks to Dr Michael Parr, ICU Liverpool Hospital for graphics
Evidence review

Compressions

CPP

Time

= chest compressions

(Berg et al. 2001)

thanks to Dr Michael Parr, ICU Liverpool Hospital for graphics
Compressions

Evidence review

- quality of CPR is variable, even in ‘expert’ hands
- 67 patients in 1st 5 minutes of in-hospital cardiac arrest

(Abella et al. 2005 JAMA)
Defibrillation

Current recommendations

- role of AEDs as part of BLS in both out of hospital and in hospital environments recognised
  - AED’s are effective in decreasing the time to first defibrillation during in-hospital cardiac arrest
- training in AED use should be part of BLS education
  - improves performance (use speed, correct pad placement)
- AED use should not be restricted to trained personnel
  - allowing the use of AEDs by individuals without prior formal training can be beneficial and may be life saving
- AEDs can accurately identify the cardiac rhythm as “shockable” or “non shockable”
Defibrillation

Current recommendations

- pad placement
  - anterior-lateral position (alt, anterior-posterior or apex-posterior)
  - reasonable to place the L) pad lateral to or underneath left breast, avoiding breast tissue
  - avoid placement implantable devices, medication patches

- in children
  - standard adult AEDs & pads are suitable for children > 8 years
  - ideally, for children 1 to 8 years paediatric equipped AED & pads should be used
  - if the AED does not have paediatric mode or paediatric pads then a standard adult AED and pads can be used
Defibrillation

Current recommendations

- pad to skin contact
  - important for successful defibrillation
  - ensure pads are not touching
    - important if using adult pads in children
  - may need to remove moisture or excessive chest hair prior to pad application
- emphasis must be on minimizing delays in shock delivery
Defibrillation

Current recommendations

- safety
  - follow the AED prompts
  - do not touch the victim during shock delivery
  - no reports of harm to rescuers from attempting defibrillation in wet environments
  - no case reports of fires caused by sparking when shocks were delivered using adhesive pads in presence of oxygen
Defibrillation

Evidence review

- VF most common cause of adult arrest
  - arrhythmia with best prognosis
  - rarely reverts spontaneously
- defibrillation
  - definitive Tx for VF / VT
  - time critical intervention
- defibrillation
  - rarely effective after 10 mins
  - good CPR may ↑ chance of successful defibrillation
Take home messages

- chest compressions if unresponsive & not breathing normally
- push hard, push fast (100/min), don’t stop
- do not over-ventilate
- use AED as soon as it is available
The Australian Resuscitation Council Online

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