

## CPR Professional Skills Notes

CPR = Cardiopulmonary Resuscitation

AED = Automated external defibrillator (vs. manual defibrillator in a hospital)

ERS = Emergency Response System

BLS = Basic Life Support

ALS = Advanced Life Support

- Chain of survival (5 steps):
  - ADULTS
    - Recognition and activation of ERS
    - CPR
    - Rapid defibrillation (AED)
    - ALS
    - Post-cardiac arrest care
  - CHILDREN (Prophylactic in nature; CPR before ERS activation)
    - Prevention (and recognition)
    - Early CPR
    - Rapid activation of ERS
    - Rapid pediatric ALS (PALS)
    - Integrated post-cardiac arrest care

**Figure 1**  
AHA ECC Adult Chain of Survival

The links in the new AHA ECC Adult Chain of Survival are as follows:

1. Immediate **recognition** of cardiac arrest and **activation** of the emergency response system
2. Early **CPR** with an emphasis on chest compressions
3. Rapid **defibrillation**
4. Effective **advanced life support**
5. Integrated **post-cardiac arrest care**



- **Children** are less likely to survive in out-of hospital cardiac arrest than adults and for this reason CPR is done **before** activation of ERS; the most common cause in children is a respiratory one, so perform CPR before calling for help.
- In **adults**, cardiac arrest from arrhythmias dominates the picture and so for this reason CPR is done **after** activation of ERS.

Generally, nowadays we use “CAB” instead of “ABC.” Indicating that you must function based on circulation, then airway and then breathing.

## ADULTS

- High Quality CPR
  - Start compressions within 10 seconds of recognition of cardiac arrest
    - In adults, compress on the lower half of the sternum
    - Two fingers below intermammary lines
    - Your shoulder should be right over your hands
    - Your dominant hand should be on the bottom
    - Movement from the hips
  - Push hard, push fast:
    - Rate: at least 100 compressions per minute
    - Depth: at least 2 inches (5 cm) for adults
  - Allow complete chest recoil after each compression
    - Make the recoil = compression (time and depth)
  - Minimize interruptions (limit it to less than 10 seconds)
  - Give effective breaths that make the chest rise
    - Two breaths between each set of compressions
    - Watch the chest rise, if it does, stop the breath and do the second one
    - Head-tilt, chin-tilt should be done to open airways
      - Don't pull back excessively, jaw thrust if suspect trauma
    - For masks:
      - Hold the mask tightly against the face
      - Give 2 breaths while watching for chest rise
      - Each breath should be delivered over 1 second
    - Avoid quick and forceful breaths
  - Avoid excessive ventilation
    - This may lead to air entering the stomach, leading to vomiting and/or aspiration of these contents
- Steps (if Alone)
  - Isolation
    - Scene is safe
  - Assessing victim status
    - Check for response (Call name, tap on shoulder)
    - Check for breathing
  - Activate ERS
    - Call for help (call 999, ask for AED)
  - Check pulse
    - Must be done in 5 – 10 seconds max (if you check 6 seconds → multiply the value by 10 for minute value)
    - Carotid pulse is felt in adults
      - 2 – 3 fingers feel between side of trachea and muscle
  - Begin CPR (CAB sequence)
    - Make sure person is on a firm flat surface
    - Begin chest compression immediately
    - If possible, remove clothing

- Chest compressions and breaths
      - 30 compressions + 2 breaths
      - Usually 5 sets in 2 minutes
    - If chest doesn't rise with breaths, SKIP BREATHS; do only compressions
  - When AED arrives (see two rescuer steps)
  - Transport will arrive for ALS
- Steps (2 rescuers from start or 1 then other arrives)
  - Isolation (Scene is safe?)
  - Assess victim status (response, breathing)
  - Activate ERS (and to bring AED)
  - Check carotid pulse
  - Begin CPR
    - 30 compressions; 2 breaths; 5 sets in 2 minutes (COUNT OUTLOUD)
    - If the other person doesn't arrive, use a face shield for breaths (if you happen to have one)
      - Thumb on chin and index under mandible
      - Head-tilt, chin-lift
      - Mouth to mouth
      - Give two breaths, watch the chest for rising
    - If the other person arrives
      - Brings AED and bag mask
      - Bag mask (Gas mask) use
        - E & C clamp technique (using dominant hand)
        - Apply mask using bridge of nose as marker
        - Make a C shape over the mask, where your index finger and thumb around the entry port
        - Make an E shape the remaining 3 fingers below the person's mandible (*not soft tissue*)
        - Do a head-tilt, chin-lift
        - 1 second delivery of breaths, not so fast; watch for chest rise
      - Switching roles
        - Needs to be done to prevent one rescuer from getting fatigue
        - After 5 sets are done, roles should be changed
        - Once AED is operated, roles should be switched whenever the AED analyzes (see later)
  - AED Use
    - Should be done WHILE other rescuer continues CPR
    - When second rescuer arrives, let him turn on the AED (press the ON button)

- There is a pediatric and adult type of AED; you can use the adult AED on a child, but you cannot use a pediatric AED on an adult (insufficient); the manual AED's joules (in a hospital) can be adjusted; the AED cannot
- Take out electric pads (two of them)
  - Apply one underneath the right collar bone (clavicle)
  - Apply one on the left axilla on the side of the left nipple
  - If wet or sweaty, dry up quickly
  - If hairy, put the pads and remove it (will pull out hair), then replace pads
  - If female, make sure there is limited body exposure and if she is accompanied by someone ask for quick permission
- Plug in the pads' cartridge into the AED
- ANALYZING
  - When the AED says "analyzing"
  - DO NOT TOUCH THE PATIENT
  - During these seconds, CHANGE ROLES (person becomes the AED controller and the other person delivers compressions)
  - Two outcomes: shock advised or not advised
- Delivering shock when advised
  - Wait for the button for shock to light up (red color)
  - Make sure nobody is touching the victim
  - SAY "EVERYBODY CLEAR?"
  - Then "CLEAR"
  - Then press the button to deliver shock
  - You will know shock is delivered when the victim's body jerks (contraction of muscles)
  - Generally, defibrillation is done in ventricular fibrillation; not in asystole
- Continue CPR if shock not advised
  - CHECK BREATHING AND PULSE (maybe the person is now awake!!!)
  - Always stop whenever the AED starts analyzing again
  - QUESTION: pulse + no breathing?
    - Opioid overdose (respiratory depression)
    - Only give breathing support in such a case
    - Position person in recovery position
    - Transport → CCU

○Steps continued until patient starts breathing OR until  
TRANSPORTATION for ALS ARRIVES

### Critical Concepts:

- **First rescuer** performs chest **compressions** at a rate of at least **100/min** and **counts out loud**.
- **Second rescuer** maintains the **open airway** and **gives breaths**
- Compression-ventilation ratio **30:2**
- **Switch roles** every **2 minutes**, or when **AED** tells you to reanalyze
- Person giving breaths should monitor chest compressions being delivered, and **encourage** the compressing rescuer to push at an adequate **rate** and **depth**, and to allow **complete recoil** after each compression.

### Children BLS

- Same as adult BLS, but
  - o You may use 1 hand or 2 hands for compressions
  - o I read somewhere it should be maximum 2 inches (5 cm) compressions (*not at least*)

### Infant BLS

- Steps (if alone or 2 rescuers)
  - o Assess infant status (Response and breathing)
    - Violently tap the infant's feet (give painful stimuli) for response
    - Check for breathing
  - o Activate ERS and AED
    - Shout for help
    - I know in the chain of survival it says do CPR first :\
  - o Measure pulse
    - Feel for the brachial pulse in the arm closest to you
    - Feel between the infant's elbow and shoulder (less than 10 s)
    - If less than 60 or no pulse (?), continue
  - o CPR
    - Compressions done in the middle of the chest (inter-mammary line; *not* the bottom of the sternum)
    - IF ALONE: TWO FINGERS technique
    - If TWO rescuers: TWO THUMBS (ENCIRCLING technique)
    - In either case, press on the TIPS of your fingers
    - Compressions should be:
      - Rate: 100/min or more
      - Depth: 1.5 inches (4 cm), 1/3<sup>rd</sup> the AP diameter
      - Make sure for complete recoil
    - If ALONE, 30: 2
      - 30 compressions to 2 breaths
      - 5 sets in 2 minutes
      - Two fingers
    - If TWO rescuers, 15: 2
      - 15 compressions to 2 breaths
      - 10 sets in 2 minutes

- Two thumbs with other fingers on back
- Switch roles every 10 cycles
- Breaths
  - Using face shield, you must breath into MOUTH AND NOSE together
  - For bag mask, use the same C and E technique
    - Do not give excess ventilation
    - Do not hyperextend the neck
- AED if necessary and present
- Same as adult steps continued until transport and so on

### Critical Concepts:

- Place the tips of your 2 fingers in the center of the infant's chest just below the nipple line. Do not press on the bottom of the breastbone.
- Deliver compressions at a rate of at least 100/min.
- Compress at least one third the depth of the chest or approximately 1.5 inches (4 cm)
- Allow the chest to recoil completely
- Count out loud as you press  
- - - - -
- Deliver each breath over 1 second
- Deliver just enough breath to make the chest rise
- Make sure you have a tight seal between the mask and the infant's face  
- - - - -
- Check for responsiveness and breathing
- If the infant doesn't respond and is not breathing or only gasping, shout for help
- Activate the ERS
- Check the infant's brachial pulse on the side closest to you
- Begin compressions at a ratio of 30:2 (switch to 15:2 when second rescuer arrives)
- Switch roles after every 10 cycles.

### Advanced Airway

- 1 breath delivered every 6 – 8 seconds (in adults) – DONE INDEPENDENTLY while the other rescuer continues to compress 30 times (as in every 6 – 8 seconds while the other person compresses!)
- Done using endotracheal tube or ventilation mask

### Rescue Breathing

- 1 breath delivered every 5 – 6 seconds (I also heard 4 – 5 seconds :s)

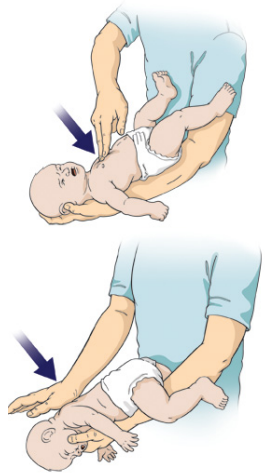
## Other concepts

- If for whatever reason you do not want to come in contact with another person mouth to mouth:
  - As in the case of fear of HIV, bloody wounds
  - Or **if you just don't want to give mouth to mouth**
  - THEN JUST **DO COMPRESSIONS ALONE** (NO NEED FOR BREATHS)
- No matter what, **never leave the patient**
- **NEVER MOVE THE PATIENT** (unless he/she regains some consciousness or if transport arrives)

## Choking

- Signs of choking:
  - Silent coughs
  - No talking or breaths
  - Cyanosis
  - CLUTCHING NECK WITH HANDS
    - Universal choking sign
- What to do?
  - Check for signs
    - Universal choking sign is the trigger for you to get up
  - Ask the person
    - Are you choking? (Making sure)
    - I am going to help you, okay? (asking for permission)
  - Act if agrees or if there is no response
  - Give abdominal thrusts (Heimlich maneuver)
    - Place one hand wide open between the victim's navel (umbilicus) and the (xiphi)sternum
    - Your other hand should make a fist and punch the underlying hand
    - Perform this until:
      - The object is discarded (shoots out of mouth)
      - The person goes unconscious or is unresponsive
  - Activate ERS + Perform CPR
  - Check for object in mouth
    - If you can see it, you can try to take it out
    - IF YOU CAN'T SEE IT, DON'T TRY TO TAKE IT OUT "BLINDLY"
      - You might push it back even further
      - This is also called a blind finger sweep
- What to do if you're choking?
  - Try to do the Heimlich maneuver on yourself, OR
  - Use a table or chair to help your thrusts





- What to do if it is an infant? “SANDWICH” the infant
  - Kneel
  - Put the infant’s stomach facing your thigh but on your arm
  - Support the head with your non-dominant hand (on which the infant is lying)
  - Slap the infant’s back 5 times
  - Turn the infant over and to your other thigh, this time the infant will be facing upwards and this time the arm that you slapped with becomes the support underneath the infant’s body and its head & neck
  - Give 5 compressions with two fingers
    - 1 per second
    - Perform this in the lower half of the sternum
  - Do 5 cycles and activate the ERS

### **Trivia**

- The AED will advise you to shock only if the victim is having a ventricular fibrillation
- The point of compression is to reverse asystole (which will not recommend shock by the AED) to allow *some* sort of electrical current to flow through the victim’s heart
- When compressions are successful, the asystole usually becomes a ventricular fibrillation and it is in this time slot that you use the AED to “fix” the electrical current to normal rhythm.
- ALS vs. BLS (ALS = using advanced airway techniques, manual defibrillator, large team)

Witnessing an event or not:

- **Children and infants**
  - If **witnessed**: **activate ERS** before CPR (compressions)
  - If **not witnessed**: **do CPR** (preventative) before ERS activation
    - Most common cause = respiratory blockage
    - Either ways, the more time you leave them, the less likely they’ll live
- **Adults**
  - If **witnessed** cardiac arrest: **CPR first** then activate ERS
    - Because you know that he/she had a cardiac arrest
  - If **not witnessed**: **Activate ERS first** then CPR
    - Since in most cases this will be true for you, that’s why we have the chain of survival!

Other things:

If person has a pacemaker or planted defibrillator, avoid putting the pads on those sites.

If person has a patch (nicotine patch), avoid putting pads on the patch or pull out the patches.



**Table 1**  
**Summary of Key BLS Components for Adults, Children, and Infants\***

Component	Recommendations		
	Adults	Children	Infants
Recognition	Unresponsive (for all ages)		
	No breathing or no normal breathing (ie, only gasping)	No breathing or only gasping	
	No pulse palpated within 10 seconds for all ages (HCP only)		
CPR sequence	C-A-B		
Compression rate	At least 100/min		
Compression depth	At least 2 inches (5 cm)	At least $\frac{1}{2}$ AP diameter About 2 inches (5 cm)	At least $\frac{1}{2}$ AP diameter About 1½ inches (4 cm)
Chest wall recoil	Allow complete recoil between compressions HCPs rotate compressors every 2 minutes		
Compression interruptions	Minimize interruptions in chest compressions Attempt to limit interruptions to <10 seconds		
Airway	Head tilt–chin lift (HCP suspected trauma: jaw thrust)		
Compression-to-ventilation ratio (until advanced airway placed)	30:2 1 or 2 rescuers	30:2 Single rescuer 15:2 2 HCP rescuers	
Ventilations: when rescuer untrained or trained and not proficient	Compressions only		
Ventilations with advanced airway (HCP)	1 breath every 6–8 seconds (8–10 breaths/min) 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.		

Abbreviations: AED, automated external defibrillator; AP, anterior-posterior; CPR, cardiopulmonary resuscitation; HCP, healthcare provider.  
 \*Excluding the newly born, in whom the etiology of an arrest is nearly always asphyxial.

“Healthcare providers are again encouraged to tailor rescue actions to the most likely cause of arrest. For example, if a lone healthcare provider witnesses a victim suddenly collapse, the provider may assume that the victim has had a primary cardiac arrest with a shockable rhythm and should immediately activate the emergency response system, retrieve an AED, and return to the victim to provide CPR and use the AED. But for a presumed victim of asphyxial arrest such as drowning, the priority would be to provide chest compressions with rescue breathing for about 5 cycles (approximately 2 minutes) before activating the emergency response system.”