Detroit Medical Center
Wayne State University

ACLS MEDICATIONS FOR ADULTS

Continuous IV infusion	IV Push or IO or infusion*	Endotracheal (ET)*
P - Procainamide	**V** - Vasopressin	**L** - Lidocaine (2-4mg/kg)
I - Isoproterenol	**A** - Amiodarone, Atropine, Adenosine	**E** - Epinephrine (2-2.5mg)
N - Norepinephrine	**L** - Lidocaine	**A** - Atropine (2-3mg)
D - Dopamine	**E** - Epinephrine	**N** - Naloxone (0.8-1.6mg)
	*Administer 10-20 mL normal saline (NS) flush after each drug (20 mL if peripheral administration) and elevate arm if used	**V** - Vasopressin (80-100 units)
		*Doses usually 2-2.5 times those given IV push; *Dilute drugs with 4-10 mL fluid to allow for adequate delivery

IO=Intraosseous

DRUG PREPARATION AND DOSING

DRUG	DOSE	SIDE EFFECTS
Adenosine	6 mg IVP over 1 to 3 seconds followed by 20 mL NS; if no response in 1-2 min, give 12mg IVP and repeat 12mg IVP in 1-2 min again Available concentration: 3mg/mL (2mL vial) Reduce initial dose to 3mg if: -patient taking dipyridamole or carbamazepine -patient with heart transplant -if given by central venous access	Flushing, dyspnea, chest pain, heart block
Amiodarone	300mg IVP diluted in 20 mL NS, may repeat with 150mg IVP one time only in 3-5 min, if needed If infusion required, use amiodarone kit: 150mg/150mL D5W for the initial bag; after loading dose given, infuse at 1 mg/min x 6 hours, then 0.5 mg/min; max daily dose=2.2 g Subsequently, obtain from pharmacy: 450mg/250mL D5W (bottle)	Hypotension, nausea, vomiting, tremor, dizziness, headache
Atropine	1mg IVP every 3 to 5 minutes up to maximum = 3mg or 0.04mg/kg ET: 2-3 mg diluted in 10 mL NS Available concentration: 1 mg/10 mL syringe	Confusion, blurred vision, dry mouth/ skin/nose, urinary retention, constipation, lightheadedness
Diltiazem	15-20 mg (0.25 mg/kg) IVP over 2 minutes; if needed in 15 min, give IVP 20-25 mg (0.35mg/kg) Available concentration: 25mg/ 5mL vial Maintenance dose: 5-15 mg/hr (125mg/125mL D5W)	Heart block, bradyarrhythmia, peripheral edema, dizziness (Avoid in WPW)
Dopamine	Continuous infusion: 400mg/250mL D5W (premix) Dosing range: 2-20 mcg/kg/min	Ectopic heartbeats, tachycardia, vasoconstriction, hypotension, ventricular arrhythmias, headache, nausea, vomiting, dyspnea
Epinephrine	1mg (1:10,000 solution) IVP every 3 to 5 minutes (syringe) ET: 2-2.5mg diluted in 10 mL NS Continuous infusion (1mg/250mL D5W or NS): 2-10mcg/min	Hypertension, tachycardia, agitation, anxiety, disorientation, nausea, vomiting
Flumazenil	Suspected benzodiazepine overdose: 0.2 mg (2mL) IV over 30 sec, After waiting 30 sec, can give 0.3mg (3mL) over another 30 sec; further doses of 0.5mg (5mL) can be given over 30 sec at 1 min intervals up to total dose= 3mg	Convulsions, headache, injection site pain, sweating, nausea, vomiting, dizziness
Fosphenytoin	Status epilepticus: 15-20 mg phenytoin sodium equivalents (PE)/kg IV (administer at 100-150 mg PE/min); dilute in D5W or NS to conc of 1.5-25 mg PE/mL (IV or IM if not status epilepticus)	Hypertension, hypotension, injection site pain, hypokalemia, shivering, constipation
Isoproterenol	Continuous infusion (1mg/250mL D5W): 2-10 mcg/min; titrate prn heart rate and rhythm	Syncope, confusion, tachyarrhythmia, headache
Lidocaine	1-1.5 mg/kg IVP first dose, then 0.5-0.75 mg/kg IVP every 5 to 10 minutes with maximum of 3 doses or 3 mg/kg Available concentration: 100mg/5 mL syringe Continuous infusion (2g/250mL bag):1-4 mg/min	Hypotension, headache, shivering, seizures, heart block
Magnesium Sulfate	1-2g diluted in 10mL D5W or NaCl, infuse over 5 minutes (if torsades de pointes or hypomagnesemia); or 1-2g in 50-100mL D5W over 5-60 minutes.	Flushing, complete heart block, respiratory paralysis, somnolence
Naloxone	Narcotic overdose: 0.4 to 2mg IV – may repeat IV at 2-3 min intervals (up to 10mg); dilute in NS for total volume of 10mL; use 0.1-0.2 mg increments to desired response	Nausea, vomiting, sweating, cardiac arrest, tachycardia, ↑ BP
Norepinephrine	Continuous infusion (8mg/250mL D5W): 0.5-30 mcg/min (Avoid dilution with plain NS)	Bradyarrhythmia, hypertension, extravasation, headache
Phenytoin	Status epilepticus: 10-15 mg/kg IV slowly (not to exceed 50mg/min) then 100mg IV/PO every 6-8 h	mental confusion, nausea, vomiting, constipation, hypotension

DRUG	DOSE	SIDE EFFECTS
Procainamide	Continuous infusion (1g/250mL D5W): 20 mg/min until arrhythmia suppressed or QRS complex widened by 50% of its original width, or a total of 17 mg/kg has been administered; then, maintenance infusion at 1-4 mg/min (Not recommended due to prolonged administration time unsuitable for cardiac arrest)	Hypotension, QT prolongation, torsade de pointes, confusion, ⇑ liver enzymes, myopathy
Sodium Bicarbonate	1 mEq/kg IV Available concentration: 50mEq/50mL syringe	Extravasation, local pain, hypernatremia, alkalosis
Vasopressin	40 units IVP x 1 (during code) Available concentration: 20 units/mL (1 mL vial) Continuous infusion (40 units/100mL D5W): (vasopressor) 0.01-0.03 units/min	Nausea, intestinal cramps, bronchial constriction, uterine contractions, ⇑ mesenteric vascular resistance

RAPID SEQUENCE INTUBATION

	PRE-MEDICATIONS	
L	Lidocaine	1.5 mg/kg IVP over 30-60 seconds
O	Opioid	Fentanyl 3 mcg/kg at 1-2 mcg/kg/min
A	Atropine	0.02 mg/kg IVP (Glycopyrrolate 0.1 mg/kg IVP)
D	Defasciculation	10% of paralyzing dose

SEDATIVES

	Dose	Onset	DOA	Side Effects	Notes
Etomidate	0.2-0.4 mg/kg IVP	60 sec	5 min	Myoclonus (involuntary muscle movement), pain on injection, adrenal suppression	Lowers ICP (for head injury pt); No effect on hemodynamics; No effect on ventilation
Midazolam	0.1-0.3 mg/kg IVP	1-2 min	10-20 min	Tachycardia, resp depression, hypotn	amnesia
Propofol	1-2.5 mg/kg IVP	30 sec	1-3 min	Resp depression, hypotension, ↓ CO	↓ ICP, ↓ cerebral oxygen demand, rapid awakening
Ketamine	1-2 mg/kg IVP	30-60 sec	5-15 min	HTN, ↑ ICP, ↑ myocardial/ cerebral oxygen demand, ↑BP, ↑HR, resp depression, vivid dreams	Bronchodilator

DOA = Duration of Action

NEUROMUSCULAR BLOCKERS

	Dose	Onset	DOA	Side Effects	Notes
Succinylcholine	1-1.5 mg/kg (70-100 mg)	< 1 min	6-10 min	↑ ICP, IOP, K+, HTN, myalgia, fasciculations, malignant hyperthermia, tachy/brady-arrhythmias	Quickest onset
Pancuronium	0.1-0.15 mg/kg (7-10 mg)	2-3 min	60-90min	Hepatic elimination	↑ HR, BP, histamine release
Vecuronium	0.1-0.15 mg/kg (7-10 mg)	2-3 min	30-45 min	Renal/Bile elimination	No hemodynamic effect
Cisatracurium	0.15-0.2 mg/kg (10.5–14 mg)	~ 2 min	30–90 min		Reserved for use in renal failure (CrCl < 30ml/min)

DRUG COMPATIBILITY

Sodium Bicarbonate + Calcium-containing IV solutions	Not Compatible
Sodium Bicarbonate + Norepinephrine	Not Compatible
Sodium Bicarbonate + Dopamine	Not Compatible
Sodium Bicarbonate + Dobutamine	Not Compatible
Sodium Bicarbonate + Amiodarone	Not Compatible
Heparin + Amiodarone	Not Compatible
Heparin + Dobutamine	Not Compatible

ACLS ALGORITHMS

ASYSTOLE and PEA

	Intervention	
P	Problem search via Differential Diagnosis table (PATCH(4)MDS)	
	Pulmonary Embolism Acidosis (pre-existing) Tension pneumothorax Cardiac tamponade Hyperkalemia (pre-existing)	Hypokalemia Hypovolemia Hypoxia Myocardial infarction Drugs Shivering
E	Epinephrine 1 mg IVP/IO q3-5 min OR Vasopressin 40 units IV/IO, once, in place of the first or second dose of epinephrine	
A	Atropine 1 mg IVP/IO q3-5 min; 3 mg maximum	

BRADYCARDIA

	Intervention	Note
Pacing	Transcutaneous pacing (TCP)	Immediately prepare for TCP with serious circulatory compromise due to bradycardia (especially high-degree blocks) or if atropine failed to increase rate
Always	Atropine	First line drug, 0.5mg IV/IO q3-5 min (maximum 3mg)
Ends	Epinephrine (2-10 mcg/min)	Second line drugs to consider if atropine and/or TCP are ineffective. Use with extreme caution.
Danger	Dopamine (2-10 mcg/kg/min)	

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TACHYCARDIA

	Intervention	
1. Stable?	**Yes** ⇓	**No** Unstable=Immediate electrical cardioversion
2. Narrow?	**Yes** ⇓	**No** Consult an expert (QRS ≥ 0.12 sec)
3. Regular?	**Yes** ⇓	**No** Consult an expert, (Irregular)
	Yes 1-2-3, think SVT, then VAC V = Vagal maneuvers A = Adenosine C = Cardizem (Diltiazem) Perform immediate electrical cardioversion, if a patient becomes unstable	

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STABLE TACHYCARDIA RHYTHMS

	Intervention	
Stable Narrow Irregular Tachycardia	Atrial fibrillation Multifocal Atrial Tachycardia Atrial flutter	Rate Control: Diltiazem or Beta-blocker
Stable Narrow Regular Tachycardia	Recurrent SVT Atrial flutter Junctional or Ectopic Atrial Tachycardia	Rate Control: Diltiazem or Beta-blocker
Stable Wide Irregular Tachycardia	Possible Atrial fibrillation+WPW* (WPW=Wolff-Parkinson-White)	*Avoid calcium channel blockers and digoxin; Consider Amiodarone; Magnesium 2g IV over 5 min for torsades
Stable Wide Regular Tachycardia	Ventricular Tachycardia	If VT, amiodarone 150mg IV over 10 minutes, repeat prn (max 2.2g IV in 24 hours); elective synchronized cardioversion

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VENTRICULAR FIBRILLATION (VF)/PULSELESS VENTRICULAR TACHYCARDIA (PVT)

	Intervention
Shock	360 J monophasic, 1st and subsequent shocks. Shock every 2 minutes if indicated.
CPR	After shock, immediately begin chest compressions followed by respirations for 2 minutes. Do not check rhythm or pulse.
Rhythm	Rhythm check after 2 minutes of CPR (and after every 2 minutes of CPR thereafter) and shock again if indicated. Check pulse only if an organized or non-shockable rhythm is present.
	Implement the Secondary ABCD Survey. Continue this algorithm if indicated. Give drugs during CPR before or after shocking. Minimize interruptions in chest compressions to < 10 seconds. Consider differential diagnosis.
Epinephrine	1mg IVP/IO q3-5 minutes or vasopressin 40 units IV/IO, once, in place of the 1st or 2nd dose of epinephrine.
Antiarrhythmic **M**edications	Consider antiarrhythmics: -Any Legitimate Medication Amiodarone 300 mg IVP/IO, may repeat once at 150mg in 3-5 minutes if VF/PVT persists or Lidocaine (if amiodarone unavailable) 1-1.5mg/kg IVP/IO, may repeat x 2, q5-10 min at 0.5-0.75 mg/kg (3 mg/kg max loading dose) if VF/PVT persists or Magnesium Sulfate 1-2 gm IVP/IO diluted in 10 mL D5W (5-20 min push) for torsades de pointes or suspected/known hypomagnesemia.

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Prepared by: Department of Pharmacy Services, June 2007