



# A.C.C.E.S.S.

Ada County City Emergency Services System

Ada County Paramedics—Branch  
370 N. Benjamin Ln, Boise, ID 83703



November 01, 2019

# SWO-UPDATES

NOVEMBER 1, 2019	UPDATES
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**SECTION: C-01****TITLE: Adult Cardiac and Respiratory Arrest****REVISED: NOVEMBER 01, 2019**

Attention to “the basics” during cardiac arrest is equally important (if not more important than) as ALS drug therapies.

**BLS-Specific Care**

- Perform high performance Cardiopulmonary Resuscitation (AKA “Pit Crew”, see appendix 30)
  - For an **unwitnessed arrest**: Perform approximately 2 minutes/**200-220** compressions of good, sustained, and effective CPR prior to defibrillation or AED attachment
  - For a **witnessed arrest**, or after approximately 2 minutes/**200-220** compressions of good, effective and sustained CPR: AED use per AHA guidelines and manufacturer recommendations
  - Emphasis on minimizing interruptions and maximizing the compression fraction of high quality compressions.
  - Apply LUCAS Chest Compression system (if/when available) as described in appendix 30.
- Careful use of BVM, airway adjuncts. Ventilations should occur over 1-2 seconds
- Reduce interruptions of compressions, particularly the “peri-shock pause” as much as possible.
- Avoid hyperventilation/hyperinflation
- Notify responding ALS unit ASAP

**AEMT/O.M. Specific Care**

- Supra-glottic Airway as appropriate
- Obtain peripheral vascular access
  - IV: 200-500 ml crystalloid solution. Repeat PRN

**ALS-Specific Care**

- Advanced airway management as appropriate
- Rhythm-specific therapy (*see appropriate protocols*)
- Epinephrine
  - IV/IO: 1 mg 1:10,000 IVP every 3-5 minutes,
- Consider underlying causes of cardiac arrest and treat accordingly.

# Protocol C-01

## ADULT CARDIAC/RESPIRATORY ARREST

Consider as appropriate:

*Anti-arrhythmic therapy: (For maintenance infusions, see protocol C-09 – “Post-ROSC Care”)*

- Lidocaine (Xylocaine)
  - IV/IO: 1.0 to 1.5 mg/kg IV bolus, can repeat in 3-5 minutes not to exceed 3 mg/kg or 300 mg in 30 minutes (not including infusion)
- Amiodarone
  - IV/IO 300 mg initial dose.
  - Consider repeat x1 150 mg 3-5 min.
- Magnesium Sulfate
  - IV/IO: 2 g every 5 minutes,
  - 1<sup>st</sup> line for Torsades or refractory V-Fib/Pulseless V-Tach.
  - Administer in conjunction with lidocaine if hypomagnesemia suspected.
  - Consider for refractory VF/pulseless VT.

*Sedation for CPR induced consciousness (Confirm continued pulseless-ness):*

- Ketamine:
  - IV/IO 1-2 mg/kg for CPR induced consciousness. May repeat if needed in 5-10 minutes.

*Other specific therapy:*

- Sodium bicarbonate for known hyperkalemia, suspected acidosis, TCA toxicity, and prolonged resuscitation.
  - IV/IO: 1 mEq/kg repeated in 10 minutes (if still in arrest) at 0.5 mEq/kg. Minimum initial dose is 50 mEq.
  - Follow TCA recommendations if TCA overdose is suspected
  - Consider dilution of Bicarb if given IO
- Calcium chloride for suspected hyperkalemia, calcium channel blocker OD, or suspected hypocalcemia
  - IV/IO: 500-1000 mg IVP
  - Administer sodium bicarbonate at 1 mEq/kg afterward for suspected hyperkalemia. **Flush line thoroughly between medications**
- Narcan (naloxone) for suspected narcotic overdose *with cardiac arrest*
  - IV/IO: 2 mg repeated PRN
- Dextrose 50% for hypoglycemia
  - IV/IO: 12.5-50 g
  - (Consider dilution of Dextrose if given IO or through small veins)

**Physician Pearls:** Outside of the POST/Comfort One/DNR situations (see *Appendix 26*), once ALS intervention is initiated; Medical Control should be called prior to ceasing efforts. In addition, BLS interventions, an advanced airway, and at least 20 minutes of rhythm-appropriate therapy should have been performed prior to considering termination of efforts.

Use waveform ETCO<sub>2</sub> as a gauge for effectiveness of resuscitation as well as monitoring CETT placement.

**SECTION: C-2a**

**TITLE: Adult Cardiopulmonary Arrest – BLS and AEMT Algorithms**

**REVISED: NOVEMBER 01, 2019**

**Box #1:**

**If adequate CPR is being performed upon arrival :**

1. Confirm cardiopulmonary arrest.
2. Transition to high performance Cardiopulmonary Resuscitation (AKA “Pit Crew”, see appendix 30) while applying AED pads
3. Move on to, “**Box 4.**”

**Box #2:**

**Sudden, witnessed arrest in the presence of EMS:**

1. Perform high performance Cardiopulmonary Resuscitation (AKA “Pit Crew”, see appendix 30) only long enough to apply AED pads.
2. Move on to, “**Box 4.**”

**Box #3:**

**If inadequate CPR, or no CPR at all, is being performed upon arrival:**

1. Initiate/Perform high performance Cardiopulmonary Resuscitation (AKA “Pit Crew”, see appendix 30)
2. During CPR:
  - a. Apply AED pads
3. Move on to, “**Box 4,**” after approximately 2 minutes/**200-220** compressions CPR completed

**Box #4:**

1. **Place patient on firm surface with good workable space as soon as possible/feasible-**
2. **AED Analysis of Rhythm and check blood glucose**

<b>Shock Advised:</b>	<b>NO Shock Advised/No Pulse</b>	<b>NO Shock Advised/ has Pulse (ROSC)</b>
<ol style="list-style-type: none"> <li>a) <b>Clear patient.</b></li> <li>a) <b>Shock @ manufacturer’s recommendation.</b></li> <li>b) Immediately resume HP-CPR without pause for rhythm check.</li> <li>c) OPA/NPA and BVM as appropriate</li> <li>d) Advanced airway management as appropriate (AEMT)</li> <li>e) Vascular Access as appropriate (AEMT)</li> </ol>	<ol style="list-style-type: none"> <li>a) No shock indicated.</li> <li>b) Immediately resume HP-CPR.</li> <li>c) OPA/NPA and BVM as appropriate</li> <li>d) Advanced airway management as appropriate (AEMT)</li> <li>e) Vascular Access as appropriate(AEMT)</li> </ol>	<ol style="list-style-type: none"> <li>a) Provide hemodynamic support</li> <li>b) Evaluate for POST-arrest/TTM care</li> <li>c) Advanced airway management as appropriate (AEMT)</li> <li>d) Vascular Access as appropriate(AEMT)</li> <li>e) Update ALS</li> <li>f) Monitor closely for re-arrest</li> </ol>

Protocol  
C-02a

ADULT CARDIOPULMONARY ARREST – BLS/AEMT

Continue the high performance Cardiopulmonary Resuscitation (AKA “Pit Crew”, see appendix 30) sequence until:

1. Transfer to a higher level of care occurs.
2. Patient regains a pulse
  - a. Initiate supportive care (i.e. oxygen via non-rebreather or BVM assisted breaths if necessary.)
3. Resuscitative efforts are terminated (See Appendix 26 “IN-FIELD DEATH/POST/DNR” )

SECTION: **C-02b**

TITLE: Adult Cardiopulmonary Arrest –ALS algorithms

REVISED: **NOVEMBER 01, 2019**

**Box #1:**

**If adequate CPR is being performed upon arrival :**

1. Confirm cardiopulmonary arrest.
2. Transition to high performance Cardiopulmonary Resuscitation
3. (AKA “Pit Crew”, see appendix 30) while applying Defib pads
4. Move on to, “**Box #4.**”

**Box #2:**

**Sudden, witnessed arrest in the presence of EMS:**

1. Perform high performance Cardiopulmonary Resuscitation
2. (AKA “Pit Crew”, see appendix 30) only long enough to apply Defib pads.
3. Move on to, “**Box #4.**”

**Box #3:**

**If inadequate CPR, or no CPR at all, is being performed upon arrival:**

1. Initiate/Perform high performance Cardiopulmonary Resuscitation
2. (AKA “Pit Crew”, see appendix 30)
3. During CPR:
  - a. Apply Defib pads
  - b. Prepare/establish Airway Management and/or vascular access
  - c. Medications/Interventions without interruption of high performance CPR
4. Move on to, “**Box #4,**” after approximately 2 minutes/**200-220** Compressions completed

**Box #4:**

**Rhythm Check**

1. Place patient on firm surface with good workable space as soon as possible/feasible-
2. **\*\*Pre-charge Monitor to manufacturer’s recommendation prior to pause**
3. **Assess blood glucose**

**VF/Pulseless VT:**

- a) **Shock @ manufacturer’s recommendation.**
- b) Immediately resume HP-CPR without pause for rhythm check.
- c) Advanced airway management as appropriate
- d) Vascular Access as appropriate

**Asystole/PEA:**

- a) No shock indicated.
- b) Immediately resume HP-CPR.
- c) Advanced airway management as appropriate
- d) Vascular Access as appropriate

**ROSC:**

- a) Provide hemodynamic support
- b) Evaluate for POST-arrest/TTM protocol
- c) Advanced airway management as appropriate
- d) Vascular Access as appropriate
- e) Monitor closely for re-arrest

Protocol  
C-02b

ADULT CARDIOPULMONARY ARREST – ALS

**Box #5:**

**Rhythm Check**

1. **\*\*Pre-charge Monitor to manufacturer's recommendation prior to pause**

**VF/Pulseless VT:**

- a) **Shock @ manufacturer's recommendation.**
- b) Immediately resume HP-CPR without pause for rhythm check.
- c) Advanced airway management as appropriate

*Medication Administration During CPR*

- d) Epinephrine
- e) Antiarrhythmic
- f) **Additional pharmacologic therapies as indicated**

**Asystole/PEA:**

- a) No shock indicated.
- b) Immediately resume HP-CPR.
- c) Advanced airway management as appropriate

*Medications Administration During CPR*

- d) Epinephrine
- e) **Additional pharmacologic therapies as indicated**

**ROSC:**

- a) Provide hemodynamic support
- b) Evaluate for POST-arrest/TTM care
- c) Advanced airway management as appropriate
- d) Vascular Access as appropriate
- e) Monitor closely for re-arrest

**Box #6:**

**Treat possible Causes**

Search for & treat possible contribution factors:

- a) **Hypovolemia**
- b) **Hypoxia**
- c) **Hydrogen ion (acidosis)**
- d) **Hypo-/hyperkalemia**
- e) **Hypothermia**
- f) **Toxins**
- g) **Tamponade, cardiac**
- h) **Tension Pneumothorax**
- i) **Thrombosis (coronary or pulmonary)**

**Return to Box #5**



\* **HP-CPR** refers to “High Performance CPR” (AKA Pit Crew CPR) as described in *Appendix 30*.

Continue this sequence until:

- Transport/transfer of care is complete.
- Resuscitative efforts are terminated. (See Appendix 26 “IN-FIELD DEATH/POST/DNR”
- A rhythm/condition change occurs.

If a rhythm/condition change occurs, treat according to its respective algorithm/protocol.

**MEDICATION ADMINISTRATION DURING CPR:**

*Vasopressors (for all cardiac arrest rhythms unless contraindicated)*

- Epinephrine
    - IV/IO: 1 mg 1:10,000 IVP every 3-5 minutes,
- or**

Consider as appropriate:

*Anti-arrhythmic therapy:*

- Lidocaine (Xylocaine)
  - IV/IO: 1.0 to 1.5 mg/kg IV bolus, can repeat in 3-5 minutes **not to exceed 3 mg/kg or 300 mg in 30 minutes (not including infusion)**
- Amiodarone
  - IV/IO 300 mg initial dose.
  - Consider repeat x1 150 mg 3-5 min.
- Magnesium Sulfate
  - IV: 2 g every 5 minutes,
  - 1<sup>st</sup> line for Torsades or refractory V-Fib/Pulseless V-Tach.
  - Administer in conjunction with lidocaine if hypomagnesemia suspected.
  - Consider for refractory VF/pulseless VT.

*Sedation for CPR induced consciousness (Confirm continued pulseless-ness):*

- IV/IO Ketamine: 1-2 mg/kg for CPR induced consciousness. May repeat if needed in 5-10 minutes.

*Other specific therapy:*

- Sodium bicarbonate for known hyperkalemia, suspected acidosis, TCA toxicity, and prolonged resuscitation.
  - IV: 1 mEq/kg repeated in 10 minutes (if still in arrest) at 0.5 mEq/kg. Minimum initial dose is 50 mEq.
  - Follow TCA recommendations if TCA overdose is suspected
  - Consider dilution of Bicarb if given IO
- Calcium chloride for suspected hyperkalemia, calcium channel blocker OD, or suspected hypocalcemia
  - IV, IO: 500-1000 mg IVP
  - Administer sodium bicarbonate at 1 mEq/kg afterward for suspected hyperkalemia. **Flush line thoroughly between medications**
- Narcan (naloxone) for suspected narcotic overdose with cardiac arrest
  - IV, IO: 2 mg repeated PRN
- Dextrose 50% for hypoglycemia
  - IV/IO: 12.5-50 g

(Consider dilution of Dextrose if given IO or through small veins)

**Physician Pearls:** Outside of the Comfort One/DNR situations (*see Appendix 26*), once ALS intervention is initiated; Medical Control should be called prior to ceasing efforts.

# Protocol C-02b

## ADULT CARDIOPULMONARY ARREST – ALS

In addition, BLS interventions, an advanced airway, and *at least* 20 minutes of rhythm-appropriate therapy should have been performed prior to considering termination of efforts.

Use waveform ETCO<sub>2</sub> as a gauge for effectiveness of resuscitation as well as monitoring CETT placement.

**SECTION: C-04**

**PROTOCOL TITLE: S.T.E.M.I. Protocol**

**REVISED: NOVEMBER 01, 2019**

**GENERAL COMMENTS:**

The 911 response to STEMI is to reduce time from the door at the Emergency Department (ED) and the Coronary Cath Lab. This protocol directly supplements the *Adult General Cardiac Care/ACS Protocol C-3*

**BLS SPECIFIC CARE:** *See Adult General Cardiac Care/ACS Protocol C-3*

Obtain or assist with acquisition of 12 lead ECG if feasible.

- Obtain the following information for data input to ACP's Life Pac 15-monitor
  - Pt Last Name
  - Pt First Name
  - Pt DOB (mm/dd/yyyy)
  - Pt Cardiologist's (if known)
  - Pt Age
  - Pt. Sex
- Patients PMH including but not limited to:
  - Meds/Allergies
  - POST/DNR/DNI status

**AEMT/O.M. SPECIFIC CARE:** *See Adult General Cardiac Care/ACS Protocol C-3*

**ALS SPECIFIC CARE:** *See Adult General Cardiac Care/ACS Protocol C-3*

- Refer to General Cardiac/ACS protocols C-3
- Confirm STEMI with 12-lead and transmit
  - Contact receiving hospital with STEMI alert
  - Unit ID
  - Stable vs Unstable (hemodynamic)
  - Age
  - Gender
  - Name of Cardiologist (if available)
  - STEMI confirmed in leads: \_\_\_\_\_ (Confirm 12-lead transmissions)
  - ETA
  - Stay on Hospital frequency
  - POST/DNR/DNI
- **Apply defib pads prophylactically.**

### PHYSICIAN PEARLS:

**Transmission of the 12 lead to a STEMI center will precipitate activation of the STEMI program. If a 12 lead is to be transmitted for other purposes (such as medical control consult) , prompt notification of the receiving should be made in BEFORE transmission to prevent inappropriate activation.**

In the ACCESS system, rapid and accurate prehospital interpretation of the 12 lead ECG is the cornerstone of STEMI detection. To that end, the expectation is:

- Scene times will be kept to a minimum, ideally less than 10 minutes.
- Initial 12 lead should be done on scene within the above 10 minute parameter.
- Digital transmission with secondary verbal notification and confirmation is the default method of activating the STEMI system.
- Primary verbal notification is permissible when the ability to transmit is delayed, has failed, or is otherwise impractical. Verbal notification will include the same information as required for transmission of the EKG (Name, DOB, Cardiologist, etc.).
- **STEMI patients are inherently unstable. Therefore, providers should apply defib pads prophylactically. In addition, the patients should remain on the EKG monitor as well to the ER bedside, and resuscitation equipment kept ready and nearby when the patient is being transferred from the cot to the ER or cath lab.**

The ACCESS system uses the 2013 European Society of Cardiology /ACCF /AHA / World Heart Federation's *Task Force for the Universal Definition of Myocardial Infarction* criteria for STEMI:

*Clinical presentation suggestive of ACS AND:*

- New ST elevation at the J point in at least 2 contiguous leads of:
  - >2mm *in men* leads V2-V3 or
  - > 1.5 mm *in women* in leads V2-V3 and/or
  - > 1 mm in *other contiguous chest leads* or the limb leads
- New or presumed new Left Bundle Branch Block; or
- ST Depression in > 2 precordial leads V1-V4 may indicate transmural posterior injury/infarction
- **Right sided EKG:** ST elevation from the J Point of approximately 1/3 QRS height measured from the J point in V4R alone, or in two contiguous leads.

Citations:

O'Gara PT, Kushner FG, Ascheim DD, Casey DE Jr, Chung MK, de Lemos JA, Ettinger SM, Fang JC, Fesmire FM, Franklin BA, Granger CB, Krumholz HM, Linderbaum JA, Morrow DA, Newby LK, Ornato JP, Ou N, Radford MJ, Tamis-Holland JE, Tommaso CL, Tracy CM, Woo YJ, Zhao DX. 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol* 2013;61:xxx-xxx, doi:10.1016/j.jacc.2012.11.019.

**SECTION: C-05**

**TITLE: Adult Wide-Complex Tachycardia**

**REVISED: NOVEMBER 01, 2019**

This protocol includes ventricular tachycardia with a pulse, Torsades with a pulse, and wide-complex tachycardias of unclear origin. When possible, a 12-lead may be helpful in determining rhythm origin.

**BLS-Specific Care** See Adult General Cardiac Care and ACS Protocol C-3

**AEMT/O.M. SPECIFIC CARE:** See Adult General Cardiac Care/ACS Protocol C-3

**ALS-Specific Care** See Adult General Cardiac Care and ACS Protocol C-3

*Cardioversion for hemodynamically UNSTABLE patients*

- Settings for manual synchronized cardioversion :

Rhythm	ZOLL	Physio Control LP12/15	Philips MRx
Atrial Flutter	75j, 120j,150j,200j	100j, 200j, 300j, 360j	100j, 150j, 200j,
Atrial Fibrillation	75j, 120j,150j,200j	100j, 200j, 300j, 360j	100j, 150j, 200j,
V-Tach w/ pulse	75j, 120j,150j,200j	100j, 200j, 300j, 360j	100j, 150j, 200j
SVT	75j, 120j,150j,200j	100j, 200j, 300j, 360j	100j, 150j, 200j

- Ensure “**SYNC**” button is pressed between each desired synchronized shock
- If synchronization is not obtained, proceed with unsynchronized cardioversion at the same settings
- Sedation/Analgesia prior to cardioversion is highly desirable, but not mandatory. If IV access cannot be obtained for prompt sedation, then cardioversion may be performed without sedation
  - See *Sedation for Painful Procedures M-15* for medications and doses
  - Use Midazolam (Versed) for sedation in cardioversion.

*Antiarrhythmics:*

- **Amiodarone**
  - **LOADING DOSE** - IV/IO:150 mg IV infusion over 10 minutes.
    - May repeat **once** as needed. (max dose loading dose of 300 mg).
    - Convert to maintenance infusion once complete.
  - **MAINTENANCE INFUSION:** IV/IO: 1 mg/min
    - To Mix: 450 mg/250 cc, infuse via infusion pump.

- Lidocaine
  - 1.0-1.5 mg/kg slow IV bolus followed by additional doses of 0.5-0.75 mg/kg every 5 minutes **not to exceed 3 mg/kg or 300 mg in 30 minutes (not including infusion).**
  - If ectopy resolves, can set up a maintenance infusion.
    - (Be sure to rebolus @ 0.5-0.75 mg/kg in first 8-10 minutes of infusion to maintain therapeutic levels of lidocaine)
  - **Maintenance Infusion:** 2-4 mg/minute titrated for effect (Start @ 2 mg/min & add 1 mg/min for each additional 1 mg/kg IV bolus)
    - 1 mg/kg bolus = 2 mg/min.
    - 1.5-2 mg/kg total bolus = 3 mg/min.
    - 2.5-3 mg/kg total bolus = 4 mg/min.

Adenosine (Adenocard): Consider Adenosine for **suspected SVT with aberrancy**. Use Lidocaine or Amiodorone instead of Adenosine in cases of **known VT**

- IV: 6 mg **rapid IVP**
- Repeat at 12 mg in 3-5 minutes two times PRN (total 30 mg)
- Follow each dose with a flush of at least 20-60 ml
- For hemodynamically STABLE patients presenting with wide complex tachycardia, antidysrhythmic therapy is indicated.
- Magnesium sulfate IV/IO:
  - First line agent in treatment of hemodynamically stable polymorphic wide complex tachycardia (torsades de pointes.)
  - Also indicated in treatment of refractory VF/VT, wide complex tachycardia in the presence of suspected hypomagnesemia and life threatening ventricular dysrhythmias due to suspected digitalis toxicity
    - IV/IO: 2 g every 5 minutes, 1<sup>st</sup> line for Torsades or refractory V-Fib/Pulseless V-Tach.
    - Do not give faster than 1 g/minute
    - **Repeat PRN every 5 minutes to a max of 8 grams**

Consider sedation prior to cardioversion if it will not cause unnecessary delays.

- **DO NOT** administer sedation if:
  - Systolic BP < 90 mmHg
  - Low respiratory rate, SpO<sub>2</sub> and/or diminished mental status

**SECTION: C-07**

**TITLE: Adult Bradycardia**

**REVISED: November 1, 2019**

When possible, a 12-lead may be helpful in determining origin of the rhythm.

**BLS-SPECIFIC CARE:** See Adult General Cardiac Care/ACS Protocol C-3

**AEMT/O.M. Specific Care:** See Adult General Cardiac Care/ACS Protocol C-3

**ALS-SPECIFIC CARE:** See Adult General Cardiac Care/ACS Protocol C-3

For hemo-dynamically **UNSTABLE** patients presenting with bradycardia:

*Cardiac Pacing:* Perform immediate transcutaneous pacing (TCP)

- Start at 80 ppm and 30 mA, titrate to mechanical capture
- Consider administering Atropine 0.5mg IV/IO while preparing TCP (nothing should delay TCP in an unstable patient)
- Consider sedation/analgesia with transcutaneous pacing if it will not cause unnecessary delays

*Sedation:*

- **DO NOT** administer if:
  - Systolic BP < 90 mmHg
  - Low respiratory rate, SpO<sub>2</sub> and/or diminished mental status
- Midazolam (Versed) IV/IM/IO:
  - IV/IO/IM: 0.5-2.5 mg slow IV push every 5-10 minutes (max dose 5 mg)
  - IN: 2.5 mg every 10 minutes (max dose of 5 mg)

*Analgesia:*

- **DO NOT** administer/discontinue administration if:
  - Systolic BP < 90 mmHg
  - Respiratory rate, SpO<sub>2</sub> and/or mental status diminishes
- Fentanyl IV/IO/IM/IN
  - 1 mcg/kg initial dose (max initial dose 100 mcg)
  - Give slowly over 2 minutes (with the exception of IN route)
  - May repeat every 10 minutes as needed (max total dose of 200 mcg)
- Morphine sulfate IV/IM/IO
  - 0.1 mg/kg as initial dose (max initial dose 10 mg)
  - Give slowly over 2 min
  - May repeat every 10 minutes as needed with 0.05 mg/kg (max dose of 20 mg)

# Protocol C-07

## ADULT BRADYCARDIA

- *Dilaudid IV/IM:*
  - *Adult Only: 0.5 mg slow IV push over 2-3 minutes. Repeat every 10 minutes PRN max of 2 mg.*

For the treatment of the adult with symptomatic and unstable bradycardia, chronotropic drug infusions are recommended as an adjunct to pacing.

*Vasopressors:* For bradycardia or hypotension unresponsive to other therapies

Epinephrine infusion:

- **IV Infusion:** IV/IO: 0.05-1 mcg/kg/min , titrate for effect
  - **For refractory Cases**
  - **To Mix:** 1 mg epinephrine in 250 cc NS bag

Dopamine infusion:

- **IV Infusion:** IV/IO: 5-20 mcg/kg/min, titrate for effect

For hemodynamically **STABLE** patients presenting with symptomatic bradycardias, pharmacologic therapy is indicated.

Atropine sulfate:

- Not indicated for complete and high degree heart blocks
  - IV/IO: 0.5 mg as needed every 3-5 minutes
  - Maximum total dose 3 mg
  - Maximum total dose of 0.04 mg/kg for morbidly obese patients



SECTION: C-09

TITLE: POST-ARREST CARE

REVISED: **November 1, 2019**

**GENERAL COMMENTS:** This protocol is intended for patients in the post-arrest period of care. Post ROSC care focuses on hemodynamic support, STEMI detection, prevention of hyperthermia, airway control, and prevention of re-arrest.

**BLS SPECIFIC CARE:** See Adult General Cardiac Care/ACS Protocol C-3

- Titrate oxygenation and ventilation to 94-98% SPO<sub>2</sub>
- Follow up vitals every 5 minutes or sooner.
- Obtain post-ROSC 12 lead. STEMI patients should be transported to appropriate PCI capable facilities.
- Leave LUCAS in place on standby

**AEMT/O.M. SPECIFIC CARE:** See Adult General Cardiac Care/ACS Protocol C-3

**ALS SPECIFIC CARE:** See Adult General Cardiac Care/ACS Protocol C-3

### General Care

**General sedation and Airway Management:** Secure the airway using means best determined by good clinical decision making.

- See "Appendix 6: Medication Assisted Intubation" as appropriate.
- Consider intubation as needed

### **Screen for STEMI:**

- Acquire 12 lead. (The acquisition of a 12-lead EKG should not significantly delay treatment or transport)
- If STEMI suspected, consider transport to facility with "24-hour cardiac cath lab capabilities". (See *Hospital Destination protocol G-3*)

### *Sedation and Paralytics:*

- Midazolam (Versed) – may be used to prevent shivering
  - IV/IO/IM: 0.5-2.5 mg slow IV push every 5-10 minutes (max dose 5 mg)
  - IN: 2.5 mg every 10 minutes (max dose of 5 mg)
- Vecuronium (Norcuron): Use only when patient shivering is witnessed (to prevent heat production)
  - **ADMINISTER ONLY AFTER ENDOTRACHEAL TUBE** type airway is **SECURED** and placement confirmed with **SPO<sub>2</sub>** and **CONTINUOUS ETCO<sub>2</sub>**
  - IV/IO: 0.1mg/kg, repeated PRN
- Rocuronium Bromide (Zemuron): Paralytic agent used *alternatively* to Vecuronium. Use only when patient shivering is witnessed (to prevent heat production)
  - **ADMINISTER ONLY AFTER ENDOTRACHEAL TUBE** type airway is **SECURED** and placement confirmed with **SPO<sub>2</sub>** and **CONTINUOUS ETCO<sub>2</sub>**
  - IV/IO 1mg/kg repeated PRN

# Protocol C-09

## POST-ARREST CARE

### Anti-arrhythmic therapy:

- Lidocaine (Xylocaine): To be initiated if V-fib/V-Tach resolves after administration of lidocaine.
  - **Maintenance Infusion:** 2-4 mg/minute titrated for effect (Start @ 2 mg/min & add 1 mg/min for each additional 1 mg/kg IV bolus)
    - 1 mg/kg bolus = 2 mg/min.
    - 1.5-2 mg/kg total bolus = 3 mg/min.
    - 2.5-3 mg/kg total bolus = 4 mg/min.
  - Always give full initial dose, but reduce all subsequent doses by ½ for elderly (>70) or with impaired hepatic function.
- Amiodarone: To be initiated if V-fib/V-Tach resolves after administration of Amiodarone
  - **Loading dose:** A loading dose of 150 mg/10 minutes may also be considered if max 300 mg bolus has not been administered.
  - **Maintenance Infusion:** Consider 1 mg/minute titrated for effect.

**Hypotension:** See Adult Hypotension and Shock Protocol M-03  
Target Systolic Blood Pressure :  $\geq$  100 mm/Hg

**Vasopressors:** titrate to a blood pressure of 100 mm/Hg systolic.

- Dopamine infusion
  - IV/IO: 2-20 mcg/kg/min
  - Start at 5 mcg/kg/min
- Epinephrine infusion
  - IV/IO: 0.05-1 mcg/kg/min
- Norepinephrine Infusion
  - IV/IO: 0.01- 2 mcg/kg/min
  - Start at 0.1 mcg/kg/min.

### PHYSICIAN PEARLS:

**Ensure early notification to receiving facility for expeditious coordination of care.**

If Vecuronium/Rocuronium is administered, ensure versed is provided for patient sedation.

Cooling/TTM has been removed from the post-ROSC care. Continued research has shown that prehospital cooling largely ineffective and problematic without invasive controls. Instead providers will focus on prevention of hyperthermia.

SECTION: M-03

PROTOCOL TITLE: Adult Hypotension and Shock

REVISED: November 1, 2019

**GENERAL COMMENTS:** *Hypotension is defined as a symptomatic blood pressure less than 90 mm/Hg.* This protocol includes shock and hypotension from a myriad of causes. Follow a more specific protocol if appropriate (i.e. dehydration or allergic reaction). Fluid administration should be performed with caution in CHF patients.

**BLS SPECIFIC CARE:** See Adult General Medical Care Protocol M-01

**AEMT/OM CARE:** See Adult General Medical Care Protocol M-01

**ALS SPECIFIC CARE:** See Adult General Medical Care Protocol M-01

- Assess and treat underlying cause of shock, if known
- Administer fluid bolus
  - IV/IO :500 ml
  - Repeat as necessary for persistent hypotension to a maximum of 2 liters
  - *Caution!* Avoid repeat fluid boluses in cases of suspected cardiogenic shock with rales present

**Vasopressors:** Titrated to maintain adequate HR, MAP>65 or SBP >100. A provider must choose the most appropriate vasopressor for the situation.

- Norepinephrine
  - IV/IO Infusion: IV/IO: 0.01- 2 mcg/kg/min
  - Start at 0.1 mcg/kg/min
- Epinephrine
  - IV/IO Infusion: 0.05-1 mcg/kg/min
  - First line agent for treatment of persistent hypotension during anaphylactic shock
- Dopamine
  - IV/IO Infusion: 2-20 mcg/kg/min
  - Start at 5 mcg/kg/min

Protocol  
M-03

ADULT HYPOTENSION / SHOCK

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**SECTION: M-10**

**PROTOCOL TITLE: Adult Allergic/Anaphylaxis**

**REVISED: November 1, 2019**

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**GENERAL COMMENTS:** This protocol covers allergic, anaphylactic, and anaphylactoid reactions of all severities.

**BLS SPECIFIC CARE:** *See adult General Medical Care Protocol M-1*

**Epi Pen Protocol (If optional Module not completed)**

- Confirm prior to administration
  - Is Epi-Pen indicated : is the patient an adult in anaphylaxis with distress? (Right Patient?)
  - Is it an Epi-Pen of the correct dose (Right Dose?)
    - Epi-Pen Adult: 0.3 mg
    - Epi-Pen Junior: 0.15 mg
  - Is the Epi-Pen an intramuscular (IM) auto injector (Right Route?)
  - Is the Epi-Pen expired?
  - What is the medication's appearance?
    - It should be clear and colorless
- Re-evaluate patient's sign and symptoms every 5 minutes following administration
- Evaluate for presence adverse effects of epinephrine.
  - Chest pain
  - Headache
  - Palpitations
  - Anxiety/tremors
- Repeat in 10 minutes if no improvement

**If signs of bronchospasm are present:**

- Assist the patient with his prescribed "rescue inhaler." Use a spacer if the patient is prescribed one and has it available
  - Assisted Inhaler: 2 puffs or a specific number of puffs as prescribed by patient's MD
  - Repeat every 5-10 minutes or as prescribed by patient's MD
  - Hold for HR >150/min
- As an alternative, the patient may be allowed to use his/her own nebulized medication. The QRU will offer to hook up oxygen in lieu of a room air "condenser" and run at 6-8 lpm with the patient's hand held nebulizer (HHN). The patient must prepare it him/herself

# Protocol M-10

## ADULT ALLERGY / ANAPHYLAXIS

### AEMT/O.M. SPECIFIC CARE: See adult General Medical Care Protocol M-1

- Treat hypotension aggressively with IV crystalloid up to max of 1000 cc. Hold for s/s of CHF/pulmonary edema or CHF History

#### *Sympathomimetic*

- Epinephrine 1:1000
  - o IM: 0.3-0.5 mg
  - o Repeat x 1 in 10 minutes if s/s do not significantly improve

#### *Bronchodilators*

- Nebulizer Treatment
  - o Albuterol 2.5 mg (0.83% in 3 cc)
  - o Ipratropium Bromide (Atrovent) 0.5 mg (0.02% in 2.5 cc)
  - o May repeat as needed using Albuterol only. May use equivalent solutions of above medications such as *DuoNeb* as available

### ALS SPECIFIC CARE: See adult General Medical Care Protocol M-1

#### *IV Fluid Resuscitation*

- Treat hypotension aggressively with IV crystalloid PRN. Hold for s/s of CHF/pulmonary edema or CHF History

#### *Sympathomimetic*

- Epinephrine 1:1000
  - IM: 0.3-0.5 mg
  - Repeat x 1 in 10 minutes if s/s do not significantly improve

- Epinephrine Infusion for persistent and symptomatic hypotension and severe refractory s/s

- IV Infusion: IV/IO: 0.05-1 mcg/kg/min titrate for effect
- To Mix: 1 mg epinephrine in 250 cc NS bag
- Administer via IV pump

- Epinephrine Neb (*for laryngeal edema only*)
  - 3 mg (3 ml) mixed with 3 ml NS for 6ml total epinephrine 1:1,000 nebulized undiluted

#### *Antihistamines*

- Benadryl (Diphenhydramine)
  - IV, IM, IO: 25-50 mg
  - PO: (If available) 25-50 mg (for mild cases)
- Zantac (Ranitidine) To be used in conjunction with Benadryl
  - IV, IM, IO: 50 mg
  - PO: (If available) 150-300 mg (for mild cases)
- Pepcid (Famotidine) May be used in conjunction with Benadryl as an *alternative to Zantac* based on availability
  - IV, IO: 20 mg Slow admin Every 12 hours. May dilute to 100 or 250 cc and administer over 15 minutes.
  - PO: (If available) 20-40 mg (for mild cases)

*Antiemetic:*

- Zofran (ondansetron) IV/IM/IO
  - 4 mg
  - Repeat one time in 15 minutes, if needed
- Benadryl (diphenhydramine) IV/IM/IO
  - 25-50 mg

*Benzodiazepines:*

- For concomitant vertigo-type symptoms.
- Valium (diazepam) IV/IO
  - IV 2.5mg every 10 minutes as needed.
  - Maximum: 10 mg
- Versed (midazolam) IV/IM/IO
  - 0.5 mg every 10 minutes as needed
  - Maximum: 2.5 mg

---

**PHYSICIAN PEARLS:**

**CAUTION: All patients receiving inhaled beta agonists and/or anticholinergic medications should be observed for a least one-hour following treatment for return of symptoms.**

**ALS evaluation is indicated if Epi administered either PTA or by EMS, and transport strongly encouraged. Refusals require medical control contact.**

**Epinephrine Auto injector:** EMTs can administer the epinephrine Auto-Injector if it has been prescribed to the patient. In addition, EMTs may administer an auto injector that HAS NOT been prescribed to the patient IF they have successfully completed additional training as required by the Department of Health and Welfare, Bureau of EMS and the ACCESS Medical Directors.

**Epi IM admin Optional Module:** EMTs can administer the epinephrine via IM injection after drawing it from a vial , glass amp, or other container if they have successfully completed additional training as required by the Department of Health and Welfare, Bureau of EMS and the ACCESS Medical Directors.

**Zantac or Pepcid:** H2 antagonists are adjunctive therapies to Benadryl (with or without epinephrine) in anaphylaxis & allergic reactions. It is not a stand-alone intervention. One or the other, based on availability should be used, but not both unless instructed to do so by physician order. **PEPCID is IV/IO ONLY.**

**Common Presentations:** The most common symptoms are urticaria and angioedema, occurring in approximately 88% of patients. The next most common manifestations are respiratory symptoms, such as upper airway edema, dyspnea, and wheezing. Gastrointestinal symptoms occur most commonly in food-induced anaphylaxis, but can occur with other causes as well. Oral pruritus is often the first symptom observed in patients experiencing food-induced anaphylaxis. Abdominal cramping is also common, but nausea, vomiting, and diarrhea are frequently observed as well. Remember that a reaction may be monophasic, biphasic, or even protracted in duration. Laryngeal edema is more common in the protracted (57%) or biphasic (40%) cases

# Protocol M-10

## ADULT ALLERGY / ANAPHYLAXIS

Cardiovascular symptoms of dizziness, syncope, and hypotension are less common, *but it is important to remember that cardiovascular collapse may occur abruptly, without the prior development of skin or respiratory symptoms.*

**PITFALLS:** It is commonly believed that all cases of anaphylaxis present with cutaneous manifestations, such as hives or mucocutaneous swelling. But in fact, as previously mentioned, up to 20% of anaphylactic episodes may not involve these signs and symptoms on presentation for emergency care. Moreover, a survey of children with food-induced anaphylaxis showed that 80% of fatal reactions were not associated with cutaneous manifestations. *Therefore, a thorough assessment and a high index of suspicion are required for all potential allergic reaction patients.*

In one study (Sampson et al) many cases of fatal food-induced anaphylaxis occurred in a biphasic clinical pattern. In these, mild oral and gastrointestinal symptoms occurred within 30 minutes of food ingestion. These symptoms resolved, only to be followed 1–2 hours later by severe respiratory symptoms and hypotension. *Due to the potential for this presentation, it is critical that patients with food-induced anaphylaxis presenting for emergency care be closely observed a minimum of 4 hours following their recovery from the initial event.*

Individuals at greater risk for a fatal reaction include those with asthma, atopic dermatitis (eczema), prior anaphylactic history, and those who delay treatment.



**SECTION: M-13**

**PROTOCOL TITLE: Adult Cold Emergencies**

**REVISED: NOVEMBER 01, 2019**

**GENERAL COMMENTS:** Hypothermia is defined as a body temperature less than 95 degrees Fahrenheit. It is further sub-categorized as follows:

- Mild hypothermia is 34-35 °C / 93-95 °F
- Moderate Hypothermia is 30-34 °C / 86-93 °F
- Severe hypothermia is < 30 °C / 86 °F

**BLS SPECIFIC CARE: See Adult General Medical Care Protocol M-01**

- Handle gently
- Do not re-warm cold, injured extremities if there is a chance of refreezing prior to arrival at definitive care
- Obtain a temperature (core temperature if unresponsive)
- For mild hypothermia, increase heat production through exercise, and calorie/fluid replacement
- For moderate and severe hypothermia, treat gently and keep horizontal

*Begin passive re-warming:*

- Heat packs to critical areas
- Rewarm trunk prior to extremities

*Cardiac arrest treatment for moderate to severe hypothermia:*

- CPR as normal; check for pulse for at least 30 seconds
- One (1) shock, then hold until temperature is > 30 °C / 86 °F
- Keep horizontal and avoid rough treatment, but do not delay critical interventions
- Active re-warming

*Fight heat loss:*

- Radiation (55-65%): Cover with warm blankets. Cover the head (not the face)
- Conduction (15%): Separate the patient from cold surfaces
- Convection (15%): REMOVE WET CLOTHING
- Evaporation (15%): Cover with warm blankets. Cover the head (not the face)
- Obtain core body (i.e. rectal) temperature as necessary
- Handle patient gently; at core body temperatures less than 30°C (86°F) rough handling can precipitate lethal cardiac dysrhythmias
- Remove patient from cold environment if possible; remove wet clothing and insulate against further heat loss
- Do not attempt to re-warm cold, injured extremities if there is a chance of the extremity refreezing prior to arrival at definitive care

# Protocol M-13

## ADULT COLD EMERGENCIES

*BLS continued...*

- Use of an AED for patients in cardiopulmonary arrest:
  - Shock as indicated
  - Continue CPR and obtain core body (rectal) temperature.
  - If core body temperature >30C/86F, administer further shocks as indicated
  - If core body temperature < 30 °C/ 86 °F, withhold further shocks
    - Focus on CPR and re-warming

**AEMT/O.M. SPECIFIC CARE: See Adult General Medical Care Protocol M-01**

- If available, administer warm IV fluids

**ALS SPECIFIC CARE: See Adult General Medical Care Protocol M-01**

- Assess and treat underlying disorder
- Obtain BGL

*Severe Pain:*

- Refer to “Adult Pain Control Protocol M-11” in SWO

*Cardiac arrest treatment for moderate to severe hypothermia:*

- (1) One total shock, then hold until temperature is > 30 °C / 86 °F
- Keep horizontal and avoid rough treatment, but do not delay critical interventions
- Active re-warming
- Temp < 30 °C / 86 °F: withhold medications
- Temp > 30 °C / 86 °F: increase intervals between meds
- Sinus bradycardia may be physiologic in severe hypothermia; therefore, cardiac pacing and medications are usually not indicated
- Focus treatment on re-warming and rapid transport of patient
- For cardiopulmonary arrest associated with hypothermia see the algorithms

**Box #1:**

**If adequate CPR is being performed upon arrival :**

1. Confirm cardiopulmonary arrest
2. Transition to high performance cardiopulmonary resuscitation (CPR) (aka "Pit Crew" CPR, see Appendix 30) while applying defib pads
3. Move on to "**Box #4**"

**Box #2:**

**Sudden, witnessed arrest in the presence of EMS:**

1. Perform high performance cardiopulmonary resuscitation (AKA "Pit Crew", see appendix 30) only long enough to apply defib pads
2. Move on to "**Box #4**"

**Box #3:**

**If inadequate CPR, or no CPR at all, is being performed upon arrival:**

1. Initiate/perform high performance cardiopulmonary resuscitation (AKA "Pit Crew", see appendix 30)
2. During CPR:
  - a. Apply defib pads
  - b. Prepare/establish airway management and/or vascular access
  - c. Medications/interventions without interruption of high performance CPR
3. Move on to, "**Box #4,**" after approximately 2 minutes/**200-220** compressions completed

**Box #4:**

**Rhythm Check**

1. Place patient on firm surface with good workable space as soon as possible/feasible
2. **\*\*Pre-charge Monitor to manufacturer's recommendation prior to pause**
3. **Assess blood glucose level**

**VF/Pulseless VT:**

- a) **Shock @ manufacturer's recommendation**
- b) Immediately resume HP-CPR without pause for rhythm check
- c) Advanced airway management as appropriate
- d) Vascular access as appropriate

**Asystole/PEA:**

- a) No shock indicated
- b) Immediately resume HP-CPR
- c) Advanced airway management as appropriate
- d) Vascular access as appropriate

**ROSC:**

- a) Provide hemodynamic support
- b) Evaluate for POST-arrest/TTM protocol
- c) Advanced airway management as appropriate
- d) Vascular Access as appropriate
- e) Monitor closely for re-arrest

# Protocol M-13

## ADULT COLD EMERGENCIES

### Box #5: Check Core Body (Rectal) Temperature

#### Core Body Temperature < 30 °C (86 °F):

- Continue HP-CPR**, check rhythm every **200-220** compressions (approx. 2 min)
- Withhold** further shocks if VF/VT present until temp > 30° C (86 °F):
- Withhold** IV/IO/CETT medications until temp > 30 °C (86 °F)
- Active external rewarming; prevent further cooling
- Infuse warm NS fluid boluses. ( 43 °C / 109 °F)
- Transport, and focus efforts upon raising core body temperature > 30 °C

#### Core Body Temperature > 30 °C (86 °F):

- Continue HP-CPR**, check rhythm every **200-220** compressions (approx. 2 min)
- Provide electrical therapy** as indicated by rhythm\*\*
- Administer appropriate IV/IO/CETT medications** for presenting rhythm (i.e. VF/VT, PEA, asystole) as indicated, but at longer than standard intervals\*\*
- Active external rewarming; prevent further cooling
- Infuse warm NS fluid ( 43 °C / 109 °F)
- Transport, and focus efforts upon raising core body temperature > 35 °C (95 °F).

**\*\* Medications and electrical therapy as found in protocols C-01, C-02a, C-02b**

### Box #7: Treat (Other) Possible Causes

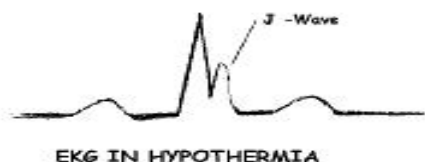
Search for & treat possible contribution factors:

- Hypovolemia**
- Hypoxia**
- Hydrogen ion (acidosis)**
- Hypo-/hyperkalemia**
- Hypothermia**
- Toxins**
- Tamponade, cardiac**
- Tension Pneumothorax**
- Thrombosis (coronary or pulmonary)**

Return to Box #5

**PHYSICIAN PEARLS:**

If the patient's core temperature falls below 32 °C, a characteristic J-wave (aka Osborn wave) may occur. The J wave occurs at the junction of the QRS complex and the ST segment. Also noticeable are T wave inversion and prolongation of the PR, QRS, and QT intervals.



Hypothermic patients also exhibit "cold diuresis." Peripheral vasoconstriction initially causes central hypervolemia, to which the kidneys respond by putting out large amounts of dilute urine. Alcohol and cold water immersion worsen this process. Therefore, hypothermic patients may also be dehydrated.

**HYPOTHERMIA: STAGES**

**Normal Cold Response (98.6-95.1 °F)**

- Feel cold
- Shivering
- Vasoconstriction

**Mild hypothermia (34-35 °C / 93-95 °F)**

- Maximum shivering at 35 °C (95°F)
- Cold, pale skin (vasoconstriction)
- Pulse and BP are normal or elevated
- Faster breathing
- Mild confusion, slurred speech, unsteady gait
- Amnesia

**Moderate (30-34 °C / 86-93 °F) to Severe Hypothermia (< 30 °C/ 86 °F)**

- Shivering stops
- Pulse slows (bradycardia)
- Breathing slows
- Risk of cardiac arrhythmia (AFib)
- Increased mortality in major trauma by 40-50%
- Intense vasoconstriction; surface pooling promotes "afterdrop"
- Decreased LOC

**Severe Hypothermia (< 30 °C / 86 °F)**

- Intense vasoconstriction - surface pooling promotes "afterdrop"
- As core temp drops, the risk of cardiac arrest increases dramatically
- Lethal cardiac dysrhythmias
- Non-cardiac pulmonary edema

Protocol

M-13

ADULT COLD EMERGENCIES

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**SECTION: PC-02**

**PROTOCOL TITLE: PEDIATRIC SYMPTOMATIC BRADYCARDIA**

**REVISED: November 1, 2019**

**General Comments:** Symptomatic bradycardia is defined in pediatrics as hypotension or other S/S of poor perfusion, with a (relative to age) bradycardia. Most bradycardia is hypoxia related, and will usually respond to oxygenation.

**BLS SPECIFIC CARE: See General Pediatric Care Protocol PC-1**

*Stable/asymptomatic/adequate perfusion*

- Ensure adequate oxygenation, ventilation, and perfusion
- Resolve any causes of hypoxia

*Unstable/symptomatic/poor perfusion/peri-arrest*

- Aggressive oxygenation and ventilations
- Initiate chest compressions for HR < 60 with frequent re-evaluation for situations refractory to oxygenation
- Determine patient's color category on length based resuscitation tape (ACCESS Pediatric Tape)

**AEMT/ O.M. SPECIFIC CARE: See General Pediatric Care Protocol PC-1**

**ALS SPECIFIC CARE: See General Pediatric Care Protocol PC-1**

*Consider underlying causes and treat as well.*

*Vasoactive Bolus Medications*

- Epinephrine:
  - IV/IO: 0.01 mg/kg (0.1 ml/kg) 1:10,000 with 5-10 ml NS flush
    - Repeat every 3-5 minutes as needed
- Atropine:
  - IV/IO: 0.02 mg/kg
    - Minimum dose: 0.1 mg
    - Maximum child dose: 0.5 mg
    - Maximum adolescent dose: 1 mg
    - Repeat every 3-5 minutes as needed x 1

*Transcutaneous Pacing:*

For bradycardia unresponsive/refractory to pharmacologic therapy and oxygenation:

- Consider initial rate at 80-100, initial MA at 60-80

# Protocol PC-02

## PED SYMPTOMATIC BRADYCARDIA

*Vasopressor Infusions:* Epinephrine is the preferred agent in this setting:

- Epinephrine infusion
  - 0.05-1 mcg/kg/min IV/IO
  - Titrate to adequate heart rate/blood pressure response
- Dopamine infusion :
  - 2-20 mcg/kg/min IV/IO dopamine infusion
  - Titrate to adequate heart rate/blood pressure response

### PHYSICIAN PEARLS:

*Consider underlying causes*

- Hypoxia
- Hypothermia
- Drug/Toxin Exposure

*The following information is adapted from the Medtronic Physio-control website regarding pediatric pacing.*

“Bradycardia is the most common dysrhythmia in children and is usually secondary to hypoxic events. Although noninvasive pacing may be attempted, typically bradycardias of hypoxic etiology do not respond. First line therapy is prompt airway support, ventilation and oxygenation.

Although less frequent in occurrence, children and infants do experience heart blocks and bradycardias where treatment with noninvasive pacing is indicated and could be lifesaving”

Considerations:

- The landmarks for pacing electrode placement are the same for adults and children; *anterior-posterior* is the most common pacing electrode placement though *Anterior-lateral* is acceptable as long as pacing pads do not overlap.
- ECG electrodes should be placed well away from the pacing electrodes.
- Pediatric pacing electrodes should be used on children who weigh less than 33 pounds (15 kg).
- *Capture thresholds in children are similar to those in adults.*



**SECTION: PM-05**

**PROTOCOL TITLE: PEDIATRIC HYPOTENSION AND SHOCK**

**REVISED: November 1, 2019**

**GENERAL COMMENTS:**

This protocol includes shock and hypotension from a myriad of causes. When another protocol is more appropriate (i.e. Allergic Reaction) it should be followed instead.

The definition of hypotension is based on blood pressure. The definition of shock is based on clinical presentation of hypo-perfusion. Use of good clinical judgment is essential.

**BLS SPECIFIC CARE: See General Pediatric Care Protocol PM-1**

**AEMT/O.M. Specific Care: See General Pediatric Care Protocol PM-1**

*IV/IO fluid therapy*

- 20 ml/kg fluid boluses over 10 minutes
- Hold for signs of pulmonary edema
- Repeat up to three times as needed to a maximum of 60 ml/kg

**ALS SPECIFIC CARE: See General Pediatric Care Protocol PM-1**

- Assess and treat underlying cause of shock, if known

**Vasopressors:** For hypotension and shock refractory to fluids and other interventions. Titrated to maintain adequate HR, MAP>65 mmHg or 100 mmHg SBP. A provider must choose the most appropriate vasopressor for the situation.

- **Norepinephrine**
  - **IV/IO Infusion: 0.01- 2 mcg/kg/min**
  - **Start at 0.1 mcg/kg/min**
- **Epinephrine**
  - **IV/IO Infusion: 0.05-1 mcg/kg/min**
  - **First line agent for treatment of persistent hypotension during anaphylactic shock.**
- **Dopamine**
  - **IV/IO Infusion: 2-20 mcg/kg/min**
  - **Start at 5 mcg/kg/min**

Protocol  
PM-05

PEDIATRIC HYPOTENSION AND SHOCK

**PHYSICIAN PEARLS:**

Pediatric Vasopressor Infusions should be administered by IV Pump

**Pediatric Hypotension:** The definition of pediatric hypotension is based on multiple factors including age and size. For the purposes of this protocol, it is defined as:

$$70 + (\text{Age in years} \times 2) = \text{Systolic B/P or } 90 \text{ mm hg, } \textit{whichever is lower.}$$

Fluid administration use should be used with caution in pediatric patients with severe congenital heart defects.

# Protocol PM-06

**SECTION: PM-06**

**PROTOCOL TITLE: PEDIATRIC HYPER/HYPOGLYCEMIA**

**REVISED: November 1, 2019**

**GENERAL COMMENTS:** Symptomatic hypoglycemia is defined as BG < 60 mg/dl with an altered LOC.

**BLS SPECIFIC CARE: See General Pediatric Care Protocol PM-1**

If hypoglycemia is confirmed by glucometry: (BG < 60 mg/dl **with** symptoms):

- Infant/ Pediatric BG = < 60 mg/dl with symptoms
- Newborn/Neonate = See Protocol PM-10

*Simple carbohydrates/sugars:*

- If the patient can hold a cup or plate without assistance (or fed by bottle or breast), and can swallow without difficulty, encourage the patient to consume simple carbohydrates.
- Attempt to document volume of food/liquid ingested (as appropriate). If grams of sugar are known, document this as well.
- Oral Glucose
  - If simple carbohydrates are not readily available or not feasible
  - Only if patient retains an intact and self-maintained airway
  - 5-45 g of glucose paste administered orally (providing the patient can swallow on command). Glucose paste may be mixed in a liquid to make it more palatable for the patient. The EMT may stop administration when the patient returns to a full state of awareness and baseline status. NOTE: A full 45 g is not likely to be needed

**AEMT/O.M. Specific Care: See General Pediatric Care Protocol PM-1**

*Fluid Resuscitation*

- If BG >300, give 20ml/kg fluid bolus 1 time.

**ALS SPECIFIC CARE: See General Pediatric Care Protocol PM-1**

If BG >300 (hyperglycemia):

- Cardiac Monitoring is indicated
- Fluid Resuscitation as needed if Hypotensive.
  - IV/IO: 20ml/kg fluid bolus
  - Hold for s/s of pulmonary edema
  - May repeat up to 3 times to a max of 60 ml/kg

If BG <60:

- Dextrose (D25% or D10%) IV/IO:
  - Birth to 3 months; use D10 10ml/kg slow IV/IO push

PED HYPER/HYPOGLYCEMIA

# Protocol PM-06

- >3 months; use D10 10ml/kg **or** D25 4 ml/kg slow IV/IO push
- Glucagon IM:
  - If unable to obtain IV/IO access
  - 0.02 mg/kg
  - Maximum of 1 mg (Unit)

---

## PHYSICIAN PEARLS:

**PEDIATRICS DO NOT FALL UNDER NORMAL TREAT & RELEASE GUIDLINES DUE TO AGE. CONTACT MEDICAL CONTROL FOR T/R**

It is important to rule out other causes for altered mental status. This particularly includes, but is not limited to:

- Stroke
- Overdose/Medication error
- Closed head injury from falls or other causes.
- Sepsis

An inadequate amount of glucose for heat production, combined with profound diaphoresis, many hypoglycemic patients are at risk for hypothermia. Keep patient warm.

Diabetics ages <12 and >65 tend to be more difficult to regulate.

The absence/presence of SZ during hypoglycemia should be assessed, and if present transport should be strongly encouraged.

PED HYPER/HYPOGLYCEMIA

**SECTION: R-02**

**PROTOCOL TITLE: Opioid Overdose**

**REVISED: NOVEMBER 01, 2019**

**GENERAL COMMENTS:** The goal in treating an opioid overdose patient is generally not to wake the patient, but to maintain breathing and the airway. While difficult, this is especially important as opiates are often mixed with hyperdynamic substances and other drugs at the street level, and the opioid may be masking or suppressing other toxic effects. The provider should always consider that there may be other causes for altered mentation.

The Opiate Toxidrome consists of:

- Altered mental status
- Miosis
- Unresponsiveness
- Shallow respirations
- Slow respiratory rate
- Decreased bowel sounds
- Hypothermia
- Hypotension

**BLS SPECIFIC CARE: See Protocol M-1, PM-1, PM-9**

- Oxygenation: Initiate prior to or simultaneously with opioid antagonists. Some opiate overdose patients will respond well to simple assisted ventilations.
- Physical restraints as necessary
- Do not delay basic care (i.e. Airway positioning, ventilations, or CPR) waiting for Naloxone availability or for Naloxone to take effect.

**AEMT/O.M. Specific Care: See Protocol M-1, PM-1, PM-9**

- Narcan (naloxone)
  - IV/IO: 0.1-2 mg slowly. Repeat as needed every 1-2 minutes to a maximum of 10 mg.
  - IM/IN: 2-4 mg. Repeat as needed to a maximum of 10 mg. If IV access is unavailable.
  - If patient has obviously aspirated, consider bypassing Narcan and manage airway to include advanced airways if required.

**ALS SPECIFIC CARE: See Protocol M-1, PM-1, PM-9**

- Attempt to identify co-morbid factors and other medical issues, including poly-pharmacy involvement.
  - Initiate EKG monitoring and obtain a rhythm strip.
- If patient has obviously aspirated, consider bypassing Narcan administration and intubate as required
- Naloxone Infusions: for recurrent somnolence or sedation
  - Re-administer bolus of 0.1-2mg naloxone and initiate infusion
  - IV/IO 0.1-10 mg/hour, titrated for effect.
  - To mix: 4 mg/250 cc.

# Protocol R-02

## OPIATE OVERDOSE

### PHYSICIAN PEARLS:

**ALS evaluation is indicated if Naloxone administered either PTA or by EMS, and transport strongly encouraged.**

The physician medical directors direct that suspected opioid overdose patients who are contacted by ACCESS system providers, **even if the overdose has resolved**, should be transported for monitoring and evaluation whenever possible. **Refusals require medical control contact.**

**Clinical Goal:** The goal of naloxone administration is to reverse respiratory depression and hypoxia while avoiding while avoiding combativeness and agitation. **Use the lowest dose possible to restore spontaneous respirations but avoid precipitating withdrawal**

**PPE:** EMS Provider risk of accidental airborne exposure is negligible when basic BSI/PPE (i.e. Gloves, eye protection, mask) is worn.

**Naloxone infusions:** Not every patient will need a naloxone infusion. Naloxone infusions are an option for patients who are re-sedating after initial naloxone administration. Naloxone infusions should be preceded by a supplementary bolus of IV/IO Naloxone, and then initiated at a rate equivalent to the initial dose required to maintain respiratory effort. I.E. if 1 mg was initially required for restoration of respirations, the dose may be initially set at 1 mg/hour to maintain that state.

The lower dose ranges of Naloxone (0.1-0.4 mg) is intended to avoid the rapid reversal of a narcotic induced coma. **Rapid Reversal may lead to vomiting, combativeness, seizures and rarely even cardiac arrest.** These adverse events can be minimized with airway management, slow administration and small titrated doses of naloxone.

Many Opiates have a longer bioavailability than Narcan, therefore assess for re-sedation. Re-administer Narcan if needed and **consider initiating infusion as needed.**

Certain opioids, such as Imodium, can cause EKG changes and QT prolongation. EKG monitoring is indicated.

**SECTION: R-06**

**PROTOCOL TITLE: Calcium Channel Blocker/Beta Blocker OD**

**REVISED: November 1, 2019**

**GENERAL COMMENTS:**

**BLS SPECIFIC CARE:** See Protocols R-1, M-1, PM-1, PM-9

**AEMT/O.M. SPECIFIC CARE:** See adult General Toxicological Care Protocol R-1

**ALS SPECIFIC CARE:** See adult General Toxicological Care Protocol R-1

- Apply cardiac monitor and multi-function electrode (MFE) pads
- 12-lead EKG
- Contact OLMC at earliest indication of calcium channel blocker overdose

**ANTIDOTES**

- **Calcium Chloride (for Calcium Channel Blocker Only)**
  - IVP (Slow): 500-1000 mg
- **Glucagon**
  - IV,IM: 1-2 mg, repeated every 5 minutes as needed

Do not use diluents (e.g. propylene glycol) supplied with single use kits. Use saline Instead

*Cardiovascular Agents:*

In conjunction with fluids and glucagon

- Atropine sulfate:
  - Not indicated for complete and high degree heart blocks
  - Adult:
    - 0.5 mg IV/IO as needed every 3-5 minutes.
      - Maximum total dose 3 mg
  - Pediatric:
    - 0.02 mg/kg IV/IO
      - Minimum dose: 0.1 mg
      - Maximum child dose: 0.5 mg
      - Repeat every 3-5 minutes as needed

Cardiac pacing for patients not promptly responsive to pharmacological therapy

- **Adult and Pediatric:**
  - Start at 80 ppm and 30 mA.
  - Titrate for mechanical Capture
  - Consider sedation/analgesia per protocol with transcutaneous pacing if it will not cause unnecessary delays

*Vasopressors:*

For bradycardia or hypotension unresponsive to other therapies

- ***Epinephrine infusion***
  - **IV Infusion: IV/IO: 0.05-1 mcg/kg/min titrate for effect**
  - **For refractory Cases**
- ***Dopamine infusion***
  - **Adult and Pediatric: 2-20 mcg/kg/min**

**PHYSICIAN PEARLS:**

**Calcium Channel Blockers**

- Aggressive cardiovascular support is necessary for management of massive calcium channel blocker overdose. While calcium may overcome some adverse effects of CCBs, it rarely restores normal cardiovascular status.
- According to many case reports, glucagon has been used with good results. However, vasopressors are frequently necessary for adequate resuscitation and should be requested early if hypotension occurs.

**Beta Blockers**

- **Bradycardia with associated hypotension and shock (systolic BP <80 mm Hg, HR <60 BPM) defines severe beta-blocker toxicity.** Bradycardia by itself is not necessarily helpful as a warning sign because slowing of the heart rate and dampening of tachycardia in response to stress is observed with therapeutic levels.
- While case reports have documented hypotension in the absence of bradycardia, blood pressure usually does not fall before the onset of bradycardia. Bradycardia may be isolated or accompanied by mild conduction disturbances affecting the entire cardiac conduction system from the sinus node to the intraventricular Purkinje system.
- Cardiac pacing may be effective in increasing the rate of myocardial contraction. Electrical capture is not always successful and, if capture does occur, blood pressure is not always restored. *Reserve cardiac pacing for patients unresponsive to pharmacological therapy.* Multiple case reports describe complete neurological recovery, even with profound hypotension, if a cardiac rhythm can be sustained.
- Hypoglycemia, while uncommon, occasionally occurs with beta blocker use. *Always check a BG with a suspected Beta Blocker OD.*
- Agents with combined alpha- and beta-selective properties (Dopamine and Epinephrine) may be necessary to maintain blood pressure. A beta-agonist may competitively antagonize the effect of the beta-blocker. The amount of beta-agonist required might be several orders of magnitude above those recommended in standard ACLS protocols.



**APPENDIX: 30**

**TITLE: High Performance Resuscitation**

**REVISED: NOVEMBER 01, 2019**

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**Clinical Indications:**

- Cardiac arrest in a patient > 8 years of age.  
(\* Many of these concepts can be adapted freely to pediatric arrest)

**Contraindications:**

- none

**Notes/Precautions:**

- High Performance CPR can be broken down into 5 major considerations; they are: *Rate, Depth, Recoil, uninterrupted, Ventilation Control*. Focus is on:
  - Minimally interrupted compressions
  - Appropriate depth, rate (target 110/min) and quality of compressions
  - Consider compressor fatigue and change compressors as needed
- small patients and morbidly obese may require modification of the procedure due to size
- This procedure is based on a 3-person crew of providers (if a 4<sup>th</sup> person is available, they should assist with setting-up airway device and rotate into a Compressor position)
- If LUCAS device is available, Position 1 (or appropriate qualified provider who is NOT the Code Commander) becomes the operator of LUCAS
- Cardiac arrest scenes are dynamic, unpredictable and fluid. Providers may have to adapt this protocol to the circumstances at hand while continuing to focus on the primary concepts.

**Procedure:**

1. First arriving providers:
2. Established prior to arriving at patient's side, the following responsibilities:
  - Position 1 (P1)** - patient's right side
    - assesses responsiveness/pulses
    - initiates chest compressions immediately (performs 2 minutes of UNINTERRUPTED chest compressions)
    - alternates chest compressions with Position 2 every 2 minute cycle
    - ventilates BVM when not performing chest compressions
    - assembles, applies & operates LUCAS
  - Position 2 (P2)** patient's left side
    - applies AED/Defibrillator pads
      - perform entire 2 min of uninterrupted CPR prior to initial defibrillation
    - operates AED after each 2 minute cycle of compressions if no ALS present
    - Compressions during AED charging

\* Boise Fire Dept uses Philips AEDs which do not allow compressions during charging. The analyze, charge and shock cycle is < 10 sec.

- alternates chest compressions with Position 1 every 2 minute cycle
- ventilates BVM when not performing chest compressions

**Position 3 (P3)** patient's head

- assembles/checks and applies all equipment for airway and ventilations within their scope of practice (OPA, BVM, Suction, O2, supra-glottic airway(SGA), airway securing device, ETCO2)
- opens/clears airway
- inserts OPA
- assembles and applies BVM
- maintains two-hand BVM mask seal while position 1 or 2 ventilates
- inserts & secures SGA when ready (and appropriately skilled provider)

**Position 4 (P4)** - if available

- rotates and assists and needed
- may function as team leader
- keeps time and record of interventions and CPR

3. ALS Integration (if not initially present):

Establish prior to arriving at patient's side, the following responsibilities:

- **Code Commander** (Paramedic in control of coordinating resuscitation) communicates/interfaces with providers performing CPR and intervention paramedic.  
May be any paramedic, but must not be at Position 1-4  
Organizes/makes all patient treatment decisions  
Sets up & operates monitor/defibrillator  
Apply 4-lead; switch pads from AED after the 2 min shock/no shock evaluation)
- **Intervention Paramedic** (positioned at feet when possible)  
Initiates IV/IO access (if not already established)  
Administers medications at the direction of the code commander  
May place advanced airway as needed
  - In the event that there is only 1 paramedic on-scene, the Code Commander may need to perform some interventions

If using an ALS monitor, may "pre-charge" to defibrillation energy prior to rhythm/pulse check so that you may analyze manually and shock immediately if VF/VT.

**"Calling 200": Calling "200" on the 200<sup>th</sup> compression and then counting down sets the tone for the next pause, notifies all providers to prepare for next changeover, and improves coordination.**

### Physician Pearls

- Design based on three person crew (more is better but the 3 person core model holds – these positions do not change)
- If initially only TWO responders on scene, priorities are AED and compressions (Positions 1 & 2). After applying AED, Position 2 may assemble BVM and oxygen and perform single person ventilations during the first 200 compressions. Positions 1 & 2 then switch as above with the non-compressing position performing single rescuer ventilations with BVM.
  - Two people put the patient in position for CPR (ensure there is sufficient space around the patient)
  - Compressor/CPR Position 1 (right side of patient) begins CPR (approximate rate of 100 – 120 compressions/minute)
  - Compressor/CPR Position 2 (left side of patient) applies and turns on the AED or monitor and then ventilates when the airway person is ready at 6-10 breaths per minute (once every 10-20 compressions, or 6-10 seconds)
- **Asynchronous ventilations** at 6-10 breaths per minute; **bag through compressions**
  - This may mean “Short” or “upstroke” ventilations due to compression force. This is OK
  - No pauses for ventilations. This is OK.
- Airway position places OPA, BVM mask and ensures the bag is hooked to oxygen (the Airway person is the logical “Team Leader” unless there are four people on scene). This person DOES NOT BAG – Position 1 or 2 does.
  - If paramedic or AEMT is initially present, this is the best role for them as they will perform airway intervention and can see/control the monitor to direct defibrillation as necessary.
  - The *airway position* uses Two Handed C-E or T-E techniques
- At 2 minute rhythm analysis, AED will automatically analyze (no compressions until shock/no shock). Continue compressions while AED is charging\* (\*BFD Philips AED analyzes, charges, and shocks in the same 8 second pause). If ALS crew present, charge defibrillator to appropriate VF/VT initial shock for the device PRIOR TO stopping for rhythm analysis. This allows for continued compressions through the charging and limits time off the chest. The “peri-shock pause” (time without compressions on either side of defibrillation) and specifically the “pre-shock pause” (time without compressions prior to defibrillation) improves outcomes when reduced.
- After shock/no shock P1 or P2 (alternating from prior cycle) **immediately** begins compressions and the other begins ventilations
- Continue as above, switching out personnel when fatigued
- This Pit Crew procedure is based on UNWITNESSED arrest. If arrest is witnessed, positions are the same, but CPR is done only as long as it takes to apply AED and analyze rhythm. Do not delay defibrillation for compressions in a witnessed arrest.
- When ALS Arrives:
  - Check in with the designated Team Leader
  - One Paramedic at the feet: perform IV/IO and meds
  - One Paramedic (“Code Commander”) to apply the defibrillator and direct the resuscitation
  - Neither should interfere with airway management or CPR unless there is a complication or ROSC has been achieved

- ALS will work around the established two minute CPR cycles in order to limit compression interruptions and maximize chest compression fraction.
- **De-emphasize the airway and ventilation.** BVM is adequate for initial resuscitation. SGA may be placed as convenient after other priorities completed (compressions and AED/monitor placement).
  - Airway placement is only done *while compressions are on going* or during planned pulse/rhythm check for less than 10 seconds.
  - **EXCEPTION:** If unable to use BVM or place SGA during resuscitation (CPR), ETT may be attempted without interruption of compressions and should ideally occur after 6 min of resuscitation.
- LUCAS Integration:
  - Back plate can be placed at the 4 minute rhythm check or any 2 minute check thereafter.
  - Chest piece should be placed at the appropriate rhythm check 2 minutes after the back plate is placed.

APPENDIX: 34

TITLE: IV Infusion Pumps

REVISED: NOVEMBER 01, 2011

NEW PROTOCOL

#### I. INDICATIONS:

- Care of a patient requiring specific medication infusions to assure that medication and fluid deliver is at a safe and therapeutic rate.
- Interfacility transport where an IV Infusion pump is already in place.

#### II. CONTRAINDICATIONS:

- Lack of trained and credentialed staff.
- Rapid infusion of IV Fluids exceeding maximum flow rate of infusion pump needed

#### III. CONSIDERATIONS

- The use/monitoring of an “IV Programmable Volume Infusion Device” (AKA IV Infusion pump) in either the prehospital or interfacility setting is considered a paramedic Level of care, and requires a paramedic to be in attendance.
- The use of an IV Infusion pump in the prehospital setting is an “Optional Module” and requires credentialing through the ACCESS system.
- When possible, the paramedic should use the “drug library” or other “smart pump” functions to reduce the chance of medication error.
- When possible, the paramedic should “**cross check**” all medication infusions with another provider, preferably either the sending facility staff or another ALS provider if available, to reduce the chance of medication error.

#### IV. MEDICATIONS:

The use of an IV Infusion pump is intended for medication maintenance infusions, not for loading dose infusions or bolus doses unless specifically indicated. The following infusions are **excluded** from requiring an infusion pump to administer (but may be used at the paramedic’s discretion or physician order):

- Crystalloid Infusions
- Dextrose solutions (i.e. D10, D10NS) without other medications.
- Magnesium Sulfate *loading dose* in the setting for the treatment of eclampsia or refractory bronchospasm.
- Blood Products (still requires a filter)
- Anti-histamine infusions in the setting of allergic and anaphylactic reactions.
- Oxytocin in the setting of post-partum hemorrhage.
- Antibiotic Infusions

Other medication infusions require the use of an IV Infusion pump.

#### IV. PROCEDURES:

- Patient shall be placed and maintained on cardiac and pulse oximetry monitors during transport.
- Follow manufacturers guidelines for the safe use of the infusion pump.

- All infusions should be documented in the EPCR flow chart and the Narrative.
- If a patient suffers undesired effect as a result of an infusion, consider discontinuation of the infusion, treat per ACCESS SWOs, and contact medical control immediately.
- IFT Transport:
  - When a patient already has an IV infusion pump in place, it should be left in place for the transport. If the paramedic is unfamiliar with the particular model of pump, the staff should be incorporated to familiarize the paramedic with the pumps basic operation prior to transport.
  - Note all drips and document any discontinuations/modifications prior to departure.
  - **Verify** all drip rates / doses with sending facility staff (i.e. Nursing staff or physician) before departure.
  - Paramedics may not titrate medications not in the ACCESS formulary without a direct physician medical order.

RX

**Drug Name:** Amiodarone

**Trade Name:** Cordarone, Pacerone

**REVISED:** NOVEMBER 01, 2019

**Class:**

- Class III antidysrhythmic.

**Mechanism of Action:**

- Prolongs duration of the action potential.
- Prolongs effective refractory period.
- Non-competitively inhibits alpha & beta receptors and possesses vagolytic & calcium channel blocking properties.
- Negative dromotrope, chronotrope, & vasodilator.

**Indications:**

- Pulseless ventricular tachycardia (VT) and ventricular fibrillation (VF).
- Ventricular tachycardia (VT) with a pulse.

**Contraindications:**

- Pulmonary Congestion
- Cardiogenic Shock
- Amiodarone Sensitivity
- Bradycardia
- Procainamide use
- TCA Overdose

**Precaution:**

- Hypotension
- Heart failure
- Long QT syndrome

**Dosage:**

**Adults:**

**Pulseless VT/VF:**

- IV/IO : 300 mg IV/IO initial dose, consider repeat dose of 150 mg 3-5 minutes after initial dose.

**Post ROSC:** To be initiated if V-fib/V-Tach resolves after administration of Amiodarone

- **Loading dose:** A loading dose of 150 mg over 10 minutes may also be considered if max 300 mg bolus has not been administered.
- **Maintenance Infusion:** 1 mg/minute titrated for effect.

**Wide Complex Tachycardia (with a pulse):**

- **LOADING DOSE** - IV/IO:150 mg IV infusion over 10 minutes.
  - May repeat **once** as needed. (max dose loading dose of 300 mg).

AMIODARONE

# RX

This document is for **reference only**. Please refer to SWO's for specific indications, dosages, and applications

# AMIODARONE

- Convert to maintenance infusion once complete.
- **MAINTENANCE INFUSION:** IV/IO: 1 mg/min
- **To Mix:** 450 mg/250 cc, infuse via infusion pump.

## Pediatrics:

### Pulseless VT/VF:

- 5 mg/kg IV/IO. May repeat doses up to 15 mg/kg (max dose of 300 mg).

### Wide Complex Tachycardia (with a pulse):

- 5 mg/kg IV/IO over 30 min. May repeat dose up twice (up to 15 mg/kg )
- Max total loading dose of 300 mg.

## Side Effects:

- Hypotension
- Headache
- Dizziness
- Bradycardia
- AV nodal conduction abnormalities
- QT prolongation
- Flushing
- Salivation

## Interactions:

- Potentiates bradycardia and hypotension with calcium channel blockers and beta blockers.
- Increases risk of AV nodal blockade with calcium channel blockers.
- May increase anticoagulation effects of Warfarin.
- May increase serum levels of Phenyton, Procainamide, Quinidine, and Theophyllines.
- Should not be used with other medications which prolong the QT interval.
- Should not run through the same IV line in which Sodium Bicarb or Furosemide have been used.

## Precautions:

- Rapid infusion may lead to hypotension.
- Terminal elimination is extremely long (half-life lasts up to 40 days).

## PEARLS:

- Evidence for one particular antiarrhythmic over another is inconclusive.
- A maintenance infusion is not typically needed

**REFERENCE ONLY**



RX

**Drug Name:** Dopamine Hydrochloride  
**Trade Name:** Dopamine, Intropin  
**REVISED:** DRAFT 1 NOV 2019  
**Class:**

Adrenergic Dopaminergic Catecholamine  
Sympathomimetic

**Mechanism of Action:**

Naturally occurring catecholamine that is the chemical precursor of norepinephrine. Is generally dose dependent on its effects.

1-2 µg/kg/min--dopaminergic receptors--dilation of renal, mesenteric, and cerebral arteries

2-10 µg/kg/min--beta receptors--inotropic, chronotropic

10-20 µg/kg/min--alpha & beta--vasoconstriction of renal, mesenteric, and peripheral arteries and veins

>20 µg/kg/min--Mimics pure alpha effects similar, to norepinephrine like effects. It is occasionally used at this range in-hospital.

**Indications:**

- Cardiogenic Shock
- Cardiogenic Shock w/ Pulmonary Edema (CHF)
- Hypovolemic Shock / Hypotension (after fluid resuscitation)
- Neurogenic Shock
- Septic Shock

**Contraindications:**

Women on oxytocin  
Tachydysrhythmias  
VF/VT  
Uncorrected hypovolemia  
Patients with known pheochromocytoma

**Precautions:**

MAOIs, TCAs, other cardiac stimulants, vasopressors, will cause increased heart rate, and SV dysrhythmias

Will precipitate in basic, alkaline solutions

May cause necrosis, sloughing at infusion site

Pregnancy (C)

**Dosage:**

**Adults:**

2-20 µg/kg/min, occasionally up to 50 µg/kg/min, generally not exceeding 20 µg/kg/min without medical control guidance.

Titrated to effect, run through a large vein.

Generally add two vials 200 mg to 250 ml NS, yielding 1600 µg/ml, although some alternative methods exist

**Pediatrics:**

2-20 µg/kg/min, with 10 µg/kg/min is a reasonable starting dose, titrated to effect, generally not exceeding 20 µg/kg/min.

Add 6 mg x weight in kg diluted to 100 ml, to create drip.

**1gtt/min (ml/hr) equals 1 µg/kg/min.**

**Onset:**

2-4 min.

DRUG: DOPAMINE

# RX

This document is for **reference only**. Please refer to SWO's for specific indications, dosages, and applications

DRUG: DOPAMINE

**Duration:**

10-15 min

**Side Effects:**

Dysrhythmias	Flushing
HTN, Headache	Angina, AMI
Nausea & Vomiting	Pain
Dizziness	Ectopy
Tremors	Bradycardia
Tachycardia, Including ventricular fibrillation, ventricular tachycardia	

**Interactions:**

Potentiating effects--TCAs, MAOIs, bretylium  
Precipitates in Alkaline Solutions  
Dopamine may cause hypotension when used concomitantly with phenytoin (Dilantin)

**PEARLS:**

- **Dopamine infusions should be administered by infusion pump only.**
- **Preferred Concentration:** 400mg/250 ml or 800/500 ml for a 1600 mcg/1 ml concentration.
  - May also be available in 80 mg/250 ml for a 3200 mcg/1 ml concentration. **Confirm concentration prior to administration.**
- **Can cause tissue necrosis and sloughing. Take care to avoid infiltration, use central intravenous access or the large veins of the arm**
- **Titrate dosage to patient's hemodynamic response**

**REFERENCE ONLY**

RX

**Drug Name:** Epinephrine  
**Trade Name:** Adrenalin, Epi

**REVISED:** November 1, 2019

**Class:**

- Adrenergic Catecholamine
- Sympathomimetic

**Mechanism of Action:**

- $\beta_1$ —increases contractility (positive inotrope), AV conduction (positive dromotrope), and automaticity
- $\beta_2$ --bronchodilation, skeletal muscle vasodilation
- $\alpha$ --peripheral vasoconstriction, fight or flight response
- Small doses, beta effects dominate--vasodilation
- Large doses, alpha effects dominate--vasoconstriction, increases systemic vascular resistance and blood pressure

**Indications:**

- Hypersensitivity reactions (anaphylaxis)
- Acute bronchospasm associated with asthma or COPD (refractory to first-line agents)
- Asystole, VF, pulseless VT, PEA
- Croup & epiglottitis

**Contraindications:**

- None in cardiac arrest or severe anaphylaxis
- Hypersensitivity

**Precautions:**

- HTN
- Ischemic heart disease
- Cerebrovascular insufficiency
- Deactivated/precipitates with alkaline solutions (NaHCO<sub>3</sub>)
- Increases myocardial oxygen demand
- Pulmonary edema
- Pregnancy (C)
- Geriatrics
- Protect from light

**Dosage:**

**Adults:**

**Pulseless Rhythms**

- **IV/IO:** 1 mg (1:10,000) every 3-5 minutes

**Anaphylaxis**

- **IM/SQ:** 0.3-0.5 mg (1:1,000), repeat once at 10 minutes if s/s do not improve
- **IV Infusion:** IV/IO: 0.05-1 mcg/kg/min titrate for effect
  - **For refractory Cases**
  - **To Mix:** 1 mg epinephrine in 250 cc NS bag
- **Neb:** *For laryngeal edema only*, 3 mg epinephrine 1:1,000 (3 ml) mixed with 3 ml NS for 6ml solution total

DRUG: EPINEPHRINE

# RX

This document is for **reference only**. Please refer to SWO's for specific indications, dosages, and applications

DRUG: EPINEPHRINE

**Acute bronchospasm** associated with asthma or COPD (refractory to first-line agents)

- **IM/SQ:** 0.3-0.5 mg (1:1,000)

**Persistent/Refractory Hypotension**

- **IV Infusion:** IV/IO: 0.05-1 mcg/kg/min , titrate for effect
  - **For refractory Cases**
  - **To Mix:** 1 mg epinephrine in 250 cc NS bag

**Symptomatic Ca Channel Blocker/Beta Blocker OD** refractory to other interventions

- **IV Infusion:** **IV/IO: 0.05-1 mcg/kg/min** titrate for effect
  - **For refractory Cases**
  - **To Mix:** 1 mg epinephrine in 250 cc NS bag

**Pediatrics:**

**Pulseless Rhythms:**

- **IV/IO:** 0.01 mg/kg (1:10,000) every 3-5 minutes
- **NEONATES:** 0.01-0.03 mg/kg (1:10,000) IV/IO every 3-5 minutes

**Anaphylaxis**

- **IM/SQ:** 0.01 mg/kg (1:1,000), **MAX: 0.3 mg**
- **Neb:** *For laryngeal edema only*, 3 mg epinephrine 1:1,000 (3 ml) mixed with 3 ml NS for 6ml solution total

**Persistent/Refractory Hypotension**

- **IV Infusion:** 0.05-1 mcg/kg/min, titrate for effect
  - **To Mix:** 1 mg epinephrine in 250 cc NS bag

**Croup & Epiglottitis:**

- **Neb:** *For laryngeal edema only*, 3 mg epinephrine 1:1,000 (3 ml) mixed with 3 ml NS for 6ml solution total

**Refractory Bronchospasm (Severe):**

- **IM/SQ:** 0.01 mg/kg (1:1000, 0.1 ml/kg)

**Onset:**

- IV/IO: 1-2 min
- IM/SQ: 5-10 min

**Duration:**

- IV/IM/SQ: 5-10 min

**Side Effects:**

- Anxiety
- Tachycardia
- HTN
- Angina
- Arrhythmias
- V-Fib
- N/V
- Fear
- Headache
- Pallor
- Dizziness
- Tremors

This document is for **reference only**. Please refer to SWO's for specific indications, dosages, and applications

RX

**Interactions:**

- Potentiated by MAOIs and TCAs
- Antagonized by beta blockers
- Precipitates in alkaline solutions

**PEARLS:**

**CAUTION: All patients receiving inhaled beta agonists and/or anticholinergic medications should be observed for a least one hour following treatment for return of symptoms.**

**ALS evaluation is indicated if Epi administered either PTA or by EMS, and transport strongly encouraged. Refusals require medical control contact.**

- **I.M. Epi may be more effective than SQ Epi in shock situations.**
- Sodium bicarbonate or Furosemide will inactivate epinephrine; flush line well between administration.
- Use an IV Infusion pump when administering Epi Infusions.
  - **To Mix:** 1 mg epinephrine in 250 cc NS bag

DRUG: EPINEPHRINE

**RX**

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**DRUG: EPINEPHRINE**

**REFERENCE ONLY**

This document is for **reference only**. Please refer to SWO's for specific indications, dosages, and applications

RX

Drug Name: **Magnesium Sulfate**  
Trade Name: **Mag, Mag Sulfate, MgSO<sub>4</sub>, Mg<sup>++</sup>**  
REVISED: **NOVEMBER 01, 2019**

**Class:**

- Antidysrhythmic
- Anticonvulsant
- CNS Depressant

**Mechanism of Action:**

- Anticonvulsant properties—reduces striated muscle contractions and blocks peripheral neuromuscular transmission by reducing acetylcholine release at the myoneural junction
- Antidysrhythmic properties—Physiological calcium channel blocker. Reduces SA node impulse formation, prolongs conduction time in myocardium

**Indications:**

- **Torsades de Points/polymorphic Ventricular Tachycardia**
- Refractory VF, VT (with or without a pulse) (*if hypomagnesemia is suspected*)
- Refractory ventricular ectopy (*if hypomagnesemia is suspected*)
- TDP (*treatment of choice*)
- Seizure prevention and control in preeclampsia and eclampsia (*treatment of choice*)
- Suspected hypomagnesemia
- Status asthmaticus not responsive to  $\beta$  agonists or anticholinergics.

**Contraindications:**

- Heart block
- MI
- Hypermagnesemia

**Precautions:**

Renal insufficiency

**Dosage:**

**Adults:**

**Refractory VT, VF, TDP:**

- IV/IO: 2 g every 5 minutes, 1<sup>st</sup> line for Torsades or refractory V-Fib/Pulseless V-Tach.
  - Do not give faster than 1 g/minute
  - To Mix: 2 g (4ml), dilute to a total of 20 ml to make 10% solution.

**Preeclampsia:**

- **Loading IV/IO infusion: 4 g over 20 minutes**
  - To Mix: 4 g /250 ml
    - Requires the use of an infusion pump.
    - If seizures occur, proceeded to Eclampsia dose.
  - Do not give faster than 1 g/minute
- **Maintenance IV/IO Infusion: 2 g an hour**
  - To Mix: 4 g/250ml NS,
    - Requires the use of an infusion pump.
  - To be completed *after* loading dose

DRUG: MAGNESIUM SULFATE

# RX

This document is for **reference only**. Please refer to SWO's for specific indications, dosages, and applications

# DRUG: MAGNESIUM SULFATE

## Eclampsia (active seizures) —

- **Loading IV/IO infusion:** 4 g over 5 minutes repeat as needed to max of 8 grams.
  - **To Mix:** 4 g /250 ml
  - **Does not require an IV Infusion pump.** Use 15 gtt set. Run *wide open* at approx. 50 cc/minute.
  - **Do not give faster than 1 g/minute.**
- **Maintenance IV/IO Infusion:** 2 g an hour
  - **To Mix:** 4 g/250ml NS
  - Requires the use of an infusion pump.
  - To be completed *after* loading dose

## Refractory Broncheospasm —

- **IV/IO:** 2 g over 5 minutes
  - **To Mix:** 2 g /250 ml
  - **Does not require an IV Infusion pump.** Use 15 gtt set. Run *wide open* at approx. 50 cc/minute.
  - **Do not give faster than 1 g/minute.**

## Pediatrics:

### Refractory VT, VF, TDP, Severe/Refractory Bronchospasm

- **IV/IO Infusion:** 25-50 mg/kg in 250 ml over 5 minutes
- **To Mix:** 25-50 mg/kg in 250 ml , **MAX 2 GM**
- **Does not require an IV Infusion pump.** Use 15 gtt set. Run *wide open* at equivalent of 3000 ml/hour (approx. 50 cc/minute).
- **Do not give faster than 1 g/minute.**

## Onset:

IV—Immediate  
IM--3-4 hours

## Duration:

IV—30-60 minutes  
IM--3-4 hours

## Side Effects:

Flushing/Sweating  
Itching/Rash  
Hypothermia  
Drowsiness  
Respiratory depression  
Respiratory failure  
Bradycardia/AV block

Cardiac arrest  
Circulatory collapse  
Complete heart block  
Flaccid paralysis  
Absence of knee jerk  
Hypotension, Diaphoresis



# RX

**Interactions:**

- Incompatible--alcohol, salicylates, sodium bicarbonate
- Additive effects can occur with other CNS depressants
- Concurrent use with nifedepine in the treatment of maternal hypertension can cause increased hypotension or pronounced muscle weakness & may harm the fetus
- Can cause cardiac conduction abnormalities when used in conjunction with cardiac glycosides

**PEARLS**

- The 2010 (reaffirmed in 2015) ECC/AHA guidelines conclude that "...IV magnesium sulfate can facilitate termination of torsades de pointes (irregular/polymorphic VT associated with prolonged QT interval). Magnesium sulfate is not likely to be effective in terminating irregular/polymorphic VT in patients with a normal QT interval".
- In some case of *Torsades de Pointes* 5-9 g have been required.
- As a smooth muscle relaxant, it is also a potentially effective 2nd line intervention in cases of severe, refractory bronchospasm secondary to Asthma.
- Use aggressively in the setting of eclampsia. If eclamptic seizures are refractory to Mag Sulfate, then proceed to benzodiazepines if not already administered.

DRUG: MAGNESIUM SULFATE

RX

This document is for **reference only**. Please refer to SWO's for specific indications, dosages, and applications

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DRUG: MAGNESIUM SULFATE

RX

**Drug Name:** Naloxone  
**Trade Name:** Narcan  
**REVISED:** **NOVEMBER 01, 2019**

**Class:** Narcotic Antagonist

**Mechanism of Action:**

Binds competitively to opiate receptor sites, displacing narcotics & synthetic narcotics. Antagonizes all actions of narcotics

**Indications:**

- Complete or partial reversal of depression caused by narcotics or synthetic narcotics
- Coma of unknown etiology

**Contraindications:**

- Known Hypersensitivity

**Precautions:**

- Pre-existing cardiac disease
- Patients who have received cardiotoxic drugs
- Abrupt and complete reversal can cause withdrawal-type effects
- Pregnancy (B)
- Use with caution in polypharmaceutical overdoses

**Dosage:**

**Adults:**

- IV/IO: 0.1-2 mg slowly. Repeat as needed every 1-2 minutes to a maximum of 10 mg.
- IM/IN: 2-4 mg. Repeat as needed to a maximum of 10 mg. If IV access is unavailable.
- If patient has obviously aspirated, consider bypassing Narcan and manage airway as required.
- IV/IO *in cardiac arrest*: 2 mg

**Pediatrics:**

- IV/IO: 0.01 - 0.05 mg/kg to max single dose of 2 mg. Administer slowly. Repeat as needed every 1-2 minutes to a maximum of 10 mg.
- IM/IN: 2-4 mg. Repeat as needed to a maximum of 10 mg. If IV/IO access is unavailable.
- If patient has obviously aspirated, consider bypassing Narcan and manage airway as required.
- IV/IO *in cardiac arrest*: 2 mg

**Naloxone Infusions:** Naloxone Infusions: for recurrent somnolence or sedation

- Re-administer bolus of 0.1-2mg naloxone and initiate infusion
- IV/IO 0.1-10 mg/hour, titrated for effect.
- To mix: 4 mg/250 cc.

**Onset:**

- IV/IO--1-2 minutes
- IN: 1-4 minutes
- IM, SubQ: 2-8 minutes

**Duration:**

- IV, IM, IN, ET, SubQ--30-60 minutes

DRUG: NALOXONE

# RX

This document is for **reference only**. Please refer to SWO's for specific indications, dosages, and applications

DRUG: NALOXONE

## Side Effects:

- Tachycardia
- Hypotension
- HTN
- Dysrhythmias
- N/V
- Diaphoresis

## Interactions:

- Incompatible with alkaline drugs

## PEARLS

**ALS evaluation is indicated if Naloxone administered either PTA or by EMS, and transport strongly encouraged. Refusals require medical control contact.**

- **Many Opiates have a longer bio-availability than Narcan, therefore assess for re-sedation. Re-administer Narcan as needed.**
- Naloxone in cardiac arrest is adjunctive to, not a replacement for other basic interventions. Focus should remain on high quality CPR and resuscitation.
- Failure to obtain reversal after 10 mg usually indicates another disease process or overdose on non-opioid drugs.
- Use with caution in poly-pharmaceutical overdoses, reversal of opiate may result in an extremely hyperdynamic patient (i.e. "speedball")
- The goal of naloxone administration is to reverse respiratory depression and hypoxia while avoiding while avoiding combativeness and agitation. These adverse events can be minimized with airway management, slow administration and small titrated doses of naloxone.
- **If patient has obviously aspirated, consider bypassing Narcan administration and transport the patient. Intubate as required**
- If pushed too rapidly, this medication will induce vomiting
- Intranasal Narcan is an effective alternative that may reduce the chance of a needle stick. It is absorbed far quicker than the IM, SQ, or SL routes
- **Naloxone infusions:** Not every patient will need a naloxone infusion. Naloxone infusions are an option for patients who are re-sedating after initial naloxone administration. Naloxone infusions should be preceded by a supplementary bolus of IV/IO Naloxone, and then initiated at a rate equivalent to the initial dose required to maintain respiratory effort. I.E. if 1 mg was initially required for restoration of respirations, the dose may be initially set at 1 mg/hour to maintain that state.

**REFERENCE ONLY**

This document is for **reference only**. Please refer to SWO's for specific indications, dosages, and applications



**NEW PROTOCOL**

**Drug Name: Norepinephrine**  
**Trade Name: Noradrenalin, Nor-Epi, Levophed**

**REVISED: NOVEMBER 01, 2019**

**Class:**

- Adrenergic Catecholamine
- Sympathomimetic
- Vasopressor

**Mechanism of Action:**

- $\alpha$ --peripheral vasoconstriction,
- Increases systemic vascular resistance and blood pressure

**Indications:**

- Refractory hypotension

**Contraindications:**

- Untreated hypovolemia
- Hypertension
- Suspected mesenteric Ischemia (relative)

**Precautions:**

- Ischemic heart disease
- Cerebrovascular insufficiency
- Pulmonary edema
- Deactivated/precipitates with alkaline solutions (NaHCO<sub>3</sub>)
- Increases myocardial oxygen demand
- Peripheral vascular Disease
- Pregnancy (C)
- Geriatrics
- Protect from light

**Dosage:**

**Adults:**

**IV Infusion**

IV/IO: 0.01- 2 mcg/kg/min

- Start at 0.1 mcg/kg/min.
- Titrated to maintain MAP>65 or SBP >100

**Pediatrics:**

IV/IO: 0.01- 2 mcg/kg/min

- Start at 0.1 mcg/kg/min.
- Titrate to maintain MAP>65 or SBP >100

**Onset:**

- IV/IO: 1-2 min

**Duration:**

- Based on infusion duration

**Side Effects:**

- Anxiety
- Tachycardia
- HTN
- Angina
- Arrhythmias
- V-Fib
- N/V
- Fear
- Headache
- Pallor
- Dizziness
- Tremors

**DRUG: NOREPINEPHRINE**

# RX

This document is for **reference only**. Please refer to SWO's for specific indications, dosages, and applications

DRUG: NOREPINEPHRINE

## Interactions:

- Potentiated by MAOIs and TCAs
- Antagonized by beta blockers
- Precipitates in alkaline solutions such as Sodium Bicarbonate

## PEARLS:

**Caution should be observed to avoid extravasation of norepinephrine during intravenous administration. Check the infusion site frequently for free-flow.**

- **Preferred Concentration/mixture:** 4 mg/250 cc normal saline.
  - May also be available in 8 mg/250 ml.
  - **Confirm concentration prior to administration.**
- **Ensure that aggressive fluid resuscitation is accomplished (unless contraindicated) prior to norepinephrine use.**
- **Nor epinephrine infusions should be administered by infusion pump only.**
- **Nor epinephrine infusions should be established in the largest vein possible for the clinical situation.**
  - **Norepinephrine is preferentially given through a central line but in the field and in emergent situations it can be given peripherally through good IV access.**
  - **Avoid administering nor epinephrine through an IV in the hand, wrist, or leg.** These veins are more likely to be affected by vaso-occlusive diseases and more prone to ischemic complications.
  - Administration through IO in the leg is permitted
- **Nor epinephrine is necrotic to tissue.**
  - Observe and monitor for infiltration. Caution should be observed to avoid extravasation of norepinephrine during intravenous administration.
  - Check the infusion site frequently for free-flow.
  - Blanching along the course of the infused vein, sometimes without obvious extravasation, has been attributed to vasa vasorum constriction with increased permeability of the vein wall, permitting some leakage. **If blanching occurs**, consider changing the infusion site at intervals to allow the effects of local vasoconstriction to subside.
  - An ischemic area may be identified by a cool, hard, and pallid appearance.
- Sodium bicarbonate will inactivate nor-epinephrine; flush line well between administration.
- Concurrent/simultaneous administration of beta agonists may produce increases in heart rate and mild bronchodilation.

This document is for **reference only**. Please refer to SWO's for specific indications, dosages, and applications

**IFT**

REFERENCE ONLY

**Drug Name:** Midazolam  
**Trade Name:** Versed  
**Class:**  
**Revised:** **NOVEMBER 01, 2019**

- Benzodiazepine (non barbiturate sedative-hypnotic agent)
- Schedule IV Controlled Substance

**Mechanism of Action:**

- Acts at the level of the limbic, thalamic, and hypothalamic regions of the CNS through potentiation of GABA (inhibitory neurotransmitter).
- Decreases neural cell activity in all regions of CNS
- Anxiety is decreased by inhibiting cortical and limbic arousal
- Promotes relaxation through inhibition of spinal motor reflex pathway, also depresses muscle & motor nerve function directly
- As an anticonvulsant, augments presynaptic inhibitions of neurons, limiting the spread of electrical activity. However, it does not alter the electrical activity of the seizure's focus.

**Indications:**

- Continuous infusions for control of status epilepticus
- Sedation during mechanical ventilation

**Contraindications:**

Shock  
Coma  
Hypersensitivity

Pregnancy (D)  
Closed Angle Glaucoma

**Precautions:**

- Patients with respiratory insufficiency (asthma, COPD, etc.) are more susceptible to respiratory depression.
- Effects are enhanced by other CNS depressants.
- Elderly

**Use caution when administering to patients with:**

- Hepatic dysfunction
- Renal insufficiency
- History of drug addiction
- Parkinson's Disease
- Myasthenia gravis

**Dosage:**

**Doses are highly variable and based on institutional guidelines and patient laboratory values. Double check orders with transferring physician.**

**Loading Dose:**

- **IV/IO: 2-10 mg over 5-10 minutes PRN,**

**Infusion:**

- **IV/IO: 1-20 mg/hr**
- **Titrate in 0.5-1 mg/hr increments or as ordered**

**Onset:**

- IV: 1-3 minutes (dose dependent)

**Duration:**

- IV: 2-6 hours after infusion complete(dose dependent)

**REFERENCE ONLY**

**IFT DRUG: MIDAZOLAM INFUSIONS**

This document is for **reference only**. Please refer to SWO's for specific indications, dosages, and applications

### Side Effects:

#### Minor:

- N/V
- Headache
- Drowsiness
- Lethargy
- Cough
- Hiccups

#### Major:

- Respiratory Depression
- Apnea
- Paradoxical CNS stimulation (i.e. Valium Rage)
- Hypotension
- Cardiac Arrest

### Interactions:

- Additive with other CNS depressants
- *Macrolides* (e.g. erythromycin, clarithromycin): Inhibit metabolism of Midazolam. Can cause excess sedation to occur
- *Antifungals* (e.g. Itraconazole, ketoconazole): Inhibit metabolism of Midazolam. Can cause excess sedation to occur
- *Phenytoin*: midazolam may make levels unpredictable (decrease or increase phenytoin levels)
- *Baclofen*: midazolam is also a muscle relaxant and can cause excessive muscle relaxation with Baclofen

### PEARLS:

**Close monitoring of SPO<sub>2</sub>, ETCO<sub>2</sub> and respiratory status is required.**

**Midazolam provides no pain relief. Agitation may be due to pain and the intubated patient should be assessed for need of pain medication/analgesia.**

**Midazolam infusions are provided multiple different concentrations and volumes. Double check all infusions to prevent a medication error.**

- *Typically supplied in a 100 mg/250 ML D5W or NS concentration.*
- *Has more potential than other benzodiazepines to cause respiratory depression and arrest. Use with extreme caution in peds. Slower administration may reduce this.*
- *Midazolam has twice the affinity for benzodiazepine receptors than does diazepam and has more potent amnesic effects*
- *It is short acting and roughly 3-4 times more powerful than diazepam*
- *Elderly, debilitated, or patients under the influence of other CNS depressants require reduced dosages*