

### **PALS Update 2005**

**Sukhmeet Singh**

*Many of the changes in BLS recommended in 2005 Guidelines are designed to simplify CPR recommendations, increase the number and quality of chest compressions delivered, and increase the number of uninterrupted chest compressions. The recommendations for compressions have been summarized as, "Push harder, push faster, allow the chest to fully recoil, and stop only to use a bag mask to ventilate the patient, analyze the rhythm, deliver a shock or intubate. When such an interruption to compressions occurs, keep the length of that interruption to an absolute minimum. For lay rescuers, a single compression-ventilation ratio (30:2) for all age groups greatly simplifies the instructions for performing CPR.*

*Recommendation of 1 Shock plus Immediate CPR for Attempted Defibrillation for cardiac arrest associated with VF or pulseless VT. Rescuers should not interrupt chest compressions to check circulation until about 5 cycles or approximately 2 minutes of CPR have been provided after the shock. The changes are designed to minimize interruptions in chest compressions.*

*For Neonatal resuscitation, additional evidence was available about the use of oxygen versus room air for resuscitation, the need for clearing the airway of meconium, methods of assisting ventilation, techniques for confirming endotracheal tube placement, and use of the laryngeal mask airway (LMA).*

**Keywords:** BLS, Life-support, PALS.

This review article summarizes the changes contained in the 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care, published in the December 13, 2005, issue of the American Heart Association journal Circulation(1-3). It highlights major changes and provides background information and detailed explanations.

*From Dr. Sukhmeet Singh, Advisor, IAP-PALS Group 2003-2004.*

*Correspondence to: Dr Sukhmeet Singh, 2103, Phase 1, Urban Estate, Dugri Road, Ludhiana, Punjab, India.*

#### **A. Five Major Changes in Basic Life Support (BALS) Affecting all Rescuers**

##### *1. Emphasis on Effective Chest Compressions*

- Push hard and Push fast (at 100 per minute).
- Allow chest to recoil completely.
- Try to limit interruptions in compression.

Chest compressions that are too shallow or too slow do not deliver much blood flow to vital organs. The first few compressions are not as effective as later compressions. When chest compressions are interrupted, blood flow stops and coronary artery perfusion pressure falls. The more the interruption in chest compressions, the worse the victim's chance of survival. Half the chest compressions given by professional rescuers are too shallow and no compression was provided during 24% to 49% of CPR time. If chest is not allowed to recoil, blood flow during next compression will be reduced because of reduced filling of heart.

##### *2. One Universal (30:2) Compression-to-Ventilation Ratio for all Lone Rescuers*

The AHA recommends a compression-to-ventilation ratio of 30:2 for all lone (single) rescuers to use for all victims from infants (excluding newborns) through adults.

##### *3. Recommendations for 1-Second Breaths During all CPR*

- Each rescue breath should be given over 1 sec.
- Each breath should make the chest rise.
- Recommended number of breaths should be given.
- Avoid giving too many—too large—too forceful breaths.

During CPR, blood flow to lungs is 25% to 33%, so the victim needs less ventilation than normal. It is also important to limit the time used in rescue breath to reduce interruptions in compressions. Hyperventilation is harmful because it decreases

venous return to heart and so limits refilling and eventually reduces the blood flow generated by next chest compressions.

#### *4. Attempted Defibrillation: One Shock, then Immediate CPR*

- Deliver one shock followed by immediate CPR, beginning with chest compressions.
- Check the victim's rhythm after giving about 5 cycles (about 2 minutes) of CPR.

The rhythm analysis by AED results in 37 sec delay, such interruptions can be harmful. Moreover the 1st shock eliminates VF 85% of time. In case it fails resumption of CPR has more value than another shock. Even when shock eliminates VF, it takes several minutes to return of normal heart beat. During this brief period CPR is useful.

#### *5. Reaffirmation of 2003 ILCOR Statement: AEDs Recommended for Children >1 year*

The evidence is insufficient to recommend for or against the use of AEDs in infants under one year of age.

### **B. Pediatric Advanced Life Support**

#### *1. Use of Advanced Airways*

- Verify correct tube placement with clinical examination and capnography.
- Use of cuffed endotracheal tubes: In the in-hospital setting, a cuffed endotracheal tube is as safe as an uncuffed tube for infants (except the newborn) and children. In certain circumstances (e.g., poor lung compliance, high airway resistance, or a large glottic air leak) a cuffed tube may be preferable, provided that attention is paid to endotracheal tube size, position, and cuff inflation pressure. Keep cuff inflation pressure  $<20$  cm H<sub>2</sub>O.

The formula used for a Cuffed endotracheal tube size (mm ID) = (age in years / 4) + 3.

- *Laryngeal Mask Airway (LMA):* When endotracheal intubation is not possible, LMA is an acceptable adjunct for experienced providers, but it is associated with a higher incidence of complications in children.

- *CPR with advanced airway:* Rescuer will no longer perform "cycles" of CPR. Compress chest at rate of 100 bpm without pause for ventilation.

#### *2. Vascular (IV or IO) Preferred to ETT Drug Administration*

Intravenous (IV) or Intraosseous (IO) drug administration is preferred. But if you cannot establish vascular access, you can give lipid-soluble drugs such as lidocaine, epinephrine, atropine, and naloxone ("LEAN") via the endotracheal tube, although optimal endotracheal doses are unknown.

#### *3. Routine Use of High-Dose Epinephrine not Recommended*

Use a standard dose (0.01 mg/kg IV/IO) of epinephrine for the first and for subsequent doses. If epinephrine is administered by endotracheal route, use a dose of 0.1 mg/kg. There is no survival benefit from routine use of high-dose (0.1 mg/kg IV/IO) epinephrine, and it may be harmful particularly in asphyxia.

#### *4. Timing of Drug Administration During Pulseless Arrest*

CPR-1 Shock-CPR. Give Drug during CPR: Drug delivery should not interrupt CPR (5 Cycles or 2 min). Check rhythm after 5 cycles. A drug may be administered during the CPR that is performed while the defibrillator is charging, or during the CPR performed immediately after the shock is delivered. These revisions were proposed to minimize interruptions in chest compressions during attempted resuscitation.

#### *5. Rhythm Disturbances and Defibrillation*

- Deemphasize the value of lidocaine compared with amiodarone in treating ventricular arrhythmias. "Give amiodarone or lidocaine (if you do not have amiodarone)."
- Tachycardia with adequate perfusion does not require resuscitation.
- The superiority and greater safety of biphasic over monophasic shocks for defibrillation is emphasized.

#### *6. Post Resuscitation Care*

- *Hypothermia:* There is possible benefits of

induced hypothermia (32°C to 34°C) for 12 to 24 hours for patients who remain comatose after resuscitation from cardiac arrest.

- *Role of Inodilators:* There is a probable beneficial effect of vasoactive medications, including inodilators, to treat post resuscitation myocardial depression.

## C. NEONATAL RESUSCITATION

### 1. Oxygen during Resuscitation

- It is reasonable to begin resuscitation with room air or oxygen concentration of less than 100% though the standard approach to resuscitation is to use 100% oxygen. In situations where oxygen is not readily available, positive-pressure ventilation should be administered with room air.
- Oxygen should be available if there is no appreciable improvement within 90 seconds.

#### **Things that have NOT changed in PALS**

- Shock doses for VF/VT (note that the second dose was 2 to 4 J/kg and is now 4 J/kg).
- Shock doses for cardioversion.
- Major steps in bradycardia and unstable tachycardia algorithm.
- Most drug doses.
- Appreciation that most cardiac arrests in infants and children result from a progression of shock or respiratory failure.
- Most recommendations for treatments of poisonings and drug overdose.

### 2. Clearing the Airway of Meconium

- Routine intrapartum oropharyngeal and nasopharyngeal suctioning is no longer advised for infants born to mothers with meconium staining.

### 3. Devices for Assisting Ventilation

- A self-inflating bag, a flow-inflating bag, or a T-piece can be used to ventilate a newborn.
- LMA can be a reasonable alternative to intubation in special cases.

### 4. Indication of Ventilation and Confirmation of ETT Placement

- Exhaled CO<sub>2</sub> detection is recommended primary technique to confirm correct ETT placement when a prompt increase in heart rate does not occur after intubation. Evidence is insufficient to recommend for or against use of esophageal detector device.

### 5. Drug Therapy

- Higher epinephrine IV doses are not recommended. While vascular access is being obtained, administration of a higher dose (up to 0.1 mg/kg) through the endotracheal tube may be considered.
- Naloxone administration is not recommended during the primary steps of resuscitation, and endotracheal naloxone is not recommended.

### 6. Temperature Control

- Polyethylene bags may help maintain body temperature during resuscitation of VLBW.
- Avoidance of hyperthermia is particularly important in hypoxic-ischemic event.
- There is insufficient data to recommend routine use of modest systemic or selective cerebral hypothermia after resuscitation of infants with suspected asphyxia.

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## REFERENCES

1. American Heart Association. 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. International Consensus on Science. Circulation 2005; 112: IV-1-IV-211.
2. ILCOR 2005. International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Circulation 2005; 112: III-1-III-125.
3. American Heart Association. Highlights of the 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Currents in Emergency Cardiovascular Care. Winter 2005-2006; 16: 1-27.