

International ACLS Guidelines 2005

Ventricular Fibrillation/Pulseless Ventricular Tachycardia

ABC'S



CPR

New Guidelines emphasize high-quality CPR with minimal interruptions in CPR
Prehospital: consider CPR x 2 min prior to shock if arrest unwitnessed or down time > 5 min



IF VF OR VT PRESENT ON DEFIBRILLATOR



DEFIBRILLATE x 1

(200 J Biphasic, 360 J Monophasic)



RESUME CPR IMMEDIATELY (Intubate – IV Access-Prepare Drugs)

Prehospital: Continue CPR x 2 min prior to rhythm or pulse check
Inhospital: Physician may check rhythm and pulse prior to CPR if continuous ECG monitoring present
Minimize interruptions in CPR (only for rhythm check and shock delivery)

↓ *Rhythm Check*

DEFIBRILLATE x 1

(200 J Biphasic, 360 J Monophasic)



RESUME CPR IMMEDIATELY

Continue CPR x 2 min prior to rhythm or pulse check
(Hard and fast CPR-100/min)

↓ *Rhythm Check*

EPINEPHRINE 1 mg IV (may be given after 1st or 2nd shock)
(REPEAT Q 3-5 MIN) give drugs during CPR after rhythm check

(Vasopressin 40 U IV may be an alternate to 1st or 2nd dose of epinephrine)



DEFIBRILLATE x 1



RESUME CPR IMMEDIATELY

Continue CPR x 2 min prior to rhythm or pulse check

↓ *Rhythm Check*

CONSIDER ANTIDYSRHYTHMICS
give drugs during CPR

AMIODARONE 300 mg IV bolus (Preferred)

(may give 2nd dose 150 mg IV)

or

LIDOCAINE 1.5 mg/kg IV

(REPEAT in 3-5 min) (Max. 3 mg/kg)

or

MAGNESIUM SULFATE 2 G IV

(especially with hypomagnesemia, torsades)



- **Hypothermia (32-34°C) recommended for resuscitated v. fib. patients who remain comatose and intubated with a BP >90.**

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WIDE COMPLEX TACHYCARDIA

ASSESS ABC'S IF STABLE, O₂, MONITOR, O₂ SAT, VITALSIGNS (Hx, P/E, ECG, CXR)

Unstable

(Chest pain, SOB, LOC, low BP, CHF, AMI)

Stable

Amiodarone

150 mg over 10 min (repeat prn)

Infusion: 1 mg/min x 6 hrs,
then 0.5 mg/min over 24 hrs

(Max: 2.2m in 24 hrs)

OR

Procainamide*

30 mg/min (max 17mg/kg)

Prepare for cardioversion
Consider premedication

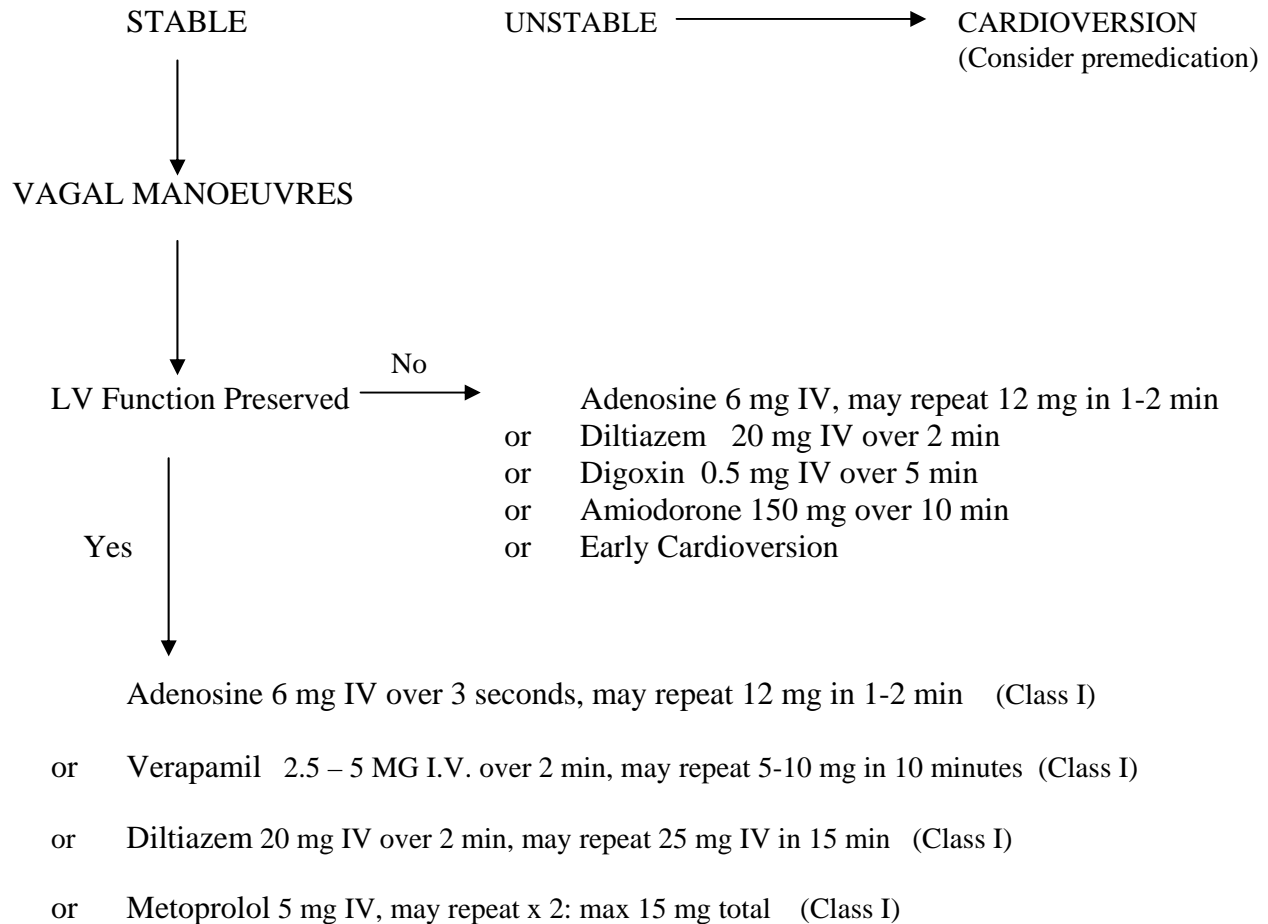
SYNCHRONIZED Biphasic: 50-100-150-200
CARDIOVERSION Monophasic: 100-200-300-360

If Ventricular Tachycardia is polymorphic (Torsades) consider: magnesium 2 gm, overdrive pacing, isoproterenol, Phenytoin, Lidocaine, amiodorone.

*Avoid giving multiple antidysrhythmics sequentially (to prevent proarrhythmias). If one antidysrhythmic fails, go to electrical cardioversion.

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PAROXYSMAL SUPRAVENTRICULAR TACHYCARDIA (regular narrow complex tachycardia)



Others to consider:

Procainamide 30mg/min to 17/kg (Class IIa)

Amiodarone 150 mg over 10 min (Class IIa)

or

↓
SYNCHRONIZED CARDIOVERSION (consider premedication)

Monophasic: 50,100,200,300 j

Biphasic: 30, 70, 100, 150 j

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Atrial Fibrillation or Atrial Flutter *

STABLE

UNSTABLE → CARDIOVERSION

-higher risk of stroke if a.fib/flutter > 48 hrs and patient not anticoagulated

↓

1) Control Heart Rate if > 120

Narrow Complex

Diltiazem 20 mg IV
Verapamil 2.5-5mg IV¹
Metoprolol 5 mg IV¹
Amiodarone 150 mg over 10 min²
Digoxin 0.5 mg IV

Wide Complex (WPW or BBB)

Procainamide 30 mg/min to 17mg/kg²
Amiodarone 150 mg over 10 min²

- 1) Do not use verapamil or metoprolol if LV function is impaired (<40%).
2) Do not use amiodarone or procainamide if fibrillation or flutter present for > 48 hours

2) Convert rhythm back to NSR

A fib < 48 hours

Cardiovert Electrically or with Drugs

Procainamide
Amiodarone
Flecainide 300 mg po
Propafenone 600 mg po
Ibutilide 1 mg IV

With LV dysfunction: Amiodarone

A. fib > 48 hrs duration

- 1) Anticoagulate x 3 weeks prior to and 4 weeks after cardioversion
or Heparinize, do TEE, cardiovert if not clot, then anticoagulate x 4 wks post cardioversion
- 2) Long term rate control with beta or ca channel blocker

Consider long term anticoagulation with recurrent episodes, if in high risk group for stroke: previous stroke or TIA, diabetes, ASHD, hypertension, LV dysfunction

*N.B. Medications are not effective in converting atrial flutter back to NSR and the treatment of choice is electrical cardioversion if < 48 hrs duration

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ELECTRICAL CARIOVERSION ALGORITHM

INDICATIONS:

- TACHYCARDIA should be > 150/min (with signs and/or symptoms)
- Ex. PSVT (it is uncommon to have to cardiovert a patient with SVT)
ATRIAL FIBRILLATION
ATRIAL FLUTTER
VENTRICULAR TACHYCARDIA

CHECK:

- IV LINE
- SUCTION
- O2 SAT
- B.V. MASK
- INTUBATION EQUIPMENT

SEDATE: APPROPRIATELY ex 1) Midazolam 1-5 mg, with or without Fentanyl 50-200 microgm
2) Propofol 50-150 mg IV
3) Ketamine 0.25-1.5 mg/kg IV
4) Etomidate 20 mg IV

SYNCHRONIZED CARIOVERSION:

PSVT-ATRIAL FLUTTER Monophasic: 50 - 100 - 200 - 300 – 360 Joules
Biphasic: 30- 70- 100- 150

V. TACH, A. FIB. Monophasic: 100 – 200 – 300 – 360 Joules
Biphasic: 50- 100- 150-200

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ASYSTOLE

ASYSTOLE SHOULD BE CONFIRMED IN TWO LEADS

CONTINUE CPR
INTUBATE AT ONCE
ESTABLISH IV ACCESS



CONSIDER POSSIBLE CAUSES

- Hypoxia
- Hyperkalemia
- Hypokalemia
- Acidosis
- Drug Overdose
- Hypothermia

EPINEPHRINE, 1 mg IV PUSH Q 3 – 5 MIN

(Vasopressin 40 U IV may replace 1st or 2nd dose of epinephrine)



ATROPINE 1 MG IV (REPEAT Q 3 – 5 MIN TO MAX OF 3 MG) (0.04 Mg/Kg)



CONSIDER TERMINATION OF EFFORTS

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PULSELESS ELECTRICAL ACTIVITY PEA

Continue CPR



Airway control (Endotracheal tube, LMA, Combitube)



IV access



TREAT REVERSIBLE CAUSES



CONSIDER POSSIBLE CAUSES
(6 H's and 6 T's)

Hypovolemia	Tablets (overdose)
Hypoxia	Tamponade, cardiac
Hydrogen ion-acidosis	Tension pneumothorax
Hyper/hypokalemia	Thrombosis, coronary
Hypothermia	Thrombosis, pulmonary
Hypoglycemia	Trauma



EPINEPHRINE 1 mg IV PUSH Q 3-5 MIN



If bradycardia, ATROPINE 1 mg IV
(Repeat Q 3-5 min to max of 3 mg) (0.04 mg/kg)

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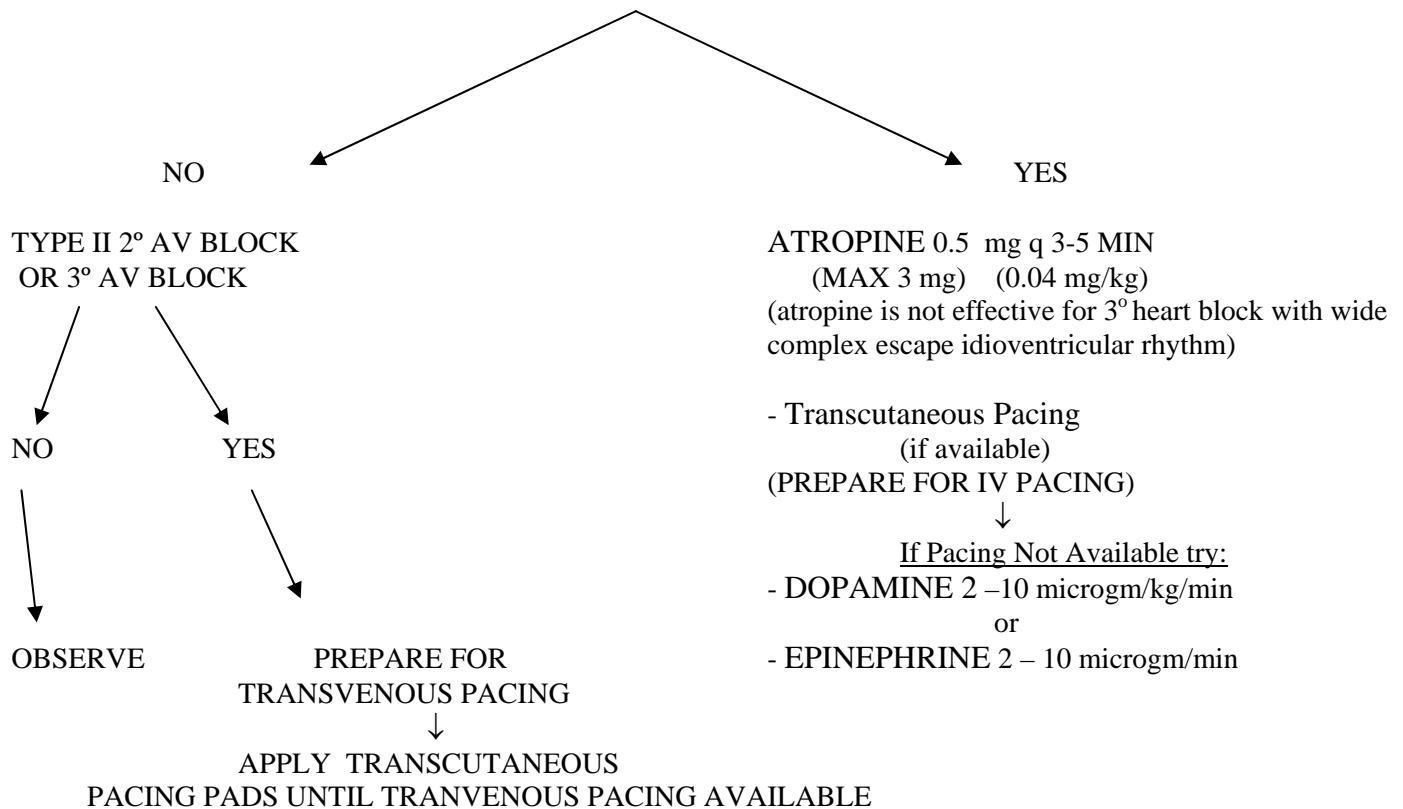
BRADYCARDIA (SLOW H.R. < 60/MIN)

ASSESS ABC'S, O2, I.V. MONITOR

BRADYCARDIA (< 60/MIN)

SERIOUS SIGNS OR SYMPTOMS?

- Hypotension
- Chest pain, dyspnea, LOC
- CHF, acute MI



RULE OF 250 FOR DRUG INFUSIONS

Mix one ampoule of any drug into 250 cc and run at:

30 cc/hr	3 cc/hr
<u>Antiarrhythmics</u>	<u>Vasodilators</u>
Lidocaine (1 gm) 2 mg/min	Nitroglycerin (50 mg) 10 micgm/min
Procainamide (1gm) 2 mg/min	Nitroprusside (50mg) 10 micgm/min
Mag SO ₄ (5gm) 0.6 gm/hr	
<u>Adrenergic agents</u>	
Epinephrine (1mg) 2 micgm/min	
Dopamine (200 mg) 5 micgm/kg/min (70 kg)	
Dobutamine (250 mg) 7 micgm/kg/min (70 kg)	
Norepinephrine (4mg) 8 micgm/min	

Drugs Given By the Endotracheal Tube (2x the dose) **Note: The IV or Intraosseous route is preferred.**

N naloxone
A atropine
V valium, ventolin, versed (midazolam)
E epinephrine
L lidocaine

Chest Pain Nemonic

M morphine
O oxygen
N nitrates
A aspirin

CORE PHARMACOLOGY REFERENCE FOR ACLS

ADENOSINE

6 mg IV RAPID PUSH over 3 seconds.
May repeat at 12 mg IV and then another 12 mg IV if first dose is not effective.
IV rapid push always followed by 20 mg NS bolus. May repeat in 2-3 min.
Should not be used as a diagnostic agent to differentiate SVT from VT

AMIODARONE

300 mg IV push for cardiac arrest, and may then give 150 mg if initial dose is not effective. 150 mg IV over 8-10 min for VT, PSVT, Atrial Fibrillation/Flutter with either good or impaired LV function. After bolus, infusion should be started immediately at 1 mg/min for 6 hours, then 0.5 mg/min for 18 hours. An effective Class III antiarrhythmic IV medication. Dilute with D5W before infusing in normal saline IV line. Keep in mind the proarrhythmic effect of all antiarrhythmics.

ATROPINE 0.5-1.0 mg IV fast push to max of 0.04 mg/kg 2-2.5 times IV dose down ETT in 10 ml NS. Drug should be given quickly to offset paradoxical effect (if given too slowly). Caution should be used in high level blocks.

BETA BLOCKER A variety of beta blockers are available. ACLS providers should have knowledge of at least one of these agents. Short-acting beta blocker is effective for treatment of tachyarrhythmias, and for post –MI management.

CALCIUM CHANNEL BLOCKER

Diltiazem: 0.25 mg/kg slow IV push over 2 minutes, repeat dose of 0.35 mg/kg in 15-30 min
Verapamil: 2.5 -5mg IV push

Caution: Common calcium channel blocker side effects: Hypotension.

Do not use in WPW with AFib or where a delta wave or short PR is apparent, sick sinus syndrome, AV block, CHF or bundle branch block.

EPINEPHRINE 1 mg IV Q 3-5 min (no maximum) 2-2.5 mg in 10 ml NS ET followed by hyperventilation when IV not available (Intermediate and high dose IV epinephrine treatment is not recommended.) Continuous infusion may be appropriate for symptomatic bradyarrhythmias.

LIDOCAINE 1-1.5 mg/kg and repeat at 0.5 - 0.75 mg/kg Q 5-10 min to max dose 3 mg/kg.
1.0 mg/kg for stable Ventricular Tachycardia. Maintenance infusion may be used after rhythm is successfully converted.

MAGNESIUM 1-2 g IV push diluted in 10 ml NS Give for known or suspected magnesium deficiency or for torsade des pointes. May cause rapid drop in BP. Caution in renal failure.

PROCAINAMIDE 20-30 mg/min IV dose to max of 17mg/kg then 1-4 mg/min as maintenance infusion (Can mix 100 mg at a time in a syringe to give over 5 min.). Class I antiarrhythmic that can be given as rapidly as 50 mg/min in urgent situations. Administer until: dysrhythmia is suppressed, QRS widens >50%, max dose reached, hypotension occurs--watch QT Interval. Has pro-arrhythmic effects as well!
Maintenance infusion may be used after rhythm is successfully converted.

SODIUM BICARBONATE

1 mEq/kg IV and may repeat (half dose) in 10 min. Give for known metabolic acidosis, TCA or Barbiturate OD, long code endpoint.

VASOPRESSIN 40 units IV for cardiac arrest. 1-2 doses used before epinephrine. Is equivalent choice to epinephrine for cardiac arrest management.

2005 New Guidelines: Major changes in BLS for Health Care Providers (HCP):

- 1) Push hard and fast (100/min)
- 2) Ensure full chest recoil
- 3) Minimize interruptions in chest compressions
- 4) Once cycle of CPR for 30 compressions, then 2 breaths: 5 cycles = 2 min
- 5) Avoid hyperventilation or excessive volume.
- 6) Secure airway and confirm placement
- 7) 8-10 breaths per min
- 8) With an advanced airway, don't pause for breaths.
- 9) Rhythm check every 2 min.
- 10) Rotate compressors every 2 minutes.
- 11) Jaw thrust is the best technique (vs head tilt chin lift) for opening airway and bagging.
- 12) Children and Infant:
 - Healthcare provider “child” CPR guidelines now apply to victims 1 year to the onset of puberty.
 - - “CPR first” (provide about 5 cycles or 2 minutes of CPR before activating the emergency response number) for unresponsive infants and children (except infants and children with sudden, witnessed collapse) and for all victims of likely *hypoxic* (asphyxial) arrest (eg, drowning, injury, drug overdose).
 - Chest compressions are recommended if the infant or child heart rate is less than 60 per minute with signs of poor perfusion despite adequate oxygenation and ventilation.
 - Use 1 or 2 hands to give chest compressions for a child; press on the sternum at the nipple line.
For the infant, press on the sternum just below the nipple line.
 - During 2-rescuer infant CPR, the 2 thumb–encircling hands technique should include a thoracic squeeze.

TABLE 2. Summary of BLS ABCD Maneuvers for Infants, Children, and Adults
 (Newborn/Neonatal Information Not Included) *Note:* Maneuvers used only by healthcare providers are indicated by “HCP.”

MANEUVER	ADULT	CHILD	INFANT
	Lay rescuer: ≥8 years HCP: Adolescent and older	Lay rescuers: 1 to 8 years HCP: 1 year to adolescent	Under 1 year of age
ACTIVATE Emergency Response Number (lone rescuer)	Activate when victim found unresponsive HCP: if asphyxial arrest likely, call after 5 cycles (2 minutes) of CPR	Activate after performing 5 cycles of CPR For sudden, witnessed collapse, activate after verifying that victim unresponsive	
AIRWAY	Head tilt–chin lift (HCP: suspected trauma, use jaw thrust)		
BREATHS Initial	2 breaths at 1 second/breath	2 effective breaths at 1 second/breath	
HCP: Rescue breathing without chest compressions	10 to 12 breaths/min (approximately 1 breath every 5 to 6 seconds)	12 to 20 breaths/min (approximately 1 breath every 3 to 5 seconds)	
HCP: Rescue breaths for CPR with advanced airway	8 to 10 breaths/min (approximately 1 breath every 6 to 8 seconds)		
Foreign-body airway obstruction	Abdominal thrusts		Back slaps and chest thrusts
CIRCULATION HCP: Pulse check (≤10 sec)	Carotid (HCP can use femoral in child)		Brachial or femoral
Compression landmarks	Center of chest, between nipples		Just below nipple line
Compression method Push hard and fast Allow complete recoil	2 Hands: Heel of 1 hand, other hand on top	2 Hands: Heel of 1 hand with second on top or 1 Hand: Heel of 1 hand only	1 rescuer: 2 fingers HCP, 2 rescuers: 2 thumb–encircling hands
Compression depth	1½ to 2 inches	Approximately ⅓ to ½ the depth of the chest	
Compression rate	Approximately 100/min		
Compression-ventilation ratio	30:2 (1 or 2 rescuers)	30:2 (single rescuer) HCP: 15:2 (2 rescuers)	
DEFIBRILLATION			
AED	Use adult pads. Do not use child pads/child system. HCP: For out-of-hospital response may provide 5 cycles/2 minutes of CPR before shock if response > 4 to 5 minutes and arrest not witnessed.	HCP: Use AED as soon as available for sudden collapse and in-hospital. All: After 5 cycles of CPR (out-of-hospital). Use child pads/child system for child 1 to 8 years if available. If child pads/system not available, use adult AED and pads.	No recommendation for infants <1 year of age