Chippewa Valley Regional

EMS PROTOCOLS

Serving affiliated EMS and Fire Departments in Western Wisconsin

This book is dedicated to Dr. James Fenno, the originator of the Chippewa Valley Regional EMS system, and who was instrumental in creating an environment of cutting edge prehospital medicine. In spirit of carrying on his vision, continued development of these protocols is headed by Dr. Stephanie Wagner, with assistance and input from regional EMS agency partners and Sacred Heart Hospital, with significant input and work by Jon Schultz, Division Chief of EMS, Eau Claire Fire and Rescue.

Notice:

The following protocols are intended to be electively adopted by Chippewa Valley regional EMS agencies who receive education, training and/or off-line medical control from common medical direction affiliated with and cooperatively facilitated by Sacred Heart Hospital, Eau Claire, WI.

EMS responders operating under these protocols with agency approval may provide medical care only to their specific scope of practice, training and license levels.

This full set of protocols is provided to all participating EMS agencies and provider levels with the intent that lower level EMS responders may know what care and interventions might be possible by obtaining intercepts from a higher level service.

The attached Tactical (TEMS) Supplemental Protocols may only be used by approved tactical EMS personnel who have received approval of their respective agency, the sponsoring law enforcement agency as well as the medical director.

The attached Critical Care Supplemental Protocols may only be used by approved Critical Care Paramedics who have received certification by an approved critical care program as well as the medical director.

EMS protocols are guidelines intended to provide appropriate care to the vast majority of the ill and injured patients treated by EMS. There may be times when protocol deviation may be in the patient's best interest. EMS personnel should make a concerted effort, if safe and feasible, to discuss the case with on-line medical control prior to deviating from these established and approved protocols. Any deviation, however slight, MUST be well documented in the patient care report explaining what was done and why the deviation was felt to be appropriate.

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INITIAL PATIENT CARE

The following **INITIAL PATIENT CARE** should be viewed as an outline for all patients receiving care by affiliated partners under these regional protocols.

SCENE SIZE UP:

Determine if the scene is safe

Determine Mechanism of Injury (MOI)

Use appropriate Body Substance Isolation precautions

Determine the number of patients

Determine the need for and request additional resources

INITIAL ASSESSMENT:

General impression of patient

Assess mental status (Alert, Verbal, Painful, Unresponsive)

Assess **AIRWAY**: Maintain C-Spine stabilization as needed
- Open airway with jaw thrust and ventilate as needed

Assess **BREATHING**: (rate and quality)
- Provide **O2** and appropriate airway adjunct as needed

Assess **CIRCULATION**:
- Pulse (peripheral pulses present, rate and quality)
- Control any major bleeding
- Skin color and temperature

PHYSICAL EXAM and HISTORY:

Medical PT:
- **O, P, Q, R, S, T**
- Appropriate physical exam
- Non-responsive, perform Rapid Trauma Assessment

INITIAL PATIENT CARE (continued)

RAPID TRAUMA ASSESSMENT: assess for DCAP/BTLS

- Rapid Trauma exam - (Significant MOI)
- Focused physical exam - (No significant MOI)

S, A, M, P, L, E

Baseline Vital Signs:

- Blood pressure
- Pulse
- Respiration
- O_2 Saturation
- Lung Sounds
- Blood Glucose check (Any altered LOC or known diabetic)

- Detailed physical exam

TRANSPORT: (refer to transport policy)

- Repeat vital signs every 5-10 minutes

CARDIAC PROTOCOLS

INITIAL CARDIAC CARE

The following **INITIAL CARDIAC CARE** should be viewed as an outline for all potential cardiac patients receiving care by affiliated partners under these regional protocols.

Symptoms:

- Typical: chest pain or pressure, particularly if radiation to neck/jaw/arm
- Atypical: chest heaviness, dyspnea, diaphoresis/sweating, syncope, generalized weakness, "sense of impending doom", epigastric/upper abdominal pain, nausea/vomiting, lightheaded/dizzy, palpitations
    - Atypical symptoms more likely to be seen in patients who are elderly, female, AND/OR diabetic

EMERGENCY MEDICAL RESPONDER

- **Initial Patient Care**
- Provide oxygen if pulse ox <94%
- Be calm and reassuring
- Treat for shock as needed
- Place in position of comfort

EMERGENCY MEDICAL TECHNICIAN

- Apply cardiac monitor

Perform 12-lead EKG on patients with any of the following and transmit to the receiving facility:

- typical or atypical symptoms listed above
- hypotension or signs of poor perfusion
- HR<60, HR>100, or irregular heart beat

Aspirin: **324 mg** PO (unless already taken)
Aspirin contraindications: *Known allergy or Active GI bleeding*

AEMT Intermediate Paramedic

IV NS at TKO

SUSPECTED ACUTE CORONARY SYNDROME
(Chest Pain)

Emergency Medical Responder

- **Initial Cardiac Care**
- Be calm and reassuring
- Treat for shock as needed
- Place in position of comfort

Emergency Medical Technician

- Acquire 12 lead ECG and transmit to the receiving facility
  - If a **STEMI (S-T Elevation MI)** is suspected on ECG proceed with the Rapid STEMI Protocol
  - **Aspirin: 324 mg** PO (unless already taken)

Per MCPO:

Due to possible **Inferior MI** (lead changes in II, III, and aVF), consult with Medical Control prior to beginning Nitroglycerin therapy

- **Nitroglycerin: 0.4 mg** SL (Assist patient with his/her own medication)
  - May repeat (x2) every 3-5 minutes
  - Maintain BP >100 Systolic

Rapid STEMI protocol:

- Call for Paramedic Intercept
- Patient should preferentially be transported to a primary PCI hospital.
- Contact medical control at the receiving hospital as soon as reasonably possible to verify the patient qualifies for Rapid STEMI Protocol. This will allow time for coordination of Cath Lab services or to coordinate transport to a PCI hospital
- Contact Hospital Registration to pre-register the patient as appropriate. When you arrive in the ED, stop for an assessment by the Emergency Physician. Proceed to either Cath Lab or an E.D. room as directed by the physician and E.D. staff.
- Perform Remote Ischemic Conditioning if time allows (see Procedure)

SUSPECTED ACUTE CORONARY SYNDROME

(Chest Pain)

Aspirin contraindications:

- *Known allergy*
- *Active GI bleeding*

Nitroglycerin contraindications:

- *Systolic BP < 100*
- *Use of Phosphodiesterase type 5 (PDE5) inhibitors in last 24 hours: Sildenafil (Viagra), Vardenafil (Levitra), Tadalafil (Cialis)*

Advanced EMT

Per MCPO:

Due to possible **Inferior MI** (lead changes in II, III, and aVF), consult with Medical Control prior to beginning Nitroglycerin therapy

- **Nitroglycerin: 0.4 mg** SL
  - May repeat (x2) every 3-5 minutes
  - Maintain BP >100 Systolic

Rapid STEMI Protocol:

- Draw blood as appropriate (With prior state EMS office approval)
- IV Access: minimum 1 peripheral IV
  - (2) peripheral IV (or) twin port saline lock if available, minimum 18g or larger **preferred.**

Intermediate

Draw blood as appropriate

Nitroglycerin: 0.4 mg SL

- May repeat (x2) every 3-5 minutes
- Maintain BP >100 Systolic

Fentanyl: 1 mcg/kg IV for persistent pain not relieved by Nitro

- May repeat every 5 minutes as needed
- Maintain BP >100 Systolic

Paramedic

Nitroglycerin Infusion: 10 mcg / minute may be instituted for persistent pain

- Titrate upwards **10 mcg** every 5 minutes until pain free
- See drip chart: Appendix A
- Maintain BP >100 Systolic

BRADYCARDIA - SYMPTOMATIC

(Altered LOC, Chest pain, Hypotension)

EMR	EMT

Initial Cardiac Care

Observe and determine if patient is symptomatic

- SBP<80 or MAP<65 AND HR<60 beats/min
- Signs of shock or poor perfusion (ALOC, syncope, pallor, diaphoresis, fatigue, absent radial pulses)
- Signs of pulmonary edema (labored breathing, wet lung sounds, SpO2<90%)
- Pt complains of angina

Advanced EMT

NS bolus as needed, see ***Shock Protocol***

Intermediate

Atropine: 0.5 mg IV (May give Atropine while preparing the pacer – see below)

- May repeat every 3-5 minutes
- **Max: 3 mg**

Consider **TRANSCUTANEOUS PACING:** (unstable)

- **Rate – 70, Milliamps - 70**
- Titrate up by **20 milliamps** at a time every 3-5 sec until capture

Paramedic

Consider sedation for pacing:

- **Ketamine 1 mg/kg** IV/IO
- Alternative: **Midazolam (Versed): 2.5 – 5 mg** IV

If pacing and atropine are ineffective, consider:

Per Medical Control:

- **Epinephrine Infusion: 2 – 10 mcg / min**
  - See drip chart: Appendix A

PULSELESS ARREST – *Adult*

For purposes of this protocol, ALS is defined as an ACLS capable EMS unit.

Determine cause of the cardiac arrest. **Cardiac Arrest due to hypoxia, choking, overdose, or trauma etc. should follow standard BLS / ACLS guidelines.** Cardiac arrest deemed to be cardiac (arrhythmia, MI) in origin should follow the CCR protocol.

Successful resuscitation requires leadership, clear role definition and planning

- Chest compressions are performed in two minute cycles (200 compressions). Do not interrupt chest compressions for any reason.
- Cardiac rhythms are analyzed briefly after each set of 200 chest compressions and treated as “shockable” or “non-shockable”
- Pulse checks are only performed during rhythm analysis. The location of the carotid pulse must be ascertained during compressions to confirm adequate chest compressions and to limit “trying to find it” during rhythm analysis.
- If crew safety is compromised or there is inadequate space to perform high quality chest compressions and effective resuscitation efforts (bathroom, hallway etc.), move the patient **before** starting resuscitation.
- Do not move the patient once resuscitation measures have been started as this will decrease the effective quality of the chest compressions

Emergency Medical Responder

Within 10 seconds establish unresponsiveness, no breathing or no normal breathing (gasping), and pulselessness at the carotid artery

Check for a DNR bracelet or indications to withhold CPR

Begin high quality continuous chest compressions (CC)

- Compression Rate: **100-120/min**
- Compression Depth: **At least 2 inches**
- Allow complete chest recoil between compressions
- Use a metronome if available to maintain a compression rate of 100/min for a total of 200 CC (2 minutes)
- Switch compressors at least every 200 CC (2 minutes)

Immediately call for an ALS Intercept

Assess blood glucose level and treat per hypoglycemia protocol as needed

PULSELESS ARREST – *Adult*

EMR – continued

Insert an OPA and begin ventilating the patient at a compression to ventilation ratio of **30:2**

AED not available

- If an AED is not available, pause briefly (5 seconds or less) at the end of each 2 minute cycle (200 CC) to perform a pulse check. If a carotid pulse is present, check breathing and assist ventilations every 6 seconds PRN
- Repeat this sequence every two minutes until an AED or ALS is available

AED available

- If bystander CPR is absent or inadequate, complete **200** high quality chest compressions (2 minutes) **BEFORE** attaching the AED. Attach the AED during the last 10 seconds of the 200 CC
- Turn on the AED, follow the voice prompts, and attach the device to the patient. (Do **NOT** interrupt chest compressions while attaching the AED)
- Preferred placement of AED pads is right upper chest and left lower chest wall (Low axillary).
- When prompted, stop chest compressions only long enough for the device to analyze and shock the patient.
    - **"SHOCK ADVISED":** Immediately deliver a shock and resume 200 CC (2 minutes)
    - **"NO SHOCK ADVISED":** Immediately resume 200 CC (2 minutes)
- The AED will keep time of the incident and automatically analyze the patient every two minutes.
- All contact with patient must be avoided during analysis of rhythm and/or delivery of shock(s).
- If the AED cannot analyze the rhythm properly when the vehicle is in motion, stop the vehicle.
- If the AED advises "analyze" after the patient has previously regained signs of circulation, immediately restart the above sequence of analysis, shock, and compressions.

PULSELESS ARREST – *Adult*

EMR – continued

Airway

- Insert a non-visualized airway (NVA) and begin actively ventilating the patient at a rate of 10 breaths per minute (Once every 6 seconds). Deliver each ventilation over one second.

- All attempts at airway management should be done without interrupting chest compressions.

Emergency Medical Technician

Airway

- If an NVA is present, confirm placement and continue ventilations. If not present, insert an NVA, confirm placement and begin ventilating the patient at 10 breaths per minute (Once every 6 seconds). Deliver each ventilation over one second.

- Monitor End Tidal CO_2

- All attempts at airway management should be done without interrupting chest compressions if possible.

Moving the Patient (Refer to *Pulseless Arrest Transport Algorithm*)

- Continue resuscitation efforts on scene until one of the following occurs:

    - If an ALS unit is en route, continue resuscitation efforts on scene until ALS arrival.

    - If a chest compression assist device is available and an ALS unit is NOT en – route or proximity to the hospital is closer than the inbound ALS unit, continue resuscitation efforts on scene until the 5th rhythm analysis then coordinate movement towards the ambulance and ultimately transport.

- If no device is available, and an ALS unit is not en – route or proximity to the hospital is closer than the inbound ALS unit, continue resuscitation efforts on scene until the 10^{th} rhythm analysis, then initiate transport.

- Keeping in mind that any decrease in the quality of chest compressions may be detrimental to patient survival, circumstances may arise, such as prompt arrival of an ALS unit or a continuing shockable rhythm, when the team feels delaying transport would ultimately benefit the patient, These circumstance must be documented on the patient care record

PULSELESS ARREST – *Adult*

ROSC

- Upon successful return of a palpable pulse, refer to ***ROSC – INDUCED HYPOTHERMIA*** **protocol**

Advanced EMT

IV/IO Access

- Consider IV placement if there is a high probability of success on the first or second attempt within 2 minutes. Consider IO placement if it is felt an IV will be delayed

Intermediate

Defibrillation

- Turn the defibrillator on when chest compressions are started and attach to the patient
- Set the energy level to 150J or manufacturers recommendation
- Charge the defibrillator during the last 10 seconds of 200 CC
- Pause briefly at the end of 200 CC to analyze the rhythm
- If indicated, deliver a shock
- If a shock is not indicated, dump the charge by reducing the energy and reset the energy. Do not charge the defibrillator until the end of the next cycle
- Immediately resume 200 CC (2 minutes) after the analysis / shock
- Limit the time of analysis / shock to under 5 seconds

Airway

- If an NVA is present, confirm placement and continue ventilations.

- If an NVA is not present, make 2 attempts to place an endotracheal tube, confirm placement with $ETCO_2$ and two other means.

    - Begin actively ventilating the patient at a rate of 10 breaths per minute (Once every 6 seconds). Deliver each ventilation over one second.
    - Monitor End Tidal CO_2, maintain at 30-45 mm Hg
    - If unable to place an ETT on the second attempt, insert an NVA and confirm placement.

- All attempts at airway management should be done without interrupting chest compressions.

PULSELESS ARREST – *Adult*

Intermediate – *continued*

Medication Administration

- Medications should be given immediately following analysis / shock. Do not delay chest compressions to administer a medication.

- Alternate shock / medication / shock / medication

- **First medication given for all rhythms:**
  - **Epinephrine (0.1mg/mL): 1 mg** IV/IO q 4 minutes

- For persistent or recurrent V-Fib / Pulseless V-Tach:
  - **Amiodarone: 300 mg** IV/IO
    - May repeat **150 mg** IV/IO in 4 minutes (**1X only**)

    –or--
  - **Lidocaine 1 – 1.5mg/kg** IV/IO push
    - May repeat 0.5-0.75mg/kg (half initial dose) every 4 min x 2
    - Max total dose is 3mg/kg

- For **wide** complex PEA administer**:**
  1) Calcium chloride: 2grams IV/IO over 1-2 min
  2) Administer NS flush if only 1 IV in place
  3) Sodium bicarbonate: 100 meq IV/IO

- For **narrow** complex PEA administer:
  - **NS bolus: 1L**
  - **Bilateral needle decompression/thoracostomy**
  - **Verify that bagging/ventilator is not causing hyperinflation**

- **Repeat the Sequence:** Analysis / Defibrillation / 200 uninterrupted chest compressions with medication administration (2 minutes)

Moving the Patient

- If the rhythm is identified as **"shockable"** , continue resuscitation efforts on scene until the **10th rhythm analysis** after ACLS is initiated, then initiate transport.

  - Keeping in mind that any decrease in the quality of chest compressions may be detrimental to patient survival, circumstances may arise that the team leader feels **NOT** initiating transport after the 10th analysis would ultimately benefit the patient. These circumstances must be documented on the patient care record

PULSELESS ARREST – *Adult*

Intermediate – *continued*

Moving the Patient (continued)

- If a chest compression assist device is available, continue resuscitation efforts on scene until the 5th rhythm analysis after ACLS is initiated, then coordinate movement towards the ambulance and transport.

- If the rhythm is identified as **"PEA"** , continue resuscitation efforts on scene until the **10th rhythm analysis** after ACLS is initiated, including completion of all appropriate wide or narrow PEA interventions, then contact MCP for further order. MCP may authorize field termination or request transport.

- If the rhythm is identified as **Asystole** after the **5th rhythm analysis** after ACLS is initiated, contact a Medical Control Physician to discuss field termination. Discuss this with the family members to ensure they are agreeable to this. If necessary, the Medical Control Physician may also speak with the family.

Paramedic

Antiarrhythmic: If the initial or any subsequent rhythm was V-Fib / V-Tach and the patient achieves a successful return of circulation, administer **one of the following**

- **Amiodarone: 150mg over 10 min** (if Amiodarone not already given)
  - **Start an infusion after bolus complete:**
  - **Amiodarone Infusion**: Mix **450mg in 250 mL D_5W** and run at **1 mg/min (33 mL/hr)**

--OR—

- **Lidocaine: 1 – 1.5mg/kg** (if Lidocaine not already given)
  - Start an infusion after bolus complete:
  - Lidocaine infusion: Mix 2g in 250mL NS) and run at **1-4mg/min (7.5 to 30mL/hr)**

Magnesium Sulfate (for **Torsades De Pointes** or persistent or recurrent V-Fib / Pulseless V-Tach)**.**

- **2g** slow IV / IO
- May repeat dose in 10 minutes for continued **Torsades (1x only)**

If patient is taking a calcium blocking agent such as verapamil, nifedipine, or diltiazem (Cardizem)

- Administer Calcium chloride 4mg/kg (max 4g)
  - May repeat x 1
- Also consider glucagon 1mg IV/IO

PULSELESS ARREST: *Continuous Cardiac Resuscitation*

For purposes of this protocol, ALS is defined as an ACLS capable EMS unit.

Determine the cause of the cardiac arrest. **Cardiac arrest in adults deemed to be cardiac in origin should follow the CCR protocol.** Cardiac Arrest due to hypoxia, choking, overdose, trauma or pediatric arrest should follow standard BLS / ACLS / PALS guidelines.

Successful resuscitation requires leadership, clear role definition and planning

- Chest compressions are performed in two minute cycles (200 compressions) before NVA or ETT placement. Do not interrupt chest compressions for any reason.
- Cardiac rhythms are analyzed briefly after each set of 200 chest compressions and treated as “shockable” or “non-shockable”.
- Pulse checks are only performed during rhythm analysis. The location of the carotid pulse must be ascertained during compressions to confirm adequate chest compressions and to limit “trying to find it” during rhythm analysis.
- If crew safety is compromised or there is inadequate space to perform high quality chest compressions and effective resuscitation efforts (bathroom, hallway etc.), move the patient before starting resuscitation.
- Do not move the patient once resuscitation measures have been started as this will decrease the effective quality of the chest compressions

Emergency Medical Responder

Within 10 seconds establish unresponsiveness, no breathing or no normal breathing (gasping), and pulselessness at the carotid artery

Check for a DNR bracelet or indications to withhold CPR

Begin high quality continuous chest compressions (CC)

- Compression Rate: **100-120/min**
- Compression Depth: **At least 2 inches or age appropriate**
- Allow complete chest recoil between compressions
- Use a metronome if available to maintain a compression rate of 100/min for a total of 200 CC (2 minutes)
- Switch compressors at least every 200 CC (2 minutes)

Immediately call for an ALS intercept

Assess blood glucose level and treat per hypoglycemia protocol as needed

PULSELESS ARREST: *Continuous Cardiac Resuscitation*

EMR – *continued*

Insert an OPA and apply a NRB at 15 lpm without interrupting chest compressions.

AED not available

- Pause briefly (5 seconds or less) at the end of each 2 minute cycle (200 CC) to perform a pulse check. If a carotid pulse is present, **c**heck breathing and assist ventilations every 6 seconds PRN
    - Repeat this sequence every two minutes until an AED or ALS is available

AED available

- If bystander CPR is absent or inadequate, complete **200** high quality chest compressions (2 minutes) **BEFORE** attaching the AED. (Attach the AED during the last 10 seconds of the 200 CC.)
- Turn on the AED, follow the voice prompts, and attach the device to the patient. (Do **NOT** interrupt chest compressions while attaching the AED)
- Preferred placement of AED pads is right upper chest and left lower chest wall (Low axillary).
- When prompted, stop chest compressions only long enough for the device to analyze and shock the patient:
    - **"SHOCK ADVISED":** Deliver a shock and immediately resume 200 CC (2 minutes)
    - **"NO SHOCK ADVISED":** Immediately resume 200 CC (2 minutes)
- The AED will keep time of the incident and automatically analyze the patient every two minutes.
- All contact with patient must be avoided during analysis of rhythm and/or delivery of shock(s).
- If the AED cannot analyze the rhythm properly when the vehicle is in motion, stop the vehicle.
- If the AED advises "analyze" after the patient has previously regained signs of circulation, immediately restart the above sequence of analysis, shock, and compressions.

PULSELESS ARREST: *Continuous Cardiac Resuscitation*

EMR – *continued*

Airway

- Insert a non-visualized airway (NVA) and confirm placement with positive pressure ventilation. Once the NVA has been placed and secured, allow passive ventilation with chest compressions.
- All attempts at airway management should be done without interrupting chest compressions if possible.
- After a total of 3 cycles of chest compressions and rhythm analysis, begin actively ventilating the patient at a rate of 6 breaths per minute (Once every 10 seconds). Deliver each ventilation over one second.

Emergency Medical Technician

Airway

- If an NVA is present, confirm placement and allow passive ventilation with chest compressions. If not present, insert an NVA and confirm placement with positive pressure ventilation. Secure the NVA and allow passive ventilation with chest compressions.
- After a total of 3 cycles of chest compressions and rhythm analysis, begin actively ventilating the patient at a rate of 6 breaths per minute (Once every 10 seconds). Deliver each ventilation over one second.
- Monitor End Tidal CO_2
- All attempts at airway management should be done without interrupting chest compressions if possible.

Moving the Patient **(Refer to *Pulseless Arrest Transport Algorithm*)**

- Continue resuscitation efforts on scene until one of the following occurs:
    - If an ALS unit is en – route, continue resuscitation efforts on scene until ALS arrival.
    - If a chest compression assist device is available and an ALS unit is NOT en – route or proximity to the hospital is closer than the inbound ALS unit, continue resuscitation efforts on scene until the 5th rhythm analysis then coordinate movement towards the ambulance and ultimately transport.

PULSELESS ARREST: *Continuous Cardiac Resuscitation*

Emergency Medical Technician – *continued*

Moving the Patient – *continued*:

- If no device is available, and an ALS unit is NOT en – route or proximity to the hospital is closer than the inbound ALS unit, continue resuscitation efforts on scene until the 10th rhythm analysis then initiate transport.

- Keeping in mind that any decrease in the quality of chest compressions may be detrimental to patient survival, circumstances may arise, such as prompt arrival of an ALS unit or a continuing shockable rhythm, when the team feels delaying transport would ultimately benefit the patient. These circumstances must be documented on the patient care record

ROSC

- Upon successful return of a palpable pulse, refer to ***ROSC – INDUCED HYPOTHERMIA*** **protocol**

Advanced EMT

IV/IO Access

- Consider IV placement if there is a high probability of success on the first or second attempt within 2 minutes. Consider IO placement if it is felt an IV will be delayed

Intermediate

Defibrillation

- Turn the defibrillator on when chest compressions are started and attach to the patient
- Set the energy level to 150J or manufacturers recommendation
- Charge the defibrillator during the last 10 seconds of 200 CC
- Pause briefly at the end of 200 CC to analyze the rhythm
- If indicated, deliver a shock
- If a shock is not indicated, dump the charge by reducing the energy and reset the energy level. Do not charge the defibrillator until the end of the next cycle
- Immediately resume 200 CC (2 minutes) after the analysis / shock
- Limit the time of analysis / shock to under 5 seconds

PULSELESS ARREST: *Continuous Cardiac Resuscitation*

Intermediate – *continued*

Airway

- If an NVA is present, confirm the placement and allow passive ventilation with chest compressions.
- If an NVA is not present, make 2 attempts to place an endotracheal tube, confirm placement with $ETCO_2$ and two other means. If unable to place an ETT on the second attempt, insert an NVA and confirm placement.
- If the initial rhythm was shockable, consider using an NVA over an ETT to limit less than optimal CC
- Allow passive ventilation with chest compressions
- After 3 cycles of chest compressions and rhythm analysis begin actively ventilating the patient at a rate of 6 breaths per minute (Once every 10 seconds). Deliver each ventilation over one second.
    - Monitor End Tidal CO_2, maintain at 30-45 mm Hg
- All attempts at airway management should be done without interrupting chest compressions.

Medication Administration

- Medications should be given immediately following analysis / shock. Do not delay chest compressions to administer a medication.
- Alternate shock / medication / shock / medication
- **First medication given for all rhythms:**
    - **Epinephrine (0.1mg/mL): 1 mg** IV/IO q 4 minutes
- For persistent or recurrent V-Fib / Pulseless V-Tach:
    - **Amiodarone: 300 mg** IV/IO
        - May repeat **150 mg** IV/IO in 4 minutes (**1X only**)

    –or--
    - **Lidocaine 1 – 1.5mg/kg** IV/IO push
        - May repeat 0.5-0.75mg/kg (half initial dose) every 4 min x 2
        - Max total dose is 3mg/kg

PULSELESS ARREST: *Continuous Cardiac Resuscitation*

Intermediate – *continued*

Medication Administration (continued)

- For **wide** complex PEA administer**:**
  1) **Calcium chloride: 2grams IV/IO over 1-2 min**
  2) **Administer NS flush if only 1 IV in place**
  3) **Sodium bicarbonate: 100 meq IV/IO**

- For **narrow** complex PEA administer:
  - **NS bolus: 1L**
  - **Bilateral needle decompression/thoracostomy**
  - **Verify that bagging/ventilator is not causing hyperinflation**

- **Repeat the Sequence:** Analysis / Defibrillation / 200 uninterrupted chest compressions with medication administration (2 minutes)

Moving the patient

- If the rhythm is identified as **"shockable"**, continue resuscitation efforts on scene until the **10th rhythm analysis** after ACLS is initiated and then initiate transport.

  - Keeping in mind that any decrease in the quality of chest compressions may be detrimental to patient survival, circumstances may arise that the team leader feels **NOT** initiating transport after the 10th analysis would ultimately benefit the patient. These circumstances must be documented on the patient care record

  - If a chest compression assist device is available, continue resuscitation efforts on scene until the 5th rhythm analysis after ACLS is initiated, then coordinate movement towards the ambulance and transport.

- If the rhythm is identified as **"PEA"**, continue resuscitation efforts on scene until the **10th rhythm analysis** after ACLS is initiated, including completion of all appropriate wide or narrow PEA interventions, then contact MCP for further order. MCP may authorize field termination or request transport.

- If the rhythm is identified as **Asystole** after the **5th rhythm analysis** after ACLS is initiated, contact a Medical Control Physician to discuss field termination. Discuss this with the family members to ensure they are agreeable to this. If necessary, the Medical Control Physician may also speak with the family.

PULSELESS ARREST: *Continuous Cardiac Resuscitation*

Paramedic

Antiarrhythmic: If the initial or any subsequent rhythm was V-Fib / V-Tach and the patient achieves a successful return of circulation, administer **one of the following**

- **Amiodarone: 150mg over 10 min (if Amiodarone not already given)**
  - **Start an infusion after bolus complete:**
  - **Amiodarone Infusion**: Mix **450mg in 250 mL D_5W** and run at **1 mg/min (33 mL/hr)**

--OR—

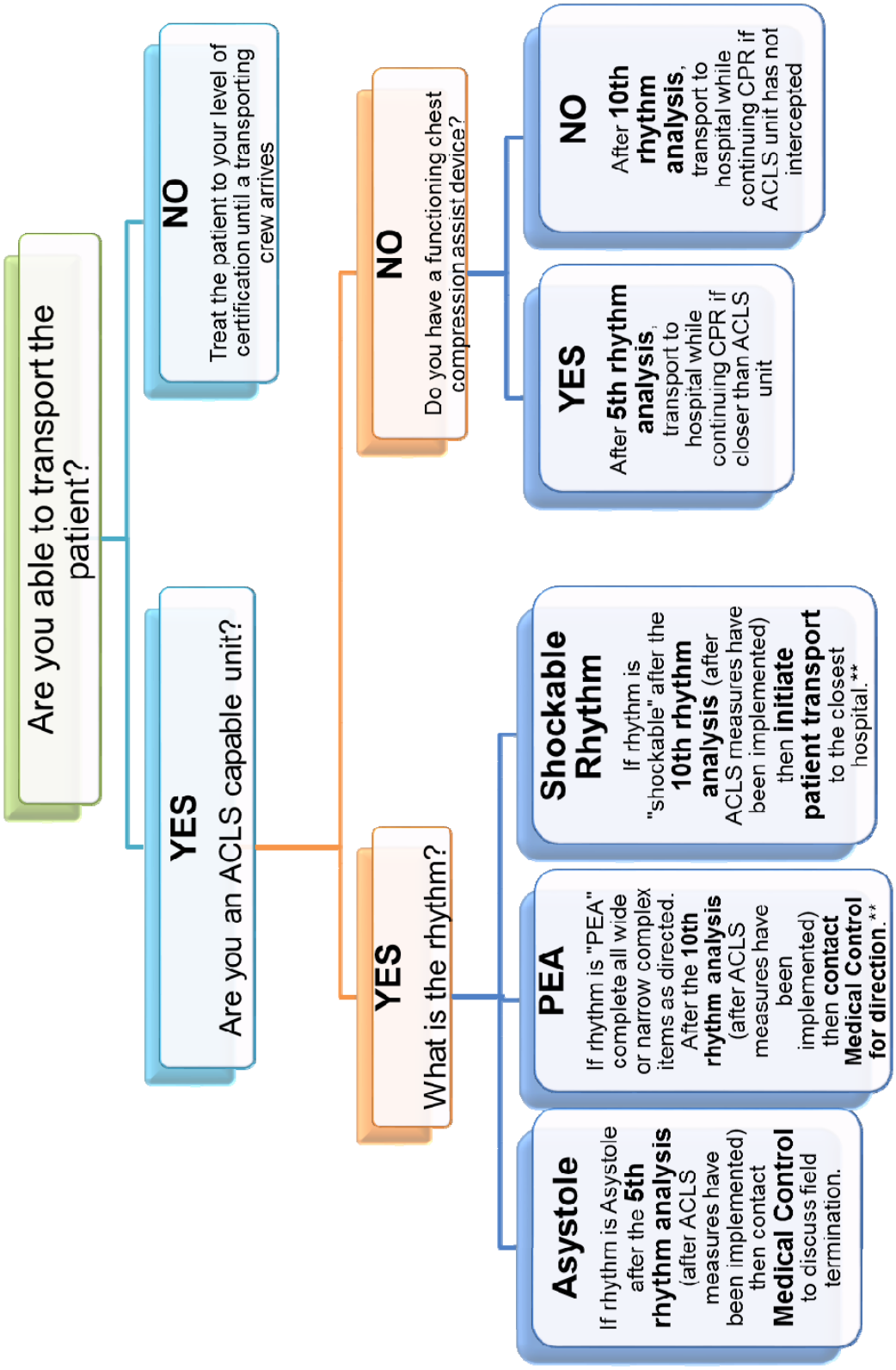
- **Lidocaine: 1 – 1.5mg/kg** (if Lidocaine not already given)
  - Start an infusion after bolus complete:
  - **Lidocaine infusion**: Mix 2g in 250mL NS and run at 1-4mg/min (7.5 to 15mL/hr)

- **Magnesium Sulfate (**for **Torsades De Pointes** or persistent or recurrent V-Fib / Pulseless V-Tach)**.**
  - **2g** slow IV / IO
  - May repeat dose in 10 minutes for continued **Torsades (1x only)**

If patient is taking a calcium blocking agent such as verapamil, nifedipine, or diltiazem(Cardizem)

- Administer Calcium chloride 4mg/kg (max 4g)
  - May repeat x 1
- Also consider glucagon 1mg IV/IO

PULSELESS ARREST – *Transport Algorithm*



ROSC – Induced Hypothermia

Return of spontaneous circulation (**ROSC**) is resumption of sustained perfusing cardiac activity associated with significant respiratory effort after cardiac arrest. Signs of ROSC include breathing, coughing, or movement and a palpable pulse or a measurable blood pressure. (Return of Spontaneous Circulation)

INCLUSION CRITERIA:

- ROSC not related to blunt/penetrating trauma or hemorrhage
- Age 16 or older
- Advanced airway in place with an EtCO2 > 20
  - Patients may develop metabolic alkalosis with cooling. Do not hyperventilate
  - If no advanced airway can be obtained, cooling may only be initiated on order from online **medical control**
- GCS ≤ 8 (No purposeful response to pain)
- No known DNR order exists
- Goal temperature 32-34°C.
- Do NOT start protocol if already suspect hypothermia (<34°C)

Emergency Medical Responder

Complete neurologic exam including GCS and pupil response

Emergency Medical Technician

Cold packs in axilla and groin; protect skin with a towel; change every 15 minutes. (Do not delay transport to cool)

Contact receiving hospital so they are ready to accept transfer of care and continue patient cooling

Advanced EMT

Chilled (4°C) **NORMAL SALINE** IV / IO bolus to a total of **2 L** max

Intermediate

Treat appropriate rhythm with medications given IV for **normothermic** patients.

Paramedic

Consider **Midazolam (Versed) 5 mg** IV for shivering:

- May repeat as needed (hold for SBP < 100)

TACHYCARDIA: *(Narrow Complex)*

EMR	EMT	AEMT

Initial Cardiac Care

Intermediate

Attempt to determine type of Narrow Complex Tachycardia:

- Sinus tachycardia – Regular, P waves identifiable, typically <150bpm
- Supraventricular (SVT) or Atrial Tachycardia – regular, no P waves identified, typically >150bpm
- Rapid Atrial Fibrillation/Atrial Flutter – irregular

DO NOT treat sinus tachycardia with medications or cardioversion. Attempt to treat identified underlying cause:

Pain, dehydration, shock, hypoglycemia, hypoxemia, anxiety, fever/sepsis, drug-induced, recent exertion, hyperthyroidism, anemia

Stable Patient:

- Valsalva maneuvers (excluding carotid sinus massage)
- **Adenosine: 6 mg** fast IV push (*Contraindications for Adenosine: Known or suspected Hx of WPW)*
    - If no change after 1 minute, **Adenosine: 12 mg** fast IV push
    - If patient has had any caffeine or stimulant within the past 4 hours, may use 12mg as initial dose
- If patient becomes unstable, proceed to immediate **cardioversion**

Contact Medical Control Physician if the patient's rhythm does not convert after 18 mg of Adenosine

Adenosine should be used with caution in any of the following conditions:

- HR <150beats/min
- Wide complex tachycardia
- COPD, CHF, CAD/AMI patients

In these situations, contact medical control

TACHYCARDIA: *(Narrow Complex)*

Intermediate - *continued*

Unstable Patient: (Chest pain, Altered LOC, Hypotension)

- **DO NOT** delay cardioversion for a 12 lead ECG
- Prepare suction, IV access and airway management equipment **PRIOR** to cardioversion
- Synchronized Cardioversion
  - 50 Joules, if no change
  - 100 Joules, if no change
  - 150 Joules, if no change
  - 200 Joules

Contact Medical Control Physician if patient rhythm does not convert after 200 Joules

Paramedic

- If no response to Adenosine or suspected history of Atrial Fibrillation/ Flutter:
  - **Diltiazem: 0.25 mg/kg** Slow IV (max 25mg/dose)
  - If no change, may repeat **Diltiazem 0.35 mg/kg** Slow IV, in 15 minutes (max 25mg/dose)
  - ***Contraindications** to **Diltiazem**: Known or suspected History of WPW*
  - Monitor for hypotension
- **If patient becomes unstable, proceed to immediate cardioversion:**
  - Consider **Midazolam (Versed): 2.5 – 5 mg** IV for sedation before cardioversion

TACHYCARDIA: *(Wide Complex with pulse)*

EMR	EMT	AEMT

Initial Cardiac Care

Intermediate

Stable Patient:

- Differentiate between monomorphic and polymorphic VTach
  - Regular rhythms are monomorphic until proven otherwise
  - Irregular rhythms are polymorphic (including *Torsades de Pointes*) until proven otherwise

- For Stable patients with monomorphic VTach:

  - **Amiodarone: 150 mg** IV over 10 minutes
    - May repeat every 10 min x 2

  --OR—

  - **Lidocaine 1.0-1.5mg/kg** IV push.
    - May repeat x 2 at half original dose – 0.5-0.75mg/kg IV push
    - Maximum total dose is 3mg/kg.

  - If patient becomes unstable, proceed to immediate **cardioversion**

- **For all other stable wide-complex tachycardias, transport and contact Medical control.**

Unstable Patient: (Chest pain, Altered LOC, Hypotension)

- **DO NOT** delay cardioversion for a 12 lead ECG

- Prepare suction, IV access and airway management equipment **PRIOR** to cardioversion

- **Synchronized Cardioversion for Monomorphic VT**
  - **100 Joules**
  - If no change, **150 Joules**
  - If no change, **200 Joules**

Contact Medical Control Physician if patient rhythm does not convert after 200 Joules

- **Polymorphic VT**
  - **Defibrillate (i.e. unsynchronized cardioversion) at 360 Joules for monophasic defibrillator or 200 Joules for biphasic defibrillator (or devise specified dose)**

TACHYCARDIA: *(Wide Complex with pulse)*

Paramedic

Upon conversion to a stable heart rhythm, administer an antiarrhythmic loading dose (if initial dose listed above not already given) and institute an infusion.

- **Amiodarone:**
  - Loading dose of **150 mg** IV/IO (over 10 minutes) (if not already given)
  - **Infusion:** Mix **450 mg in 250 mL D_5W**
    - **Dose: 1 mg per minute (33 mL/ hr)**

--OR—

- **Lidocaine:**
  - **Loading dose of 1 – 1.5 mg/kg IV/IO push (if not already given)**
  - **Infusion: Mix 2g in 250 mL NS**
    - **Dose: 1-4 mg/min (7.5 to 30mL/hr)**

Torsade's De Pointes with a pulse:

- **Magnesium Sulfate: Mix 2g in 250 mL D_5W** and run **over 20 minutes**
  - May repeat once in 5 minutes for persistent **Torsades De Pointes.**

Torsade's De Pointes WITHOUT a pulse:

- **Magnesium Sulfate: 2g IV/IO over 2-4 minutes.**
  - May repeat once in 10 minutes for persistent **Torsades De Pointes.**

Consider **Midazolam (Versed): 2.5 – 5 mg** IV for sedation before cardioversion

VENTRICULAR ECTOPY

Treat ectopy if:

- **Patient is symptomatic (chest pain, shortness of breath, dizziness, hypotensive, immediate post arrest)**
  --AND—Multifocal PVCs or Group of 3 or more PVCs in a row

EMR	EMT

Initial Cardiac Care

Advanced EMT

If patient is hypotensive, follow Shock protocol

Attempt to identify and treat underlying cause of PVCs:

- Hypovolemia/Dehydration: Consider fluid bolus.
- Hypoxia, shortness of breath or respiratory distress: apply O2 with EtCO2 monitor (if SOB or respiratory distress but not hypoxic, consider possibility of unreliable pulse ox reading and attempt applying oxygen)
- Signs or symptoms of hyperkalemia:
  1) Calcium chloride: 2grams IV/IO over 1-2 min
  2) Administer NS flush if only 1 IV in place
  3) Sodium bicarbonate: 100 meq IV/IO

Intermediate

Administer an Antiarrhythmic ONLY AFTER attempts at treating potential underlying causes AND patient remains SYMPTOMATIC:

- **Amiodarone: 150 mg** IV (over 10 minutes)
  - If after 20 minutes, the patient exhibits recurrent runs of ventricular ectopy, consider a re-bolus of **Amiodarone: 150 mg** (over 10 minutes)
  - **Contraindicated** if heart rate <60 BPM.
  - Use **caution** if hypotensive. Consider consultation with on-line medical control.

--OR—

- **Lidocaine: 1 to 1.5mg/kg** slow IVP/IO
  - May repeat 0.5 to 0.75mg/kg (half original dose) every 5-10 min
  - Maximum total dose 3mg/kg

VENTRICULAR ECTOPY

Paramedic

Upon successful conversion to a normal rhythm, start infusion of antiarrhythmic that converted rhythm:

- **Amiodarone:**
  - **Start an infusion after bolus complete:**
  - **Amiodarone Infusion**: Mix **450mg in 250 mL D_5W** and run at **1 mg/min (33 mL/hr)**

--OR—

- **Lidocaine:**
  - Start an infusion after bolus complete:
  - **Lidocaine infusion:** **Mix 2g in 250mL NS** and run at **1-4mg/min (7.5 to 30mL/hr)**

MEDICAL PROTOCOLS

INITIAL MEDICAL CARE

The following **INITIAL MEDICAL CARE** should be viewed as an outline for all adult patients with any medical problem not deemed to be cardiac in nature.

EMR

Initial Patient Care

Provide oxygen if SpO_2 <94%

Be calm and reassuring

Treat for shock as needed

Place in position of comfort

EMT

Perform 12-lead EKG on patients with any of the following and transmit to the receiving facility:

- Chest pain or equivalent
- Shortness of breath or respiratory distress
- Altered mental status
- hypotension or signs of poor perfusion
- HR<60, HR>100, or irregular heart beat
- Any neurologic deficit or suspected stroke patient
- Overdose patient
- Carbon monoxide intoxication patient
- Hypertensive emergency patients
- Seizure patient
- Hypothermia

Apply cardiac monitor if patient fits any of the above categories

Advanced EMT	Intermediate	Paramedic

IV **NS** at TKO (if safe to do so and clinically indicated)

- Clinically indicated if the cardiac monitor is applied and/or when medications are used that may affect blood pressure and heartrate

ADDISON'S DISEASE

Information on Addison's Disease:

What is Addison's disease?
Addison's disease is an endocrine or hormonal disorder that occurs in all age groups and afflicts men and women equally. The disease is characterized by weight loss, muscle weakness, fatigue, low blood pressure, and sometimes darkening of the skin in both exposed and non-exposed parts of the body. Patients with this disease often "crave salt" in response to their electrolyte needs.

How does Addison's disease occur?
Addison's disease occurs when the adrenal glands do not produce enough of the hormone cortisol and, in some cases, the hormone aldosterone. The disease is also called adrenal insufficiency, or hypocortisolism.

What is cortisol?
Cortisol is normally produced by the adrenal glands, located just above the kidneys. It belongs to a class of hormones called glucocorticoids, which affect almost every organ and tissue in the body. Scientists think that cortisol has possibly hundreds of effects in the body. Cortisol's most important job is to help the body respond to stress.
Among its other vital tasks, cortisol:

- helps maintain blood pressure and heart function
- helps slow the immune system's inflammation response
- helps balance the effects of insulin in breaking down sugar for energy
- helps regulate the metabolism of proteins, carbohydrates, and fats
- helps maintain proper arousal and sense of well-being

How is Addison's disease treated?
Treatment of Addison's disease involves replacing, or substituting, the hormones that the adrenal glands are not making. Cortisol is replaced orally with hydrocortisone tablets, a synthetic glucocorticoid, taken once or twice a day. If aldosterone is also deficient, it is replaced with oral doses of a mineralocorticoid called fludrocortisone acetate (Florinef), which is taken once a day. Patients receiving aldosterone replacement therapy are usually advised by a doctor to increase their salt intake. Because patients with secondary adrenal insufficiency normally maintain aldosterone production, they do not require aldosterone replacement therapy. The doses of each of these medications are adjusted to meet the needs of individual patients.

What are symptoms of a Crisis and why does it happen?
Symptoms commonly seen in a crisis are abdominal pain, nausea/vomiting. In some cases you can also see syncope, orthostatic hypotension, changes in mental status, seizures, fatigue, diarrhea, and hyperthermia.

Crisis can happen for many reasons. Some are: forgetting doses of steroid medicine, stress situations, infections, dehydration, trauma/burns, or bleeding in the adrenal glands.

ADDISON'S DISEASE

How to Treat a Crisis
During an Addisonian crisis, low blood pressure, low blood glucose, and high levels of potassium can be life threatening. Standard therapy involves intravenous injections of hydrocortisone, saline (salt water), and dextrose (sugar). This treatment usually brings rapid improvement. When the patient can take fluids and medications by mouth, the amount of hydrocortisone is decreased until a maintenance dose is achieved. If aldosterone is deficient, maintenance therapy also includes oral doses of fludrocortisone acetate.

Identification of Addison's Patients
Almost every patient will be wearing a medical ID tag on their wrist or around the neck as a necklace. Consult with family members.

Paramedic

Once Addison's Crisis is identified, perform the following:

- Find the patient's crisis steroid medicine: either Hydrocortisone (Solu-Cortef) or Powder Dexamethasone (Decadron or Solurex) usually packaged 4mg/ml
- Administer crisis steroid medicine:
    - Either of the following:
        - Hydrocortisone (Solu-Cortef): Re-constitute the powder with 2cc of Normal saline. Gently role to mix thoroughly. Administer IM.
        - Dexamethaxone (Decadron or Solurex): Administer 4mg IM.
- Intra muscular-(IM) injection is the preferred site of delivery.
- IV with fluid bolus if needed based on vital signs and patient condition
    - Start 10mL/kg NS, may repeat x1 PRN based on VS and patient condition
- Check blood glucose and follow Hypoglycemia protocol as indicated
- Repeat vitals every 5 minutes

Transport to most appropriate facility unless patient with complete response, normal vital signs, and discussion with MCP about no-transfer situation

ALLERGIC REACTION / ANAPHYLAXIS

SYMPTOMS:

- ***MILD*:** localized swelling or rash
- ***MODERATE*:** generalized hives, bronchospasm / wheezing
- ***SEVERE:*** *anaphylaxis, hypotension -systolic BP < 90, airway compromise*

EMR

- Initial Medical Care
- Remove patient from the area to avoid further contact with allergen
- Remove stinger if possible by scraping, not tweezing
- Apply cold pack to site if localized reaction with swelling

Mild Symptoms:

- Monitor patient
- Position of comfort
- Calm and reassure patient

Moderate and Severe Symptoms:

EPI-PEN auto injector to lateral thigh • May repeat every 10–15 minutes with increasing symptoms • May administer through the patient's clothing • Use with caution for elderly/ cardiac patients	OR	**Epinephrine (1:1,000): 0.3 mg (0.3mL)** IM • May repeat every 10–15 minutes with increasing symptoms • Best place to administer is lateral thigh • Use with caution for elderly/ cardiac patient
If bronchospasm or wheezing present: • **Albuterol: 2.5 mg** via nebulizer **(**May repeat as needed every 5-10 minutes)		

ALLERGIC REACTION / ANAPHYLAXIS

EMT

Moderate and Severe Symptoms

- If bronchospasm or wheezing present:
  - **Albuterol** 2.5 mg / **Ipratropium Bromide (Atrovent)** 0.5 mg via nebulizer.
  - May repeat **Albuterol** q 5-10 minutes as needed
- Treat for shock per protocol

Advanced EMT

Moderate and Severe Symptoms

- Administer fluid bolus to maintain BP >90 systolic

Intermediate

Severe Symptoms:

- **Epinephrine (1:10,000): 0.1mg - 0.5 mg (1 - 5 mL)** IV/IO given slowly
  - May repeat every 10–15 minutes as needed or with increasing symptoms

Paramedic

Mild Symptoms:

- **Diphenhydramine (Benadryl): 25 – 50 mg** IV / IM

Moderate or Severe Symptoms:

- **Methylprednisolone (Solumedrol): 125 mg** IV

****Per Medical Control Physician Order****

Severe Symptoms:

- **Epinephrine Infusion: 2 – 10 mcg / min** (See drip chart – Appendix A)

ALTERED LEVEL of CONSCIOUSNESS

EMR

Initial Medical / Trauma Care

Determine blood glucose level with Glucometer

- If glucose < 70 mg/dl refer to Hypoglycemia protocol.

Consider Carbon Monoxide intoxication and refer to Carbon Monoxide protocol.

If suspected drug abuse, and patient has constricted pupils and/or respiratory depression, consider:

- **Naloxone (Narcan): 0.4 - 2.0 mg** Intranasal
  - Use discretion to avoid a full reversal and combative behavior
  - May repeat as needed every 3 – 5 minutes **up to 10 mg**
  - Fentanyl may require higher Naloxone doses

- If ALOC due to suspected drug overdose, refer to Poisoning/Overdose protocol

EMT

If suspected drug abuse, and patient has constricted pupils and/or respiratory depression, consider:

- **Naloxone (Narcan): 0.4 - 2.0 mg** IM / IN

- Monitor EtCO2 if able and safe to do so with patient. If >50, consider CPAP if patient will tolerate

Advanced EMT | Intermediate

- If suspected drug abuse, and patient has constricted pupils and/or respiratory depression, consider:
  - **Naloxone (Narcan): 0.4 - 2.0 mg** IV / IO / IM / IN

Paramedic

- If unable to maintain the airway, consider *DRUG FACILITATED AIRWAY MANAGEMENT* protocol

BEHAVIORAL EMERGENCIES

*****Whenever possible, use **communication** rather than force to gain permission to assess, provide care, and/or transport patients experiencing behavioral emergencies*****

EMR

- Initial Medical Care
- Assess for possible hypoxia, hypoglycemia, alcohol or drug intoxication, stroke or brain trauma. **DO NOT ASSUME** all agitation is behavioral, think of possible medical emergencies as the cause. Investigate possible medications the patient has had access to and make note or provide them to transport agency.

EMT | AEMT | Intermediate

- Physical restraints may be needed for patients whose behavior is physically threatening to themselves or others. **(See restraint policy)**
- Attempt to have law enforcement involved and take the lead in gaining physical control of patient.
- Apply restraints only to an appropriate level where patients can be controlled.
- Notify medical control as soon as possible of use of physical restraints.
- **NEVER** restrain a patient in a prone position as this may cause positional asphyxia
- Cardiac monitor, SpO_2, BP, HR, RR, glucose level, and mental status frequently after patient has been physically restrained

Paramedic

MILD / MODERATE AGITATION:

- Consider **Midazolam (Versed)**: **5 mg** IV / IM / Intranasal
    - May repeat (x1) in 5 minutes (**Max: 10 mg**)
    - May give **IM** through clothing if necessary
    - ***USE WITH CAUTION!!!!!*** *(Patients with coma, respiratory depression, hypotension, alcohol or sedative OD)*

BEHAVIORAL EMERGENCIES

Paramedic - *continued*

SEVERE AGITATION / COMBATIVE: (Behavior with high probability of injury to patient or others, to include *excited delirium*)

- Rapid sedation is the key to de-escalation!!!!!
- Consider **Ketamine: 5 mg/kg** IM or **1 mg/kg** IV
    - May repeat **2.5 mg/kg** IM or **0.5 mg/kg** IV PRN
        - May give IM through clothing if necessary
        - Precautions:
            - Consider sedation with **Midazolam 2.5 – 5.0 mg** before patient wakes due to "Emergence Reaction"
            - May need to position the head and suction the airway as Ketamine increases secretions
- Post sedation care:
    - Monitor respiratory effort, provide **O_2** to maintain SPO_2 at >92%
    - Establish IV, run NS at least TKO, bolus as indicated
    - Cardiac monitor and $EtCO_2$ with nasal prongs
    - Record BP, HR, RR, SPO_2 and $ETCO_2$ ideally every 5 minutes after sedation with ketamine
    - Intervene with airway adjunct, BVM or intubation/DFAM if needed

****Per Medical Control Physician Order****

- Higher doses of Midazolam (Versed) or Ketamine

CARBON MONOXIDE INTOXICATION

- Carbon monoxide is colorless and odorless, binding to hemoglobin 200+ times stronger than oxygen. Fetal hemoglobin as even greater affinity for CO. Half-life of binding is 320 minutes on room air. CO causes asphyxia as well as direct toxicity to the heart, brain and nervous system.
- Symptoms may include but not limited to: N/V, headache, abdominal pain, weakness, dizziness, dyspnea, chest pain, changes in gait or behavior, mental status changes, cardiac ischemia or ectopy, seizures.
- Pulse oximetry reads the percentage of hemoglobin bound to something. Typically this is oxygen but the pulse ox cannot distinguish oxygen from CO and reads only the percentage of hemoglobin which is bound to anything. CO will displace oxygen from hemoglobin but will give you a seemingly normal SpO_2 reading. Do not rely on this!
- Utilize atmospheric monitoring device to assess for background CO levels.
- If elevated, ensure evacuation of all from the area until CO is ventilated and the source is found and mitigated.

EMR	EMT

Initial Medical Care

SpO_2, BP, HR, RR, glucose level, and re-assess mental status frequently. Remember that CO will artificially raise the SpO_2 level so **DO NOT** rely on SpO_2.

Provide high flow NRB **O_2** with suspected CO intoxication despite a seemingly normal SpO_2.

Support ventilations as needed using assisted BVM ventilations, NPA / OPA or appropriate Non – Visualized Airway (NVA) if indicated.

Screen all area occupants including all prehospital responders utilizing a CO co-oximeter if available.

0 – 5%	Considered normal in non-smokers. When symptomatic at any level, consider high flow oxygen and evaluate environment for CO sources. In absence of symptoms, no further medical evaluation of SpCO needed.
5 – 10%	Considered normal in smokers, abnormal in non-smokers. If symptoms are present, place high flow oxygen and transport. If no symptoms, release is acceptable. Provide CO education. **Treat and transport all pregnant patients with CO ≥5% regardless of any symptoms or not.**
10 – 20%	Abnormal in any patient. With no symptoms consider high flow oxygen until CO level is <5% otherwise transport for further evaluation and management.
≥ 20%	Significantly abnormal in any patient. Administer high flow oxygen, regardless of symptoms. Consider call to medical control for possible transfer directly to hyperbaric oxygen facility.

CARBON MONOXIDE INTOXICATION

Advanced EMT

Consider fluid bolus

Intermediate

Provide supportive care including standard ACLS interventions if needed.

Paramedic

If CO source is from burning materials such as plastic, carpet, insulation, clothing or other synthetics, **strongly** consider cyanide intoxication**.** See ***Poisoning / Overdose*** protocol

If unable to maintain the airway, consider ***DRUG FACILITATED AIRWAY MANAGEMENT*** protocol

DRUG FACILITATED AIRWAY MANAGEMENT (DFAM)

Note: This procedure requires the presence of TWO paramedics attending to the patient at all times, ideally both of whom are DFAM certified.

Paramedic

Indications:

- Severe respiratory distress or failure
- Persistent hypoxia after high-flow O_2 , basic airway management, and noninvasive ventilation
- Altered mental status/decreased GCS <8 with need to protect/secure airway
- Airway compromise in the trauma patient

Contraindications:

- Known allergy to induction/paralytic medications
- Suspected epiglottitis
- Upper airway obstruction
- Cardiac / Respiratory arrest
- For patients ≤12 years old, please refer to Pediatric DFAM protocol

Use Caution:

- Patients with suspected difficult intubation (**LEMONS evaluation**) and/or suspected inability to ventilate via BVM (**BONES evaluation**)
- Patients in whom a cricothyrotomy would be difficult

PREPARE:

- IV/IO normal saline TKO
- Draw up and label medications.
- Organize equipment
- Assure suction capabilities are available and ready for use.
- Select and prepare ET tube/stylet or non-visualized airway
- Have backup airway planned and readily available
- Consider placing a second IV as time permits

DRUG FACILITATED AIRWAY MANAGEMENT (DFAM)

PRE-OXYGENATE:

- High-flow oxygen for 3 – 5 minutes prior to intubation
- If patient is breathing and pulse oximetry is above 90%, apply non-rebreather at 15 lpm. If patient is **NOT** breathing adequately or pulse oximetry is below 90%, ventilate slowly and easily with bag valve mask hooked up to high flow oxygen. Best practice is to place a nasal cannula at 4-6 lpm in addition to NRB or BVM ventilations to maximize PO_2 level as well as CO_2 washout. This nasal cannula should remain in place while airway management is performed.
- Continuous pulse oximetry and capnography is required

STANDARD PROTOCOL

❖ For patients in respiratory distress or failure or trauma patients w/o potential head injury

❖ Refer to 3:2:1 DFAM protocol if pt. presents with elevated heartrate (>130 bpm) and/or elevated SBP (>180mmHg)

INDUCTION: (Use Ketamine as first choice medication for induction)

Ketamine: 2 mg/kg IV / IO	*OR*	**Etomidate: 0.3 mg/kg** IV (Max: 30 mg)

PARALYZE: Paralytic agents are **not** to be given until adequate sedation and pain control medications have been administered

Special Note: ***Succinylcholine*** *is NOT to be used in patients with: suspected renal failure, dialysis patients, suspected rhabdomyolysis / prolonged down time, ocular trauma, myopathy or neuro-muscular disease, suspected hyperkalemia, hx of malignant hyperthermia, recent crush injury or major burn (>48 hrs after the injury) and recent spinal cord injury (72 hrs – 6 months).*

- **Succinylcholine: 2 mg/kg** IV/IO (Max: 200 mg)
- **Rocuronium: 1 mg/kg** IV/IO (Max: 140 mg/dose) Use only if Succinylcholine is contraindicated

PLACE AIRWAY:

- ETT (preferred – max of two (2) attempts) or non-visualized airway or Cricothyrotomy

DRUG FACILITATED AIRWAY MANAGEMENT (DFAM)

Standard Protocol – *continued*:

POST MANAGEMENT:

- Confirm airway placement: (Minimum of 3 means)
  - Visualize
  - Check Lungs / Epigastric Sounds
  - Capnography

POST INTUBATION PLAN: Optimize sedation and pain control post-intubation. This will allow sufficient ventilation for the vast majority of intubated patients.

Sedation (PRN)			Pain (PRN)
Ketamine: • **1 mg/kg** IV/IO • May repeat q 10 min as needed	OR	**Midazolam**: • **0.05 mg/kg** IV/IO • Max: 10 mg/dose	**Fentanyl**: • **1 mcg/kg** IV/IO • May repeat x1 in 10 min as needed

- **Rocuronium: 1mg/kg IV/IO**
  - Rocuronium should **only** be considered post-intubation if unable to manage the patient with sedation and pain control. If Rocuronium is utilized for initial intubation, there should be minimum 30 min before a post-intubation dose is administered.

- Continuous monitoring of ECG, Pulse Oximetry, and Capnography is required

DRUG FACILITATED AIRWAY MANAGEMENT (DFAM)

3:2:1 PROTOCOL

For patients with respiratory distress / failure with/who are:

- *suspected head trauma*
- *potential stroke/spontaneous brain bleed patients*
- *seizure patients with the likelihood of increased intracranial pressure*

If patient has a medication allergy, then revert to standard protocol and utilize alternative medications

Administer the following medications in this order:

1. **Fentanyl: 3mcg/kg** IV/IO over 60 seconds
   (If patient is hypotensive, follow a 1:2:1 protocol. Administer fentanyl 1mcg/kg IV/IO in lieu of 3mcg/kg)

2. **Ketamine: 2mg/kg** IV/IO over 60 seconds

3. **Rocuronium: 1mg/kg** IV/IO over 30 seconds

Paralytic agents are **not** to be given until adequate sedation and pain control medications have been administered

See table in appendix for dosing amounts

PLACE AIRWAY:

- ETT (preferred – max of two (2) attempts) or non-visualized airway or Cricothyrotomy

POST MANAGEMENT:

- Confirm airway placement: (Minimum of 3 means)
  - Visualize
  - Check Lungs / Epigastric Sounds
  - Capnography

DRUG FACILITATED AIRWAY MANAGEMENT (DFAM)

POST INTUBATION PLAN: Optimize sedation and pain control post-intubation. This will allow sufficient ventilation for the vast majority of intubated patients.

Sedation (PRN)			Pain (PRN)
Ketamine: • **1 mg/kg** IV/IO • May repeat q 10 min as needed	OR	**Midazolam**: • **0.05 mg/kg** IV/IO • Max: 10 mg/dose	**Fentanyl**: • **1 mcg/kg** IV/IO • May repeat x1 in 10 min as needed

- **Rocuronium**: **1mg/kg** IV/IO PRN
  - Please note: Rocuronium should **only** be considered post-intubation if unable to manage the patient with sedation and pain control. If Rocuronium is utilized for initial intubation, there should be minimum 30 min before post-intubation dose is administered..

- Continuous monitoring of ECG, pulse oximetry, and capnography is required

EPISTAXIS

- ❖ Most common site of bleeding is from the anterior nose in the septum.
- ❖ This is typically controlled with direct pressure.
- ❖ If bleeding is from posterior nose, EMS control is unlikely and severe blood loss and airway compromise may occur.

EMR | EMT

- Initial Medical Care
- Have patient blow their nose forcefully to expel blood and clot from nose.
- Have patient pinch the soft, fleshy part of the nose firmly between two fingers and maintain this pressure for at least fifteen (15) minutes without release.
- Assist the patient as needed or consider use of commercial nose clamp device.
- Suction mouth as needed.
- If bleeding not controlled with the above, consider use of Combat Gauze or other topical hemostatic dressing.
- Monitor vital signs closely.
- Apply a nasal clamp

Advanced EMT | Intermediate

- IV fluid bolus as indicated. Use 250mL boluses of NS and reassess patient.
- Refer to **SHOCK** Protocol as indicated

Paramedic

- **Neosynephrine (Afrin):** Saturate a 2” x 2” gauze dressing and pack into the bleeding nostril

HYPERTENSIVE EMERGENCIES

Systolic **BP > 220** or Diastolic **> 120**

- ❖ Recognize that hypertension may be a protective and physiological mechanism for another underlying medical problem (i.e. acute thrombotic stroke).
- ❖ Identify potential medical contributors to the hypertensive state and treat accordingly (chest pain, pulmonary edema).

EMR

- Initial Medical Care

EMT

- Consider calling for paramedic intercept for use of Labetalol and / or NTG infusion
- May assist patient with prescribed Nitroglycerin SL tablet x 1 dose

****Per Medical Control Physician Order****

- Notify medical control if: Systolic BP >220, diastolic >120, signs of stroke, renal failure, CHF, ACS, or aortic dissection
- Additional doses of patient's prescribed Nitroglycerin SL tablets

Advanced EMT | Intermediate

- **Nitroglycerin: 0.4 mg** SL. May repeat every 5 min as needed
  - Consider end-point BP: 170-180 SBP (dropping blood pressure further can cause lack of oxygen / bloodflow to organs)
  - Consider discussion with on-line medical control prior to use as SL NTG would be expected to give erratic and sub-optimal blood pressure control. Use this option only if paramedic intercept is not feasible.

Paramedic

- **Labetolol: 20 mg** slow IV.
  - May repeat **40 mg** every 10 minutes for persistent severe hypertension
  - Max of 300 mg
  - Contraindicated: if heart rate ≤ 60 BPM
- **Nitroglycerin Infusion: Initial rate 10 mcg/min** (See drip chart – Appendix A)
  - Titrate upward **10 – 20 mcg/min** every 3 – 5 minutes to achieve a SBP 170-180 or DBP 90-100
  - May use with **Labetolol** for persistent severe hypertension
  - May start at 20 mcg/min if patient with severe/decompensated heart failure requiring CPAP or airway intervention

HYPERTHERMIA / HEAT INJURIES

Untreated heat injuries listed below may progress toward heat stroke which is a life-threatening emergency.

- **Heat cramps**: Muscle cramps induced by dehydration and/or electrolyte abnormalities. Sweating is preserved. Temperature and mental status are normal.

- **Heat exhaustion**: The progression of heat injury which often presents with headache, nausea/vomiting, fatigue, dizziness, facial flushing. Sweating should be preserved. Temperature and mental status are normal.

- **Heat Stroke**: The continued progression of heat injury to the point that the brain loses auto-regulation and the body loses the ability to cool itself. Sweating stops and mental status becomes altered. Symptoms listed in heat exhaustion worsen as body temperature steadily increases. Coma ensues with death to follow unless rapid cooling and life support are provided.

Some elderly patient and those on certain medications such as beta blockers may not show classic signs of heat injury. Certain medications such as anti-histamines, certain anti-nausea medications and many psychiatric medications impair thermoregulation and make heat related injury more likely.

EMR	EMT

- Initial Medical Care
- Measure vital signs including rectal temperature if possible (oral panting and sweating can make other temperature measurements unreliable)
- Begin tepid water evaporative cooling. Pour or mist body temperature water over patient. Fan the patient's skin to encourage evaporation which will lower temperature.
- **DO NOT** use cold water or ice packs as this may induce vasoconstriction of skin vessels trapping heat in the core and/or cause shivering which can raise the temperature even more.
- If fully conscious, consider having patient drink cold water in small amounts to help in cooling the stomach which will work to cool core (NOT for purposes of re-hydration).

****Per Medical Control Physician Order****

- Notify Medical Control of any Heat Stroke patients to allow preparation of alternate cooling means and resources prior to arrival and for patients treated for suspected heat stroke who are refusing transport

HYPERTHERMIA / HEAT INJURIES

Advanced EMT

- Consider a 10 – 20 mL/kg **NS** bolus as indicated. Use chilled saline infusion if available.

Intermediate

Paramedic

- Consider DFAM as indicated.

HYPOGLYCEMIA

Symptoms of Hypoglycemia: Confusion, anxiety, palpitations, hunger, headache, irritable, seizure, unconscious, tremulous, fatigue, diaphoresis, dizziness, tingling around mouth and fingers, shakiness

EMR

- Initial Medical Care
- Blood Glucose check:
  - If Blood Glucose is 60-70 mg/dl –**AND**— patient is symptomatic:
    - Administer **7.5g Oral Glucose,** placed in buccal mucosa
  - If Blood Glucose is < 60 mg/dl:
    - Administer **15g Oral Glucose** placed in buccal mucosa
  - Reassess blood glucose after 5 min, repeat steps as needed

EMT

- Patient responds only to pain or unresponsive
  - **Glucagon: 1mg** IM
    - Reassess blood glucose level after approximately 5-10 minutes. Patient may not respond for 10 – 15 minutes after Glucagon administration.
    - Repeat steps as needed

****Per Medical Control Physician Order****

- Contact medical control for direction with patients who have been treated for hypoglycemia and are refusing transport

Advanced EMT | Intermediate | Paramedic

- If Blood Glucose is 60-70 mg/dl –AND—patient is symptomatic:
  - Administer **D10: 5g or 50mL** IV
- If Blood Glucose is < 60 mg/dl
  - Administer **D10: 10g or 100mL** IV

HYPOGLYCEMIA

Advanced EMT	Intermediate	Paramedic

- Reassess patient mental status and blood glucose level 5 minutes after infusion:
    - If blood glucose less than 70:
        - Repeat initial D10 dose x 1 and reassess the patient after 5-10 minutes. Transport the patient if blood glucose still remains below 70.
        - For persistent blood sugar <70, continue to repeat D10 in 5gm (50mL) increments every 5-10 minutes (max of 30g or 300mL total). Reassess blood glucose and mental status every 5 minutes after each increment.
- If unable to establish an IV, administer **Glucagon: 1mg** IM
    - Reassess blood glucose level after approximately 5 – 10 minutes. Patient may not respond for 10 – 15 minutes after Glucagon administration.
    - Repeat steps as needed

****Per Medical Control Physician Order****

- Contact medical control for direction with patients who have been treated for hypoglycemia and are refusing transport

HYPOTHERMIA

- **Mild**: Core temperature 32-35° C / 89.6-95° F. The patient is generally alert with intact shivering mechanism
- **Moderate**: Core temperature 28-31.9°C / 82.4-89.5° F. The patient's mental capacity declines, pupils dilate, and shivering ceases
- **Severe**: Core temperature <28°C / <82.4° F. Unconsciousness
- Cardiac medication and repeated defibrillation is ineffective if core body temperature is <30°C (86°F)
- Hypothermia victims of cold water (<70° F) submersion in cardiac arrest should undergo prolonged resuscitation efforts.

EMR	EMT

- Initial Medical Care
- Gently remove wet garments and protect against further heat loss and wind chill.
- Avoid rough handling and excess activities, which can cause V-fib.
- Obtain vitals with a rectal temperature if at all possible.
- Check blood glucose. Refer to HYPOGLYCEMIA protocol.
- Place airway adjunct or Non – Visualized Airway (NVA) and ventilate if indicated.
- If patient is in cardiac arrest, initiate CPR and follow AHA BLS guidelines.
- If patient is in cardiac arrest, CPR is to be initiated unless obvious lethal injury, chest wall is too stiff to perform CPR, or patient has been buried for 35 min or more and has snow in the airway.

Mild Hypothermia (32 – 35°C): Begin active external re-warming

- Place heat packs on chest and in neck, groin and axillary areas.
- Consider use of Ready – Heat Blanket and Mylar blanket if available.

Moderate Hypothermia (28 – 31.9°C): No active external re-warming below this temp.

- Carefully check for spontaneous respirations and / or pulses. If present, DO NOT START CPR.
- O_2 at 10-15 lpm via NRB

HYPOTHERMIA

EMR

Severe Hypothermia (**<28°C)**

- Request an ALS intercept. Preferentially transport to a hospital with cardiac bypass capabilities
- Consider placement of supra-glottic/non-visualized airway as needed
- End tidal CO2 monitoring

EMT

Advanced EMT

Moderate and Severe Hypothermia:

- 1 – 2 Liters warmed **NS** if available.
- V- fib or pulseless V- tach present:
  - Begin CPR
  - Defibrillate once at maximum power of defibrillator (typically 200J)
  - Resume CPR and continue rewarming. Initiate additional defibrillations only after temperature has reached **30°C**

****Per Medical Control Physician Order****

- Contact Medical Control and advise of moderate or severe hypothermia to allow receiving hospital to prepare for active re-warming

Intermediate

Severe Hypothermia:

- Intubate patient unless SGA / NVA in place and ventilating well
- End tidal CO2 monitoring
- Continue internal warming efforts
- V- fib or pulseless V- tach present:
  - Administer 1 defibrillation and 1 round of medications only.
  - Perform no other ACLS procedures (medications, pacing or defibrillations) except continuation of CPR until core temperature is > 86° F (30°).

HYPOTHERMIA

Paramedic

- Consider DFAM if indicated. Be mindful that sedatives and paralytics can last significantly longer in hypothermic patients due to altered metabolism. Use medications for airway interventions only if absolutely necessary

NAUSEA / VOMITING

EMR

- Initial Medical Care
- Ensure patent airway. Suction if necessary and prevent aspiration
- If decreased LOC, place patient in left lateral recumbent position if no contraindications.

EMT

Advanced EMT

- Consider a fluid bolus.

Intermediate

- **Ondansetron (Zofran): 4 mg** slow IV
  - May give IM or Intranasal if unable to establish an IV.
  - Monitor for arrhythmia, allergic reaction, dystonia or other reactions.
  - May give Ondansetron (Zofran) 4mg ODT if preferred

Paramedic

- **Benadryl: 25 – 50 mg** IV. May give IM if unable to establish IV
  - May use with Zofran to treat symptoms

OBSTETRICAL EMERGENCIES

Expectant Mother

EMR	EMT	AEMT	Intermediate	Paramedic

- Initial Medical Care

- If delivery is not imminent:
  - Transport patient in left lateral recumbent or semi-fowlers for ease of breathing
  - Monitor contractions including duration and time between contractions

- If any of the following are present, notify Medical Control immediately:
  - Heavy bleeding
  - Limb presentation
  - Multiple fetus'
  - Trauma to abdomen
  - Prolapsed cord
    - Place patient in Trendelenburg or knee to chest position
    - Advise patient not to "bear down" or push
    - Insert two fingers into birth canal and hold the presenting part off the cord to relieve pressure on the cord
    - DO NOT remove hand/fingers until receiving facility directs you to

- If delivery is imminent with a normal presentation (crowning noted):
  - Refer to Neonatal Resuscitation protocol following delivery

- Important documentation points:
  - Frequency and strength of contractions
  - Rupture of membranes
  - Meconium staining
  - Fetal presentation
  - Onset of labor
  - Due date
  - Gravida (# of pregnancies)
  - Para (# of live births), any known anomalies
  - APGAR score at 1 and 5 minutes.
  - Prenatal provider (physician or midwife name) if possible

OBSTETRICAL EMERGENCIES

Vaginal Bleeding Pre-Delivery

EMR	EMT

- Initial Medical Care
- Place on left lateral side, recumbent, for transport.
- Treat for shock.
- Monitor vital signs frequently.

Advanced EMT	Intermediate	Paramedic

- Consider **Fluid Bolus** to maintain MAP > 65

OBSTETRICAL EMERGENCIES

Vaginal Bleeding Post-Delivery

EMR

- Initial Medical Care
- Monitor vital signs frequently and treat for shock as indicated.
- Massage the fundus vigorously. Place non-dominant hand at the base of the uterus prior to massaging the fundus. This will anchor the uterus in place and prevent uterine inversion.
- Place baby to breast and have mom encourage baby to breastfeed
- Loose bulky dressings (do not pack)

Advanced EMT

- Fluid Bolus to maintain MAP > 65

Paramedic

- May use either of the following to treat symptoms:

Oxytocin (Pitocin): 20 units IM	OR	**Oxytocin (Pitocin)**: 20 units in 1000ml NS, run at 200 ml/hour

OBSTETRICAL EMERGENCIES

Pre – Eclampsia / Eclampsia

- ❖ Determine if patient is 20 WEEKS OR MORE pregnant or within four weeks post-partum
- ❖ Clarify history of pre-eclampsia
- ❖ Patients with **SBP >160** or **DBP >110**
- ❖ Treat patients even if the seizure resolves

EMR	EMT	AEMT	Intermediate

- Initial Medical Care
- Ensure patent airway.
- Provide a quiet non-stimulating environment.
- Place in left lateral recumbent position.
- Treat for seizures per protocol

Paramedic

- **Magnesium Sulfate: 4g in 250 cc D_5W**, r**un over 20 minutes**
- **Labetolol: 20 mg** slow IV**.** May repeat **40 mg** every 10 minutes for persistent severe hypertension to a max of 300 mg

****Per Medical Control Physician Order****

- Repeat **Magnesium Sulfate**: 2 grams in 250 cc D_5W, run over 20 minutes

PAIN MANAGEMENT

EMR

- Initial Medical/Trauma Care
- Immobilize any injury, ice and elevate if possible
  - Consider realigning angulated fractures, if possible, being cautious not to aggravate the injury or cause additional pain
  - Reposition (NOT reduce) dislocated joints to improve comfort, circulation, sensation, and motion. DO NOT force an extremity.
  - Apply a padded splint that immobilizes the long bone above and below the injury
    - Do NOT compromise distal circulation
- Evaluate pain based on 1-10 scale. Report to receiving facility. Reassess pain after all interventions.
- Verbal reassurance, redirection, and distraction with conversation
- Coach the patient's breathing – calm, deep full inhalations, and relaxed slow exhalation
- Consider paramedic intercept for pain control

EMT

Advanced EMT

Nitrous Oxide: (50% mixture with oxygen) protocol: Verify that inclusion and exclusion criteria support administration of nitrous oxide. If so, then proceed:

- Setup Nitrous oxide system. Invert nitrous oxide cylinder several times before use.
- Coach patient in self administration of nitrous oxide
  - Instruct patient to inhale deeply through the demand valve mask/mouthpiece until pain/anxiety relieved –OR—patient no longer able to hold the mask/mouthpiece to their face
  - Self-administration by patient only (NOT by EMS personnel or friend / family member)
  - Turn off flow of nitrous oxide when patient completes self-administered dose
- Reassess pain 3-5 minutes after administration. If pain not controlled, consider other pain management options.
- Record vital signs during and after treatment (every 5-10 minutes)
- Document start and stop times of nitrous oxide use. DO NOT exceed time permitted by NIOSH occupational exposure standards.
  - In open, outside, well aerated areas: no maximum time of administration
  - Ambulance with open windows and exhaust fans running: Max 30min per 8hr period
- Follow proper disposal guidelines once patient transport completed
  - Document canister weight at start and end of administration.

PAIN MANAGEMENT

Intermediate

- **Fentanyl: 0.5 – 1 mcg/kg** IV over 1 – 2 minutes.
  - May repeat every 10 minutes as needed to a max total dose of 300 mcg.
  - May give Intranasal or IM if no IV

- Post analgesia care:
  - Monitor respiratory effort, provide **O_2** to maintain SPO_2 at >92%
  - Establish IV, run NS at least TKO, bolus as indicated
  - Cardiac monitor and $EtCO_2$ with nasal prongs
  - Intervene with airway adjunct, BVM or intubation if needed

Paramedic

For mild to moderate pain:

- Consider **Tylenol**: **500 – 1000mg PO** x 1 dose

For patients with suspected renal colic / kidney stone pain:

Toradol: 30mg IV x 1 dose	*OR*	**Toradol: 60mg IM** x 1 dose

For patients with suspected renal colic / kidney stone pain: >65 years old –OR-- <50kg weight

Toradol: 15mg IV x 1 dose	*OR*	**Toradol: 30mg IM** x 1 dose

For **severe pain** not adequately relieved by above interventions:

- Consider use of **Midazolam (Versed) 0.05 mg/kg** IV **–OR--** Intranasal / IM (If no IV) in addition to fentanyl.

- Consider **SUB-DISSOCIATIVE KETAMINE** as an adjunct to fentanyl

  - **Ketamine**: **0.25 mg/kg** IV over 1 – 2 minutes –OR-- **0.5 mg/kg** IN or IM if no IV. May repeat every 5 minutes to a total of 4 doses. If an adequate response is achieved, may repeat every 10 – 15 minutes as needed.

    - Max dose of ketamine is 1mg/kg IV or 2mg/kg IN or IM total in first hour, then max dose is 0.5mg/kg IV or 1mg/kg IN or IM every hour in subsequent hours

  - Sub-dissociative Ketamine may be used in conjunction with **Midazolam 0.05 mg/kg** IV / Intranasal / IM if needed. Be sure to monitor vitals, cardiac monitor and $EtCO_2$ as with full dose ketamine administration. Max dose of midazolam is 10mg in one hour.

PAIN MANAGEMENT

Paramedic – *continued*

- Consider **DISSOCIATIVE KETAMINE** for complicated extrication or orthopedic manipulation that would not be expected to be controlled adequately with IV fentanyl and/or sedation with midazolam
    - **Ketamine: 5 mg/kg IM or 1 mg/kg IV**
    - Precautions:
        - Consider sedation with **Midazolam 2.5 – 5.0 mg** IV if needed due to possible "Emergence Reaction"
        - May need to position the head and suction the airway as Ketamine increases secretions
        - Consider fentanyl if patient becoming arousable and having continued pain.
- Record BP, HR, RR, SPO_2 and $ETCO_2$ ideally every 5 minutes after dosing with ketamine
- Intervene with airway adjunct, BVM or intubation / DFAM if needed

****Per Medical Control Physician Order****

- Additional doses of Fentanyl, Midazolam, or Ketamine

POISONING / OVERDOSE

Ensure scene safety:

- ❖ If Haz-Mat suspected, request Haz-Mat team response.
- ❖ Protect yourself from contamination (dust, fumes)
- ❖ Move patient to safe environment. Remove all contaminated clothing.
- ❖ Have trained personnel decontaminate patient by brushing off and rinsing with copious amounts of water if appropriate
- ❖ Notify **POISON CONTROL (800-222-1222)** Notify them of the substance, amount and time of ingestion.

EMR

- Initial Medical Care
- Continuous irrigation with **NS** if eyes are contaminated.
- Contact and advise Medical Control and Poison Control early for preparation of an antidote. Knowledge of the poisoning agent is **CRITICAL.**
- Consider CARBON MONOXIDE protocol for any suspicion of CO intoxication.
- If suspected drug abuse, and patient has constricted pupils and/or respiratory depression, consider:
    - **Naloxone (Narcan): 0.4 - 2.0 mg** Intranasal
        - Use discretion to avoid a full reversal and combative behavior
        - May repeat as needed every 3 – 5 minutes **up to 10 mg**
        - Propoxyphene or Fentanyl may require higher Naloxone doses
- Bring ALL bottles and/or pills from the scene to the hospital
- If bronchospasm or wheezing present:
    - **Albuterol: 2.5 mg** via nebulizer (May repeat as needed every 5-10 minutes)

EMT

- If suspected drug abuse, and patient has constricted pupils and/or respiratory depression, consider:
    - **Naloxone (Narcan): 0.4 - 2.0 mg** IM / IN
        - May repeat as needed every 3 – 5 minutes **up to 10 mg**

POISONING / OVERDOSE

EMT – *continued*

- If patient has inhaled a chemical in which wheezing or bronchospasm has occurred:
    - **Albuterol** 2.5 mg **/ Ipratropium Bromide (Atrovent)** 0.5 mg via nebulizer.
        - May repeat **Albuterol** q 5-10 minutes as needed

Advanced EMT

- Suspected Narcotic overdose consider: (Symptomatic)
    - **Naloxone (Narcan): 0.4 – 2 mg** IV/IO, may give IN / IM if unable to establish an IV**.**
        - May repeat as needed every 3 – 5 minutes up to 10 mg

Intermediate

NOTE: If patient is suspected to have any of the following, early notification to physician at receiving facility is very helpful.

- Organophosphate poisoning (Carbamate / pesticide / insecticide): *If the patient displays symptomatic bradycardia, bronchospasm and/or bronchorrhea*
    - **Atropine:** 1 – 2 mg IV / IO (every 5 minutes)
- Suspected Beta-Blocker or Calcium Channel Blocker OD
    - **Glucagon:** 2mg IM / IV
- Tricyclic Antidepressant Overdose: (Symptomatic: *Widened QRS > 0.10ms, hypotension, ventricular arrhythmias)*
    - **Sodium Bicarbonate: 1 mEq/kg** IV. May repeat in 10 minutes if QRS complex remains wide (QRS >0.10ms)

POISONING / OVERDOSE

Paramedic

- Cyanide Toxicity: (Suspected)
    - **Amyl Nitrite ampule**:
        - Crush ampule and place in a non-rebreather mask or BVM with **O_2** for 15–30 seconds followed by 30-45 seconds of O_2
        - Repeat until IV antidote available
        - When giving the radio report, alert ED staff that Amyl Nitrite was administered so additional medications can be prepped.

OR

- **Hydroxocobalamin:** (Preferred Antidote)
    - **5 grams IV piggyback over 15 minutes**. Reconstitute with 250cc of NS, LR or D5W
    - Repeat x 1 for continued symptoms

****Per Medical Control Physician Order****

- Calcium Channel Blocker OD: **Ca Chloride: 1g IV**
- Stimulant OD (Cocaine / Methamphetamine): **Midazolam: 5mg IV / IN**

RESPIRATORY DISTRESS

COPD / Emphysema / Asthma / Chronic Bronchitis

EMR

- Initial Medical Care
- Position patient upright or in position of comfort
- If bronchospasm or wheezing present:
    - **Albuterol: 2.5 mg** via nebulizer (May repeat as needed every 5-10 minutes)

EMT | AEMT | Intermediate

- Consider **CPAP (See CPAP Procedure)**
- If bronchospasm or wheezing present:
    - **Albuterol** 2.5 mg **/ Ipratropium Bromide (Atrovent)** 0.5 mg via nebulizer.
        - May repeat **Albuterol** q 5 – 10 minutes as needed
- Monitor End-Tidal CO_2 via nasal prongs for severely ill patients
- Respiratory distress continues despite the above interventions:
    - If patient age <50, HR <130, AND no significant cardiac history may give **Epinephrine (1:1,000): 0.3 mg/ 0.3 mL** IM
    - If patient age >50, HR >130, OR significant cardiac history:

****Per Medical Control Physician Order****

- **Epinephrine (1:1,000): 0.3 mg / 0.3 mL** Sub Q / IM

Paramedic

- Consider **Methylprednisolone (Solumedrol): 125 mg IV**
- If patient continues to have difficulty breathing despite epinephrine, nebulizers, and solumedrol, consider administration of magnesium:
    - **Magnesium Sulfate:** 2g in 250mL D5W (infuse over 20 min)
- Consider Drug Facilitated Airway Management (DFAM) protocol if patient worsens despite above treatment

RESPIRATORY DISTRESS: *(Pulmonary Edema)*

EMR

- Initial Medical Care
- Position patient upright or in position of comfort.

EMT

- Apply **CPAP** if indicated **(See CPAP Procedure)**
- Monitor End-Tidal CO_2 via nasal cannula for severely ill patients.
- Call for paramedic intercept if prolonged transport.
- If SBP is >130 and / or DBP is >80, may assist patient with prescribed Nitroglycerin SL tablet x 1 dose.

Advanced EMT

- **Nitroglycerin: 0.4 mg** SL
    - May repeat as needed (Maintain systolic BP >100)

Intermediate

- **Fentanyl: 1 mcg/kg** IV

Paramedic

- **Nitroglycerin Infusion: Initial rate 10 mcg/min** (See drip chart – Appendix A)
    - Titrate upward **10-20 mcg/min** every 3-5 minutes to achieve a SBP 170-180 or DBP 90-100
    - For persistent severe hypertension, may use with Labetolol
    - May start at 20 mcg/min if patient with severe/decompensated heart failure requiring CPAP or airway intervention

RESPIRATORY DISTRESS: *(Obstructed Airway)*

EMR

- Initial Medical Care
- Ensure patent airway by providing **100%** O_2 via NRB or BVM if necessary. Use **AHA** foreign body obstructed airway procedure as needed.
    - Do **NOT** use NVA if concerns of obstructed airway as it may push a partial obstruction into a complete obstruction and prevent ventilations
- If bronchospasm or wheezing present:
    - **Albuterol: 2.5 mg** via nebulizer (May repeat as needed every 5-10 minutes)

EMT

- If patient becomes unconscious, attempt to remove object with laryngoscope and Magill's forceps if you can see it.
- Consider cardiac monitor for partial obstruction or once full obstruction is relieved.
- If bronchospasm present (wheezing):
- **Albuterol** 2.5 mg / **Ipratropium Bromide (Atrovent)** 0.5 mg via nebulizer.
    - May repeat **Albuterol** q 5-10 minutes as needed
- If unable to relieve obstructed airway – call for Paramedic Intercept, advise that an emergent surgical airway is needed.

Advanced EMT | Intermediate

- If unable to ventilate despite the above and the patient is unconscious, consider emergent endotracheal intubation attempt to dislodge foreign body distally, or placement of a supraglottic airway to provide better positive pressure ventilation. Preference should be on attempting endotracheal intubation if possible. Use supraglottic airway as a last resort as it may advance a partial obstruction into a complete obstruction.

Paramedic

- If airway remains unsecure or the patient is in extremis, perform an emergent cricothyrotomy. (See cricothyrotomy procedure)

RESPIRATORY DISTRESS: *(Obstructed Airway)*

Paramedic – *continued*

- Consider **Racemic Epinephrine (2.25%): 0.50 ml** via nebulizer for upper airway stridor
    - Dilute with 3 cc NS
- May use 3mL of undiluted **Epinephrine (1:10,000)** if racemic epinephrine unavailable

****Per Medical Control Physician Order****

- Additional dosing of **Racemic Epinephrine**

SEDATION

Adjunct for pain / medical management

- Severe pain not totally responsive to opiates, hyperventilation, significant anxiety, CPAP anxiety, etc.

- Be extremely cautious about labeling hyperventilation or anxiety as psychiatric problems. These can be symptoms of grave underlying medical conditions. Anxiety and hyperventilation syndrome are both diagnoses of **exclusion**!

Paramedic

- **Midazolam (Versed): 0.05 mg/kg** IV
    - May give Intranasal / IM if no IV
    - May repeat (x1) in 5 minutes as needed.

- Patients receiving sedation will have vital signs monitored closely with at least 1 set before and 1 set after sedation being documented in the run report.

- For patients who seem over sedated, monitor End-Tidal CO_2 (nasal cannula).

SEIZURES

EMR

- Initial Medical Care
- Place patient in left lateral recumbent position and protect from injury.
- Assess blood glucose level and follow HYPOGLYCEMIA protocol if necessary.
- Document the length and number of seizures and the type and dosage of seizure medications.
- If seizures persist call for a paramedic intercept

Advanced EMT

- Consider fluid bolus.

Intermediate

- **Midazolam (Versed): 5 mg** slow IV; **Intranasal / IM / IO** if unable to establish an IV
    - May repeat (x1) in 5 minutes if seizures continue

****Per Medical Control Physician Order****

- **Contact Medical Control for sustained seizures**

Paramedic

- Seizures suspected to be pre-eclamptic / eclamptic in origin
    - Determine if patient is 20 WEEKS OR MORE pregnant or within four weeks post-partum
    - Clarify history of pre-eclampsia and/or previous history of seizure
    - Treat even if seizure resolves
    - **Magnesium Sulfate: 4 g in 250cc D_5W**, Run over 20 minutes
- If severe hypertension, follow OBSTETRICAL protocol

****Per Medical Control Physician Order****

- Repeat **Magnesium Sulfate:** 2 grams in 250 cc D_5W, Run over 20 minutes

SHOCK

If shock due to trauma, please refer to Shock – Traumatic protocol

EMR

- Initial Medical Care
  - Provide **O2 at 10-15 lpm** via NRB
  - Place patient in Trendelenburg position or elevate the patient's legs
  - Keep the patient warm
  - Assess code status with patient or family if possible.
  - Refer to ALLERGIC REACTIONS / ANAPHYLAXIS protocol if indicated.

EMT

CARDIOGENIC SHOCK:

- Transport in position of comfort, usually sitting upright
- Consider CPAP if indicated
- Call for a paramedic intercept.

Advanced EMT | Intermediate

- IV / IO **NS**: (*Use as large of an IV catheter as anatomy allows, preferably 18g or larger)*
- Start a second IV as time allows

HYPOVOLEMIC / NEUROGENIC SHOCK:

- Initial **500 ml NS** fluid bolus is appropriate for most (Maintain systolic BP at 90-100 mm hg). Consider starting at **250 cc** for elderly, pulmonary edema or history of renal failure patients.
- Reassess patient and repeat fluid as needed based on clinical response and situation

SHOCK

Advanced EMT – *continued*

****Per Medical Control Physician Order****

- Contact Medical Control for persistent Hypovolemic or Neurogenic shock despite 2 fluid boluses for possible Permissive Hypotension

SEPTIC SHOCK:

- Start with **1L NS** fluid bolus (Maintain systolic BP at 90-100 mm hg). Consider starting at **250 mL** for elderly, pulmonary edema or history of renal failure patients.
- Reassess patient and repeat fluid as needed based on clinical response and situation.

CARDIOGENIC SHOCK: Assess rhythm and treat any abnormality first. Use caution with fluid.

- **250 mL NS** fluid bolus **(**re-evaluate patient). May repeat to max of 500 cc NS

****Per Medical Control Physician Order****

- Per MCPO, may repeat NS fluid bolus

Intermediate – *continued*

Paramedic

- If the patient is exhibiting signs / symptoms of a tension pneumothorax perform a needle decompression
- Use vasopressors in Hypovolemic Shock **only** if refractory to fluid administration. Consultation with medical control is strongly suggested in this case.

NEUROGENIC / CARDIOGENIC / SEPTIC / HYPOVOLEMIC SHOCK:

Vasopressor Infusions – Titrate to achieve MAP ≥ 65: (See Drip Charts – Appendix A)		
Norepinephrine: • **4mg in 250ml NS** • **Start at 4-6 mcg/min**	**Dopamine:** • **800mcg/ml** • **2 – 10 mcg/kg/ min**	****Per MCPO**** **Epinephrine:** • **1mg in 250ml NS** • **2 – 10 mcg / min**

- Use Dopamine if Norepinephrine is not available
- If Neurogenic shock with bradycardia, dopamine or epinephrine is preferred
- Epinephrine Infusion is per Medical Control Physician Order

STROKE

*****PRIORITY – LIMIT SCENE TIME to 10 MIN OR LESS*****

EMR	EMT

- Initial Medical Care

- Obtain a thorough history
  - Time of onset of signs and symptoms
  - When was patient last seen **normal**? (BE SPECIFIC!!!!)
  - Seizure activity
  - Age
  - Hx of blood thinner us
  - Code status (DNR, Do Not Intubate, Comfort Measures Only, etc.)

- Assess blood glucose level
  - Follow HYPOGLYCEMIA protocol if indicated.
  - Document hyperglycemia if present.

- Perform a neurological exam – Cincinnati Stroke Scale
  - Facial droop (symmetry of smile or showing of teeth)
  - Arm strength (hand grasp and closed-eyes arm drift with extension)
  - Impairment of speech (dysarthria or aphasia)

- Alert receiving facility early (Priority Patient) for Rapid Stroke Protocol:
  - Call Registration with patient information for pre-registration
  - Provide clinical findings including **time** of onset and symptoms.
  - Speak directly to Medical Control to determine if patient qualifies for Rapid Stroke Protocol.

Advanced EMT	Intermediate	Paramedic

- If systolic BP > 220 or diastolic > 120, reference HYPERTENSION protocol

- Attempt blood draw if time permits

- Attempt second IV if time permits

TRAUMA PROTOCOLS

INITIAL TRAUMA CARE

Perform INITIAL PATIENT CARE on every situation

The following **INITIAL TRAUMA CARE** should be viewed as an outline for all patients receiving care by affiliated partners under these regional protocols.

PACKAGE PATIENT APPROPRIATELY: Follow Selective C-Spine procedure if indicated

TRANSPORT: Limit scene time to 20 minutes or less unless precluded by extenuating circumstance. Be sure to thoroughly document any delay in transport.

- Call the receiving hospital early with ***Trauma*** criteria per protocol
- Transport patient to the most appropriate trauma facility in accordance with WI field triage and/or RTAC guidelines (see diagrams on next pages)
- If situation creates any of the following, consider activating Mass Casualty Incident (MCI) system for best patient care and regional support:
  - 2 or more Red patients + 2 or more Yellow patients
  - 1 or more Red patients + 4 or more Yellow patients
  - Any situation that creates more patients than locally available resources can manage using routine procedures. This may vary depending on location of incident, weather conditions, and/or concurrent demands/strains on said area's prehospital resources.

Emergency Medical Responder

- Do NOT let any trauma patients eat anything by mouth
- Relieve airway obstruction, if present
  - Open airway with jaw-thrust (no head tilt-chin lift in trauma patients)
- Provide oxygen if SpO_2 <94%
- Be calm and reassuring
- Control any signs of hemorrhage with direct pressure or pressure points
  - Utilize combat gauze, Israeli bandages, and tourniquets as indicated.
- Treat for SHOCK-TRAUMATIC as needed
- Place in position of comfort
- Leave any impaled objects in victim. Stabilize as possible minimizing movement of object.

Emergency Medical Technician

Apply cardiac monitor for any of the following:

- hypotensive patient (MAP <65 or SBP <90)
- Any patient with chest trauma
- Any submersion/near-drowning patient
- Consider monitor for patient with spinal trauma

Advanced EMT	Intermediate	Paramedic

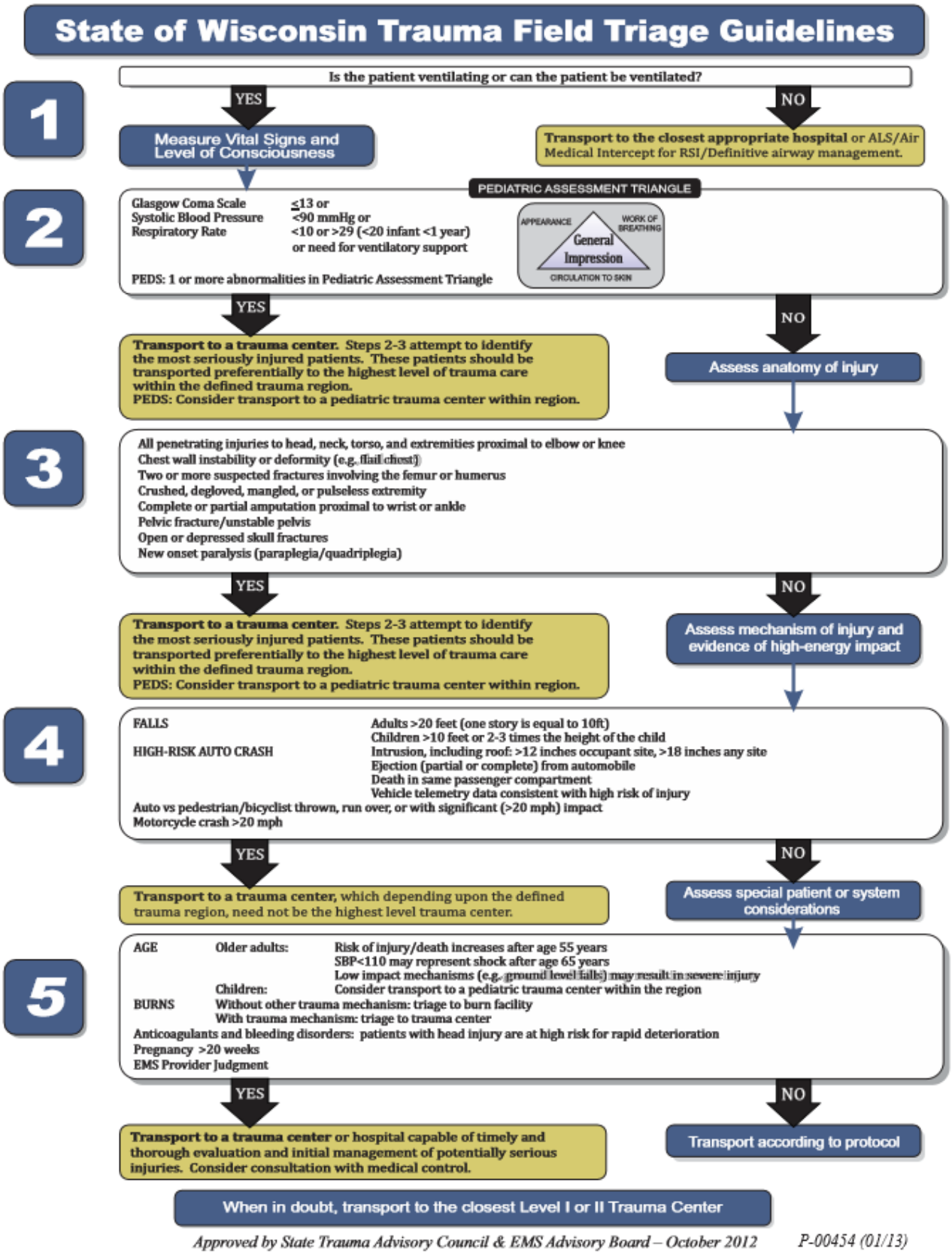
Place IV for any patient with following criteria (large bore 18g or larger preferred) and administer NS at TKO unless indication for bolus (see below)

- Abdominal trauma
- Hypotension (MAP <65 or SPB <90)
- Patient in need of pain control
- Patient in need of airway management

Indications for IV NS bolus: Administer IV NS to maintain SBP between 90-100mm Hg.

- Start with 500mL bolus IV NS
  - Use 250mL bolus for elderly >65, history of heart or kidney failure, or any signs of fluid overload (rales, edema, etc.)
- Optimize hemorrhage control with tourniquets, wound packing using Combat gauze, and/or Israeli bandages as indicated.
- Repeat IV NS boluses x 2 if goal BP not obtained. On third bolus, contact MCP for additional directions and possible permissive hypotension.

Treat per ***Pain Management*** protocol.


State of Wisconsin Trauma Field Triage Guidelines
Is the patient ventilating or can the patient be ventilated?
YES
NO
1
Measure Vital Signs and Level of Consciousness
Transport to the closest appropriate hospital or ALS/Air Medical Intercept for RSI/Definitive airway management.
PEDIATRIC ASSESSMENT TRIANGLE
2
Glasgow Coma Scale ≤13 or
Systolic Blood Pressure <90 mmHg or
Respiratory Rate <10 or >29 (<20 infant <1 year)
or need for ventilatory support
PEDS: 1 or more abnormalities in Pediatric Assessment Triangle
APPEARANCE
WORK OF BREATHING
General Impression
CIRCULATION TO SKIN
YES
NO
Transport to a trauma center. Steps 2-3 attempt to identify the most seriously injured patients. These patients should be transported preferentially to the highest level of trauma care within the defined trauma region.
PEDS: Consider transport to a pediatric trauma center within region.
Assess anatomy of injury
3
All penetrating injuries to head, neck, torso, and extremities proximal to elbow or knee
Chest wall instability or deformity (e.g. flail chest)
Two or more suspected fractures involving the femur or humerus
Crushed, degloved, mangled, or pulseless extremity
Complete or partial amputation proximal to wrist or ankle
Pelvic fracture/unstable pelvis
Open or depressed skull fractures
New onset paralysis (paraplegia/quadriplegia)
YES
NO
Transport to a trauma center. Steps 2-3 attempt to identify the most seriously injured patients. These patients should be transported preferentially to the highest level of trauma care within the defined trauma region.
PEDS: Consider transport to a pediatric trauma center within region.
Assess mechanism of injury and evidence of high-energy impact
4
FALLS
Adults >20 feet (one story is equal to 10ft)
Children >10 feet or 2-3 times the height of the child
HIGH-RISK AUTO CRASH
Intrusion, including roof: >12 inches occupant site, >18 inches any site
Ejection (partial or complete) from automobile
Death in same passenger compartment
Vehicle telemetry data consistent with high risk of injury
Auto vs pedestrian/bicyclist thrown, run over, or with significant (>20 mph) impact
Motorcycle crash >20 mph
YES
NO
Transport to a trauma center, which depending upon the defined trauma region, need not be the highest level trauma center.
Assess special patient or system considerations
5
AGE
Older adults:
Risk of injury/death increases after age 55 years
SBP<110 may represent shock after age 65 years
Low impact mechanisms (e.g. ground level falls) may result in severe injury
Children:
Consider transport to a pediatric trauma center within the region
BURNS
Without other trauma mechanism: triage to burn facility
With trauma mechanism: triage to trauma center
Anticoagulants and bleeding disorders: patients with head injury are at high risk for rapid deterioration
Pregnancy >20 weeks
EMS Provider Judgment
YES
NO
Transport to a trauma center or hospital capable of timely and thorough evaluation and initial management of potentially serious injuries. Consider consultation with medical control.
Transport according to protocol
When in doubt, transport to the closest Level I or II Trauma Center
Approved by State Trauma Advisory Council & EMS Advisory Board – October 2012
P-00454 (01/13)

GLASCOW COMA SCORE

Adult

Eye Opening	Verbal Response	Motor Response
4 – Spontaneous	**5 –** Oriented Answers	**6 -** Obeys verbal commands
3 - To verbal commands	**4 –** Confused Answers	**5 -** Localizes pain
2 - To pain	**3 -** Inappropriate Responses	**4 -** Withdraws from pain
1 - No response	**2 -** Incomprehensible sounds	**3 -** Decorticate posturing
	1 - No response	**2 -** Decerebate posturing
		1 - No response

Infant

Eye Opening	Verbal Response	Motor Response
4 – Spontaneous	**5 -** Coos, babbles	**6 -** Spontaneous
3 - To speech	**4 -** Irritable cries	**5 -** Localizes pain
2 - To pain	**3 -** Cries to pain	**4 -** Withdraws from pain
1 - No Response	**2 -** Moans, grunts	**3 -** Flexion
	1 - No response	**2 -** Extension
		1 - No response

ABDOMINAL TRAUMA

Assess patient for signs and symptoms of serious abdominal trauma realizing that very serious internal injuries may occur with little to no outward signs of injury. Have a low threshold for aero-medical activation if in rural setting or if transport to trauma center will be delayed.

Emergency Medical Responder

- **Initial Trauma Care**
- Abdominal eviscerations should be covered with sterile saline and an occlusive dressing. Do **NOT** reinsert any organs or tissue back into the abdominal cavity.
- Open wounds caused by penetrating injury should be cleaned as possible without introducing contamination into the wound. Cover with sterile dressing. If bleeding is severe, apply modest direct pressure.

EMT	AEMT	Intermediate	Paramedic

- Suspected pelvic fractures should be splinted with a binding device such as towels, sheets or SAM pelvic binder. **(See pelvic immobilization procedure)**.

BURNS

Emergency Medical Responder

- **Initial Trauma Care**

- Stop the burning process:
  - Chemical - Remove affected clothing, brush off dry chemicals, then flush with copious amounts of water.
  - Tar - Cool with water. **DO NOT REMOVE TAR**

- Determine:
  - The extent of body surface area (BSA) involved (see chart)
    - Note: First degree burns do not count toward % BSA affected
    - Best way to tell between first and second degree burns is if skin is edematous and blistered (2nd degree) versus just reddened (1st degree)
  - The degree and type of burn (thermal, electrical, chemical, radiation)
  - Consider possible exposure to cyanide or phosgene
  - Potential inhalation and associated injury

- Apply clean dry dressings to the burned area:
  - **Water Gel** dressing may be used (**See Water Gel Procedure**)
  - May use a cool saline dressing if **<5%** BSA burned

- Maintain patient body temperature as hypothermia could be a concern.

- Consider aero medical transport directly to a burn center for any patient with critical burn criteria (see below)

- Bronchospasm or wheezing present:
  - **Albuterol** 2.5mg via nebulizer
    - May repeat as needed every 5-10 min

Emergency Medical Technician

If bronchospasm or wheezing present:

- **Albuterol: 2.5 mg** via nebulizer every 5-10 minutes as needed
- **Ipratropium Bromide (Atrovent): 0.5mg** via nebulizer x 1 dose

Advanced EMT

- IV **NS** at **150 cc/hr**

- For critical burns, **Fluid Bolus: 0.25mL x (body weight in kg) x % BSA burned. Goal to infuse this volume within the first hour of treatment. If patient is hypotensive, see Shock-Traumatic protocol for fluid management guidelines.**

BURNS

Intermediate	Paramedic

****Inhalation burn injuries must be treated quickly and aggressively****

Consider:

- ***Drug Facilitated Airway Management (DFAM)***
- Surgical Airway **(See surgical airway procedure)**

CRITICAL BURNS
Notify Medical Control / Consider direct transport to a burn center

- **2nd and 3rd degree burns ≥ 10% BSA: Age < 10 or >50 years**
- **2nd and 3rd degree burns ≥ 20% BSA: Any Age**
- **Burns to the face, hands, feet, genitalia, perineum, major joints**
- **3rd degree burns: ≥ 5% BSA**
- **Special burn types and situations:**
  - **Electrical / lightning**
  - **Chemical**
  - **Inhalation injury**
  - **Circumferential chest or extremity injury**
- **Presence of significant pre-existing medical disorders**
- **Presence of other significant injury**

BURNS

BURN CHART / RULE OF NINES

AREA	ADULT %	INFANT%	CHILD%
Head & Neck	9	20	15
Arm:			
Right	9	10	10
Left	9	10	10
Torso:			
Front	18	20	20
Back	18	20	20
Leg:			
Right	18	10	15
Left	18	10	15
Genitalia & Perineum	1	1	1
Total	100	100	100

DETERMINE THE DEGREE / DEPTH OF BURN

Degree	Depth	Color / Appearance	Skin Texture	Cap Refill	Sensation
1st	Superficial epidermis	Red	Normal	Yes	Yes
2nd	*Superficial* partial-thickness	Red; may be blistered	Edematous	Yes	Yes
	Deep partial-thickness	Pink to white	Thick	Possibly	Possibly
3rd	Full-thickness	White, black, or brown	Leathery	No	No
4th	Involves sub-q tissue, tendon, or bone	Variable	Variable	No	No

CARDIO – THORACIC TRAUMA

All penetrating injuries from the navel to the neck should be treated as a chest injury*

Emergency Medical Responder

- **Initial Trauma Care**
- Seal **ALL** penetrating chest wounds with **commercial chest seal (See Chest Seal Procedure)**, vaseline gauze, occlusive dressing, plastic bag, exam glove, or other field expedient material. (tape down all four sides).
- Vaseline gauze, commercial chest seals,
- If penetrating injuries on both sides of chest, repeat the above two steps as indicated.
- Place the patient in a position of comfort if spinal immobilization is not indicated
- Stabilize flail segments or impaled objects

EMT AEMT

- If time permits, acquire a 12 lead ECG and transmit to the receiving facility

Intermediate | Paramedic

- Perform needle thoracostomy (chest decompression) if signs and symptoms of a pending tension pneumothorax are present **(See Chest Decompression Procedure)**

2nd intercostal space, mid-clavicular line **OR** **4th intercostal space, mid-axillary line**

EXTREMITY TRAUMA

EMR	EMT	AEMT	Intermediate	Paramedic

- **Initial Trauma Care**
- Apply manual stabilization, control bleeding and dress open wounds. Use hemostatic dressing (**See Topical Hemostatic procedure** or tourniquet (**See Tourniquet procedure**) if indicated.
- Immobilize and splint extremity in anatomic position if possible and apply ice. Assess and document CMS of injured limb before and after repositioning.
- Wrap any amputated parts in dry sterile dressings, seal in a plastic bag and place in ice water.
- Apply traction device or splint to suspected angulated or displaced femur fractures.
- Assess for pulse and sensation/motor function distal to any suspected fracture to determine if neurovascular function is intact or compromised.

Contact Medical Control if neurovascular function is compromised

EYE INJURIES

EMR	EMT	AEMT	Intermediate

Blunt trauma:

- Covered injured eye with dressing or rigid eye shield.
- Cover unaffected eye.

Penetrating trauma:

- Immobilize impaled objects in place.
- Cover unaffected eye.

Chemical exposure / trauma:

- Irrigate with **NS** for at least 10 minutes.

Paramedic

Blunt, Penetrating and Chemical:

- **Tetracaine: 2 drops** in the affected eye for pain. May repeat as needed.

NEURO TRAUMA: (HEAD INJURY)

EMR	EMT	AEMT	Intermediate

- **Initial Trauma Care**
- Avoid use of NPA with suspected basilar skull fracture if any resistance at all is felt, unless patient has compromised airway/ventilations and all other attempts at ventilation are unsuccessful
- Maintain c-spine immobilization.
- Check blood sugar for any altered mentation. Refer to ***HYPOGLYCEMIA*** protocol.
- Transport with the patient's head elevated 30 degrees if possible.
- Assess, monitor and document at 5 minute intervals:
  - Glasgow coma scale
  - Pupillary response
  - Breathing pattern
  - Level of consciousness
- Always check and correct **airway**, **oxygenation**, **blood pressure** or **other traumatic conditions (tension pneumothorax)** before attributing deterioration to a neurological cause.

Paramedic

- Maintain $EtCO_2$ between 35-45 for all head injury patients (preferred 35-40) Monitor closely for any signs of herniation:
  - Unilateral pupillary dilation
  - Worsening clinical status despite appropriate management
- Consider ***Drug Facilitated Airway Management (DFAM)*** if indicated and follow suspected head trauma/ **3-2-1 protocol**

PULSELESS ARREST - TRAUMATIC

Determine cause of the cardiac arrest. **Follow this protocol if it is <u>CLEAR</u> that the cardiac arrest was caused by a traumatic event.**

The utilization of chest compressions and Advanced Cardiac Life Support (ACLS) medications in the setting of Advanced Trauma Life Support (ATLS) resuscitation is of limited, if any, benefit until the bleeding has been stopped.

Emergency Medical Responder

- **Initial Trauma Care**

- Follow the traumatic arrest algorithm and perform **Life Saving Interventions (LSI)** to your scope of training. Chest compressions are <u>NOT</u> indicated until all LSI are performed to attempt to reverse cause of arrest.

- If possible, determine the patient's code status or check for presence of a DNR bracelet.

- **Begin Life Saving Interventions (LSI) such as:**

    - Place a tourniquet on any extremity that appears to have received any trauma.

    - Apply Israeli bandage and/or combat gauze to any other wounds that are bleeding heavily (arterial)

    - Open the airway using the jaw-thrust maneuver. Provide ventilations using a BVM with a NPA, OPA or supra-glottic/non-visualized airway device.

    - If penetrating chest injury is present perform one of the following on all chest wounds:
        - Commercial Chest Seal (See Chest Seal Procedure)
        - Vaseline gauze occlusive dressing (seal all four sides)
        - If above not available, seal any chest wound with plastic bag, glove, or other field expedient material (seal all four sides).

- After the above LSI are completed, begin chest compressions.

- CPR can be withheld in Traumatic Cardiopulmonary Arrest under the following circumstances:

    <u>Option 1</u>: Patient is pulseless after a blunt trauma incident –-OR— isolated penetrating trauma to the head, provided all the following criteria are present:
    - Pulseless and apneic
    - Lack of pupillary reflexes and spontaneous movement
    - AED states "no shock advised"

    <u>Option 2</u>: Patient is pulseless after a severe traumatic injury, arrival at the nearest ED cannot be accomplished within 15 minutes **and** transport has not been initiated, **and** all the following criteria are present:
    - Pulseless and apneic
    - Lack of pupillary reflexes and spontaneous movement
    - AED states "no shock advised"

PULSELESS ARREST - TRAUMATIC

Emergency Medical Responder

Option 3: Patient is pulseless after a severe traumatic injury, CPR has been in progress on scene for >15 min prior to your arrival **and** the following criteria are met:

- Pulseless and apneic
- Lack of pupillary reflexes and spontaneous movement
- AED states “no shock advised”

EXCEPTIONS to the above scenarios:

- Cardiac arrest is **NOT** consistent with traumatic cause
- Lightning or other high voltage injuries
- Drowning or submersion injuries
- Suspected hypothermia
- Transport has been initiated
- Pregnancy 20 weeks or more (fundus at umbilical height or higher)

Contact Medical Control with any additional questions or
to discuss termination of resuscitation in field

EMT	AEMT

- Request an ALS intercept
- Immediate, rapid, safe transport to the nearest appropriate trauma facility

Intermediate	Paramedic

- Immediate, rapid, safe transport to the nearest appropriate trauma facility
- An ETT may be used in lieu of a supra-glottic/non-visualized airway device
- ACLS drugs not indicated unless ordered by medical control

SHOCK – TRAUMATIC

Any signs of shock in the setting of trauma are critically important and represent a pre-arrest state. Patients may decompensate into an arrest state at any time and are to be treated very aggressively to attempt to avoid decompensation. Controlling hemorrhage and rapid transport to an appropriate trauma facility are of utmost importance.

Emergency Medical Responder

- Initial Trauma Care
- Consider that a medical problem may have preceded/caused the traumatic injury. Perform **Initial Medical Care** and check blood glucose as indicated.
- Focus on hemorrhage control (wound packing, tourniquet, Israeli bandages)
- If patient loses spontaneous breaths and central pulses, refer to **Pulseless Arrest - Traumatic protocol.**
- Place patient in Trendelenburg position or elevate the patient's legs if not contraindicated due to traumatic injuries.
- Keep the patient warm (Recommended 85 degrees Fahrenheit in ambulance)

Emergency Medical Technician

- Call for an ALS intercept or aeromedical assistance for any trauma patient with signs of shock**. **Goal is to get these patients to an appropriate trauma facility as quickly as possible.****
- Immediate transport to highest level trauma facility. Do not delay scene time except to control hemorrhage
- Obtain 12 lead ECG and transmit to the receiving facility.
- Notify receiving facility as early as possible about the status of the patient with traumatic shock
- Apply SAM pelvic binder/splint or other approved pelvic splint in event of a suspected pelvic injury

Advanced EMT

- Target BP in trauma patient is 90-100 Systolic (permissive hypotension)
- Place (2) large bore IVs if possible and time allows (consider IO if IV cannot be established)

SHOCK – TRAUMATIC

Advanced EMT - *continued*

- Fluid Bolus for SBP<100 mmHg or heartrate >120bpm.
  - Goal is to maintain SBP between 90-100mm Hg.
  - Start with 500mL bolus IV NS
  - Start with 250mL bolus for patients >65 years old, or patients with a history of heart or kidney failure, or any signs of fluid overload (rales, edema, etc.)

- Reassess and repeat IV NS boluses x 1. On second bolus, contact MCP for additional directions and possible permissive hypotension.

- Keep fluids to a minimum as they will dilute out remaining red blood cells causing worsened anemia.

Contact Medical Control if neurovascular function is compromised

Intermediate

- If signs of tension pneumothorax: perform needle decompression on the affected side(s).

- Consider EJ if IV cannot be established.

Paramedic

- Infuse 1L **NS** as rapidly as possible

- If patient still hypotensive SBP<90 after 1L NS, start a vasopressor and titrate to achieve SBP 90-100 or MAP ≥ 65

  - First choice vasopressor, **Norepinephrine**: **4mg in 250ml NS at 4-6 mcg/min**
  - Alternate vasopressor **Dopamine**: **2 – 10 mcg/kg/min** (See drip chart – Appendix A)
  - If patient is bradycardic, **Epinephrine (1mg/mL):** **1mg in 250mL NS at 2-10 mcg/min**

- **Consider Tranexamic Acid (TXA): 1 gram (mixed in 50 cc saline) over 10 minutes**
  - **Inclusion criteria**:
    - Age ≥18
    - Injury <3 hours prior, no clinical signs of clotting
    - All appropriate hemorrhage control measures must be applied to patient prior to TXA use
    - 1L NS must be infused before TXA is indicated
    - If within 5 min of arrival at the receiving facility, consider contacting Medical Control on use of TXA.
  - ***At handoff, notify receiving staff that TXA was used in the field and that PCC is contraindicated (share warning sheet with staff).***

SPINAL TRAUMA

Emergency Medical Responder

Initial Trauma Care

EMT AEMT Intermediate Paramedic

All patients with clinical indications of spinal injury (focal or global neurological deficits such as weakness, paralysis or sensory change) should be immobilized with a cervical collar.

Patients having a high risk of cervical spine injury due to dangerous mechanism and presenting with any of the following should be immobilized with a cervical collar:

- Suspected intoxication (drug or alcohol) or otherwise altered mental status
- Age >65 years
- Presence of midline bony tenderness of the cervical spine
- Midline spinal pain with movement of the cervical spine (neck)
- Presence of a distracting injury
- Patient's inability to communicate with EMS providers
- EMS provider discretion

- Dangerous mechanism includes but is not limited to: Falls > 3 feet or 5 stairs, axial load injuries (i.e. diving), high speed MVC, rollover, ejection, motorized recreational vehicle crashes and bicycle crashes.

- Patients immobilized with a cervical collar should be transported with their head in neutral alignment and padded as necessary.

- **Selectively immobilize patients with penetrating trauma (e.g. gunshot or stab wound) only if they meet the above criteria.** Emphasis should be placed on airway management, treatment of shock, and rapid transport to a Trauma Center.

- **Utilize the long spine board, scoop stretcher, or Kendrick Extrication Device (KED) to minimize movement of the patient when moving them from the point of injury to the cot.** Once the patient is moved to the cot, using the log roll or lift-and-slide technique, lay the patient flat on the cot and leave the c-collar in place. The head of the cot may be elevated as needed for patient comfort.

- **Do NOT transport a patient to the hospital on a backboard, scoop stretcher, or KED unless necessary for patient safety and/or comfort.** Patients who are markedly agitated and/or confused from a head injury or medical condition may not be able to follow commands with regard to minimizing spinal movement. These patients **should remain** on a backboard if the crew deems it safer for the patient. This decision will be at the discretion of the crew and shall be documented on the Patient Care Report.

SPINAL TRAUMA

- **Multi – system blunt trauma patients,** such as from a high velocity crash or significant fall, **who are unable to follow commands** due to combativeness, intoxication, or decreased mental status, **should remain on the backboard or scoop for their safety until handed off to the ED.**

- Patients who are **300 lbs in size or larger**, preference to **keep patient on the backboard** if possible to best facilitate evaluation in the Emergency Department. If patient becomes significantly uncomfortable, remove backboard using spinal precautions and document this in Patient Care Report.

- If manual cervical stabilization is hampering efforts to intubate the patient or otherwise control the airway, **the patient's head may be moved to allow securing of the airway.** An unsecured airway is a far greater danger to the patient than a spinal fracture. Reapply cervical stabilization after airway is secured.

- Document the initial LOC / mental status, extremity function and sensory level.

- Reassess at 5 minute intervals to monitor for deterioration.

******NOTE******

A "horse collar" extrication device may be used in lieu of a KED if the patient must be rapidly extricated due to life threatening injuries or situation.

SUBMERSION (NEAR DROWNING)

- ❖ Rescuer safety is paramount.
- ❖ If victim is still in the water, dispatch water rescue resources.
- ❖ Death is from asphyxiation which may be “wet” or “dry”. Wet drowning is due to aspiration of water which will likely cause pulmonary edema. Dry drowning is due to asphyxiation from laryngospasm which keeps the lungs free of water contamination. The management of each of these types of drowning is the same.
- ❖ Aggressive cardio-respiratory resuscitation is key. Follow standard ACLS protocols unless patient is hypothermic.

Emergency Medical Responder

- Initial Trauma Care
- Initial Medical Care (patient may have had medical cause preceeding submersion injury)
- Ensure proper airway, placing oxygen via NRB or ventilating with BVM as indicated. Place airway adjunct or Non – Visualized Airway (NVA) if indicated.
- Check SpO_2 and other vitals every 5 minutes.
- Check blood glucose level. Treat per Hypoglycemia protocol as indicated.
- Assess for and treat possible hypothermia (hypothermia may happen in any temperature water and any season/ambient temperature).
- If SCUBA related, collect all dive gear, gauges and computer and transport with patient.

Emergency Medical Technician

- Apply CPAP if respiratory distress is present.
- Transport in head down, left lateral recumbent position if decompression injury is suspected. (This traps possible bubbles in the right atrium and lowers chances of arterial gas embolism)
- Consider scene flight to nearest **emergency** hyperbaric chamber- (Hennepin County, MN, etc.)
- Treat cardiac arrest, pulmonary edema, respiratory distress, hypothermia, etc. per protocol.

SUBMERSION (NEAR DROWNING)

Advanced EMT | Intermediate

- Initiate IV/IO **NS** TKO. Avoid large fluid boluses unless necessary as pulmonary edema may be present or may develop rapidly.
- Intubate if indicated using ETT or Non – Visualized Airway (NVA).

Paramedic

- Consider **Drug Facilitated Airway Management (DFAM)** if indicated.

Pediatric Protocols

Less than 13 years old

Or

Less than 40 kg

INITIAL PEDIATRIC CARE

The following **INITIAL PEDIATRIC CARE** should be viewed as an outline for all pediatric patients receiving care by affiliated partners under these regional protocols.

Age based pediatric vital signs for reference:

Age	Normal Heartrate (beats/min)	Normal Respiratory rate (breaths/min)	Hypotension (SBP)
0-3 months	140-160	40-60	<70
3-6 months	140-160	40-60	<70
6mo – 1year	120-160	30-60	<72
1-2 years	100-140	24-40	<75
2-3 years	90-140	24-40	<80
3-4 years	90-140	24-40	<80
4-6 years	80-110	22-34	<82
6-8 years	75-100	18-30	<86
8-12 years	75-100	18-30	<90

Emergency Medical Responder

Initial Patient Care

Provide oxygen if pulse ox <94% unless stated differently in condition specific protocol

Be calm and reassuring

Treat for shock as needed

Place in position of comfort

All pediatric patients regardless of age should receive a complete set of vital signs including: pulse rate and quality, respiratory rate and quality, blood pressure, and oxygen saturation, unless it would agitate the patient

Any pediatric patient with altered mental status, potential seizure activity, or who is a known diabetic should receive a blood glucose check

INITIAL PEDIATRIC CARE

Emergency Medical Technician

Apply cardiac monitor and obtain 12-lead EKG for patients with any of the following:

- Abnormal heartrate (based on age appropriate vital signs, unless easily explained by fever or severe pain)
- Potential overdose
- Potential carbon monoxide poisoning
- Any signs of shock/poor perfusion based on clinical assessment
- Hypotension (based on age appropriate blood pressure values)
- Severe respiratory distress, Hypoventilation or apnea, or signs of pulmonary edema

AEMT Intermediate Paramedic

IV NS at TKO (if safe to do so and clinically indicated)

PEDIATRIC: Allergic Reaction / Anaphylaxis

SYMPTOMS:
- ***MILD*:** localized swelling or rash
- ***MODERATE*:** generalized rash, hives, bronchospasm/ wheezing
- ***SEVERE*:** anaphylaxis, hypotension -systolic BP < 90, airway compromise

Emergency Medical Responder

- **Initial Pediatric Care**
- Remove patient from the area to avoid further contact with allergen
- Remove stinger if possible by scraping, not tweezing

Mild Symptoms:
- Monitor patient.
- Apply cold pack to site if localized reaction with swelling.

Moderate and Severe Symptoms:

EPI-PEN Junior auto injector to lateral thigh • May repeat every 10–15 minutes with increasing symptoms • May administer through the patient's clothing	OR	**Epinephrine (1:1,000 or 1mg/mL): 0.15 mg (0.15mL)** IM • May repeat every 10–15 minutes with increasing symptoms • Best place to administer is lateral thigh • May administer through clothing if necessary
If bronchospasm or wheezing present: • **Albuterol: 2.5 mg** via nebulizer **(**May repeat as needed every 5-10 minutes)		

Note: for patients 66pounds or more, use adult dose of epinephrine

Emergency Medical Technician

Moderate and Severe Symptoms:
- If bronchospasm or wheezing present:
  - Ipratropium Bromide (Atrovent)**:** **0.5 mg** via nebulizer x 1 dose
  - Albuterol: **2.5 mg** via nebulizer
    - May repeat as needed every 5-10 minutes
- Consider cardiac monitor.
- Treat for *SHOCK* per protocol.

PEDIATRIC: Allergic Reaction / Anaphylaxis

Advanced EMT

- Consider **NS** fluid bolus as indicated.
- Continue nebulizer treatments as per **EMR/BASIC** protocol
  - May repeat **Albuterol** every 5-10 minutes as needed

Intermediate

Severe symptoms:

- Epinephrine (0.1mg/mL): **0.01 mg/kg (0.1 mL/kg)** IV/IO
  - Give slowly over 2 – 5 minutes
  - **Max: 0.50 mg**
- **Fluid bolus: 10 mL/kg**
  - Repeat to maintain age appropriate blood pressure
  - Refer to *SHOCK* protocol

Paramedic

Mild symptoms:

- Diphenhydramine (Benadryl): **1 mg/kg** IV/IM
  - **Max: 50 mg**

Moderate symptoms:

- Methylprednisolone (Solumedrol): **2 mg/kg** IV
  - **Max: 125 mg**

Severe symptoms:

****Per Medical Control Physician Order****

- Epinephrine Infusion: **0.1 – 1 mcg/kg/min**
  - **Max: 10 mcg/min**

PEDIATRIC: Altered Level of Consciousness

❖ Common causes of decreased LOC in pediatrics are hypoxia, hypoglycemia, febrile illness, seizure/postictal, medication ingestion / overdose and trauma.

Emergency Medical Responder

- **Initial Pediatric Care**
- Ensure patent airway. Ventilate as indicated. Consider airway adjunct if needed.
- Check blood glucose level. Treat according to **HYPOGLYCEMIA** protocol as needed.
- Check temperature. Consider fever/sepsis as cause.
- Consider possibility of traumatic injury.
- Treat possible **HEAD INJURY** per protocol.
- Treat possible **SPINAL TRAUMA** per protocol.
- Explore the possibility of drug ingestion. Interview family and caregivers for possible clues and/or medication bottles, etc. Treat possible **POISONING / OVERDOSE** per protocol.

EMT AEMT Intermediate

- Monitor cardiac rhythm, vitals and SpO_2 frequently.

Paramedic

- Consider **Drug Facilitated Airway Management (DFAM)** if clinically indicated.

PEDIATRIC: Behavioral Emergencies

❖ Whenever possible, use communication rather than force to gain permission to assess, provide care, and/or transport patients experiencing behavioral emergencies

Emergency Medical Responder

- **Initial Pediatric Care**
- Assess for possible ***hypoxia, hypoglycemia, alcohol or drug intoxication, stroke or brain trauma****. Do not assume all agitation is behavioral- think of medical emergencies. Investigate possible medications the patient has had access to and make note or provide them to transport agency.*

EMT	AEMT	Intermediate

- Physical restraints may be needed for patients whose behavior is physically threatening to themselves or others. **(See restraint policy)**
- Attempt to have law enforcement involved and take the lead in gaining physical control of patient.
- Apply restraints only to an appropriate level where patients can be controlled.
- Notify medical control as soon as possible of use of physical restraints.
- **Never restrain a patient in a prone position as this may cause positional asphyxia**
- Cardiac monitor, SpO_2, BP, HR, RR, glucose level, and mental status frequently after patient has been physically restrained

Paramedic

Mild / Moderate Agitation:

- Consider **Midazolam (Versed)**: **0.1 mg/kg** IV/IM; **0.2 mg/kg** Intranasal (If no IV) (See dosing chart)
    - **Max: 5 mg**
    - May repeat ½ **dose** in 5 minutes if violent behavior persists
    - May give **IM** through clothing if necessary
    - ***USE CAUTION*** *in patients with coma, respiratory depression, hypotension, alcohol or sedative OD*

PEDIATRIC: Behavioral Emergencies

Paramedic - *continued*

Severe Agitation / Combative: (Behavior with high probability of injury to patient or others, to include ***excited delirium***)

- Rapid sedation is key to de-escalation
- Consider **Ketamine: 5 mg/kg** IM or **1 mg/kg** IV
    - May repeat **2.5 mg/kg** IM or **0.5 mg/kg** IV PRN
    - May give **IM** through clothing if necessary
    - **Precautions:**
        - Consider sedation with **Midazolam 0.05mg/kg** before patient wakes due to possible "Emergence Reaction"
        - May need to position the head and suction the airway as Ketamine increases secretions.

Post Sedation Care:

- Monitor respiratory effort frequently
- Establish IV/IO access, run NS at least TKO, bolus as indicated
- Cardiac monitor and $EtCO_2$ with nasal prongs
- Record BP, HR, RR, SPO_2 and $ETCO_2$ ideally every 5 minutes after sedation
- Intervene with airway adjunct, BVM or intubation/DFAM if needed

****Per Medical Control Physician Order****

- **Higher doses of Midazolam (Versed) or Ketamine**

PEDIATRIC: Bradycardia *(With Cardio-Respiratory Compromise)*

EMR

- **Initial Pediatric Care**
- Apply supplemental 100% O2 regardless of pulse ox reading for any bradycardia with signs of cardio-respiratory compromise
    - Open airway as necessary, supplement respirations as necessary
- Persistent symptomatic bradycardia **(HR <60/min with poor perfusion)**
    - Begin chest compressions (At least 100/min)
    - Compression to ventilation ratio (15:2 for 2 rescuer, 30:2 for single rescuer)
- Check blood glucose level and treat hypoglycemia if present.
    - Refer to HYPOGLYCEMIA protocol
- Treat hypothermia if present
- Assess for any potential toxic ingestion and treat according to overdose protocol
- Re-evaluate after 2 minutes of chest compressions and ventilations.

EMT

AEMT

Intermediate

For Persistent Symptomatic Bradycardia: HR <60/ min with chest compressions and positive pressure ventilation

- **Epinephrine (0.1mg/mL): 0.01 mg/kg (0.1 ml/kg)** IV/IO (Repeat q 4 min)
- If no IV/IO, give **Epinephrine** (**1mg/mL**): **0.1 mg/kg (0.1 ml/kg)** ETT
    - Flush with 2 – 5 cc NS
    - Repeat q 4 min
- **Atropine: 0.02 mg/kg** IV/IO **(For increased vagal tone or primary AV block)**
    - Minimum Dose: 0.1 mg
    - May repeat once
    - **Max single dose: 0.5 mg / Max total dose: 1.0 mg**
- Consider **Transcutaneous pacing**: Set pacer to **70 BPM / 30 MA (**Increase MA until capture)

PEDIATRIC: Bradycardia *(With Cardio-Respiratory Compromise)*

Paramedic

Consider sedation prior to pacing:

- **Ketamine**: **0.25 mg/kg IV** (over 1-2 minutes), **0.5 mg/kg IN or IM**
    - May repeat every 5 minutes to a total of 4 doses if inadequate response is achieved, then every 10-15 minutes as needed.
    - May use in conjunction with **Midazolam** **0.05 mg/kg** IV / Intranasal / IM if needed. Be sure to monitor vitals, cardiac monitor and $EtCO_2$ as with full dose ketamine administration.
- For pacing ≥15kg, use adult transcutaneous pacemaker
- For pacing <15kg, use pediatric pads
    - Use lowest setting that provides ventricular capture (both electrical EKG signal as well as palpable pulse)
    - Set rate to 100bpm regardless of age of pediatric patient
- If pacing ineffective and pt with persistent bradycardia and signs of poor perfusion, consider use of dopamine:
    - **Dopamine** 5-20 mcg/kg/min (See dosing chart)

PEDIATRIC: Carbon Monoxide Intoxication

- Carbon monoxide is colorless and odorless, binding to hemoglobin 200+ times stronger than oxygen. Fetal hemoglobin as even greater affinity for CO. Half-life of binding is 320 minutes on room air. CO causes asphyxia as well as direct toxicity to the heart, brain and nervous system.
- **Symptoms may include but not limited to:** N/V, headache, abdominal pain, weakness, dizziness, dyspnea, chest pain, changes in gait or behavior, mental status changes, cardiac ischemia or ectopy, seizures.
- Consider CO poisoning if multiple family members presenting with N/V or "flu-like" illness
- Pulse oximetry reads the percentage of hemoglobin bound to something. Typically this is oxygen but the pulse ox cannot distinguish oxygen from CO and reads only the percentage of hemoglobin which is bound to anything. CO will displace oxygen from hemoglobin but will give you a seemingly normal SpO_2 reading. Do not rely on this!
- Utilize atmospheric monitoring device to assess for background CO levels. If elevated, ensure evacuation the area until CO is ventilated and the source is found and mitigated. Be mindful of prehospital provider safety!

EMR	EMT	AEMT

- **Initial Pediatric Care**
- SpO_2, BP, HR, RR, glucose level, and re-assess mental status frequently. Remember that CO will artificially raise the SpO_2 level so **don't rely on SpO_2**.
- Provide high flow NRB **O_2** with suspected CO intoxication despite a seemingly normal SpO_2.
- Support ventilations as needed using assisted BVM ventilations, NPA / OPA or appropriate supraglottic/nonvisualized airway if indicated.
- Screen all area occupants utilizing a CO co-oximeter if available

0 – 5%	Considered normal in non-smokers. When symptomatic at any level, consider high flow oxygen and evaluate environment for CO sources. In absence of symptoms, no further medical evaluation of SpCO needed.
5 – 10%	Considered normal in smokers, abnormal in non-smokers. If symptoms are present, place high flow oxygen and transport. If no symptoms, release is acceptable. Provide CO education.
10 – 20%	Abnormal in any patient. With no symptoms consider high flow oxygen until CO level is <5% otherwise transport for further evaluation and management.
≥ 20%	Significantly abnormal in any patient. Administer high flow oxygen, regardless of symptoms. Consider call to medical control for possible transfer directly to hyperbaric oxygen facility.

PEDIATRIC: Carbon Monoxide Intoxication

Intermediate

- If unable to maintain the airway, consider endotracheal intubation or nonvisualized airway placement
- Provide supportive care including standard PALS interventions if needed.

Paramedic

- If CO source is from burning materials such as plastic, carpet, insulation, clothing or other synthetics, **strongly consider cyanide intoxication as well.**
    - See ***Poisoning / Overdose*** protocol

PEDIATRIC: Hypoglycemia

Symptoms of Hypoglycemia:
Confusion, anxiety, palpitations, hunger, headache, irritable, seizure, unconscious, tremulous, fatigue

Emergency Medical Responder

Initial Pediatric Care

Blood glucose check: 60-70 mg/dl –AND— patient is symptomatic
- Oral Glucose: **7.5g** placed in buccal mucosa

Blood glucose check: < 60 mg/dl
- Oral Glucose: **15g** placed in buccal mucosa

Reassess blood glucose after 5 min

Emergency Medical Technician

- If level of consciousness ***is*** depressed:
  - **Glucagon:**
    - **For child <20kg: 0.5mg IM**
    - **For child >20kg: 1mg IM**
    - **May repeat dose x1 after 20min if no response**
  - Reassess blood glucose level after approximately 10-15 minutes. *Patient may not respond for 10-15 minutes after **Glucagon** administration.*

-- Contact medical control for direction on patients who have been treated for hypoglycemia and are refusing transport --

Advanced EMT | Intermediate | Paramedic

If blood glucose <60 –OR— blood glucose <70 and patient symptomatic, option of glucagon above or D10 below for treatment:

- Administer IV Dextrose in the form of D10:
  - **D10: dose is 5mL/kg which is 0.5g/kg of glucose**
  - **Use chart below for reference**

PEDIATRIC: Hypoglycemia

Advanced EMT – *cont.*	Intermediate -*cont.*	Paramedic -*cont.*

- **Assess patient response 5 minutes after infusion:** Mental Status and blood glucose level
  - If blood glucose 70 or greater: Ongoing assessment
  - If blood glucose less than 70:
    - Repeat initial D10 dose x 1. Reassess patient 5-10 minutes after administered. Initiate transport to hospital.
    - For persistent blood sugar <70, repeat initial D10 dose (third dose of D10). If still <70 after 5-10minutes, contact Medical Control for further orders/recommendation while in transport.

Pediatric IV Dextrose/D10	
Patient Age	**Dose: mL of D10**
Birth	**18**
1 month	**22**
3 months	**30**
6 months	**39**
9 months	**45**
1 year	**49**
18 months	**56**
2 years	**61**
3 years	**72**
4 years	**82**
5 years	**93**
6 years	**100 (adult dose)**
7-8 years	**100 (adult dose)**
9-11 years	**100 (adult dose)**

PEDIATRIC: Nausea / Vomiting

EMR

- **Initial Pediatric Care**
- Keep patient NPO.
- If decreased LOC, place patient in left lateral recumbent position if no contraindications.
- If multiple family members in same household affected and seem quite ill, consider possibility of CO poisoning in the right circumstances

EMT

Advanced EMT

- **Fluid bolus: 20 mL/kg** IV x 1 bolus

Intermediate

Paramedic

Moderate to severe nausea / vomiting:

- **Ondansetron (Zofran): 0.1 mg/kg** slow IV
  - **0.2 mg/kg** IM or Intranasal if unable to establish an IV
  - Monitor for allergic reaction, arrhythmia, dystonia
  - If >15kg may use Ondansetron (Zofran) 2mg ODT

Ondansetron (Zofran) – Intranasal / IM
4 mg/ 2ml (2 mg/ml)
Dosage is **0.2 mg/kg** + 0.1 ml dead space. Give ½ the volume in each nostril

Patient	Weight		Dose: mg / ml	Total Volume
	Lbs.	kg		
GREY / PINK	7 – 16	3 – 7	1.0 mg / 0.5 ml	0.6 ml
RED	17 – 21	8 – 9	2.0 mg / 1.0 ml	1.1 ml
PURPLE	22 – 25	10 – 11	2.0 mg / 1.0 ml	1.1 ml
YELLOW	26 – 31	12 – 14	2.0 mg / 1.0 ml	1.1 ml
WHITE	32 – 40	15 – 18	3.0 mg / 1.5 ml	1.6 ml
BLUE	41 – 50	19 – 23	4.0 mg / 2.0 ml	2.1 ml
ORANGE	51 – 65	24 – 29	4.0 mg / 2.0 ml	2.1 ml
GREEN	66 - 79	30 – 36	4.0 mg / 2.0 ml	2.1 ml

NEONATAL RESUCITATION

(See OBSTETRICAL DELIVERY Procedure)

EMR	EMT

- **Initial Pediatric Care**
- After baby delivers, note the time of the delivery
- Warm and dry the infant
- Position and clear airway using bulb syringe, provide tactile stimulation
    - Suction mouth, oropharynx, and then nose
- Evaluate respirations, heart rate, color, and muscle tone:
    - **Pt. Breathing, HR >100, pink** – observational care
    - **Pt. Breathing, HR >100, cyanotic** – supplemental oxygen
    - **Pt. Apneic (or) HR <100 (or) persistent cyanosis**:
        - Positive pressure ventilation: **40-60 ventilations per minute**
    - **HR <60**
        - Chest compressions and ventilations – **3:1 ratio (120 events per minute)**

For all infants requiring oxygen: Use 21-30% oxygen with ventilations and titrate up if goal SpO2 levels based on age are not met (see table below). Avoid flow >10L/min.

Target SpO2 based on time after birth:

1 min	60-65%
2 min	65-70%
3 min	70-75%
4 min	75-80%
5 min	80-85%
10 min	85-95%

- **Notify medical control ASAP**
- Determine **APGAR** score at 1 and 5 minutes

NEONATAL RESUCITATION

EMR -*continued*

EMT -*continued*

APGAR SCORE				
SIGN		0	1	2
Appearance:	(Skin Color)	Blue / Pale	Pink body / Blue extremities	PINK
Pulse:	(Heart Rate)	Absent	< 100	> 100
Grimace:	(Irritability)	No response	Grimaces	Cries
Activity:	(Muscle Tone)	Limp	Some flexion of extremities	Active motion
Respiratory:	(Effort)	Absent	Slow and irregular	Strong cry
Score	(1 minute)			
Score	(5 minutes)			

Advanced EMT

HR < 60 without response after 30 seconds of PPV and chest compressions

- Establish IV/IO
- Consider a fluid bolus: **10mL/kg**

Intermediate

- **Epinephrine (0.1mg/mL): 0.01 mg/kg (0.1 ml/kg)** IV/IO
- Consider endotracheal intubation

Meconium staining:

- **DO NOT** stimulate the baby until the airway has been suctioned
- **Option to suction with pediatric Yankauer in the oropharynx –OR-- direct tracheal suction, but quick suction and emphasis on BVM with ventilations to oxygenate the newborn**
- Notify **Medical Control** and advise of Meconium staining

Paramedic

PEDIATRIC: Pain Management

EMR

- **Initial Pediatric/Trauma Care**

- Immobilize injury, ice and elevate

    - Consider realigning angulated fractures, if possible, being cautious not to aggravate the injury or cause additional pain
    - Reposition (NOT reduce) dislocated joints to improve comfort, circulation, sensation, and motion. DO NOT force an extremity.
    - Apply a well-padded splint that immobilizes the long bone above and below the injury
        - Do NOT compromise distal circulation

    - Evaluate pain based 1-10 scale before and after treatment. Report to receiving facility.

    - Verbal reassurance, redirection, and distraction with conversation

    - Coach the patient's breathing – calm, deep full inhalations, and relaxed slow exhalations

    - Consider paramedic intercept for pain control.

EMT

Advanced EMT

Nitrous Oxide (50% mixture with oxygen) protocol: Verify that inclusion and exclusion criteria support administration of nitrous oxide. Verify child is old enough to comprehend self-administration and is able to follow directions from EMS provider. If so, then proceed:

- Setup Nitrous oxide system. Invert nitrous oxide cylinder several times before use.
- Coach patient in self administration of nitrous oxide
    - Instruct patient to inhale deeply through the demand valve mask/mouthpiece until pain/anxiety relieved –OR—patient no longer able to hold the mask/mouthpiece to their face
    - Patient ONLY must self-administer (NOT EMS personnel or friend/family member). **Important that parent is NOT to administer to child.**
    - Verify that flow of nitrous oxide stops when patient completes self-administered dose
- Reassess pain 3-5 minutes after administration. If pain not controlled, consider other pain management options.
- Record vital signs during and after treatment (every 5-10 minutes)
- Document start and stop times of nitrous oxide use. DO NOT exceed time permitted by NIOSH occupational exposure standards.
    - In open, outside, or well aerated area: No limit of time for use of nitrous oxide.
    - In ambulance with open windows and exhaust fan running: Max 30min per 8hr period
- Follow proper disposal guidelines once patient transport completed
    - Document canister weight at start and end of administration.

PEDIATRIC: Pain Management

Intermediate

Moderate to Severe Pain:

Fentanyl		
IV/IO	**Intranasal**	**IM**
○ **1.0 mcg/kg** over 1 – 2 min ○ May repeat 0.5 mcg/kg in 5-10 min	○ **1.7 mcg/kg** ○ Refer to Peds Intranasal Dosing Chart below	○ **1 mcg/kg** ○ **Max: 50 mcg**

- For inadvertent overdose: Low BP, decreased LOC
  - **Naloxone: 0.1 mg/kg** IV / IO / IM (or) **0.2 mg/kg Intranasal** (if no IV/IO)
    - May repeat as needed

Exclusion Criteria for Fentanyl:
- Decreased LOC
- Hypotension
- Respiratory depression
- Alcohol or sedative drug intoxication

Pediatric Intranasal Fentanyl

Fentanyl: 50 mcg/ml (5 mcg/0.1 ml)

Dosage is **1.7 mcg/kg** + 0.1 ml dead space. Give ½ the volume in each nostril Contact medical control for patient under the age of 2 yrs old

Patient	Weight (lbs)	Weight (kg)	Dose: mcg / ml	Total Volume
Small Child	26 – 31	12 – 14	20 mcg / 0.4 ml	0.5 ml
Child	32 – 36	15 – 16	25 mcg / 0.5 ml	0.6 ml
Child	37 – 40	17 – 18	30 mcg / 0.6 ml	0.7 ml
Child	41 – 50	19 – 20	35 mcg / 0.7 ml	0.8 ml
Child	46 – 49	21 – 22	35 mcg / 0.7 ml	0.8 ml
Large Child	50 – 56	24 – 25	40 mcg / 0.8 ml	0.9 ml
Large Child	57 – 65	26 – 28	45 mcg / 0.9 ml	1.0 ml
Adolescent	66 – 69	30 – 31	50 mcg / 1.0 ml	1.1 ml
Adolescent	70 – 73	32 – 33	55 mcg / 1.1 ml	1.2 ml
Adolescent	74 – 79	34 – 36	60 mcg / 1.2 ml	1.3 ml

PEDIATRIC: PAIN MANAGEMENT

Intermediate -*continued*

Contact Medical Control if pain medication is indicated and exclusion criteria is present

Post analgesia care:

- Monitor respiratory effort frequently
- Establish IV, run NS at least TKO, bolus as indicated
- Cardiac monitor and $EtCO_2$ with nasal prongs
- Intervene with airway adjunct, BVM or intubation

Paramedic

Consider PO Tylenol for mild to moderate pain. See dosing table below:

		Tylenol Dose			
	Form of Medicine →	Liquid 160mg/5mL	Chew Tab 80mg per tab	Adult tab 500mg	Rectal dose 325mg suppository
Weight (kg)	3	1.4 mL	n/a	n/a	n/a
	4	1.8 mL	n/a	n/a	n/a
	5	2.3 mL	n/a	n/a	n/a
	6-7	3.0 mL	1	n/a	n/a
	8-9	4.0 mL	1.5	n/a	n/a
	10-11	5.0 mL	2	n/a	0.5
	12-14	6.0 mL	2.5	n/a	0.5
	15-18	7.5 mL	3	0.5	1
	19-23	9 mL	4	0.5	1
	24-29	12 mL	5	0.5	1
	30-36	15 mL	6	1	2
	>36	16-20mL	7-8	1	2

If pain is not adequately relieved by Fentanyl:

- Consider use of **Midazolam (Versed)** in addition to Fentanyl
    - **0.05 mg/kg** IV (or) Intranasal / IM (If no IV)

PEDIATRIC: PAIN MANAGEMENT

Paramedic -*continued*

- Consider ***SUB-DISSOCIATIVE KETAMINE*** as an adjunct to Fentanyl
    - **Ketamine**: **0.25 mg/kg IV** (over 1-2 minutes), **0.5 mg/kg IN or IM**
        - May repeat every 5 minutes to a total of 4 doses if inadequate response is achieved, then every 10-15 minutes as needed.
        - May use in conjunction with **Midazolam 0.05 mg/kg** IV / Intranasal / IM if needed. Be sure to monitor vitals, cardiac monitor and $EtCO_2$ as with full dose ketamine administration.
- Consider ***DISSOCIATIVE KETAMINE*** for complicated extrication or orthopedic manipulation that would not be expected to be controlled adequately with IV fentanyl and/or sedation with midazolam
    - **Ketamine: 5 mg/kg IM or 1 mg/kg IV**
- Record BP, HR, RR, SPO_2 and $ETCO_2$ ideally every 5 minutes after dosing with ketamine
- Precautions for use of **Ketamine**:
    - Consider sedation with **Midazolam 0.05 mg/kg** IV if needed due to possible "Emergence Reaction"
    - May need to position the head and suction the airway as ketamine increases secretions

PEDIATRIC: POISONING / OVERDOSE

Ensure scene safety

- If Haz-Mat suspected, request Haz-Mat team response.
- Protect yourself from contamination (dust, fumes).
- Move patient to safe environment. Remove contaminated clothing.
- Have trained personnel decontaminate patient by brushing off and rinsing with copious amounts of water if appropriate.
- Notify **POISON CONTROL (800-222-1222)** Advise type of substance involved, amount and time of ingestion.

Emergency Medical Responder

- **Initial Pediatric Care**
- Continuous irrigation with NS for at least 10 minutes if eyes are contaminated.
- If altered LOC, assess blood glucose level and follow **HYPOGLYCEMIA** protocol.
- Contact and advise **Medical Control** and **Poison Control** early, for preparation of an antidote. Knowledge of the poisoning agent is critical.
- Consider **CARBON MONOXIDE** protocol for any suspicion of CO intoxication.
- If bronchospasm or wheezing present:
  - Albuterol: **2.5 mg** via nebulizer
    - May repeat as needed every 5-10 minutes

Suspected Narcotic Overdose: (Symptomatic)

- **Naloxone (Narcan): 0.2 mg/kg** Intranasal (**Max: 2 mg)**
  - May repeat as needed

Emergency Medical Technician

- Consider CPAP if indicated
- If bronchospasm or wheezing present:
  - Ipratropium Bromide (Atrovent)**: 0.5 mg** via nebulizer x 1 dose
  - Albuterol: **2.5 mg** via nebulizer
    - May repeat as needed every 5-10 minutes

Suspected Narcotic Overdose: (Symptomatic)

- **Naloxone (Narcan): 0.1 mg/kg IM** (or) **0.2 mg/kg** Intranasal (**Max: 2 mg)**
  - May repeat as needed

PEDIATRIC: POISONING / OVERDOSE

Advanced EMT

- Consider fluid bolus as needed. 10-20 mL/kg **NS**.

Suspected Narcotic Overdose: (Symptomatic)

- **Naloxone (Narcan): 0.1 mg/kg** IV / IO / IM (or) **0.2 mg/kg** Intranasal (If no IV/IO)
    - **Max: 2 mg**. May repeat as needed

Intermediate

Organophosphate Poisoning: (Carbamate / pesticide / insecticide)
If the patient displays symptomatic bradycardia, bronchospasm, bronchorrhea

- **Atropine: 0.05 mg/kg** IV/IO
    - Repeat at **0.05 mg/kg** in 5 minutes if no response
    - Repeat at **0.2 mg/kg** in 5 minutes if no response
    - **Minimum Atropine dose: 0.1mg**

****Per Medical Control Physician Order****

- **B-Blocker OD: Glucagon**
- **Calcium Channel Blocker: Glucagon**

Paramedic

Cyanide Toxicity: (Suspected)

- **Amyl Nitrite:** Crush ampule and place in a non – rebreather mask or BVM with O_2 for 15–30 seconds followed by 30 – 45 seconds of O_2. Repeat until IV antidote is available
    - Alert ED staff that Amyl Nitrite was administered during the radio report so additional medications can be prepped.

OR

- **Hydroxycobalamin: (Preferred antidote) 70 mg/kg IV piggyback over 15 minutes**. Reconstitute 5g in with 250cc of NS, LR or D5W
    - See dosing table below

PEDIATRIC: POISONING / OVERDOSE

Paramedic -*continued*

Tricyclic Antidepressant Overdose: (Symptomatic: *Widened QRS > 0.10ms, hypotension, ventricular arrhythmias)*

- **Sodium Bicarbonate: 1 mEq/kg** IV. May repeat in 10 minutes if QRS complex remains wide (QRS >0.10ms)

****Per Medical Control Physician Order****

- **B-Blocker OD: Glucagon**
- **Calcium channel blocker OD: Glucagon, Ca Chloride**
- **Antipsychotics with wide QRS OD: Sodium Bicarbonate**
- **Stimulant OD (Cocaine / Methamphetamine): Midazolam**

Hydroxycobalamin Pediatric Dosing Table:

Weight (kg):	Dose (mL):	Weight (kg):	Dose (mL):	Weight (kg):	Dose (mL):	Weight (kg):	Dose (mL):
3-4	15	21	75	38	135	55	195
5	20	22-23	80	39-40	140	56-57	200
6-7	25	24	85	41	145	58	205
8	30	25	90	42-43	150	59-60	210
9-10	35	26-27	95	44	155	61	215
11	40	28	100	45	160	62-63	220
12-13	45	29-30	105	46-47	165	64	225
14	50	31	110	48	170	65	230
15	55	32-33	115	49-50	175	66-67	235
16-17	60	34	120	51	180	68	240
18	65	35	125	52-53	185	69	245
19-20	70	36-37	130	54	190	70+	Adult

PEDIATRIC: PULSELESS ARREST

For the purpose of these guidelines, an "infant" is less than 1 year of age. A "child" is from about 1 year of age to the start of puberty. These guidelines are from **AHA**.

For the purpose of this guideline, ALS is defined as an ACLS capable EMS unit

In infants and children, most cardiac arrests result from progressive respiratory failure, shock or both. Less commonly, sudden cardiac arrest may occur secondary to arrhythmia (V-Fib or V – Tach) (Chameides, Samson, Schexnayder, & Hazinski Mary Fran RN, 2011) Aggressive, properly performed airway management and early recognition and treatment of shock is essential to increase survivability.

Emergency Medical Responder

- **Initial Pediatric Care**
- Within 10 seconds establish unresponsiveness, no breathing or no normal breathing (gasping), and pulselessness at the carotid / brachial artery
- Insert an OPA and begin cycles of 30 chest compressions and 2 breaths **(Single Rescuer)** or 15 chest compressions and 2 breaths **(Two Rescuers)**
- If crew safety is compromised or there is inadequate space to perform high quality chest compressions and effective resuscitation efforts (bathroom, hallway etc.), move the patient before starting resuscitation.
- Do not move the patient once resuscitation measures have been started as this will decrease the effective quality of the chest compressions.
- High quality continuous chest compressions (CC) should be performed in 2 minute cycles
    - Compression Rate: **Rate of 100-120/min (200-240 total per cycle)**
    - Compression Depth: **At least 1/3 diameter of the chest**
    - Allow complete chest recoil between compressions
    - Minimize interruptions in compressions
    - Avoid excessive ventilation
    - Use a metronome if available to maintain a compression rate of 100-120/min for a total of 200-240 CC (2 minutes)
    - Switch compressors every 2 minutes
- If an AED is not available, pause briefly (5 seconds or less) at the end of 200 CC to perform a pulse check. If a carotid / brachial pulse is present, **c**heck breathing and assist ventilations at one breath every 3 seconds PRN
- Repeat this sequence every two minutes until an AED or ALS is available
- Assess blood glucose level and treat per hypoglycemia protocol as needed
- Assess possibility of opioid overdose and administer naloxone as indicated
    - Refer to POISONING/OVERDOSE protocol

PEDIATRIC: PULSELESS ARREST

EMR – *continued*

AED available:

- Turn on the AED, follow the voice prompts, and attach the device to the patient. Do **NOT** interrupt chest compressions while attaching the AED
- Place appropriate sized AED pads so they do not touch. Right upper chest and left lower chest wall (Low axillary) or anterior / posterior.
- The AED will keep time of the incident and automatically analyze the patient every two minutes.
- If the AED cannot analyze the rhythm properly when the vehicle is in motion, stop the vehicle.
- When prompted, stop chest compressions only long enough for the device to analyze and shock the patient.
    - **"SHOCK ADVISED"**
        - Immediately deliver a shock and resume 200 CC (2 minutes)
    - **"NO SHOCK ADVISED"**
        - Immediately resume 200 CC (2 minutes)
- If the AED advises "analyze" after the patient has previously regained signs of circulation, immediately restart the above sequence of analysis, shock, and compressions.

Emergency Medical Technician

Moving the Patient

- Continue resuscitation efforts on scene until one of the following occurs:
    - If an ALS unit is en route, continue resuscitation efforts on scene until ALS arrival.
    - If an ALS unit is NOT en route or proximity to the hospital is closer than the inbound ALS unit, continue resuscitation efforts on scene until the 3rd rhythm analysis then initiate transport.
- Keeping in mind that any decrease in the quality of chest compressions may be detrimental to patient survival, circumstances may arise, such as prompt arrival of an ACLS capable unit or a continuing shockable rhythm, when the team feels delaying transport would ultimately benefit the patient. These circumstances must be documented on the patient care record.

PEDIATRIC: PULSELESS ARREST

Advanced EMT

IV/IO Access

- Consider IV placement if there is a high probability of success on the first or second attempt. Limit IV attempts to 2 minutes or less.
- Consider IO placement if it is felt an IV will be delayed.

Intermediate

Refer to the Broselow Tape for weight based equipment, medication and defibrillation dosages.

Defibrillation

- Turn the defibrillator on when chest compressions are started and attach to the patient.
- Set the energy level to **2J/kg.**
- Charge the defibrillator during the last 10 seconds of 200 CC.
- Pause briefly at the end of 200 CC to analyze the rhythm.
- If indicated, deliver the first shock at **2J/kg.**
- If a shock is not indicated, dump the charge by reducing the energy and reset the energy to **2J/kg**. Do not charge the defibrillator.
- Immediately resume 200 CC (2 minutes) after the analysis / shock.
- Limit the time of analysis / shock to under 5 seconds.
- Second and subsequent shocks at **4J/kg.**

Airway

- Place an endotracheal tube and confirm placement with $ETCO_2$ and two other means.
    - Begin actively ventilating the patient at a rate of 10 breaths per minute (Once every 6 seconds). Deliver each breath over one second.
    - Monitor End Tidal CO_2
- All attempts at airway management should be done without interrupting chest compressions.

Medication Administration

- Medications should be given during compressions, immediately following an analysis / shock,
- Alternate shock / medication / shock / medication
- **Epinephrine (0.1mg/mL): 0.01 mg/kg (0.1 ml/kg)** IV/IO q 4 minutes

PEDIATRIC: PULSELESS ARREST

Intermediate -*continued*

Medication Administration (continued)

- **Medications for persistent or recurrent Vfib or pulseless V-Tach:**
  Choose one of the following:
  - **Amiodarone:**
    - **5 mg/kg** IV/IO (**Max:** 300mg)
    - May repeat 2x
  - **Lidocaine:**
    - 1mg/kg IV/IO
    - May repeat x1 after 15 min

- For **wide** complex PEA administer**:**
  1) Calcium chloride: 20mg/kg IV/IO over 1-2 min (max 2g)
  2) Normal saline flush if only 1 IV/IO available
  3) Sodium bicarbonate: 1 meq/kg IV/IO over 1-2 min

- For **narrow** complex PEA administer:
  - **NS bolus: 20mg/kg**
  - **Bilateral needle decompression/thoracostomy**
  - **Verify that bagging/ventilator is not causing hyperinflation**

Repeat the Sequence: Analysis / Defibrillation / Medication / 200 high quality chest compressions and ventilations

Moving the Patient:

- If the rhythm is identified as **"shockable"**, continue resuscitation efforts on scene until the **10th rhythm analysis** after PALS is initiated, then transport.

- Keeping in mind that any decrease in the quality of chest compressions may be detrimental to patient survival, circumstances may arise that the team leader feels **NOT** initiating transport after the 10th analysis would ultimately benefit the patient. These circumstances must be documented on the patient care record

- If the rhythm is identified as "**Asystole" or "PEA",** continue resuscitation efforts on scene until the 3rd rhythm analysis after PALS is initiated, then transport.

Paramedic

Torsades De Pointes

- **Magnesium Sulfate: 50 mg/kg** over 10 min **(Max: 2 g)**

****Per Medical Control Physician Order****

- **Additional doses of Magnesium Sulfate for persistent Torsade's de pointes**

PEDIATRIC: RESPIRATORY DISTRESS

ASTHMA / CROUP

Emergency Medical Responder

- **Initial Pediatric Care**
- Position of comfort. Avoid alarming patient which can precipitate airway failure in severe cases. Allow child to sit on parent's lap, etc.
- If bronchospasm or wheezing present:
  - Albuterol: **2.5 mg** via nebulizer
    - May repeat as needed every 5-10 minutes

Emergency Medical Technician

- **If bronchospasm or wheezing present:**
  - Ipratropium Bromide (Atrovent)**: 0.5 mg** via nebulizer x 1 dose
  - Albuterol: **2.5 mg** via nebulizer
    - May repeat as needed every 5-10 minutes
- **Respiratory distress continues despite the above interventions:**
  - Epinephrine (1mg/mL): **0.01 mg/kg (0.01mL/kg)** IM
    - **Max: 0.3 mg (0.3 mL)**
    - **Preferred administration site is anterior-lateral thigh**

Advanced EMT | Intermediate

- Continue nebulizer treatments as per **EMR/BASIC** protocol
  - May repeat **Albuterol** every 5-10 minutes as needed
- Determine if patient has been intubated for asthma in the past and if so, prepare for aggressive airway management

PEDIATRIC: RESPIRATORY DISTRESS

ASTHMA / CROUP

Paramedic

- **Wheezing/Asthma:** Methylprednisolone (Solumedrol): **2 mg/kg** IV
  - **Max: 125 mg**
  - For patients requiring multiple **Albuterol** treatments

- Consider Magnesium sulfate: **25 mg/kg IV infusion over 15 min**
  - For patients requiring multiple Albuterol treatments
  - See dosing table

CROUP: (Upper airway stridor) Racemic Epinephrine (2.25%): via nebulizer:
- **<6 months old: 0.25 mL, (Dilute with 3 mL NS)**
- **>6 months old: 0.50 mL, (Dilute with 3 mL NS)**
- **Max: 0.5 ml (1 unit dose)**
- 1X only

(May use 1.5mL of 0.1mg/mL Epinephrine if racemic epinephrine unavailable. **Dilute with 1.5 mL NS)**

****Per Medical Control Physician Order****

- **Additional doses of racemic epinephrine**

PEDIATRIC: RESPIRATORY DISTRESS

HYPOVENTILATION / APNEA

EMR	EMT	AEMT

- **Initial Pediatric Care**
- Properly position the child (sniffing position) and provide O_2 if SPO2 <94%
- Consider use of NPA or OPA if needed.
    - Assist ventilations as needed with BVM or barrier device. Breaths per minute should mimic normal respiratory rate for age
        - Infant through 1 year old: 1 breath every 2 sec (goal 30 per min)
        - 1 -6 year old: 1 breath every 2- 3 sec (goal 25 per min)
        - 6-12 year old: 1 breath every 3 sec (goal 20 per min)
    - Administer each breath over one second
    - Watch for chest rise
    - Evaluate the patient's pulse every 2 minutes
- If unable to ventilate adequately with a BVM or unable to protect the airway, consider use of a non – visualized airway if indicated.
- Determine and treat the cause of hypoventilation: Think cardiac H's and T's

Intermediate

- If an NVA is present, confirm placement and continue ventilations.
- If an NVA is not present, make 2 attempts to place an endotracheal tube or nonvisualized airway. Confirm placement with $ETCO_2$ and two other means.
    - Monitor End Tidal CO_2, maintain at 35-45 mm Hg
    - Check ETT placement often and document findings, especially after any patient movement
    - If unable to place either ETT or NVA, continue assist BVM until intercept or arrival at ED

Paramedic

- Consider ***DFAM protocol*** if appropriate
- Consider use of a surgical airway if unable to secure the patient's airway by other means
- Adjust ventilation rate based on end-tidal CO2 readings

PEDIATRIC: RESPIRATORY DISTRESS

PULMONARY EDEMA

Emergency Medical Responder

- **Initial Pediatric Care**

Emergency Medical Technician Advanced EMT

- Consider CPAP if indicated and properly fitting equipment available.

Intermediate

- **Fentanyl: 1 mcg/kg** IV/IO over 1 – 2 minutes**.** May repeat **0.5 mcg/kg** in 5 – 10 minutes

Fentanyl Exclusion Criteria:
- Decreased LOC
- Multiple systems trauma
- Hypotension
- Respiratory depression
- Severe headache
- Alcohol or sedative drug intoxication

Paramedic

****Per Medical Control Physician Order****

- **Nitroglycerin Drip: If felt to be cardiac in nature**

PEDIATRIC: RESPIRATORY DISTRESS

OBSTRUCTED AIRWAY

Emergency Medical Responder

- **Initial Pediatric Care**
- Appropriate **AHA Foreign Body Obstructed Airway** procedure if:
    - Patient conscious, choking and unable to move any air – **Heimlich Maneuver**
    - Patient unconscious and after repositioning the airway, the rescuer is unable to ventilate – **Chest thrusts with ventilation attempts**
    - When airway is cleared, provide **O_2 via NRB** or **BVM** as needed.

Emergency Medical Technician Advanced EMT

- If patient becomes unconscious, attempt to remove object with laryngoscope and Magill Forceps
- If unable to relieve obstructed airway – call for **Paramedic Intercept**, advise that trans-tracheal needle jet insufflation or an **emergent surgical airway** is needed.

Intermediate

- Attempt to Intubate

Paramedic

- If airway remains unsecure or the patient is in extremis, perform trans-tracheal needle jet insufflation or perform **emergent** cricothyrotomy. **(See Cricothyrotomy Procedure)**

PEDIATRIC: SEIZURE

Emergency Medical Responder

- **Initial Pediatric Care**
- Place patient in left lateral recumbent position and protect patient from injury.
- Provide spinal immobilization if trauma present.
- Assess blood glucose level and *follow* ***HYPOGLYCEMIA*** protocol.
- Check vital signs to include temperature if patient feels febrile.
- Document, length of seizure and length of post-ictal period.

Emergency Medical Technician

- Call for ALS intercept if patient has had > 2 seizures within short period or a single seizure lasting > 5 minutes.

--Contact Medical Control for transport vs. no transport orders--

Advanced EMT

- IV saline lock for seizure lasting > 5 minutes or > 2 seizures within a short period.

Intermediate

Treat **ONLY** if sustained seizure > 5 minutes:

- **Midazolam (Versed): 0.1 mg/kg** IV/IO; **0.2 mg/kg** Intranasal (If no IV/IO)
  - **See Pediatric Intranasal Dosing Chart**
  - **Max: 5 mg**
  - May repeat **½ dose** in 5 minutes if seizure persists

--Contact Medical Control for sustained seizures after treating with medication --

PEDIATRIC: SEIZURE

Paramedic

Febrile seizure:
If history and assessment of patient strongly suggest fever as cause of seizure and temperature of child is >100.4F or 38C, **administer Tylenol.** See dosing table under **Pain Management** protocol.

Midazolam – IV / IO
5 mg/ml (1 mg / 0.2 ml)
Dosage is **0.1 mg/kg** (Repeat ½ dose in 5 minutes PRN)

Patient	Weight		Dose: mg	Total Volume
	Lbs.	kg		
GREY / PINK	7 – 16	3 – 7	0.5 mg	0.1 ml
RED	17 – 21	8 – 9	1.0 mg	0.5 ml
PURPLE	22 – 25	10 – 11	1.0 mg	0.5 ml
YELLOW	26 – 31	12 – 14	1.0 mg	0.5 ml
WHITE	32 – 40	15 – 18	1.5 mg	0.3 ml
BLUE	41 – 50	19 – 23	2.0 mg	0.4 ml
ORANGE	51 – 65	24 – 29	2.5 mg	0.5 ml
GREEN	66 - 79	30 – 36	3.5 mg	0.7 ml

Midazolam – Intranasal / IM
5 mg/ml (1 mg / 0.2 ml)
Dosage is **0.2 mg/kg** + 0.1 ml dead space. Give ½ the volume in each nostril

Patient	Weight		Dose: mg / ml	Total Volume
	Lbs.	kg		
GREY / PINK	7 – 16	3 – 7	1.0 mg / 0.2 ml	0.3 ml
RED	17 – 21	8 – 9	2.0 mg / 0.4 ml	0.5 ml
PURPLE	22 – 25	10 – 11	2.0 mg / 0.4 ml	0.5 ml
YELLOW	26 – 31	12 – 14	2.0 mg / 0.4 ml	0.5 ml
WHITE	32 – 40	15 – 18	3.0 mg / 0.6 ml	0.7 ml
BLUE	41 – 50	19 – 23	4.0 mg / 0.8 ml	0.9 ml
ORANGE	51 – 65	24 – 29	5.0 mg / 1.0 ml	1.1 ml
GREEN	66 - 79	30 – 36	5.0 mg / 1.0 ml	1.1 ml

PEDIATRIC: SHOCK

Emergency Medical Responder

- **Initial Pediatric Care**
- Control any hemorrhage: direct pressure, hemostatic agents or tourniquet.
- Place patient in Trendelenburg position or elevate the patient's legs.
- Keep the patient warm.

Emergency Medical Technician

Cardiogenic Shock:

- Transport in position of comfort, usually sitting upright
- Call for a paramedic intercept

Advanced EMT | Intermediate

- IV **NS** (*Use as large of a catheter as the patient's anatomy allows)*

Hypovolemic Shock / Neurogenic Shock:

- **Fluid bolus: 20cmL/kg** (maintain systolic BP at 90-100 mm hg)
  - May repeat once (**Max: 40mL/kg**)

Contact Medical Control for persistent hypotension. Possible permissive hypotension

Septic Shock:

- **Fluid bolus: 60mL/kg** administered in the first 60 min of patient care

Cardiogenic Shock:

- Assess rhythm and treat any abnormality first.
- Use caution with fluid:
  - **Fluid bolus: 5-10 mL/kg** and re-evaluate patient (May repeat once)

PEDIATRIC: SHOCK

Paramedic

Neurogenic / Cardiogenic / Septic / Hypovolemic Shock:

- Use vasopressors in **Hypovolemic Shock** only if refractory to fluid administration. Consultation with medical control is strongly suggested in this case.

Per Medical Control Physician Order		
Norepinephrine Infusion • **0.2 mcg/kg/min** • **See Drip Chart – Appendix A**	**OR**	**Epinephrine Infusion** • **0.1 – 1 mcg/kg/min** • **Max: 10 mcg/min** • **See Drip Chart – Appendix A**

Pediatric Blood Pressure Goals for titrating pressors:

	Blood Pressure Goal	
Weight (kg)	**3**	SBP 65
	4	SBP 70
	5	SBP 70
	6-7	SBP 70
	8-9	SBP 75
	10-11	SBP 75
	12-14	SBP 78
	15-18	SBP 80
	19-23	SBP 85
	24-29	MAP ≥ 65
	30-36	MAP ≥ 65
	>36	MAP ≥ 65

PEDIATRIC: TACHYCARDIA *(Narrow Complex)*

Infants >220 BPM / Children >180 BPM

EMR	EMT	AEMT

- **Initial Pediatric Care**

Intermediate

Stable Patient:

- **Valsalva maneuvers –** ice pack applied to face for 30-60 seconds

Per MCPO: (Stable Patient with severe symptoms)

- **Adenosine: 0.1 mg/kg IV (Max: 6 mg)**
- **If no change after 1 – 2 minutes give Adenosine: 0.2 mg/kg IV (Max: 12 mg)**
- Consider initial adenosine dose of 0.2mg/kg if significant caffeine ingestion in the past4 hours

Contraindications for Adenosine: Known or suspected Hx of WPW

- If patient becomes unstable at any time, proceed to immediate cardioversion

Unstable Patient: (Chest pain, Altered LOC, Hypotension)

- Do not delay cardioversion for a 12 lead ECG.
- Prepare suction, IV access and airway management equipment **PRIOR** to cardioversion
- If sinus tachycardia, identify and treat causes
- **Synchronized Cardioversion for SVT/atrial tachycardia:**
  - 0.5 – 1.0 J/kg
  - If rhythm does not convert, increase to 2 J/kg
  - Contact medical control if patient rhythm does not convert after 2J/kg

PEDIATRIC: TACHYCARDIA *(Narrow Complex)*

Infants >220 BPM / Children >180 BPM

Paramedic

- Check temperature. If patient with fever, administer Tylenol and cool environment (remove clothes/blankets, apply ice packs, etc.) See dosing table in pain management protocol.

- Consider sedation before cardioversion:

  - Fentanyl: **1.0 mcg/kg over 1 – 2 min**
    - **May repeat 0.5 mcg/kg in 5-10 min**

  - **Midazolam (Versed): 0.1 mg/kg** IV/IO **(Max: 4mg)**

  - Avoid ketamine with tachycardia

PEDIATRIC: TACHYCARDIA *(Wide Complex)*

QRS >0.09 sec

EMR	EMT	AEMT

- **Initial Pediatric Care**

Intermediate

Stable Patient:

Per MCPO: (Stable Patient)

- **Amiodarone: 150 mg** IV over 10 minutes. May repeat (x1) after 20 minutes
- May consider **Adenosine** if suspect SVT with aberration
  - **1st dose: 0.1 mg/kg (6 mg max)**
  - **2nd dose: 0.2 mg/kg (12 mg max)**

Unstable Patient: (Chest pain, Altered LOC, Hypotension)

- **DO NOT** delay cardioversion for a 12 lead ECG
- Prepare suction, IV access and airway management equipment **PRIOR** to cardioversion

Unstable Patient – *continued*:

- **Synchronized Cardioversion:**
  - 0.5 – 1.0 J/kg
  - If rhythm does not convert, increase to 2 J/kg
  - Contact medical control if patient rhythm does not convert after 2J/kg

Paramedic

- Consider sedation prior to cardioversion:
  - Fentanyl: **1.0 mcg/kg over 1 – 2 min**
    - **May repeat 0.5 mcg/kg in 5-10 min**
  - **Midazolam (Versed): 0.1 mg/kg** IV/IO **(Max: 4mg)**
  - Avoid ketamine with tachycardia

IV INFUSION DRIP CHARTS

AMIODARONE

Amiodarone: 450mg in 250ml D_5W = 1.8mg/ml Dose: 1 mg/min

Dose: **mg/min**	**1**
In the absence of an IV pump, use **mini-drip tubing** (60gtts/ml)	
Flow Rate: **gtts/min**	**33.33**

MAGNESIUM

Magnesium: 2g in 250ml D_5W = 8mg/ml Dose: Over 20 minutes
4g in 250ml D_5W = 16mg/ml Dose: Over 20 minutes

Grams in 250ml D_5W	2	4
In the absence of an IV pump, use **MACRODRIP TUBING (15gtts/ml) only**		
Flow Rate: **gtts/min** (over 20 minutes)	187	187
Flow Rate: **gtts/sec** (over 20 minutes)	3	3

NITROGLYCERIN

Nitroglycerin: 50mg in 250ml D_5W = 200mcg/ml Dose: 10mcg/min (titrated)

Dosage mcg/min	10	20	30	40	50	60	70	80	90	100
FLOW RATE IN ML/HR (gtts/min) In the absence of an IV pump, use mini-drip tubing (60gtts/ml)										
	3	6	9	12	15	18	21	24	27	30

IV INFUSION DRIP CHARTS

PITOCIN

Pitocin: 20units in 1000ml NS = 0.02 units/ml **Dose: 200ml/hr (4 units/hr)**

In the absence of an IV pump, use **mini-drip tubing** (60gtts/ml)	
Flow Rate: **200gtt/min**	**3gtt/sec**

EPINEPHRINE – Adult

Epinephrine 1:1,000: 1mg in 250ml D_5W = 4mcg/ml **Dose: 2 – 10 mcg/min**

Dosage mcg/min	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
FLOW RATE IN ML/HR (gtts/min) In the absence of an IV pump, use mini-drip tubing (60gtt/ml)									
	30	**45**	**60**	**75**	**90**	**105**	**120**	**135**	**150**

IV INFUSION DRIP CHARTS

EPINEPHRINE – Pediatric

DRIP RATE CHART FOR EPINEPHRINE INFUSION - PEDIATRIC
(1mg Epinephrine in 250ml D_5W =4 mcg/ml) Dose: 0.1 – 1.0 mcg/kg/min

Dosage mcg/kg/min	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Body weight (lbs & kg)	FLOW RATE IN ML/HR (gtts/min) In the absence of an IV pump, use mini-drip tubing (60gtt/ml)									
11lb/5kg	8	15	23	30	38	45	53	60	68	75
17lb/7.5kg	11	23	34	45	56	68	79	90	101	113
22lb/10kg	15	30	45	60	75	90	105	120	135	150
28lb/12.5kg	19	38	56	75	94	113	131	150		
33lb/15kg	23	45	68	90	113	135	150			
39lb/17.5kg	26	53	79	105	131	150				
44lbs/20kg	30	60	90	120	150					

Boxes shaded in red are within the adult range of 2 – 10 mcg/min (30 – 150 gtts/min).
For pediatrics >44 lbs, use the adult dose.

NOREPINEPHRINE (LEVOPHED)

ADULT dosing table: concentration is **16mcg/ml norepinephrine**:

IV dose (mcg/min)	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
Pump rate (ml/hr)	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5

IV INFUSION DRIP CHARTS

NOREPINEPHRINE (LEVOPHED)

PEDIATRIC dosing table: concentration is **16mcg/ml** norepinephrine:

Weight (kg)	IV pump rate (ml/hr)									
Mcg/kg/min →	**0.1**	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**	**1**
3	1.1	2.3	3.4	4.5	5.6	6.8	7.9	9	10	11.3
4	1.5	3	4.5	6	7.5	9	10.5	12	13.5	15
5	1.9	3.8	5.6	7.5	9.4	11.3	13	15	16.9	18.8
6-7	2.4	4.9	7.3	9.8	12.2	14.6	17	19.5	22	24.4
8-9	3.2	6.4	9.6	12.8	16	19	22.3	25.5	28.7	31.9
10-11	3.9	7.9	11.8	15.8	19.7	23.6	27.6	31.5	35.4	39.4
12-14	4.9	9.8	14.6	19.5	24.4	29.3	34	39	43.9	48.8
15-18	6.2	12.4	18.6	24.8	31	37	43.3	49.5	55.7	62
19-23	7.9	15.8	23.6	31.5	39.4	47.3	55	63	70.9	78.8
24-29	Use adult dosing									
30-36	Use adult dosing									
>36	Use adult dosing									

Weight (kg)	IV pump rate (ml/hr)									
Mcg/kg/min →	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**	**1.6**	**1.7**	**1.8**	**1.9**	**2**
3	12.4	13.5	14.6	15.8	16.9	18	19.1	20.3	21.4	22.5
4	16.5	18	19.5	21	22.5	24	25.5	27	28.5	30
5	20.6	22.5	24.4	26.3	28.1	30	31.9	33.8	35.6	37.5
6-7	26.8	29.3	31.7	34.1	36.6	39	41.4	43.9	46.3	48.8
8-9	35.1	38.3	41.4	44.6	47.8	51	54.2	57.4	60.6	63.8
10-11	43.3	47.3	51.2	55.1	59.1	63	66.9	70.9	74.8	78.8
12-14	53.6	58.5	63.4	68.3	73.1	78	82.9	87.8	92.6	97.5
15-18	68.1	74.3	80.4	86.6	92.8	99	105.2	111.4	117.6	123.8
19-23	86.9	94.8	102.7	110.6	118.5	126.4	134.3	142.2	150.1	158
24-29	Use adult dosing									
30-36	Use adult dosing									
>36	Use adult dosing									

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Disclaimer:

The following is a brief overview of these medications taken in the context of continuous infusion during and EMS transfer from one facility to another. This document is not meant to provide an exhaustive list of all contraindications, adverse effects, precautions, drug-drug interactions or incompatibility. Assumption is made that the sending facility will provide guidance with respect to the dose and rate of the mediation to be given as well as to any anticipated complications which may be encountered.

As with all EMS calls, on-line medical control is only a telephone call or a radio transmission away. Do not hesitate to call for additional information or guidance when administering a medication you are not fully familiar with, especially if you feel uneasy or feel that an adverse effect or complication is occurring. Follow on-line medical direction regarding dosage adjustments or cessation of the drip in question.

Pregnancy risk categories:

The United States FDA has the following definitions for the pregnancy categories:

Pregnancy Category A	Adequate and well-controlled human studies have failed to demonstrate a risk to the fetus in the first trimester of pregnancy (and there is no evidence of risk in later trimesters).
Pregnancy Category B	Animal reproduction studies have failed to demonstrate a risk to the fetus and there are no adequate and well-controlled studies in pregnant women OR Animal studies have shown an adverse effect, but adequate and well-controlled studies in pregnant women have failed to demonstrate a risk to the fetus in any trimester.
Pregnancy Category C	Animal reproduction studies have shown an adverse effect on the fetus and there are no adequate and well-controlled studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks.
Pregnancy Category D	There is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience or studies in humans, but potential benefits may warrant use of the drug in pregnant women despite potential risks.
Pregnancy Category X	Studies in animals or humans have demonstrated fetal abnormalities and/or there is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience, and the risks involved in use of the drug in pregnant women clearly outweigh potential benefits.

Azithromycin (Zithromax)

Indications: Antibiotic used for various infections, often used for pneumonia

Descriptions and actions: Macrolide family antibiotic in same class as erythromycin.

Typically dosed at 10mg/kg, up to 500mg IV piggyback for adults and pediatrics.

Pregnancy risk: Category B

Contraindications: Allergy. Use with caution in patients with impaired hepatic function.

Adverse effects and Precautions: May cause: CNS: fatigue, headache, somnolence. CV: chest pain and palpitations. GI: abdominal pain, N/V/D. Skin: pain at injection site

Interactions:
Amiodarone and quinidine: May increase risk of life-threatening dysrhythmias including torsades de pointes. Monitor ECG.
Carbamazepine and phenytoin: May increase levels of these drugs leading to sedation and possible toxicity
Digoxin: May increase digoxin level. Monitor for digitalis toxicity

Cefoxitin (Ancef)

Indications: Antibiotic used for various infections, pre-op, skin flora, etc

Description and action: Cephalosporin family antibiotic.

Typical adult dose 1-2 grams IV piggyback. Typically pediatric dose 6-12.5mg/kg/dose, q6 hours.

Pregnancy risk: Category B

Contraindications: Allergy- very low likelihood of cross reactivity in those with penicillin allergies

Adverse effects and Precautions: May cause CNS: fever. Skin: phlebitis, rash. GI: N/V/D. Resp: dyspnea

Interactions: None significant to EMS

Ceftriaxone (Rocephin)

Indications: Antibiotic used for various infections, meningitis, pneumonia, internal, etc

Description and action: Cephalosporin family antibiotic.

Typical adult dose 1-2 grams IV piggyback q12-24 hours. Typical pediatric dose 25-37.5 mg/kg/dose, q12-24hours, higher for meningitis.

Pregnancy risk: Category B

Contraindications: Allergy. Extremely low likelihood of cross reactivity in those with penicillin allergy. Contraindicated in neonates who require or are expected to require IV calcium including calcium in TPN- can cause fatal reaction. In other patients, do not give ceftriaxone and calcium containing solutions simultaneously. Can give after line is flushed.

Adverse effects and Precautions: May cause: GI: diarrhea. Skin: pain/induration/tenderness at injection site, rash

Interactions: None significant to EMS

Ciprofloxacin (Cipro)

Indications: Antibiotic used for various infections

Description and action: fluoroquinolone class, 2nd generation.

Typical adult dose is 200-400 mg IV q 8-12 hours. Not routinely used in pediatrics.

Pregnancy risk: Category C

Contraindications: Allergy. Not recommended for pediatric use.

Adverse effects and Precautions: May cause: CNS: Seizures, confusion, headache, restlessness. GI: N/V/D. Skin: Steven's-Johnson syndrome, toxic epidermal necrolysis syndrome

Interactions: None significant to EMS

Levofloxacin (Levaquin)

Indications: Antibiotic used for various infections

Description and action: fluoroquinolone class, 3rd generation.

Typical adult dose is 250-750 mg IV q 24 hours. Not routinely used in pediatrics.

Pregnancy risk: Category C

Contraindications: Allergy. Not recommended for pediatric use. Do not administer at the same time as the medications listed below in the interaction section.

Adverse effects and Precautions: May cause: CNS: encephalopathy, seizure, dizziness, headache. GI: abdominal pain, N/V/D. Endocrine: hypoglycemia. Musculoskeletal: back pain. Resp: dyspnea. Skin: Steven's-Johnson syndrome, rash, itching.

** Requires dosage adjustment for patients with renal impairment

Interactions:
Procainamide, quinidine, amiodarone, chlorpromazine (Thorazine), erythromycin, fluconazole, imipramine: May increase risk of life-threatening dysrhythmias. Avoid giving both at same time. Monitor ECG.

Metronidazole (Flagyl)

Indications: Antibiotic used for various infections

Description and action: Antibacterial and anti-protozoal in the nitroimidazole class

Typical adult dose is 1g IV load then 500mg IV q 6-8h. Infuse over 1 hour.
Typical pediatric dose 15 mg/kg IV load, then 7.5 mg/kg IV q 6 hours.

Pregnancy risk: Category B

Contraindications: Allergy. Use with caution in patients with alcoholism or hepatic dysfunction.

Adverse effects and Precautions: May cause: CNS: headache, seizure, fever, vertigo/dizziness/confusion, weakness, CV: flattened T waves, edema, flushing, phlebitis. ENT: ringing in ears. GI: N/V/D, abdominal pain/cramping, metallic taste in mouth, dry mouth, Skin: rash,

Interactions:
Cimetadine: May increase risk of metronidazole toxicity.
Disulfiram (Antabuse): may cause acute psychosis and confusion.
Lithium: May increase lithium levels causing toxicity.

Piperacillin/Tazobactam (Zosyn)

Indications: Antibiotic used for moderate to severe infections

Description and action: Extended-spectrum penicillin with beta-lactamase inhibitor.

Typical adult dose is 3.375-4.5g q6h. Typical pediatric dose is 80-100mg/kg IV q8h.

Pregnancy risk: Category B

Contraindications: Allergy.

Adverse effects and Precautions: May cause: CNS: headache, insomnia, fever, seizure, agitation, anxiety, dizziness. CV: dysrhythmias, chest pain, edema, tachycardia, hypertension. GI: abdominal pain, N/V/D. Resp: dyspnea. Skin: itching, rash.

** Requires dosage adjustment for patients with renal impairment

Interactions: None significant to EMS

Vancomycin (Vancocin)

Indications: Antibiotic used for severe infections

Description and action: Aminoglycoside class often used for known or suspected MRSA infections.

Typical adult dose is 15-20 mg/kg and up to 30 mg/kg for severe infections. Infuse over 1 hour with 1.5h infusion for doses greater than 1g. Typical pediatric dose is 10-15mg/kg q6h.

Pregnancy risk: Category C

Contraindications: Allergy.

Adverse effects and Precautions: May cause: CNS: fever. CV: hypotension, phlebitis. ENT: ringing in ears. GI: N/V. Resp: wheezing, dyspnea. Skin: "Red-man syndrome" with rapid IV administration

Long list of non-compatible medications. Check with pharmacy or infuse through dedicated line.

** Requires dosage adjustment for patients with renal impairment

Interactions: None significant for EMS

Dobutamine (Dobutrex)

Indications: Treatment of decompensated cardiogenic shock caused by depressed contractility such as refractory heart failure

Description and action: Inotropic adrenergic beta agonist which stimulates Beta1 receptors increasing myocardial contractility and stroke volume. Increases cardiac output by decreasing peripheral vascular resistance, reducing ventricular filling pressure and facilitating AV nodal conduction.

Typical adult and pediatric dose for infusion is 0.5-1 mcg/kg/min titrating to optimum dose between 2-20 mcg/kg/min. Usual effective range for increasing cardiac output is 2.5-10 mcg/kg/min.

Usually given through a central line or large bore antecubital IV.

Pregnancy risk: Category B

Contraindications: Allergy.

Adverse effects and Precautions: May cause: CNS: headache. CV: hypertension, increased heart rate, PVC's, chest pain, palpitations, ventricular ectopy, hypotension, phlebitis. GI: N/V. Resp: Asthma exacerbation and dyspnea. Other: anaphylaxis and hypersensitivity reactions.
Use caution in patients with a history of hypertension, after MI and in those with sulfite sensitivity.

Interactions:
Beta blockers: may antagonize dobutamine effects. Avoid using together.
Bretylium: increased risk of dysrhythmias. Monitor ECG
General anesthetics: increased risk of cardiac dysrhythmias. Monitor ECG
Oxytocic drugs/guanethidine: may cause increased pressor response causing severe hypertension. Monitor blood pressure closely.
Tri-cyclic medications: May potentiate pressor response and cause dysrhythmias. Monitor ECG.

Incompatible with many medications. Infuse through a dedicated line.

Dopamine (Intropin)

Indications: Treatment of shock/hypotension and to correct hemodynamic imbalances. To improve perfusion to vital organs. To increase cardiac output.

Description and action: Adrenergic agonist vasopressor. Stimulates dopaminergic and alpha and beta receptors of the sympathetic nervous system increasing positive inotropic effect and increasing cardiac output. Action is dose-dependant. Large doses cause mainly alpha stimulation.

Typical adult and pediatric infusion dosing for shock is 10-20 mcg/kg/min titrated for effect with range from 2-50 mcg/kg/min

Usually given through a central line or large bore antecubital IV.

Pregnancy risk: Category C

Contraindications: Allergy. Uncorrected tachydysrhythmias, pheochromocytoma, or ventricular fibrillation.

Adverse effects and Precautions: May cause: CNS: headache, anxiety. CV: hypotension, ventricular dysrhythmias, ectopic beats, tachycardia, angina, vasoconstriction. GI: N/V. Resp: dyspnea and asthma exacerbation. Skin: necrosis and sloughing with extravasation. "Goose bumps". Other: anaphylactic reactions.

Use with extreme caution on patients with occlusive vascular disease, pregnant/breast feeding patients, those on MAO inhibitors and those with sulfite sensitivities.

BLACK BOX WARNING:
Causes severe sloughing and necrosis if extravasates into subcutaneous tissues. May need to infiltrate 5-10mg of phentolamine in 10-15cc saline to minimize necrosis and sloughing.

Interactions:
MAO inhibitors (phenylzine, tranylcypromine, etc): may cause fever, hypertensive crisis, severe headache.
Oxytocics: May cause severe, persistent hypertension.
Phenytoin: may cause severe hypotension, bradycardia and cardiac arrest.

Epinephrine

Indications: To restore and maintain blood pressure in acute hypotension or treat severe allergy or anaphylaxis. It can also be used IM for allergy and IV for cardiac arrest.

Description and action: Adrenergic vasoconstrictor with stimulates both alpha and beta receptors in the sympathetic nervous system causing increased heart rate, blood pressure as well as bronchial smooth muscle relaxation.

Typical adult dose for infusion is 1-4 mcg/minute

Pregnancy risk: Category C

Contraindications: Allergy. Pre-existing hypertension

Adverse effects and Precautions: May cause: CNS: drowsiness, headache, nervousness, anxiety, vertigo, dizziness, fear, agitation, cerebral hemorrhage. CV: palpitations, ventricular fibrillation, widened pulse pressure, hypertension, tachycardia, angina, abnormal ECG. GI: N/V. Resp: dyspnea. Skin: urticaria, pallor, hemorrhage at injection site. Other: tissue necrosis.

Use with extreme caution in patient with prior history of hypertension, atherosclerotic heart disease, ACS/MI, and in those with history of dysrhythmias.

Interactions:
Alpha blockers: may cause hypotension from unopposed beta-adrenergic effects.
Antihistamines, thyroid hormones, cardiac glycosides: may increase risk of dysrhythmias
Beta blockers: may cause hypertension followed by bradycardia.
Methylphenidate, MAO inhibitors, tri-cyclic medications: may increase risk of dysrhythmias, CNS stimulation and pressor effects. Monitor ECG.

Nicardipine (Cardene)

Indications: Treatment of hypertensive emergencies and severe hypertension in strokes

Description and action: Calcium channel blocker anti-hypertensive. Inhibits calcium ion influx across cardiac and smooth muscle cells. Dilates coronary arteries and arterioles.

Typical adult dose is 5mg/h infusion increased by 2.5mg/h every 5-15 minutes to maximum of 15mg/h.

Pregnancy risk: Category C

Contraindications: Allergy.

Adverse effects and Precautions: May cause: CNS: headache, dizziness. CV: peripheral edema, palpitations, flushing, angina, tachycardia. GI: N/V/D, dry mouth. Skin: rash

Check blood pressure every 3-5 minutes during titration and every 15 minutes thereafter.

Interactions:
Anti-hypertensives: may increase anti-hypertensive effects. Monitor blood pressure

Incompatible with heparin, furosemide, Lactated Ringer's solution, sodium bicarbonate and several antibiotics.

Nitroprusside (Nipride)

Indications: To lower blood pressure quickly in hypertensive emergencies.

Description and action: Vasodilator anti-hypertensive. Relaxes arteriolar and venous smooth muscle causing drop in blood pressure. Effects occur quickly and go away quickly after stopping infusion.

Typical dose is 0.3 mcg/kg/min. Titrate every few minutes to maximum infusion of 10 mcg/kg/min.

Pregnancy risk: Category C

Contraindications: Allergy and those with compensatory hypertension such as AV shunt, coarctation of the aorta, cerebral ischemia, acute heart failure.

Adverse effects and Precautions: May cause: CNS: headache, dizziness, increased intracranial pressure, restlessness, loss of consciousness. CV: bradycardia, hypotension, tachycardia, palpitations, ECG changes, flushing. GI: N/V, abdominal pain. Hematologic: methemoglobinemia. Metabolic: acidosis, hypothyroidism. Musculoskeletal: muscle twitching. Skin: diaphoresis, pink color, rash. Other thiocyonate toxicity, cyanide toxicity, venous streaking, irritation at IV site.
Use with extreme caution in patients with increased intracranial pressure, those with hepatic or renal disease, hyponatremia and hypothyroidism.

BLACK BOX WARNINGS:
-Further dilute concentration in 250, 500, or 1,000cc of D5W to provide solutions with 200, 100 or 50 mcg/cc respectively.
-Because drug is light sensitive, wrap solution in foil or other opaque material. It is not necessary to wrap the tubing.
-Use an infusion pump. Drug is best given IV piggyback through a dedicated line. Don't titrate rate of main IV while drug is being infused. Even a small bolus can cause severe hypotension.
-Check blood pressure every 5 minutes during titration then every 15 min.
-If severe hypotension occurs, stop infusion- effects of drug reverse quickly.

Interactions:
Gas anesthetics, negative inotropic drugs and other anti-hypertensives: may cause additive effects. Monitor BP closely.
Sildenafil(Viagra), vardenafil(Cialis), etc: may increase hypotensive effects.

Incompatible with **amiodarone, levofloxacin and bacteriostatic water**. Don't mix with other IV drugs or preservatives.

Norepinephrine (Levophed)

Indications: To restore and maintain blood pressure in acute hypotension

Description and action: Direct acting adrenergic vasopressor which stimulates alpha and beta receptors in the sympathetic nervous system causing vasoconstriction and cardiac stimulation.

Typical initial adult infusion is 10 mcg/min titrated to effect with an average maintenance rate of 2-4 mcg/min.

Give through a central line or large bore antecubital IV.

Pregnancy risk: Category C

Contraindications: Allergy.

Adverse effects and Precautions: May cause: CNS: headache, anxiety, weakness, dizziness, tremor. CV: bradycardia, severe hypertension, dysrhythmias. Resp: dyspnea, asthma exacerbation. Skin: necrosis and sloughing if extravasation occurs. Other: anaphylaxis

Check blood pressure every 3-5 minutes during titration and every 5 minutes thereafter. Monitor ECG.

BLACK BOX WARNING:
-Check IV site frequently for signs and symptoms of extravasation. If this occurs, stop infusion immediately. May need to infiltrate 5-10 mg of phentolamine in 10-15cc saline into the area to minimize necrosis and sloughing.
-Protect from light.
-Avoid mixing with alkaline solutions, oxidizing drugs or iron salts.

Interactions:
Alpha blockers: may antagonize drug effects and cause hypertension.
Antihistamines, atropine, ergot alkaloids, MAO inhibitors, oxytocics, methyldopa: My cause severe hypertension.
Inhaled anesthetics: increased risk of dysrhythmias. Monitor ECG.
Tri-cyclic medications: may potentiate effects and cause dysrhythmias. Monitor ECG

Incompatible with many drugs. Infuse through a dedicated line.

Phenylephrine (Neosynephrine)

Indications: To restore and maintain blood pressure in acute hypotension

Description and action: Adrenergic vasoconstrictor which stimulates alpha receptors in the sympathetic nervous system causing vasoconstriction.

Typical adult infusion for severe hypotension is 100-200 mcg/min decreasing to 40-60 mcg/min when blood pressure stabilizes.

Pregnancy risk: Category C

Contraindications: Allergy. Pre-existing hypertension.

Adverse effects and Precautions: May cause: CNS: headache, excitability, anxiety, dizziness. CV: bradycardia, dysrhythmias, hypertension. Resp: dyspnea, asthma exacerbation. Skin: necrosis and sloughing if extravasation occurs. Other: anaphylaxis

Use with extreme caution in patient with prior history of hypertension, atherosclerotic heart disease, ACS/MI, and in those with history of dysrhythmias.

BLACK BOX WARNING:
-Give through a central line or large bore antecubital IV.
- Check blood pressure every 3-5 minutes during titration and every 5 minutes thereafter. Monitor ECG.
-Check IV site frequently for signs and symptoms of extravasation. If this occurs, stop infusion immediately. May need to infiltrate 5-10 mg of phentolamine in 10-15cc saline into the area to minimize necrosis and sloughing.

Interactions:
Atropine, guanethidine, oxytocics: may increase pressor response.
Beta blockers: may block cardiostimulation
Sympathomimetics: may cause serious dysrhythmias. Monitor ECG.

Incompatible with alkaline solutions, iron salts, other metals, phenytoin and sodium thiopental.

Heparin (Calciparine, Hemochron, Hepalean)

Indications: Prevention of clotting or to reduce further clotting

Description and action: Anticoagulant. Typical pediatric dose is 50u/kg then 25u/kg/h titrated based on PTT levels.

Typical adult dose is 4,000-5,000u bolus, then ~1,000 u/h titrated based on weight and PTT levels.

Pregnancy risk: Category C

Contraindications: Allergy.

Adverse effects and Precautions: May cause: CNS: fever. Hematologic: hemorrhage, thrombocytopenia. Metabolic: hyperkalemia. Skin: irritation, mild pain, hematoma formation,

Interactions:
Many drug-drug interactions: most of which cause increased anticoagulant effect and may precipitate hemorrhage.

Long list of incompatible medications. Check with pharmacy or infuse through a dedicated line.

Eptifibatide (Integrillin)

Indications: Prevention of clotting or to reduce further clotting

Description and action: Anti-platelet agent of the Glycoprotein IIb/IIIa inhibitor type.

Typical adult dose for Acute Coronary Syndrome (ACS) is 180 mcg/kg IV bolus, then 2mcg/kg/min

Pregnancy risk: Category B

Contraindications: Allergy. Creatinine levels >4. Extreme caution in patients at risk for bleeding, platelets <150,000, active abnormal bleeding within 30 days, severe hypertension with systolic >200mmHg, diastolic >110mmHg, major surgery within 6 weeks, history of stroke within 30 days, or any prior history of hemorrhagic stroke

Adverse effects and Precautions: May cause: CV: hypotension. GU: hematuria. Hematologic: bleeding/hemorrhage, thrombocytopenia.

Need to protect this drug from light

** Requires dosage adjustment for patients with renal impairment

Interactions:
clopidogrel (Plavix), dipyridamole, NSAIDs, warfarin and other oral anticoagulants: May increase risk of bleeding.
thrombolytics, ticlodipine, other GP IIb/IIIa inhibitors: May increase risk of bleeding.

Incompatible with furosemide

Ketamine (Ketalar)

Indications: Sedation and as adjunct for pain relief. Can also be used with IV, IM and IN (intranasal) routes for EMS management of pain, behavioral emergency and sedation.

Description and action: Dissociative anesthetic related to PCP. Controlled substance (schedule III). Effects mediated via non-competitive NMDA receptor antagonism.

Typical adult infusion dose for analgesia is 0.2-0.5 mg/kg/h. Typical infusion for anesthesia or deep sedation is 1-2mg/kg/hr

Pregnancy risk: Category B

Contraindications: Allergy. Use extreme caution with other CNS depressant use.

Adverse effects and Precautions: May cause: CNS: dissociated state to profound sedation with loss of muscle tone leading to compromised airway, nystagmus, disconjugate gaze, hallucinations, emergence reaction. CV: mildly elevated heart rate and blood pressure. GI: N/V, hypersalivation. Resp: typically maintained gag and airway reflexes. At typical doses, respirations are maintained unless other CNS depressants have been used.

Requires continuous hemodynamic monitoring including ECG, pulse ox and capnography

This drug has potential to reduce muscle tone to the point that airway can be compromised from airway occlusion. Must be able to immediately provide advanced airway interventions and management.

Interactions:
CNS depressants, opiates, benzodiazepines, barbiturates, alcohol: May potentiate effects causing profound sedation to the point of airway compromise or respiratory arrest.
Many other medications and drugs: may increase effects causing profound sedation to the point of airway compromise or respiratory arrest.

Midazolam (Versed)

Indications: Sedation and as adjunct for pain relief

Description and action: Benzodiazepine anxiolytic with hypnotic and amnestic properties. Controlled substance (Schedule IV). May potentiate effects of GABA, depress the CNS, and suppress spread of seizure activity.

Typical adult infusion dose for critical care sedation of intubated patients is 0.02-0.1 mg/kg/h. Pediatric infusion dose for critical care sedation of intubated patients is 0.06-0.12mg/kg/hr. Neonates >32 weeks gestation: 0.06 mg/kg/h. Neonates <32 weeks gestation: 0.03 mg/kg/h.

Pregnancy risk: Category D

Contraindications: Allergy. Acute angle closure glaucoma, shock, coma. Inability to closely monitor airway and ventilations to include continuous capnography.

Adverse effects and Precautions: May cause: CNS: sedation, drowsiness, amnesia, headache, nystagmus, paradoxical behavior or excitement. CV: variations in pulse and blood pressure. GI: N/V. Resp: decreased respiration, respiratory acidosis up to and including apnea.

Use extreme caution with patients under influence of other sedatives or alcohol, and those suffering from uncompensated acute illness and in the elderly. Consider lower dosage in these patients.

This drug has potential to reduce muscle tone to the point that airway can be compromised from airway occlusion or total respiratory depression to apnea. Must be able to immediately provide advanced airway interventions and management.

BLACK BOX WARNINGS:
-Administer only with critical care monitoring including continuous ECG, pulse ox, capnography, etc. Requires continuous airway and respiratory monitoring with capability of performing immediate airway intervention and management.
-Peds dosages must be calculated on a mg/kg basis and should be titrated slowly
-Pregnancy class D. Teratogenic. Do not use in those possibly pregnant

Interactions:
CNS depressants: may potentiate effects and cause apnea
Diltiazem: may increase CNS depression and respirator depression

Propofol (Diprovan)

Indications: Sedation after intubation and other critical care needs

Description and action: Hypnotic derivative of phenol. Can be given as IV boluses as needed to induce sedation.

Typical adult dose for continuous infusion is 0.1-0.2 mg/kg/min or 20-50mg intermittent IV boluses as needed. Typical pediatric dose for continuous infusion is 125-300 mcg/kg/min.

Pregnancy risk: Category B

Contraindications: Allergy to propofol or to soybean oil, eggs and glycerol. . Inability to closely monitor airway and ventilations to include continuous capnography.

Adverse effects and Precautions: general anesthetic capable of stopping respirations and causing loss of protective airway reflexes. Patient needs to have critical care monitoring to include continuous capnography and pulse oximetry. Must be able to intervene with advanced airway interventions if needed. May cause fetal cardiovascular depression in pregnant patients.

May cause: CNS: dystonic or choreiform movements, sedation up to and including general anesthesia. CV: bradycardia, hypotension, hypertension, decreased cardiac output. Resp: decreased ventilations leading to respiratory acidosis up to and including apnea. Skin: rash

For elderly or systemically ill patients, give 80% of the usual dose. Avoid rapid IV boluses.

Use with extreme caution in hemodynamically unstable patients.

Interactions:
Anesthetics, opiates, benzodiazepines, alcohol or other CNS depressants: Will cause additive anesthetic and sedative effects. May cause hypotension and decreased cardiac output.

Amiodarone (Cordarone, Pacerone)

Indications: Anti-dysrhythmic typically used for ventricular fibrillation or unstable ventricular tachycardia

Description and action: Benzofuran derivative with some effects similar to beta and calcium channel blockers. Blocks potassium chloride channels leading to prolongation of action potential duration.

Typical adult dose is 150mg over 10 minutes followed by infusion of 1mg/min for next 6 hours, then 0.5mg/min

Pregnancy risk: Category D

Contraindications: Allergy. Do not give to those allergic to iodine. Contraindicated in cardiogenic shock, second or third degree heart block, severe SA node disease without pacemaker in place.

Adverse effects and Precautions: May cause: CNS: fatigue, malaise, tremor, ataxia, paresthesia, headache. CV: hypotension, bradycardia, dysrhythmias, heart failure, heart block, sinus arrest, edema. GI: N/V, abdominal pain, abnormal taste in mouth. Hematologic: coagulation abnormalities. Hepatic: hepatic dysfunction and failure. Metabolic: thyroid dysfunction. Resp: acute respiratory distress syndrome (ARDS), severe pulmonary toxicity. Skin: dermatitis, blue-gray skin

BLACK BOX WARNINGS:
-Give loading doses in a hospital setting and with continuous ECG monitoring due to risk of dysrhythmias.
-Drug may pose life-threatening management problems in patients at risk for sudden death. Use only for patients in life-threatening, recurrent ventricular dysrhythmias unresponsive to or intolerant of other antidysrhythmics or alternative drugs. This drug can cause fatal hepatic and pulmonary toxicity.
-This drug is highly toxic and can cause pulmonary toxicity. Risk increases in patients receiving doses >400mg/24 hours.
-This drug is teratogenic. Do not use in patients who may be pregnant.

Interactions:
Many, many interactions!
Antidysrhythmics: may induce Torsades de Points.
Beta and calcium channel blockers: may potentiate bradycardia, sinus arrest and heart block as well as increase hypotensive effect.
Cimetadine: may increase amiodarone levels.
Digoxin: may increase digoxin levels up to 70-100% and precipitate toxicity. **Fentanyl:** may cause hypotension, bradycardia and decreased cardiac output. **Fluoroquinolone antibiotics:** increased risk of dysrhythmias including Torsades de Points.
Macrolide antibiotics: additive prolongation of QT interval.
Theophylline: increased theophylline levels and cause toxicity.
Warfarin and other oral anticoagulants: may increase anticoagulant response with potential for serious or fatal hemorrhage.

Diltiazem (Cardizem)

Indications: Anti-dysrhythmic typically used for atrial fibrillation with rapid ventricular response.

Description and action: Calcium channel blocker which decreased myocardial contractility and oxygen demand while dilating coronary arteries and arterioles.

Typical adult dose is 0.25mg/kg IV followed by infusion at 10-15 mg/h.

Pregnancy risk: Category C

Contraindications: Allergy. 2nd or 3rd degree heart block or sick sinus syndrome without a pacemaker. Cardiogenic shock, ventricular tachycardia, acute MI, systolic BP <100, Wolf-Parkinson-White or other short PR syndromes.

Adverse effects and Precautions: May cause: CNS: headache, dizziness. CV: edema, dysrhythmias, AV block, bradycardia, heart failure, flushing and hypotension, GI: nausea, abdominal pain, Hepatic: acute hepatic injury, Skin: rash.

Not compatible with heparin, furosemide, diazepam, insulin, phenytoin, sodium bicarbonate, and others. Infuse in dedicated line if at all possible.

Interactions:
Cimetadine: may increase effects of diltiazem causing toxicity.
Digoxin: may increase digoxin levels causing toxicity.
Lithium: may increase levels of lithium causing toxicity.
Beta Blockers: may precipitate heart failure or prolong conduction time.
Theophylline: may increase effects of theophylline causing toxicity.

Lidocaine (Xylocaine)

Indications: Anti-dysrhythmic typically used for ventricular fibrillation or unstable ventricular tachycardia

Description and action: Class IB amide derivative with local anesthetic effects. Decreases depolarization, automaticity and excitability of the ventricles during the diastolic phase by direct action on the tissues, especially the Purkinje network.

Typical adult dose is 1-1.5 mg/kg IV bolus q3-5 minute until dysrhythmias subside.
IV infusion after bolus is typically 1-4 mg/min.
Typical pediatric dose is 1 mg/kg IV bolus with infusion at 50 mcg/kg/min.

Pregnancy risk: Category B

Contraindications: Allergy to any amide-type local anesthetics. Wolff-Parkinson-White syndrome, Adams-White syndrome, severe degrees of SA, AV or intraventricular block without a pacemaker.

Adverse effects and Precautions: May cause: CNS: confusion, tremor, stupor, restlessness, lightheadedness, seizure, lethargy, anxiety, hallucinations, paresthesia, muscle twitching, CV: hypotension, bradycardia, new or worsening dysrhythmias, cardiac arrest, E-ENT: ringing in ears, blurred or double vision, GI: N/V, Resp: respiratory depression/arrest.

** Reduce dose of bolus and infusion by 50% in elderly patients

** Requires dosage adjustment for patients with cardiac, renal, hepatic impairment or weigh less than 50kg (110 pounds).

Interactions:
Atenolol, metoprolol, nadolol, propranalol: may increase risk of lidocaine toxicity.
Cimetadine: may increase risk of lidocaine toxicity.
Phenytoin, procainamide, propranolol: may increase cardiac depressant effects.

Albumin

Indications: Plasma volume expander. May be used for hypovolemic shock, burns and low protein states as a replacement

Description and action: Human blood product. Comes in various concentrations: 5%, 20%, 25%

Typical adult dose for hypovolemia is 500-750cc of 5% q30 minutes as needed. Typical pediatric dose for hypovolemia is 12-20cc/kg of 5% solution q15-30 minutes. Typical dose for burns is 20%-25% solution infused no faster than 2-3cc/min to maintain albumin levels or oncotic pressures. Typical adult dose for hypoproteinemia is 200-300cc of 25% up to 50-75g daily. Typical pediatric dose for hypoproteinemia is 25g daily.

Pregnancy risk: Category C

Contraindications: Allergy. Don't use in patients with extreme anemia. Extreme caution with hypertension, low cardiac reserve, hypervolemia, pulmonary edema or low albumin levels with peripheral edema.

Adverse effects and Precautions: May cause: CNS: headache, fever, CV: vascular overload from rapid infusion, hypotension, tachycardia, GI: N/V, Resp: altered respirations, pulmonary edema, Skin: urticaria, rash

Interactions:
ACE inhibitors: May increase risk of atypical reactions such as flushing and hypotension.

Incompatible with midazolam, vancomycin, verapamil, alcohol or amino acid containing solutions

Fresh Frozen Plasma

Indications: Moderate to severe bleeding. Low blood clotting factors. Reversal of anti-coagulated blood.

Description and action: Human blood component which replaces lost or missing plasma and clotting factors

Typical dose is 8-10cc/kg or approximately 2 bags of FFP for adults but depends on the clinical situation.

Contraindications:
-ABO incompatibility.

Adverse effects and Precautions: Possible serum sickness or transfusion reaction which may cause fever, chills, itching or hives. Severe symptoms include severe dyspnea and loss of consciousness. Electrolyte imbalance with hypocalcemia, hypokalemia. Non-cardiogenic pulmonary edema due to volume overload. Hypothermia if blood is chilled when administered. Transmission of blood borne pathogens is unlikely but not zero risk.

Interactions:
Will reverse some but not all anti-coagulants such as heparin and warfarin

Platelets

Indications: Severe thrombocytopenia or active bleeding

Description and action: Human blood component which replaces loss of missing platelets. Six random donor packs or one platelet pheresis pack should raise the platelet count by 50,000.

Dose and rate are dependent upon the clinical situation

Contraindications:
-ABO and Rh incompatibility.

Adverse effects and Precautions: Possible serum sickness or transfusion reaction which may cause fever, chills, itching or hives. Severe symptoms include severe dyspnea and loss of consciousness. Electrolyte imbalance with hypocalcemia and hypokalemia possible, especially with massive transfusions. Non-cardiogenic pulmonary edema due to volume overload. Hypothermia if blood is chilled when administered. Transmission of blood borne pathogens is unlikely but not risk free.

Interactions: None significant to EMS

Packed Red Blood Cells (PRBC's)

Indications: Anemia or hemorrhagic shock

Description and action: Human blood component which replaces lost or missing red blood cells. Certain units may be irradiated or washed for certain patient types such as transplant patients, etc.

Dose and rate are dependant upon the clinical situation

Typical infusion rate for non-critical patients is one unit over 1-2 hours. In severe anemia and traumatic blood loss, blood may be run in as fast as needed.

Contraindications:
-ABO and Rh incompatibility.

Adverse effects and Precautions: Possible serum sickness or transfusion reaction which may cause fever, chills, itching or hives. Severe symptoms include severe dyspnea and loss of consciousness. Electrolyte imbalance with hypocalcemia, hypokalemia. Non-cardiogenic pulmonary edema due to volume overload. Hypothermia if blood is chilled when administered. Transmission of blood borne pathogens is unlikely but not zero risk.

Infuse through blood tubing, a large bore IV (18 gauge or larger) as well as a micropore filter to prevent clumps of platelets, fibrin and leukocytes from creating an embolism.

Interactions: None significant to EMS

Cimetidine (Tagamet)

Indications: Reduces stomach acid secretion, anti-allergy effects

Description and action: H2 receptor antagonist which reduces stomach acid secretion and has some anti-allergy effects and may be given during severe allergic reaction. Competitively inhibits action of histamine reducing allergic reactions and stomach acid secretion.

Typical adult dose for allergic reaction is 300mg IV piggyback over 15 minutes.

Pregnancy risk: Category B

Contraindications: Allergy.

Adverse effects and Precautions: May cause: CNS: confusion, dizziness, hallucinations, headache, GI: diarrhea, Musculoskeletal: muscle and joint pain.

Interactions:
IV lidocaine: may increase lidocaine effects leading to toxicity
Beta blockers: May increase effects of beta blockade
Procainamide: may increase procainamide levels leading to toxicity
Caffeine/guarana: may increase caffeine level and prolong half-life

Famotidine (Pepcid)

Indications: Reduces stomach acid secretion, anti-allergy effects

Description and action: H2 receptor antagonist which reduces stomach acid secretion and has some anti-allergy effects and may be given during severe allergic reaction. Competitively inhibits action of histamine reducing allergic reactions and stomach acid secretion.

Typical adult dose for allergic reaction is 20mg over 15-30 minutes.

Pregnancy risk: Category B

Contraindications: Allergy.

Adverse effects and Precautions: May cause: CNS: headache, dizziness, fever, malaise, vertigo, paresthesias. CV: flushing, palpitatations. GI: dry mouth, funny taste in mouth. Skin: irritation at IV site. Musculoskeletal: muscle and bone pain.

Interactions: None significant to EMS

Ranitidine (Zantac)

Indications: Reduces stomach acid secretion, anti-allergy effects

Description and action: H2 receptor antagonist which reduces stomach acid secretion and has some anti-allergy effects and may be given during severe allergic reaction. Competitively inhibits action of histamine reducing allergic reactions and stomach acid secretion.

Typical adult dose for allergic reaction is 50mg over 15-20 minutes.

Pregnancy risk: Category B

Contraindications: Allergy.

Adverse effects and Precautions: May cause: CNS: headache, malaise, vertigo. EENT: blurred vision. Other: angioedema, anaphylaxis, burning and itching at IV site.

Interactions: None significant to EMS

Levetiracetam (Keppra)

Indications: Treatment of partial or generalized seizures or epilepsy

Description and action: Pyrrolidine class anti-convulsant. May act by inhibiting simultaneous neuronal firing that leads to seizure activity.

Typical infusion dose is 500-1500 given over 15 minutes. Pediatric use is not common.

Pregnancy risk: Category C

Contraindications: Allergy.

Adverse effects and precautions: May cause: CNS: headache, somnolence, amnesia, anxiety, ataxia, dizziness, emotional lability, hostility, nervousness, vertigo and pain. EENT: double vision.

Interactions:
Antihistamines, benzodiazepines, opioids, alcohol and other CNS depressants: may cause severe sedation possibly leading to unresponsive state

Fosphenytoin (Cerebrex)

Indications: Treatment of partial or generalized seizures or epilepsy

Description and action: Hydantoin class anti-convulsant. May stabilize neuronal membranes and limit seizure activity by increasing efflux or decreasing influx of sodium ions across cell membranes in the motor cortex during generation of nerve impulses.

Typical infusion dose is 100-1500mg given over 30 minutes. Pediatric use is not common.

Pregnancy risk: Category D

Contraindications: Allergy. Sinus bradycardia, SA, AV or other cardiac blocks

Adverse effects and precautions: May cause: CNS: ataxia, brain edema, somnolence, intracranial hypertension, agitation, headache, vertigo, incoordination, tremor, speech abnormality, dysarthria, extrapyramidal symptoms. CV: hypertension, hypotension, tachycardia, vasodilation. EENT: nystagmus, double vision, ringing in ears. GI: dry mouth, taste abnormalities, N/V. Skin: itching, rash

Interactions:
Lithium: may precipitate lithium toxicity.

Valproate/Valproic Acid (Depakote/Depacon)

Indications: Seizure treatment, sometimes used for migraine headaches

Description and action: carbolic acid derivative with anticonvulsant activity. Probably facilitates effects of GABA neurotransmitter pathways.

Typical adult infusion dose is 500-1,000mg IV piggy over one hour at no more than 20 mg/min.

Pregnancy risk: Category D

Contraindications: Allergy or severe hepatic disease of dysfunction and in those with urea cycle disorder.

Adverse effects and Precautions: May cause: CNS: dizziness, headache, tremor, ataxia, fever, emotional upset. CV: chest pain, edema, hypertension, hypotension, tachycardia. EENT: blurred vision, double vision, nystagmus, ringing in ears. GI: abdominal pain, N/V/D. Hematologic: hemorrhage. Resp: bronchitis, dyspnea. Skin: Stevens-Johnson syndrome, rash.

BLACK BOX WARNING:
-This drug is teratogenic. Do not use in patients who may be pregnant.
-Fatal hepatotoxicity or pancreatitis may occur.

Interactions:
Aspirin, cimetidine, chlorpromazine, erythromycin: may cause valproate toxicity
Carbamazepine: may cause carbamazepine toxicity and precipitate seizures

Tissue Plasminogen Activator (tPA)

Indications: Reversal of organized thrombus causing clinical significance such as pulmonary embolism, myocardial infarction or ischemic stroke thought to be due to clot.

Description and action: Injectable thrombolytic which lyses organized thrombus.

Typical adult dose:

Acute MI: 15mg IV bolus, then 0.75mg/kg (max 50mg) IV over first 30 minutes, then 0.5 mg/kg (max 35mg) IV over next 60 minutes.

Acute ischemic stroke: 0.9mg/kg, not to exceed 90mg infused over 60 minutes with 10% of the total dose administered as an initial intravenous bolus over 1 minute.

Pulmonary embolism: 100mg IV over 2 hours

Pregnancy risk: Category C

Contraindications:
-Allergy
-SBP > 185 or DBP > 110 mm Hg, or aggressive treatment (IV medication) necessary to achieve these limits
-CT findings suggesting ICH, SAH, or established major acute stroke
-Suspicion of subarachnoid hemorrhage
-Seizure at onset of stroke
-Recent intracranial or spinal surgery, head trauma, or stroke (less than 3 months)
-Major surgery or trauma within 3 months
-History of intracranial hemorrhage / aneurysm / vascular malformation / tumor
-Recent active internal bleeding (less than 22 days) (including arterial puncture at a non-compressible site)
-Platelets < 100,000; heparin use within 48 hours with PTT > 40; INR > 1.7
-Known bleeding diathesis or other disorder with increased bleeding risk

Adverse effects and Precautions: May reverse ALL clots which may uncover significant GI bleeding, bleeding at IV and venipuncture sites or at any other area which has recently had clotting occur. Risk of life-threatening inter-cranial or other severe bleeding. Aminocaproic acid works to reverse tPA actions should significant adverse effects occur.

Interactions: Typically run with heparin which will increase blood thinning, preventing clotting cascade from functioning. Use of aspirin or other blood thinners may compound bleeding risk.

Total Parenteral Nutrition (TPN)

Indications: Providing intravenous nutrition to patient unable to take oral nutrients

Description and action: Customized mixture of sugars, electrolytes, proteins, lipids, trace minerals and other nutrients blended to meet the nutritional needs of the patient. Often run over many hours each day.

Pregnancy risk: Category C

Contraindications: Allergy to constituent ingredients.

Adverse effects and Precautions: Typically given through central line. Monitor for complications of central line: displacement, pneumothorax, etc.

Interactions:
Possible incompatibilities depending on ingredients. Infuse through a dedicated line.

Mannitol

Indications: Temporary benefit in reducing cerebral edema due to head trauma

Description and action: Osmotic diuretic which reduces blood and plasma volume thereby reducing cerebral edema. This takes 15-30 minutes to take effect. It also expands circulating volume, decrease viscosity and thereby increases cerebral blood flow and oxygen delivery. Typically given after or with a dose of furosemide to assist in diuresis.

Typical adult infusion dose is 0.5-2g given over 30-60 minutes via 10-20% solution at 25-75cc/hour

Pregnancy risk: Category C

Contraindications: Allergy

Adverse effects and Precautions: After prolonged infusion mannitol can actually increase cerebral edema. Angina-like chest pains. May cause: CNS: Seizures, headache, dizziness CV: angina-like chest pain, CHF, hypotension GI: N/V/D, thirst, Uro: urinary retention Optho: blurred visionl, Blood: Fluid and electrolyte imbalances, acidosis

Interactions: None significant to EMS

Insulin

Indications: Diabetic ketoacidosis and other diabetic emergencies such as hyperosmolar coma

Description and action: Insulin allows cells to utilize glucose. Helps to reduce blood sugars and restore normal metabolism in diabetic ketoacidosis and hyperosmolar states.

Typical adult infusion dose is 2-20 units Regular Insulin per hour as continuous infusion 0.1 units/kg/hr IV continuous infusion; decrease infusion to 0.05-0.1 units/kg/hour when blood sugar <16.5 mmol/L (300 mg/dL)

Pregnancy risk: Category B

Contraindications: Allergy, normal to low blood sugar unless being supplemented with dextrose containing continuous IV infusion
Adverse effects and Precautions: May cause: CNS: headache, Constitutional: Influenza-like symptoms, Blood: hypoglycemia. Be sure infusion is of rapid acting, regular insulin and NOT a long acting insulin. Probably best given in a dedicated line due to many incompatibilities.

Interacts and Incompatible with:
Amiodarone, Cefoxitin, Ceftazidime, Cimetidine, Diazepam, Diltiazem, Diphenhydramine, Dobutamine, Epinephrine, Famotidine, Furosemide, Gentamycin, Heparin, Ketamine, Labetalol, Levofloxacin, Midazolam, Morphine, Ondansetron (Zofran), , Oxytocin (Pitocin), Phenylephrine, Phenytoin, Piperacillin-tazobactam (Zosyn), Rocuronium, Succinylcholine
Vasopressin

Tactical EMS (TEMS)

INTRODUCTION

Scope & Applicability

a) The following TEMS protocols are intended for use during high-risk law enforcement operations and training.

b) These protocols supplement the current version of the conventional Chippewa Valley Regional EMS Protocols.

c) The Tactical Emergency Medical Services Protocols shall be used only by approved Tactical EMS providers sponsored by a law enforcement agency while actively operating under law enforcement command.

d) Tactical EMS Providers may administer the medications and perform the procedures listed in these protocols only after receiving specific training on their use and only under the medical direction and approval of the Tactical EMS Medical Director.

e) The primary function of the Tactical EMS Provider is to support law enforcement operations by facilitating the health and safety of critical public safety personnel inside the perimeter of high-risk, large-scale, and/or extended operations.

f) Tactical Emergency Medical Services (TEMS) providers are not directly responsible for any person(s) outside the direct field of operations, whose care may safely be provided by local conventional EMS agencies/providers.

g) Once the patient(s) is removed from the law enforcement perimeter of operation, transition of care to the local EMS agency and their protocols shall occur. An exception may be made when the Tactical EMS Provider's specialized training and continued care of the patient is needed to manage a specific illness/injury or upon the expressed request of the local EMS agency.

h) If the Tactical EMS Provider's specialized training is needed to manage the patient's illness/injury, then the Tactical EMS Provider may accompany the patient to the hospital or medical facility maintaining medications and/or treatments that are not allowed by local EMS protocol. The Tactical EMS provider needs to weigh the risks and benefits of leaving the law enforcement perimeter of operation, which may expose involved personnel to injury without the continued availability of specialized TEMS care.

Tactical EMS (TEMS)

Definition of Tactical Environment

The Tactical Environment is defined as:

- Any law enforcement operation where deployed personnel are exposed to risk of illness or injury sufficiently high as to warrant the presence of on-scene emergency medical services providers. It should be understood that EMS providers specially trained and equipped to operate in these austere environments and situations should be preferable to conventional EMS providers.

- Types of operations may include but are not limited to: high-risk warrant service, hostage-barricade situations, emergency ordinance disposal, executive protection details, civil demonstration or protest, aquatic operations, high-angle search and rescue missions, responding to acts of terrorism, and stationary or dynamic training operations.

- The safety of the general public and that of deployed law enforcement personnel benefit from the presence of Tactical EMS Providers who support operations by monitoring health status, environmental circumstances and other factors during any prolonged law enforcement deployment, where performance decrement or environmental issues may arise.

Tactical EMS Provider Minimum Training Requirements

The Tactical EMS Provider shall be a Wisconsin licensed ALS provider (AEMT or Paramedic) and have successfully completed introductory training on the following:

- Team wellness and health management, including preventive medicine.
- Orientation to the specialized medical gear and personal protective equipment used in tactical medical operations
- Planning medical special operations missions and medical intelligence
- Operational security, light and sound discipline
- Response to an Active Shooter
- Officer/victim rescue and extrication
- Remote medical assessment (“medicine across the barricade”)
- Weapons safety
- Response and management of WMD events
- Less-than-lethal weaponry, the injuries they may cause, and any specific interventions required.
- Team movement, tactics, communication and chain of command

This requirement may be fulfilled by successful completion of a formal Tactical Emergency Medical Service/Support program if approved by the Tactical Medical Director.

Tactical EMS (TEMS)

GENERAL PROTOCOLS:

Authorization

- Tactical EMS Providers may provide medical care under the Tactical EMS Medical Protocols only upon Tactical EMS provider activation by the Law Enforcement Tactical Team commander or designee of an officially affiliated law enforcement agency during a tactical incident or training excise.

- All levels of TEMS providers, Advanced EMT through Paramedic, will maintain their separate scope of practice for all interventions.

Operational Command

- Operational command within a law enforcement perimeter of operation lies with the law enforcement commander. At times, the safety and success of the law enforcement objectives may override the need to care for casualties. The Tactical EMS provider is expected to make recommendations and suggestions regarding patient care but must understand that the ultimate responsibility for the care and movement of casualties within a law enforcement operation lies with the law enforcement commander or designee.

Special Considerations for Tactical EMS

- The execution of some law enforcement operations may require that minor illness or injury in essential public safety personnel be treated and, to the extent that it is medically safe to do so, that those treated personnel return to duty. Fitness for duty of public safety personnel with minor injuries or illnesses shall be determined by the law enforcement commander in consultation with a tactical EMS provider or operational EMS physician/medical director.

- Prescription and Over the Counter (OTC) medications may be used for the treatment or “symptomatic relief” of constitutional symptoms as required to promote the health, safety, and functionality of persons necessary to the operation. The Tactical EMS Provider must know (or be able to review in real time) the TEMS medication formulary including the indications, contraindications and operational status for the medications available as delineated under “Additional Medications for Tactical EMS”.

Tactical EMS (TEMS)

- The Tactical EMS Provider may provide care to all persons associated with the operation, and shall be responsible for initial access, assessment, and stabilization of those victims, bystanders, and suspects within the “warm” or “hot” zones until they may be extracted to local EMS providers. Although the Tactical EMS provider is not directly responsible for any person(s) outside the direct field of operations, whose care may safely be provided by conventional EMS, they may engage in patient assessment and care in the “cold” zone as the situation dictates but only until availability of conventional EMS allows for transition of care. The Tactical EMS Provider should maintain the capability to rapidly disengage care of these patients and return to the law enforcement area of operation, which shall be their primary area of responsibility.

- The typical standard of care for pre-hospital medicine may not be possible in the tactical arena. For example, it may not be practical, feasible or desirable to carry pressurized oxygen cylinders into a high threat area. Thus, oxygen therapy may be delayed until such time as the Tactical EMS Provider can transition care to conventional EMS. Access to cardiac monitoring equipment, AED/defibrillators and other ALS medications and interventions may not be available options until conventional EMS is able to receive and accept the patient. It should be understood that the best medicine for an injured officer, subject or other victim may be to temporarily withhold care or provide only minimal care until the threat(s) in the tactical environment has been neutralized paving the way for transition to conventional EMS. Tactical EMS Providers should “do the best they can with what they have” in the high threat environment then transfer the patient to conventional EMS as soon as practical, keeping the safety of all foremost in their minds.

- Remote assessment of patients using visual amplification devices (binoculars, thermal or night vision systems, robots, etc) may be the only safe initial assessment possible. If the Tactical EMS Provider is able to determine with reasonable certainty that a patient has likely suffered a lethal or non-survivable injury via identification of exposed brain matter, no signs of breathing, etc, physical contact with that patient may be delayed until the scene has been secured to a sufficient degree so as to not to place undue risk on the lives of the living to attempt care for the non-survivable or the deceased.

- “Medicine across the barricade” may need to be employed when direct access to the patient(s) is not possible. This may occur during a hostage situation or when access to victims is otherwise hampered by the tactical situation. In these cases the Tactical EMS Provider may need to perform assessments and direct medical care via a third party, over telephone, radio, text messaging or other such methods. Again, the tactical environment has the potential to create significant obstacles to typical standard of care EMS. When indicated, “medicine across the barricade” will be utilized until such time that physical contact can be made with the patient(s) and care rendered directly by the Tactical EMS Provider.

Tactical EMS (TEMS)

- The Tactical EMS Provider will need to coordinate extraction, evacuation and eventual link up with conventional EMS assets. The tactical environment can present extreme challenges in patient movement. As with medical care provided in the tactical arena, extraction and evacuation will likely not follow typical standard of care and may involve prolonged litter carries, drags, and other unconventional methods of movement such as transport in armored vehicles, squad cars, personal vehicles, etc along with the lack of typical advanced life support equipment. It is understood that due to the austere nature of the tactical arena that atypical and improvised transport may be needed due to the tactical situation at hand.

Documentation

- All medical care and/or medications provided while operating in the tactical arena whether using conventional or TEMS protocols shall be recorded. Conditions, exam findings and treatment provided will be properly documented. If the affected person is transported to the hospital or turned over to local EMS, a full patient report shall be made. If treating a law enforcement member involved in tactical operations who is not turned over to local EMS or transported to a medical facility, an abbreviated medical contact form may be used. At a minimum, such documentation will include the person's name, age or DOB, agency and contact information, chief complaint or condition, medical care and/or medications provided and if the person is released to OPERATIONAL or NON-OPERATIONAL status. Such documentation will be kept and stored by the TEMS agency for medico-legal as well as for QA/QI purposes.

SPECIFIC PROCEDURES:

Dentemp OS temporary dental filling/patch

AVAILABILITY……Pre-mixed putty
ACTION……..Reduces pain, topical antimicrobial, hardens to provide temporary protection
INDICATIONS…….... Broken tooth, displaced filling or other dental hardware
CONTRAINDICATIONS……..……. Known hypersensitivity to zinc oxide or clove oil (Eugenol)
PRECAUTIONS…….None significant to EMS
OPERATIONAL STATUS……..……**Operational**
SIDE EFFECTS……Sharp taste, possible numbness of mouth/tongue
INTERACTIONS…….... None significant to EMS
USAGE..…….…….Firmly pack putty into void avoiding entrapment of air pockets. Place a piece of waxed paper, aluminum foil or plastic between teeth and have patient bite down gently to conform putty to provide good dental occlusion. Do not let patient chew or eat anything for at least 30 minutes. Refer patient to dentist as soon as practical.

Tactical EMS (TEMS)

Merocel nasal packing

OPERATIONAL STATUS……..……**Operational**
AVAILABILITY……Compressed and dried sponge
ACTION……Controls anterior epistaxis by direct pressure
INDICATIONS…….... Epistaxis uncontrolled by conventional treatment
CONTRAINDICATIONS……..……..None significant to EMS
PRECAUTIONS……None significant to EMS
SIDE EFFECTS……..…Possible sinusitis if left in for prolonged period (days)
INTERACTIONS…….... None significant to EMS
USAGE..……Determine which side of nose is bleeding. Have patient blow nose forcefully to expel any residual clots. Firmly and quickly insert Merocel sponge into affected nare until sponge is fully inside nare. Expand sponge by hydrating with saline or Afrin nasal spray. May place sponges in both nares if indicated. If nares are very large, consider placing two sponges side to side to ensure proper fit.

Foreign body removal from eye

OPERATIONAL STATUS……..……**Depends**
INDICATIONS……....Foreign material on surface of eye (non-penetrating)
CONTRAINDICATIONS……..…….Penetrating injury to globe
PRECAUTIONS…….None significant to EMS
SIDE EFFECTS…….May induce corneal abrasion or other damage
USAGE..……Consider placing ophthalmic anesthestic such as tetracaine drops to facilitate foreign body removal. Inspect eye to determine nature of foreign body and ensure injury is non-penetrating. Using cotton-tipped applicator, monofilament loop or plastic coated eye magnet, or stream of saline, gently extract foreign material from eye. May need to irrigate eye with saline or water as indicated if foreign object is irritating or contains chemical contaminants. Place ophthalmic antibiotic to reduce chance of infection. If object(s) removed and no residual pain, loss of visual acuity, peripheral vision or other problems are encountered, patient may be released to **OPERATIONAL** status. If residual symptoms or deficit in vision is noted, the patient shall be removed from duty and deemed **NON-OPERATIONAL**.

Tactical EMS (TEMS)

MEDICATIONS FOR TACTICAL EMS

- Tactical EMS Providers may administer the following medications to support and maintain Tactical Personnel and other essential public safety personnel in the operation environment according to their respective scope of practice.

Medications	Provider Level
Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)	
Ibuprofen (PO)	EMT
Naproxen (PO)	EMT
Ketorlac (IV/IM)	Paramedic
Antihistamines / Decongestants	
Fexofenadine (PO)	EMT
Pseudoephedrine (PO)	EMT
Oxymetazoline Nasal Spray (Afrin) (IN)	EMT
Gastrointestinal	
Liquid Antiacid (Mylanta or equivalent) (PO)	EMT
Ranitidine (PO)	EMT
Loperamide (PO)	EMT
Meclizine (PO)	Paramedic
Ondansetron ODT (SL,IV, IN)	Paramedic
Opthalmological Anesthetic	
Tetracaine (TOP)	Paramedic
Analgesics	
Tramadol (PO)	Paramedic with additional training
Acetaminophen (PO)	EMT
Lidocaine (SQ/IM)	Paramedic
Antibiotics	
Erythromycin ophthalmic ointment (TOP)	Paramedic
Moxifloxacin (Avelox) (PO)	Paramedic
Respiratory Bronchodilator	
Albuterol HFA inhaler (INH)	EMT
Wound Management	
Hemostatic impregnated dressing (TOP)	EMT
Tranexamic acid (IV)	Paramedic with additional training

Tactical EMS (TEMS)

Definitions:

- **OPERATIONAL:** The medication may be given to a law enforcement member who MAY CONTINUE to perform their assigned tasks and duties.

- **NON-OPERATIONAL:** Once the medication has been administered, the law enforcement member SHALL BE REMOVED from their assigned duties as the medication or the associated medical or traumatic condition MAY IMPAIR their ability to perform critical law enforcement tasks and duties.

All care and/or medications administered shall be recorded and documented.

Non-Steroidal Anti-Inflammatory Drugs

IBUPROFEN (Motrin/Advil)

- OPERATIONAL STATUS……..……**Operational**
- AVAILABILITY…… Tablet: 200mg (OTC) and 100mg/5mL suspension
- ACTION…….. Non-steroidal anti-inflammatory pain medication
- INDICATIONS……... Mild to moderate pain
- CONTRAINDICATIONS……..……. Known hypersensitivity; renal insufficiency or disease, peptic ulcer disease, GERD, GI bleed history
- PRECAUTIONS……. Do not use with other NSAIDs;
    - Caution with concomitant steroid use.
    - Category D in 3rd trimester pregnancy
- SIDE EFFECTS……..……. GI upset / nausea; GI bleeding risk
- INTERACTIONS……... None significant to EMS
- DOSAGE……. 400-600mg / 4 to 6 hours or 600-800mg / 6 to 8 hours

NAPROXEN (Aleve/Naprosyn)

- OPERATIONAL STATUS……..……**Operational**
- AVAILABILITY…… Tablet: 220 / 375 / 500mg
- ACTION…….. Non-steroidal anti-inflammatory pain medication
- INDICATIONS……... Mild to moderate pain
- CONTRAINDICATIONS……..……. Known hypersensitivity; renal insufficiency or disease, peptic ulcer disease, GERD, GI bleed history
- PRECAUTIONS……. No use with other NSAIDs;
    - Caution with concomitant steroid use.
    - Category D in 3rd trimester pregnancy
- SIDE EFFECTS……GI upset / nausea; GI bleeding risk
- INTERACTIONS……...None significant to EMS
- DOSAGE……..…220-500mg / 12 hours

Tactical EMS (TEMS)

NSAIDS – *continued:*

KETOROLAC (Toradol) (Injectable)

- OPERATIONAL STATUS……..……..**Operational**
- AVAILABILITY……30mg/mL IV/IM
- ACTION……..Non-steroidal anti-inflammatory pain medication
- INDICATIONS……Mild to moderate pain
- CONTRAINDICATIONS……..……. Known hypersensitivity; renal insufficiency or disease, peptic ulcer disease, GERD, GI bleed history
- PRECAUTIONS……. No use with other NSAIDs;
  - Caution with concomitant steroid use.
  - Category D in 3rd trimester pregnancy
- SIDE EFFECTS……..GI upset / nausea; GI bleeding risk
- INTERACTIONS…… None significant to EMS
- DOSAGE……....30mg IV every 8 hours, 60mg IM every 8 hours

Antihistamines / Decongestants

FEXOFENADINE (Allegra)

- OPERATIONAL STATUS……..……..**Operational**
- AVAILABILITY……Tablet: 60mg
- ACTION……..Non-sedating antihistamine
- INDICATIONS……...Allergic symptoms
- CONTRAINDICATIONS……..……Known hypersensitivity
- PRECAUTIONS……..…..Hypertension history;
- SIDE EFFECTS……May impair thermoregulation in heat stress environments, especially excess doses, or with other antihistamines
- INTERACTIONS……None significant to EMS
- DOSAGE……....60mg / once or twice daily

PSEUDOEPHEDRINE (Sudafed)

- OPERATIONAL STATUS……..……**Operational**
- AVAILABILITY……Tablet: 30mg; 60mg (OTC)
- ACTION……..Decongestant
- INDICATIONS……Nasal congestion; rhinorrhea
- CONTRAINDICATIONS……..……Known hypersensitivity; hypertension
- PRECAUTIONS……..…..May significantly increase heart rate and blood pressure
- SIDE EFFECTS……Insomnia
- INTERACTIONS……Beta Blockers, antihistamines, reserpine, guanethidine, methyldopa
- DOSAGE……....30mg to 60mg every 4 to 6 hours, as needed

Tactical EMS (TEMS)

Antihistamines / Decongestants – *continued*:

OXYMETAZOLINE (Afrin)

- OPERATIONAL STATUS……**Operational**
- AVAILABILITY……Nasal spray 0.05%
- ACTION……..Nasal vasoconstriction; decongestant
- INDICATIONS……Rhinorrhea; sinus congestion and pain
- CONTRAINDICATIONS……..Known hypersensitivity
- PRECAUTIONS…….. Prolonged use can lead to “rebound” congestion
- SIDE EFFECTS……..Nose bleed possible, often used in treatment of nosebleed
- INTERACTIONS……Stimulants, Bronchodilators
- DOSAGE……Two sprays per nostril two to three times per day

Gastrointestinal

LIQUID ANTACID (Mylanta/Maalox)

- OPERATIONAL STATUS……**Operational**
- AVAILABILITY……Liquid (OTC)
- ACTION……Antacid
- INDICATIONS ……GI upset, GERD, Gastritis, Esophagitis
- CONTRAINDICATIONS……Known hypersensitivity
- PRECAUTIONS……Caution with meds requiring acidic stomach pH
- SIDE EFFECTS……Nausea, constipation, diarrhea, headache
- INTERACTIONS ……Loose stools possible
- DOSAGE……...15-45mL every 4 to 8 hours

RANITIDINE (Zantac)

- OPERATIONAL STATUS……**Operational**
- AVAILABILITY ……75mg, 150mg tablet; 50mg IV/IM
- ACTION……H1 blocker
- INDICATIONS ……PUD; GERD; Esophagitis; Gastritis
- CONTRAINDICATIONS……Known hypersensitivity;
- PRECAUTIONS……Kidney, Liver, Immune System insufficiency, concomitant H-2 blocker use
- SIDE EFFECTS……Headache, dizziness, drowsiness, diarrhea
- INTERACTIONS …… Many, though short, temporary dosing should be tolerated
- DOSAGE……...50mg IV/IM/PO every 6-8 hours; 75-150mg po twice daily

Tactical EMS (TEMS)

Gastrointestinal – *continued*:

LOPERAMIDE (Imodium-AD)

- OPERATIONAL STATUS……..……**Operational unless sedation or dizziness occurs**
- AVAILABILITY……Tablet: 2mg (OTC) and 1mg/5mL suspension
- ACTION……..Anti-diarrheal
- INDICATIONS……Diarrhea
- CONTRAINDICATIONS……..……Known hypersensitivity; hypertension; bloody diarrhea
- PRECAUTIONS……..…..Can be sedating when taken in supra-therapeutic doses
- SIDE EFFECTS…….ENT-dryness
- INTERACTIONS……..,..None significant to intermittent usage. May compound with other sedating medications causing more sedation
- DOSAGE……..…4mg first dose then 2mg each diarrhea episode with
- maximum 16mg (8 tablets) per day

MECLIZINE (Antivert)

- OPERATIONAL STATUS……..……**NON-OPERATIONAL**
- AVAILABILITY……25-50mg tablet
- ACTION……..Anti-emetic; anti-motion sickness/vertigo
- INDICATIONS……...Nausea / vomiting, motion sickness or vertigo
- CONTRAINDICATIONS……..…… Known hypersensitivity
- PRECAUTIONS……..…..May cause sedation or impairment
- SIDE EFFECTS…….Sedation
- INTERACTIONS……Other antihistamines, benzodiazepines, codeine
- DOSAGE……... 25-50mg PO every 4 hours, as needed.

ONDANSETRON / 5-HT3 Antagonist (Zofran)

- OPERATIONAL STATUS……..……**OPERATIONAL unless sedation or dizziness occurs**
- AVAILABILITY……IM/IV injectable; tablets; ODT (orally dissolving tablets)
- ACTION……..Anti-emetic
- INDICATIONS……..Nausea / vomiting
- CONTRAINDICATIONS……..……Known hypersensitivity
- PRECAUTIONS……..…..QT interval prolongation abnormality
- SIDE EFFECTS…….May cause QT prolongation
- INTERACTIONS……...Amiodarone, tramadol, other anti-dysrhythmic agents
- DOSAGE……....4 mg SL, IV, IM, IN q4h prn

Tactical EMS (TEMS)

Opthalmologicals

TETRACAINE Eye Drops

- OPERATIONAL STATUS……..……**Operational**
- AVAILABILITY ……..……Ocular anesthetic solution
- ACTION……..Topical anesthetic
- INDICATIONS……..To facilitate eye exam; relieve eye pain
- CONTRAINDICATIONS……..…… Known hypersensitivity
- PRECAUTIONS……..….Insure eye protection from foreign objects after exam. Prolonged use can cause direct corneal damage
- SIDE EFFECTS…….None significant to EMS
- INTERACTIONS……..…..Eye pain
- DOSAGE……....1-2 drops per eye as needed

Analgesics

ACETAMINOPHEN (Tylenol)

- OPERATIONAL STATUS……**Operational**
- AVAILABILITY ……..……Tablet: 325 and 500mg
- ACTION……..….Analgesic, antipyretic (fever reducer)
- INDICATIONS……...Mild to moderate pain
- CONTRAINDICATIONS……..…… Known hypersensitivity; liver disease
- PRECAUTIONS……...….Hepatic Disease
- SIDE EFFECTS……GI upset
- INTERACTIONS ……..None significant to EMS
- DOSAGE……..…650-1000mg / 4 to 6 hours

TRAMADOL (Ultram)

- OPERATIONAL STATUS……..……**NON-OPERATIONAL**
- AVAILABILITY ……..PO Tablet: 50 and 100mg
- ACTION…….Analgesic
- INDICATIONS……...Moderate to moderately severe pain
- CONTRAINDICATIONS……..……Known hypersensitivity; seizure disorder; SSRI/TCA/MAOI use; renal or liver insufficiency (dose adjustment needed)
- PRECAUTIONS……..….Caution with concomitant narcotic use.
- SIDE EFFECTS…….Potentially dizziness / nausea, lower seizure threshold
- INTERACTIONS…….. Antidepressants; antipsychotics; Warfarin; Digoxin;
- Tegretol; Quinidine
- DOSAGE……..…50 to 100mg every 4 to 6 hours; 400mg/day maximum

Tactical EMS (TEMS)

Analgesics – *continued*:

LIDOCAINE (As temporizing measure only)

- OPERATIONAL STATUS……..……**Operational**
- AVAILABILITY ……..…IM or SQ Injectable 1% (10mg/cc) solution
- ACTION……..….Local anesthetic
- INDICATIONS……..Infiltration anesthesia
- CONTRAINDICATIONS……..…… Known hypersensitivity
- PRECAUTIONS……..….Higher doses may cause temporary muscle weakness or paralysis
- SIDE EFFECTS…….None significant to EMS
- INTERACTIONS……..None significant to EMS
- DOSAGE……....Typically 3-10cc, 5mg/kg maximum, (0.5cc/kg max dose)

Antibiotics

ERYTHROMYCIN Opthalmic Ointment

- OPERATIONAL STATUS……..……**Non-Operational if vision becomes blurred**
- AVAILABILITY ……..Opthalmic ointment
- ACTION……..…..Topical antibiotic
- INDICATIONS……Corneal abrasion or foreign body in eye
- CONTRAINDICATIONS……..…… Known hypersensitivity
- PRECAUTIONS……..…..May cause blurring of vision due to ointment on cornea
- SIDE EFFECTS…….None significant to EMS
- INTERACTIONS……..None significant to EMS
- DOSAGE……....Typically 1cm of ointment to lower lid ever 4-6 hours

Tactical EMS (TEMS)

Antibiotics – *continued*:

MOXIFLOXACIN (Avelox)

- OPERATIONAL STATUS……..……**Operational**
- AVAILABILITY ……..Oral antibiotic
- ACTION…….Broad spectrum antibiotic in fluoroquinolone class
- INDICATIONS……Prophylaxis for a significant penetrating/open wound
- CONTRAINDICATIONS…….…… Known hypersensitivity to this, ciprofloxacin, levofloxacin
- PRECAUTIONS……..…..May cause tendonitis/tendon rupture, photosensitivity, QT prolongation. Should be avoided in patients receiving Class IA (for example quinidine, procainamide) or Class III (for example amiodarone, sotalol) antiarrhythmic agents.
- SIDE EFFECTS…… Abdominal pain, diarrhea, vomiting, oral sores, headache
- INTERACTIONS…….……..Antacids such as Mylanta and multivitamins reduce effect
- DOSAGE……...One pill (400mg) by mouth every 24 hours

Respiratory Bronchodilator

ALBUTEROL HFA

- OPERATIONAL STATUS……..……**Operational**
- AVAILABILITY ……..Metered dose inhaler
- ACTION…….Bronchodilator of Beta 2 Class
- INDICATIONS……Treatment of wheezing or other bronchospasm symptoms
- CONTRAINDICATIONS…….…… Known hypersensitivity
- PRECAUTIONS……..…..None significant to EMS
- SIDE EFFECTS…… Palpitations, mild tachycardia, tremulous if taken in excess. Will temporarily lower serum potassium levels
- INTERACTIONS…….……..None significant to EMS
- DOSAGE……...Two puffs every 10-15 minutes as needed. Better delivery If used with a spacer device- commercial or improvised

Tactical EMS (TEMS)

Wound Management

Combat Gauze

- OPERATIONAL STATUS……..……**Operational**
- AVAILABILITY ……..Rolled gauze impregnated with agent
- ACTION……..Topical hemostatic due to kaolin
- INDICATIONS……Significant venous or arterial bleeding not adequately controlled with conventional wound management
- CONTRAINDICATIONS…….…… Known hypersensitivity
- PRECAUTIONS……..…..None significant to EMS
- SIDE EFFECTS……..None significant to EMS
- INTERACTIONS…….……..None significant to EMS
- DOSAGE……....Remove any old clot. Place impregnated gauze directly against bleeding tissue. Secure with pressure dressing. May aggressively pack into void or wound cavity.

Tranexamic Acid (TXA)

- OPERATIONAL STATUS……..……**NON-OPERATIONAL**
- AVAILABILITY ……..100mg/ml, 10ml vials and ampules
- ACTION……Injectable anti-fibrolytic (blocks action of plasminogen)
- INDICATIONS……TXA is indicated for treatment of significant penetrating traumatic injury age ≥ 18 along with evidence of hemorrhagic shock if delivery to a Trauma Center will be delayed >30 minutes. Blood products should be administered if an adult patient has 2 of the following after traumatic injury or other evidence of bleeding:
  - Hypotension (single reading of systolic blood pressure less than or equal to 90mm Hg)
  - Tachycardia (single reading of heart rate greater than or equal to 120)
  - Penetrating mechanism (i.e. stabbing, gunshot, etc…)
- CONTRAINDICATIONS…….…… Known hypersensitivity; ANY anticoagulant use such as warfarin, heparin, enoxaparin (Lovenox), dabigatrin, etc; Administration of other procoagulant factors: prothrombin complex concentrates (PCC), recombinant Factor VII, etc; Evidence of active intravascular clotting (DVT, PE, embolic stroke, etc.
- PRECAUTIONS……..…..TXA is a pro-coagulant and can cause clotting which can be life threatening (DVT, PE, embolic stroke, etc). **Give the receiving hospital TXA information sheet.**
- SIDE EFFECTS……Headache, nasal/sinus sx, back, abdominal, and body pain
- INTERACTIONS…….……..Concomitant use of hormonal contraceptives, Oral tretinoin, Factor IX Complex concentrates, Anti-Inhibitor Coagulant Concentrates, Tissue Plasminogen Activators
- DOSAGE……....Initial dose: 1 gram in 50-100cc NS or Lactated Ringer's given over 10 minutes within three hours of injury. Second dose as infusion of second 1 gram TXA in 50cc NS given over 8 hours. (8.6 cc/hour)

Tactical EMS (TEMS)

Warning

This patient has received **TRANEXAMIC ACID (TXA)** for bleeding control.

DO NOT GIVE: Prothromin Complex Concentrates (PCC) or other pro-coagulants to this patient, such as:

- Bebulin
- FEIBA
- Recombinant Factor VII

A one gram IV loading dose of tranexamic acid has been administered by EMS.

An additional **1 gram TXA** given IV piggyback over 8 hours **needs to be started**.

Tactical EMS (TEMS)

The following is modified from Tactical Combat Casualty Care Guidelines (October 28, 2013)

Basic Management Guideline for Care Under Fire

- Return fire and take cover.
- Direct or expect casualty to remain operational and engaged if appropriate.
- Direct casualty to move to cover and apply self-aid if able.
- Try to keep the casualty from sustaining additional wounds.
- Casualties should be extricated from burning vehicles or buildings and moved to places of relative safety. Do what is necessary to stop the burning process.
- Airway management is generally best deferred until the **Tactical Field Care** phase.
- Stop life-threatening external hemorrhage if tactically feasible:
    - Direct the casualty to control hemorrhage by self-aid if able.
    - Use an approved tourniquet for hemorrhage that is anatomically amenable to tourniquet application.
    - Apply the tourniquet proximal to the bleeding site, over the clothes, tighten, and move casualty to cover.

Basic Management Guideline for Tactical Field Care

- **Casualties with an altered mental status should be disarmed immediately.**

- **Airway management**
    - Unconscious casualty without airway obstruction:
        - Chin lift or jaw thrust maneuver
        - Nasopharyngeal airway
        - Place casualty in the recovery position

    - Casualty with airway obstruction or impending airway obstruction
        - Chin lift or jaw thrust maneuver
        - Nasopharyngeal airway
        - Allow casualty to assume any position that best protects the airway, to include sitting up

    - Place unconscious casualty in the recovery position.

    - If previous measures unsuccessful:
        - Surgical cricothyrotomy (using lidocaine if conscious)
        - Supraglottic airway
        - Endotracheal intubation

Tactical EMS (TEMS)

Guideline for Tactical Field Care – *continued*:

- **Breathing:**
  - In a casualty with progressive respiratory distress and known or suspected torso trauma, consider a tension pneumothorax and decompress the chest on the side of the injury with a 14-gauge, 3.25 inch needle/catheter unit or other approved device inserted in the second intercostal space at the midclavicular line. Ensure that the needle entry into the chest is not medial to the nipple line and is not directed towards the heart. An acceptable alternate site is the 4th or 5th intercostal space at the anterior axillary line (AAL).

  - All open and/or sucking chest wounds should be treated by immediately applying a vented chest seal to cover the defect. If a vented chest seal is not available, use a non-vented chest seal. Monitor the casualty for the potential development of a subsequent tension pneumothorax. If the casualty develops increasing hypoxia, respiratory distress, or hypotension, and a tension pneumothorax is suspected, treat by burping or removing the dressing or by needle decompression.

  - Most combat casualties do not require supplemental oxygen, but administration of oxygen when possible may be of benefit for the following types:
    - Low oxygen saturation by pulse oximetry
    - Injuries associated with impaired oxygenation
    - Unconscious casualty
    - Casualty with moderate/severe traumatic brain injury (TBI)
    - maintain oxygen saturations >90%
    - Casualty in shock
    - Casualty at altitude

- **Bleeding:**
  - Assess for unrecognized hemorrhage and control all sources of bleeding. If not already done, use an approved tourniquet to control life-threatening external hemorrhage that is anatomically amenable to tourniquet application or for any traumatic amputation. Apply directly to the skin, 2-3 inches above the wound.

Tactical EMS (TEMS)

Guideline for Tactical Field Care – *continued*:

- **Bleeding – *continued*:**
  - For compressible hemorrhage not amenable to tourniquet use or as an adjunct to tourniquet removal (if evacuation time is anticipated to be greater than two hours), use Combat Gauze as topical hemostatic. Combat Gauze should be applied with at least 3 minutes of direct pressure. Before releasing any tourniquet on a casualty who has been resuscitated for hemorrhagic shock, ensure a positive response to resuscitative efforts (i.e. a peripheral pulse normal in character and normal mentation if there is no traumatic brain injury (TBI).

  - Re-assess prior to additional tourniquet application. Expose wound and determine if an additional tourniquet is needed. If so, move tourniquet from over clothing and apply directly to skin 2-3 inches above the wound. If a tourniquet is not needed, use other techniques to control bleeding.

  - When time and tactical situation permits, a distal pulse check should be accomplished. If a distal pulse is still present, consider additional tightening of the tourniquet or the use of a second tourniquet, side by side and proximal to the first, to eliminate the distal pulse.

  - Expose and clearly mark all tourniquet sites with the time of tourniquet application. Use an indelible marker if possible.

- **Intravenous (IV) access**
  - Start an IV or saline lock if indicated. (18-gauge or larger preferable)
  - If resuscitation is required and IV access is not obtainable, use the intraosseous (IO) route

- **Tranexamic Acid (TXA)**
  - If a casualty is anticipated to need significant blood transfusion (i.e. presents with hemorrhagic shock, one or more major amputations, penetrating torso trauma, or evidence of severe bleeding).
    - Administer 1 gram of tranexamic acid (TXA) in 100cc or Normal Saline or Lactated Ringer's as soon as possible but NOT LATER THAN 3 hours after injury.
    - Begin second infusion of 1 gram TXA after initial fluid resuscitation. Run IV piggyback over 8 hours.

Tactical EMS (TEMS)

Guideline for Tactical Field Care – *continued*:

- **Traumatic Brain Injury (TBI)**
  - Casualties with moderate/severe TBI should be monitored for:
    - Decrease in level of consciousness
    - Pupillary dilation
    - SBP should be >90 mmHg
    - Oxygen saturation should be >90%
    - Hypothermia
    - PCO_2 (if capnography available, maintain between 35-40 mmHg)
    - Penetrating head trauma.
    - Assume a spinal injury until cleared

  - Unilateral papillary dilation accompanied by a decreased level of consciousness may signify impending cerebral herniation. If these signs occur, take the following actions to decrease intracranial pressure:
    - Elevate the casualty's head to 30 degrees
    - Hyperventilate the casualty:
      - Respiratory rate of 20 initially
      - Capnography should be used to maintain end-tidal CO_2 between 30-35 mmHg
      - The highest oxygen concentration (FIO_2) possible should be used for hyperventilation.

  - Notes on Traumatic Brain Injury (TBI):
    - Do not hyperventilate unless signs of impending herniation are present.
    - Casualties may be hyperventilated using bag-valve-mask or mouth-to-mask technique

- **Fluid resuscitation**
  - Asses for hemorrhagic shock: altered mental status (in absence of head injury) and weak or absent peripheral pulses are the best field indicators of shock. If BP monitoring is available, maintain target systolic BP of 80-90 mmHg.
    - If not in shock:
      - No IV fluids necessary
      - PO fluids permissible if conscious and can swallow
    - If in shock:
      - 500-1000 cc of Normal Saline or Lactated Ringers
      - Repeat in 15 minutes if still in shock

Tactical EMS (TEMS)

Guideline for Tactical Field Care – *continued*:

- **Fluid resuscitation – *continued*:**
  - Continued efforts to resuscitate must be weighed against logistical and tactical considerations and the risk of incurring further casualties.

  - If a casualty with an altered mental status due to a suspected TBI has a weak or absent peripheral pulse, resuscitate as necessary to maintain a palpable radial pulse. If BP monitoring is available, maintain target systolic BP of at least 90 mmHg.

- **Prevention of hypothermia**
  - Minimize casualty's exposure to the elements. Keep protective gear on or with the casualty if feasible.
  - Replace wet clothing and replace with dry if possible. Get the casualty onto an insulated surface as soon as possible.
  - Apply a Ready-Heat Blanket to the casualty's torso (not directly on the skin) and cover the casualty with the Heat Reflective Shell (HRS).
  - If a Heat Reflective Shell is not available, cover the casualty with reflective mylar blanket or similar product.
  - If the items above are not available, use dry blankets, coats, dry clothes, or anything that will retain heat and keep the casualty dry.
  - Warm fluids are preferred if IV fluids are required. Consider use of a fluid warmer.

- **Penetrating Eye Trauma**
  - If a penetrating eye injury is noted or suspected:
    - Performa a rapid field rest of visual acuity
    - Cover the eye with a rigid eye shield (NOT a pressure patch)
    - Ensure that the oral antibiotic (moxifloxicin) is taken, if possible, as soon as practical.

- **Monitoring**
  - Pulse oximetry should be available as an adjunct to clinical monitoring. All individuals with moderate/severe TBI should be monitored with pulse oximetry. Readings may be misleading in the setting of shock or hypothermia.

- **Inspect and dress known wounds**
- **Check for additional wounds**
  - Dress and treat as indicated.

Tactical EMS (TEMS)

Guideline for Tactical Field Care – *continued*:

- **Analgesia:** Analgesia in the tactical arena should be generally achieved using one of three options:

  - **Option 1**
    - Mild to Moderate Pain
    - If not otherwise precluded, casualty is able to remain **OPERATIONAL:**

      - Acetaminophen 650-1000mg by mouth every 6 hours
        –PLUS—
      - Ibuprofen 400-600mg po every 6 hours **–OR—**
        Naprosyn 375, 440 or 500g po every 12 hours **–OR—**
        Ketorolac 30mg IV or 60mg IM every 8 hours
        (Do not administer more than one NSAID)

  - **Option 2**
    - Moderate to severe pain
    - Casualty is NOT in shock or respiratory distress
    - Casualty shall be and remain **NON-OPERATIONAL**

      - Fentanyl 0.5-1 mcg/kg IV or intranasal every 15 minutes as needed

      - May use sub-dissociative ketamine 0.25mg/kg IV every 5 minutes as an adjunct to fentanyl

  - **Option 3**
    - Moderate to severe pain
    - Casualty is in hemorrhagic shock or respiratory distress or casualty is at significant risk of developing either condition
    - Casualty shall be and remain **NON-OPERATIONAL**

      - Ketamine 1mg/kg IV every 15 minutes as needed
        (OR)
        Ketamine 5mg/kg IM every 30 minutes as needed

      - End points: Control of pain or development of nystagmus
  - **Analgesia notes:**
    - Casualties need to be disarmed prior to administering fentanyl or ketamine
    - Document a mental status exam using AVPU prior to administering fentanyl or ketamine
    - For all casualties given opioids or ketamine, monitor airway, breathing and circulation closely
    - Naloxone should be available when using opioid analgesics.

Tactical EMS (TEMS)

Guideline for Tactical Field Care – *continued*:

- **Analgesia – *continued*:**
    - Both ketamine and opioids have the potential to worsen severe TBI. The tactical medic must consider this fact in his analgesic decision, but if the casualty is able to complain of pain, then the TBI is likely not severe enough to preclude the use of ketamine or fentanyl.
    - Penetrating eye injury does not preclude use of ketamine. Risk of additional damage to the eye from using ketamine is low and maximizing the casualty's chance for survival takes precedence if the casualty is in shock or respiratory distress or at significant risk for either.
    - If respirations are noted to be reduced after using opioids or ketamine, provide ventilatory support with a bag-valve-mask or mouth-to-mask ventilations and consider administration of naloxone.
    - Ondansetron po, intranasal or IV may be given as needed for nausea and vomiting.
- **Splint fractures and re-check pulses**
- **Antibiotics**
    - Antibiotics are recommended for all tactically sustained open wounds.
        - If able to take po:
            - Moxifloxacin 400 mg po once daily
        - If ocular trauma sustained:
            - 1cm ophthalmic erythromycin ointment every 4-6 hours
- **Burns**
    - Facial burns, especially those that occur in closed spaces, may be associated with inhalational injury. Aggressively monitor airway status and oxygen saturation in such patients and consider early surgical airway for respiratory distress or oxygen desaturation.
    - Estimate total body surface area (TBSA) burned to the nearest 10% using the Rule of Nines.
    - Cover the burned area with dry, sterile dressings if possible. For extensive burns (>20%), consider placing casualty in the Heat-Reflective Shell in order to both cover the burned areas and prevent hypothermia.

Tactical EMS (TEMS)

Guideline for Tactical Field Care – *continued*:

- **Burns – *continued*:**
  - Fluid Resuscitation (USAISR Rule of Ten)
    - If burns are greater than 20% of TBSA, fluid resuscitation should be initiated as soon as IV/IO access is established. Resuscitation should be initiated with Lactated Ringer's or Normal Saline.
    - Initial IV/IO fluid rate is calculated as %TBSA x 10cc/hour for adults weighing 40-80kg
    - For every 10kg above 80kg, increase initial rate by 100cc/hour.
    - If hemorrhagic shock is also present, resuscitation for hemorrhagic shock takes precedence over resuscitation for burn shock. Administer IV/IO fluids per Fluid Resuscitation Guidelines.
  - Analgesia should be treated in accordance with Analgesia Guidelines.
  - Pre-hospital antibiotic therapy is not indicated for isolated burns, but antibiotics should be given per Antibiotic Guidelines in Section if indicated to prevent infection in penetrating wounds.
  - All interventions may be performed on or through burned skin in a burn casualty if needed though it is preferable to avoid burned skin if possible.

- **Communicate with the casualty if possible**
  - Encourage and reassure
  - Explain care and procedures being performed.

- **Cardiopulmonary Resuscitation (CPR)**
  - Resuscitation in the tactical arena for victims of blast or penetrating trauma who have no pulse, no respirations, and no other signs of life will not be successful and should not be attempted. However, casualties with torso trauma or poly-trauma who have no pulse or respirations during Tactical Field Care should have bilateral needle decompression performed to ensure they do not have a tension pneumothorax prior to discontinuation of care. This procedure is described in Breathing Guidelines above.

- **Documentation of Care**
  - Document clinical assessments, treatments rendered, and changes in the casualty's status and condition on a Casualty Card or other such record. Forward this information with the casualty to the next level of care, whether that be to conventional EMS or to hospital Emergency Department personnel.

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Chippewa Valley Regional EMS Protocols

CRITICAL CARE PROTOCOLS

To be used only by personnel with current critical care paramedic certification

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GENERAL GUIDELINES

Standard procedures

1. Vital signs should be obtained and documented every ten (15) minutes, unless otherwise required by protocol.
2. Vital signs required for every type transfers to be obtained prior to transfer of care and recurring in route are:
    - Blood Pressure
    - Heart Rate
    - Respiration rate and quality
    - Pulse Oximetry (SPO2)
    - Level of Consciousness
    - Complaint or pain level
3. Other vital signs required to be monitored for each type of transfer and recurrence in route as listed in the Types of Transfer section under each patient condition classification.
4. Baseline temperature should be obtained for any patient receiving blood product administration.
5. Patient must have vital signs appropriate for the type of transfer IAW Patient Condition Guidelines presented in the Types of Transfer section of this document.
6. If patient does not meet the minimum criteria for vital stability, then the type of transfer must be upgraded accordingly and may affect personnel required or have transfer arranged with a higher level service.
7. If clinically indicated, patients will have continuous monitoring of electrocardiogram (ECG) and Capnography for ventilated patients.
8. All artificially ventilated patients (and all other patients where it is clinically indicated) will have continuous monitoring of waveform capnography.
9. All monitoring and therapy will be continued until care is transferred to the receiving medical staff
    - 3 Lead ECG's required for transfer in the Types of Transfer section, will require at least a 6 second print-out to be obtained prior to assumption of care; continuously monitored in route and a second printout recorded prior to transfer of care.
    - IV or IV access will remain in place until transfer of care at tertiary facility.
    - Oxygen provided will remain in place unless indicated by a change in patient's condition.
10. A written Patient Care Report should be recorded within 2 hours of return from a transfer event unless extenuating circumstance prevents record creation, but will definitely be recorded no later than 24 hours after transfer.
11. Stable for Transport transfers and above should have peripheral intravenous (IV) access, if possible.
    - Primary Patient Caregiver or ALS Personnel should attempt to establish IV access if no attempts have been made at the sending facility.
    - ALS Caregivers are authorized to establish IO access if warranted by the patient's condition.
    - NO Patient will be transported for cardiac reasons without a patent IV access established.
    - ALS Caregiver will flush with 10ml NSS any saline lock prior to assumption of patient care to ensure IV patency.

- Medications may also be administered through any central venous catheter
- ALS Caregivers may administer medication boluses, infusions and fluids through administration sets connected by the sending facility to IV sites or subcutaneous devices (e.g., Port-a-Cath).

Patient Deterioration

1. Patient must be regularly re-assessed in order to identify changes in patient condition as soon as possible.
2. Primary Patient Caregiver must be acutely aware of specific physician orders regarding this patient and the medications that are being administered so that alterations may be made as ordered to accommodate patient condition.
3. Primary Patient Caregiver should have written transfer orders on board from the sending physician that specifies therapies to be continued, given as needed (prn), and dose titration parameters
4. Review what medications must be administered to prevent deterioration?
5. Review any on board additional medications to administer in the event of deterioration?
6. If patient deterioration is dramatic, severe or unexpected, medical control should be contacted for further instructions
    1. First choice is the Medical Control Physician or the physician that has the most information regarding the patient
    2. Second choice is the receiving physician/facility. This person/facility should have received a detailed report and understand the patient's condition
    3. Third choice is a third party physician/facility such as a local hospital en route
        - A Third party hospital may be necessary for life saving interventions including a possible diversion to stabilize the patient
7. Medications may need to be discontinued
    - Note: Extreme caution should be taken in discontinuing medications
    - As the medications are discontinued, so are the therapeutic effects.
    - Is the value of discontinuing the medication more than the danger of discontinuing the therapeutic benefit?

ROUTINE TRANSPORT

Routine transport: defined as scheduled or unscheduled transport; Patient clearly stable for transport with no requirement for airway management, IV maintenance and/or cardiac monitoring due to DNR status, impending death from terminal disease process or requested no interventions by sending physician.

- Minimum vital statistics allowed:
  Systolic BP > 90, Respirations < 24; SPO^2 > 90%; HR < 120 and LOC > GCS 11
- Minimum Staffing: Two EMT-Basics
- Types of transfer that typically qualify: Nursing Home Return, Return to Residence, Hospice, Bariatric, Clinic Visit

Emergency Medical Technician

- Routine Scope of practice for EMT-B
- General Guidelines
- Primary Patient Caregiver assumes responsibility for patient care

Advanced EMT

- Routine Care for AEMT
- General Guidelines
- Primary Patient Caregiver assumes responsibility for patient care

Intermediate

- Routine Care for Intermediate
- General Guidelines
- Primary Patient Caregiver assumes responsibility for patient care

Paramedic

- Routine Care for Paramedic
- General Guidelines
- Primary Patient Caregiver assumes responsibility for patient care

Critical Care Paramedic (CCEMT-P)

- Routine Care for Critical Care Paramedic
- General Guidelines
- Primary Patient Caregiver assumes responsibility for patient care

STABLE TRANSPORT

Stable transport: defined (as stated above in Routine transport, but who) has a "maintenance" IV running without additives; (e.g., cancer patient transported for radiation therapy, with unadulterated crystalloid IV solution running).

- Minimum vital statistics allowed:

Systolic BP > 90, Respirations < 24; SPO^2 > 90%; HR < 120 and LOC > GCS 10

- Minimum Staffing:
  - One **AEMT, EMT-I or EMT-P** as Primary Patient Caregiver
  - One **EMT or AEMT** driving
- Types of transfer that typically qualify: Return to Residence, Hospice, Bariatric

Emergency Medical Technician

- Routine Scope of practice for EMT-B
- General Guidelines
- Support role with expanded skills available based on competencies
- This transport type does not support EMT as Primary Patient Caregiver

Advanced EMT

- Routine Care for AEMT
- General Guidelines
- Primary Patient Caregiver assumes responsibility for patient care

Intermediate

- Routine Care for Intermediate
- General Guidelines
- Primary Patient Caregiver assumes responsibility for patient care

Paramedic

- Routine Care for Paramedic
- General Guidelines
- Primary Patient Caregiver assumes responsibility for patient care

Critical Care Paramedic (CCEMT-P)

- Routine Care for Critical Care Paramedic
- General Guidelines
- Primary Patient Caregiver assumes responsibility for patient care

SUB-ACUTE TRANSPORT

Sub-Acute transport: defined as a patient has a medical problem that is either completely or, at least, to the best of a facility's ability, stabilized; who has the potential to become less stable during transport. Instrumentation or medication running must be consistent with the Inter-facility Transfer Guidelines.

- Minimum vital statistics allowed:

Systolic BP > 90, Respirations < 24; SPO2 > 90%; HR < 130 and LOC > GCS 09

- Vital sign monitoring as per General Guidelines plus:
  - 3 Lead ECG continuous
  - 12 Lead ECG if condition warrants at start and end of transfer
  - Temperature for septic patients
- Transport Non-emergent unless:
  - Sending Physician orders high speed transport (confirm with medical control physician if your assessment differs from sending physician).
  - No Critical Care Paramedic, CCRN or MD is available and delaying transport would most likely result in a negative outcome.
  - Patient condition degrades in route to below minimums set above o Patient develops unforeseen complication to treatments at sending hospital or in route.
- Minimum Staffing:
  - One **EMT-P or CCEMT-P** as Primary Patient Caregiver
  - One **AEMT or EMT** as driver
- Types of transfer that typically qualify: Hospital to Hospital (Direct Admit), Emergency Department to Emergency Department, Bariatric, Clinic Visit

Emergency Medical Technician

- Routine Scope of practice for EMT-B
- General Guidelines
- Support role with expanded skills available based on competencies
- This transport type does not support EMT as Primary Patient Caregiver

Advanced EMT

- Routine Care for AEMT
- General Guidelines
- Support role with expanded skills available based on competencies
- This transport type does not support AEMT as Primary Patient Caregiver

Intermediate

- Routine Care for Intermediate
- General Guidelines
- Primary Patient Caregiver role limited to scope of practice and protocols
- Any required interventions en route or continuing medications not in scope of practice requires a higher level EMS provider as Primary Patient Caregiver
- Primary Patient Caregiver assumes responsibility for patient care

Paramedic

- Routine Care for Paramedic
- General Guidelines
- Primary Patient Caregiver assumes responsibility for patient care

Critical Care Paramedic (CCEMT-P)

- Routine Care for Critical Care Paramedic
- General Guidelines
- Primary Patient Caregiver assumes responsibility for patient care

ACUTE TRANSPORT

Acute transport: defined as a patient who has a problem with high potential to become unstable; Critical care patient with any other instrumentation or medication running that is not included in the Interfacility Transfer Guidelines.

- Minimum vital statistics allowed:

Systolic BP > 80, Respirations < 30; SPO2 > 86%; HR < 140 and LOC > GCS 09

- Vital sign monitoring as per General Guidelines plus:
  - 3 Lead ECG continuous
  - 12 Lead ECG if condition warrants at start and end of transfer
  - Temperature for septic patients or patients receiving blood products
    - Preference is for oral temperature monitoring
    - Baseline temperature prior to departure from sending facility required
  - Ventilatory rate, Capnography number and waveform as well as tube position required for mechanically ventilated patients.
  - Hemodynamically challenged patients should have BP monitored every 5 minutes.
- Transport Non-emergent unless:
  - Sending Physician orders high speed transport (confirm with medical control physician if your assessment differs from sending physician).
  - No Critical Care Paramedic, CCRN or MD is available and delaying transport would most likely result in a negative outcome.
  - Patient condition degrades in route to below minimums set above
  - Patient develops unforeseen complication to treatments at sending hospital or in route.
- Minimum Staffing:
  - One **EMT-P or CCEMT-P** as Primary Patient Caregiver
  - One **AEMT or EMT** as driver
  - If anticipated that potential DFAM may be needed in route, then two EMT-Ps must be staffing the transport
  - Appropriate additional medical personnel must accompany the patient during transfer to facilitate good patient care.
  - Individual EMT-Paramedics lacking Critical Care license endorsement can obtain qualifications for acute care transport as per the discretion of the Service Medical Director and requires prior completion of competencies relevant to the level of care being rendered.
- Types of transfer that typically qualify: Hospital to Hospital (Direct admit), Emergency Department to Level I Trauma Center, High Risk Pregnancy with imminent birth, Mass Casualty Transfer

Emergency Medical Technician

- Routine Scope of practice for EMT-B
- General Guidelines
- Support role with expanded skills available based on competencies
- This transport type does not support EMT as Primary Patient Caregiver

Advanced EMT

- Routine Care for AEMT
- General Guidelines
- Support role with expanded skills available based on competencies
- This transport type does not support AEMT as Primary Patient Caregiver

Intermediate

- Routine Care for Intermediate
- General Guidelines
- Support role with expanded skills available based on competencies
- This transport type does not support EMT-I as Primary Patient Caregiver

Paramedic

- Routine Care for Paramedic
- General Guidelines
- Primary Patient Caregiver role limited to scope of practice and protocols
- Any required interventions en route or continuing medications not in scope of practice requires a higher level EMS provider as Primary Patient Caregiver.
- Primary Patient Caregiver assumes responsibility for patient care

Critical Care Paramedic (CCEMT-P)

- Routine Care for Critical Care Paramedic
- General Guidelines
- Primary Patient Caregiver assumes responsibility for patient care

CRITICAL CARE TRANSPORT

Critical Care Transport: Defined as a patient with an acute problem with high potential to become unstable or is currently unstable; Critical care patient with any instrumentation or medication running that is not included in the Wisconsin Paramedic Scope of Practice.

- Minimum vital statistics allowed:

Systolic BP > 80, Respirations < 40; SPO2 > 70%; HR < 160 and LOC > GCS 3

- Vital sign monitoring as per General Guidelines plus:
  - 3 Lead ECG continuous
  - 12 Lead ECG if condition warrants at start and end of transfer
  - Temperature for septic patients or patients receiving blood products
    - Preference for oral temperature monitoring unless indwelling temperature sensor present and monitor able to display value
    - Baseline temperature prior to departure from sending facility required
  - Ventilatory rate, Capnography number and waveform as well as tube position required for mechanically ventilated patients.
  - Hemodynamically challenged patients should have BP monitored every 5 minutes.
  - End-tidal CO2 monitoring for any unstable patient
- Transport Non-emergent unless:
  - Sending Physician orders high speed transport (confirm with medical control physician if your assessment differs from sending physician).
  - Delaying transport time would most likely result in a negative outcome.
  - Patient condition degrades in route to below minimums set above
  - Patient develops unforeseen complication to treatments at sending hospital or en route.
- Minimum Staffing:
  - One **CCEMT-Paramedic (or one CCRN or MD)** as Primary Patient Caregiver – AND- **one Paramedic**
  - One **AEMT or EMT** as driver
- Types of transfer that typically qualify: ICU to ICU (Direct Admit), Emergency Department to Level I Trauma Center or tertiary care center, Post Return of Spontaneous Circulation, Any aero medical level transfer with no aero medical service available

Emergency Medical Technician

- Routine Scope of practice for EMT-B
- General Guidelines
- Support role with expanded skills available based on competencies
- This transport type does not support EMT as Primary Patient Caregiver

Advanced EMT

- Routine Care for AEMT
- General Guidelines
- Support role with expanded skills available based on competencies

- This transport type does not support AEMT as Primary Patient Caregiver

Intermediate

- Routine Care for Intermediate
- General Guidelines
- Support role with expanded skills available based on competencies
- This transport type does not support EMT-I as Primary Patient Caregiver

Paramedic

- Routine Care for Paramedic
- General Guidelines
- Support role with expanded skills available based on competencies
- This transport type does not support EMT-P without CCT endorsement as Primary Patient Caregiver

Critical Care Paramedic (CCEMT-P)

- Routine Care for Critical Care Paramedic
- General Guidelines
- Primary Patient Caregiver assumes responsibility for patient care

MEDICATION ADMINISTRATION

The transport paramedic must be familiar or become familiar through consultation (i.e., with a drug reference or discussion with hospital staff) on the following attributes of each drug the patient has received prior to and will receive during transport:

- The type and name of medication being administered.
- The indication and contraindications for administration of the medication.
- The correct dose, rate, and mixture of medication.
- Any titration indications or instructions.
- Any specific medical control instructions.
- Any patient-specific information
- Any adverse effects of the medication being administered.
- The seven rights of medication administration should always be considered, even when transporting patients between facilities.
- Right patient, drug, dose, route, time, outcome, documentation
- Paramedics may not accept any unlabeled medications from the sending facility for the purposes of bolus administration during transport.

Medications not included in the Wisconsin Scope of Practice for the level of Paramedic are to be monitored, maintained and/or initiated by a Chippewa Valley Regional (for remainder of document abbreviated as CVR) Critical Care Paramedic as ordered by Medical Control or the sending facility.

Care should be taken for education on unfamiliar medications as available. Medical Control will be established prior to transport to allow for resources regarding recognizing and treating untoward reactions associated with non-standard medications.

Medications not part of the CVR Formulary shall be provided by the sending facility with documented orders from Medical Control or the Sending Physician as to how these medications are to be administered. Verbal orders are sufficient for any non-standard medication with the exception of BLOOD PRODUCTS. Verbal orders are to be documented in the PCR if written orders are not provided.

Any of the following medications or medication classes, not currently part of the Paramedic Statewide Medication List, may only be maintained or initiated en route by the CVR Critical Care Paramedic. Common examples include, but are not limited to:

- **Aminophylline**
- **Analgesics Infusions (PCA Pump – maintenance only)**
- **Anticonvulsants/ Antiepileptics**
- **Antidysrhythmics**
- **Antihypertensive agents**

- **Anti-infectives (e.g., antibiotics, anti-sepsis)**
- **Anti-psychotics**
- **Blood products**
- **Chemotherapeutic agents**
- **Electrolyte infusions (other than NS)**
- **Potassium**
- **Glycoprotein IIb / IIIa inhibitors**
- **Heparin Drip**
- **Insulin infusions**
- **Mannitol infusions**
- **Octreotide**
- **Parenteral nutrition**
- **Sedatives (other than Ketamine or Versed)**
- **Thrombolytic agents**
- **Vasodilators (other than Nitroglycerin)**

Other medication(s) may be ordered by the sending facility/Medical Control, and may be used based upon the experience and comfort level of the Critical Care Paramedic.

BLOOD PRODUCT ADMINISTRATION

****For any blood product administration, double check correct patient with every product prior to administration.****

Transfusion Reaction:

In the event of a transfusion reaction (for all types of reactions listed below):

- Discontinue the infusion IMMEDIATELY
- Disconnect the administration set (IV Tubing) containing the offending product and replace with a normal saline infusion and new IV tubing and infuse at a wide open rate
- Save the previously used administration set and blood product for examination by the receiving facility.
- Treat for shock and provide supportive care as necessary
- **CONTACT MEDICAL CONTROL FOR ADVICE** and to inform the sending facility of the transfusion reaction.

Symptoms of Various Types of Transfusion Reaction during Blood Product Infusion and Specific Treatment for each type:

Acute Hemolytic Reaction Include:

- Fever, hypotension, flushing, wheezing, dark and / or red colored urine, Uncontrolled bleeding, joint pain, chest tightness, Lumbar/Back Pain
- **Treatment:**
  - **Flush with normal saline**
  - **Consider Furosemide 1 mg/kg (max 100mg dose) slow IV along with fluid administration for renal protection**
  - **Treat for shock/ signs of anaphylaxis as necessary**

Nonhemolytic Febrile Reaction:

- Increase in temperature (2 degrees F or 1 Degree C) from baseline
- Fever, chills, rigors, vomiting, hypotension
- **Treatment:**
  - **Antipyretic (Tylenol/Acetaminophen)**
    - **If no acetaminophen has been taken by patient within the past 4 hours, administer 1000mg PO x1 for adults or follow pediatric dosing according to Pain Control Protocol**
  - **Treat for shock as necessary**

Anaphylactic Reaction:

- Dyspnea, wheezing, anxiety, hypotension, bronchospasm, abdominal cramps, vomiting, diarrhea , Urticaria/Hives, facial or throat swelling or itching
- **Treatment (follow Anaphylaxis protocol):**
  - **Epinephrine (1:1,000): 0.3 mg (0.3mL)** IM
    - May repeat every 5–15 minutes with increasing symptoms
    - Preferred location anterior-lateral thigh
  - **Benadryl 25-50 mg IV/IM**
  - **Methylprednisolone 125gm IV/IM**
  - If bronchospasm or wheezing present:
    - Ipratropium Bromide (Atrovent): **0.5 mg** via nebulizer x 1 dose
    - Albuterol: **2.5 mg** via nebulizer
      - May repeat as needed every 5-10 minutes
  - **Fluid Resuscitation as necessary**
  - **Follow Shock Protocol as indicated**
  - **Consider Aggressive Airway Control**

Volume Overload:

- **Dyspnea, hypoxia, rales, tachycardia, jugular vein distention**
- **Treatment:**
  - **Discontinue or decrease rate of infusion**
  - **Consider Furosemide 1mg/kg Slow IV (max 100mg dose)**
  - **Consider Aggressive Airway Control**

Transfusion-Related Acute Lung Injury ("TRALI"):

- **Dyspnea, hypoxia, rales , Non-Cardiogenic Pulmonary Edema**
- **Treatment:**
  - **Aggressive Airway Control**
  - **Treat for shock as necessary**
  - **If no signs of dehydration, consider Furosemide 1mg/kg slow IV (max 100mg dose)**

INTRAVENOUS PUMPS

Paramedics acting as Primary Patient Caregivers on inter-facility transfers are expected to have a thorough understanding of the functions and operations of the infusion pump they will utilize (whether property of the ambulance service or sending facility).

Paramedics are expected to not only control the basic functions of the pump, but also be able to dynamically troubleshoot pump issues. Prior to transport, paramedics must be proficient at the following:

1. How to turn the pump on and off.
2. How to load and safely eject the administration set into pump.
3. The importance of having spare tubing.
4. How to suspend pump operation.
5. How to adjust the infusion rate, if necessary.
6. How to clear air bubbles from the tubing.
7. How to troubleshoot problems (e.g., occlusion alarms).
8. How the specific service addresses low battery or power issues.

Medications Requiring the Use of an IV Pump

The following medications / types of medications should be administered by IV pump:

- **Anticoagulants**
- **Antidysrhythmics**
- **Antihypertensives**
    - **Electrolyte Solutions (other than normal saline)**
- **Insulin**
- **Thrombolytic**
- **TPN**
- **Vasodilators**
- **Vasopressors**

MECHANICAL VENTILATION

For Interfacility transports of intubated, mechanically ventilated patients, or for airway management in an intubated patient in a 911 setting with a transport time of greater than 20 minutes, consider use of the transport ventilator.

Indications:

- Previously intubated, mechanically ventilated patients
- Tracheostomy, mechanically ventilated patients
- Field DFAM/Intubated patient's requiring mechanical ventilation for transport times of greater than 20 minutes

Contraindications:

- Patient weight less than minimum allowed by ventilator
- Patient unable to tolerate mechanical ventilator therapy
- Poor oxygenation/perfusion with mechanical ventilator therapy
- Unable to maintain sedation during transport

Patients who are already ventilator dependent and have their own ventilators with them, should be transported with their own equipment. If the Provider is unfamiliar with the patient's own machine, consider having a caregiver familiar with the patient and machine ride along for the transport.

Patients being mechanically ventilated in an interfacility environment should have the transport vent settings matched as close a possible to those of the sending facility. If unfamiliar with the vent or particular settings, consult RT at the sending facility or Medical Control

Equipment and Agency specific operation:

Individual agencies operating under these CVR critical care protocols may submit an addendum to this ventilation protocol (either as a procedure or policy) that includes equipment specific information (including but not limited to: settings, parameters, operation, scope of practice). This may include agency specific approved ventilator use by Paramedics in accordance with the Wisconsin states scope of practice (separate from Critical Care Paramedic Ventilator use).

General Settings to note:

- Tidal Volume (V_t)
    - In an ideal setting this should be set **at 6-8 ml/kg** of **ideal body weight** (see chart below)
    - It is adequate to adjust Tidal Volume until the presence of chest rise/fall is noted
    - May be adjusted to maintain adequate EtCO2 and SpO2 (although adjusting respiratory rate/frequency first may be a better option)

- Frequency (f)
  - To be set at a rate that adequately allows for as exchange. EtCO2 monitoring is ideal in adjusting for this. In an adult patient, 8-20 is appropriate but can be adjusted as needed for EtCO2 readings
  - Pediatric patients should be started at age-appropriate respiratory rates and titrated according to O2 and EtCO2
- Fraction of Inspired Oxygen (FIO2)
  - If able to be adjusted, this is either 50% or 100% depending on patient need. Again, EtCO2 monitoring should be in place
  - For long transports, if ABG had been obtained at transferring facility and correlates with pulse ox readings, FiO2 may be titrated to maintain O2 sat of 94% or greater (or different goal based on underlying need for intubation, i.e. COPD patient goal may be 90-92% or titrated primarily on EtCO2 instead of O2)
- Positive End Expiratory Pressure (PEEP)
  - Can be adjusted only by CC-EMTP
  - Start at 5 cmH20, range is 5-15 cmH2O, as needed for EtCO2 anomalies or patient condition.
  - Asthma, ARDS, or bronchiolitis patients *may need* much higher PEEP values. Best to discuss with sending physician, Medical Control physician, or receiving ICU physician. With higher PEEP settings, monitor very closely for any changes in respiratory status as chances of pressure induced pneumothorax is higher.
- Maximum Airway Pressure (P_{max})
  - Should not exceed 30-40 mmHg
  - Thresholds can be adjusted only by CC-EMTP
  - Any deviation should be discussed with RT at the sending facility or Medical Control if available.
- Extended expiratory phase (increasing I:E ratio) may be needed in COPD and/or asthma patients to allow proper exhalation of accumulated CO2.
  - Can be adjusted only by CC-EMTP

Pediatric Ventilator Volumes:

Patient Category	Body Weight	Rate (Breaths/Min)	Tidal Volume (6-10ml/kg)
Gray - Newborn	3-5kg	40-60 Breaths	20-50 ml
Pink – 4 mo	6 kg	30-60 Breaths	35-60 ml
Red – 6 mo	8 kg	24-40 Breaths	50-80 ml
Purple – 1 yr	10 kg	24-40 Breaths	60-100 ml
Yellow – 2 yrs	12 kg	24-40 Breaths	75-120 ml
White – 3-4 yrs	15 kg	22-34 Breaths	90-150 ml
Blue – 5-6 yrs	20 kg	18-30 Breaths	120-200ml
Orange – 7-8 yrs	25 kg	18-30 Breaths	150-250 ml
Green – 9-13 yrs	30 kg	18-30 Breaths	180-300 ml

Adult Ventilator Volumes-Based on ideal body weight per patient height:

Male (mL) 6 mL/kg	Male (mL) 8 mL/kg	Height	Female (mL) 6 mL/kg	Female (mL) 8 mL/kg
250	325	56 inches (4'8")	225	275
275	350	58 inches (4'10")	250	325
300	400	60 inches (5'0")	275	350
330	425	62 inches (5'2")	300	400
350	475	64 inches (5'4")	325	425
375	500	66 inches (5'6")	350	475
400	550	68 inches (5'8")	375	500
425	575	70 inches (5'10")	425	550
450	625	72 inches (6'0")	450	600
500	650	74 inches (6'2")	475	625
525	700	76 inches (6'4")	500	650
550	725	78 inches (6'6")	525	700

Sedation Considerations:

- Unless otherwise ordered by medical control consider:
  - **Midazolam 2.5-5mg** IV/IO q 30 minutes or as needed
  - **Ketamine 1-2mg** IV/IO q 30 minutes or Ketamine drip
  - ****Propofol gtt 25-150 mcg/kg/min** IV gtt titrated q 3-5 minutes
  - Other long acting sedative as ordered or otherwise provided by medical control

  For long transports or in cases where provided sedatives may be inadequate, consider a low dose narcotic IV/IO in between doses of the above sedatives to prolong sedation

*****PARALYTIC AGENTS BELOW ARE NOT TO BE ADMINISTERED UNLESS SEDATION AND PAIN CONTROL BOTH ARE OPTIMIZED!!!*****

- Unless contraindicated (such as neurological injuries, seizure disorders, etc), consider:
  - **Rocuronium (Zemuron) 0.6-1mg/kg** IV q 30 minutes or as needed
  - ****Vecuronium 0.1mg/kg** IV q 30 minutes or as needed.
    - May be in infusion of 20-100 mcg/kg/hr IV
  - ** **Cisatracarium (Nimbex) 150-200 mcg/kg** IV q 45-60 minutes or as needed
  - ****Pancuronium (Pavulon) 60-100 kg/min** IV q 60-100 minutes or as needed
  - Other long acting paralytic agent as ordered or otherwise provided by medical control

**these medications as provided by sending facility

Common Problems Associated with Ventilator Therapy:

TREAT THE PATIENT FIRST, then the machine

- D: Displacement of the ETT or disconnect of the ventilator circuit
- O: Obstruction or the ETT, Vent Circuit, Mucus Plug in the patient's airway
- P: Pneumothorax, Tension Pneumothorax, Hemothorax, etc.
- E: Equipment Failure: Move to BVM ventilations and monitor progress.

Patients with Reactive Airway Disease, ARDS, Acute Lung Injury, etc should be monitored for Barotrauma. Any situation that could cause poor lung compliance should be acutely monitored for perfusion and oxygenation status as well as pneumothorax. Patients with poor lung compliance may benefit from Low tidal volumes with higher frequencies.

Head injury or acute neurologic patients with concern for possible herniation should have EtCO2 maintained between 35-40mmHg. DO NOT hyperventilate lower than 35mmHg.

Common Alarm Indications:

- **High pressure at the beginning of inspiration**
  - Possible Airway Obstruction
  - Excessive Flow Rate (Decrease Tidal Volume)
- **High pressure at the end of inspiration**
  - Excessive Tidal Volume (Decrease Tidal Volume)
- **Low pressure alarm**
  - Possible hose/connection leak
  - tidal volume is set too low

*****CONSULT MEDICAL CONTROL IF EVER IN DOUBT*****

CENTRAL LINES

Central Lines encountered in the transport environment include but are not limited to:

- Peripherally Inserted Central Catheters
  - PICC lines
  - Groshong-Style PICC lines
  - Arrow/Triple Lumen Catheters
  - Internal Jugular Lines
- Tunneled Catheters:
  - Hickman lines
  - Broviac lines
  - NeoStar lines
- Implanted Ports:
  - Port-A-Cath
  - Infus-A-Port
  - Mediport

In the transport environment, Central Venous Lines may be utilized by Paramedic and Critical Care Paramedic Providers with the approval of the Sending Physician or Medical Control.

Access Procedure if the existing line is not already accessed:

1. Clean the port of the catheter with alcohol wipe. (For multi-lumen lines, consider Medical control for guidance as to which lumen to use. Note brown port is always proximal port).
2. Using sterile technique, withdraw 5-10mL of blood and place syringe in sharps box.
3. Using 5mL of Normal Saline, access the port with sterile technique and gently attempt to flush the saline.
4. If there is no resistance, no evidence of infiltration (e.g., no subcutaneous, collection of fluid), and no pain experienced by the patient, then proceed to step 5. If there is resistance, evidence of infiltration, pain experienced by the patient, or any concern that the catheter may be clotted or dislodged, do not use the catheter.
5. Begin administration of medications or IV fluids slowly. Observe for any signs of infiltration. If difficulties are encountered, stop the infusion and reassess.
6. Record procedure, any complications, and fluids/medications administered in the Patient Care Report (PCR).

Dialysis Catheters are not to be used for any infusion(s) unless ordered so by Medical Control. If no other venous access exists or if peripheral access has proven futile, consult with the sending physician or medical control on placement of a central line in the emergency setting.

Implanted Ports: Infus-A-Ports, Medi-Ports, etc require access with a non-coring or Huber-Style needle and, unless equipment and training are made available at a future date, must be done so at the sending facility. Direct injection into an implanted port is contraindicated in all scenarios.

CENTRAL VENOUS PRESSURE (CVP) MONITORING

Central Venous Pressure Monitoring may be performed by Critical Care Paramedics approved by CVR EMS Training Staff.

Central Venous Pressure measurements can be used to assess fluid volume and right sided heart function in the patient.

CVP Monitoring shall only be used if started at the sending facility or otherwise ordered by the Sending Physician or Medical Control.

Orders are to be obtained from the Sending Physician or Medical control as to the treatment of any variance encountered in CVP.

Refer to “Invasive Pressure Monitoring” procedure for use and monitoring of Central Venous Pressures.

- **Increase in CVP:**
  - Fluid Overload
  - Right Heart Failure/ Right Ventricular Dysfunction
  - Vasoconstrictive States
  - Cardiac Tamponade

- **Decrease in CVP:**
  - Hemorrhage
  - Dehydration
  - Vasodilation
  - Overzealous Diuresis

ARTERIAL PRESSURE MONITORING

Arterial Pressure Monitoring or “Art Lines” offer real time measurement of the patient’s blood pressure

Arterial Line Monitoring may be performed by the Critical Care Paramedic as approved by CVR EMS Training Staff.

Refer to “Invasive Pressure Monitoring” procedure for use, care, and monitoring of Arterial Blood Pressures

FOLEY CATHETER PLACEMENT

It may be necessary for the placement of a Foley Catheter for patients in the Critical Care Transport environment.

Indications include but are not limited to:

- Monitoring of urine output
- Patient comfort for long transport times
- Transports involving the use of diuretic medications (**Furosemide, Bumetenide**, etc.)
- Transports involving the infusion of blood products
- Transport of Burn Patients

Supplies for catheter placement and monitoring may be provided by the sending facility and may be placed by the CVR Critical Care Paramedic as approved by CVR Training Staff.

Refer to “Foley Catheter Placement” procedure.

THORACOSTOMY TUBE MONITORING

1. Request and document order to maintain tube to gravity or to mechanical suction (specify amount of suction to be maintained during transport) and patient response.
2. If possible elevate head of gurney to 30-45 degrees.
3. Tape all tube connections securely.
4. In the event of an air leak, recheck all connections.
5. Do not pull on the tube.
6. Secure the collection chamber to the side of the gurney (do not tip over)
7. Keep the collection chamber below the level of the chest.
8. Avoid clamping or kinking of the tube and avoid dependent loops of fluid filled tubing.
9. If chest tube is partially pulled out:
    - Do not push tube back into chest.
    - Secure the tube in place.
10. If chest tube is pulled out, place occlusive dressing over the insertion site.
11. If patient becomes dyspneic:
    - Assess breath sounds.
    - Needle thoracostomy may need to be performed.

I-STAT DIAGNOSTIC DEVICE

The I-Stat Diagnostic Device may be used in any appropriate 911 or Interfacility setting. The original purpose for the I-Stat Device was the pre-hospital acquisition of Troponin levels in patients with acute coronary syndrome or STEMI. The I-Stat device is capable of several diagnostic tests, including but not limited to: Chem-8, Venous Blood Gasses, Hematology and Troponin-I. Other testing requires specific disposable supplies for the IStat and may be available at varying times when appropriate. Specific training for individual tests will be made available as necessary.

Tested parameters and results should be documented in the PCR. Any abnormal findings are to be reported to the receiving facility. Any values found to be of "Critical Levels" should be reported to medical control or sending physician for advice on possible correction.

Procedure for Analysis:

A. Preparation for Use:

All cartridges should stand at room temperature for 1 hour before use (an entire box). Individual cartridges can be used after standing just 5 minutes at room temperature.

- Verify Refrigerated Cartridges
    - Verify that the cartridges stored in the refrigerator are all within the expiration date printed on the boxes.
    - Verify that the refrigerator did not exceed the limits of 2 to 8°C. If the temperature of the cartridge storage refrigerator is within the range of 2 to 8°C use cartridges as required.
    - If the temperature is outside the range of 2 to 8°C, quarantine the cartridges in the storage refrigerator and do not use.
- Verify Room Temperature Cartridges:
    - Verify that all boxes of cartridges at room temperature have been out of the refrigerator less than two weeks. Do not use any expired cartridges.

B. Operating Procedure:

1. Remove the cartridge from its pouch. Avoid touching the contact pads or exerting pressure over the calibrant pack in the center of the cartridge.
2. Direct the dispensing tip or capillary tube containing the blood into the sample well.
3. Dispense the sample until it reaches the FILL TO mark on the cartridge. Leave some sample in the well.
4. Close the cover over the sample well until it snaps into place. (Do not press over the sample well.)
5. Insert the cartridge into the cartridge door until it clicks into place.
6. Enter an operator ID number up to 7 digits. Repeat the process for verification.
7. Enter the patient ID number (6 digit Medical Record #). Repeat the process for verification.

8. Enter the parameters (if required) for cartridges requiring thermal control; Patient temperature can be entered as degrees Centigrade or Fahrenheit. Use the * key for a decimal point. %FIO2 can be entered as the number of liters or as a percentage of the oxygen a patient is receiving.
9. Choose the number corresponding to the type of sample used when prompted at the Sample Type field.
10. Press the SAVE soft-key to record the blood gas parameters entered.
11. View results shown on the analyzer's display screen.

LABORATORY REFERENCE RANGES

ANALYTE	UNIT	REFERENCE RANGE		CRITICAL RANGE	LINEARITY RANGE
SODIUM	mmol/L	134-146		115-155	100-180
POTASSIUM	mmol/L	Age		3.0-7.0	2.0-9.0
		0	5.0-7.5		
		2D	4.0-5.9		
		1 M	4.0-6.2		
		3 M	3.5-5.3		
		>16Y	3.5-5.5		
CHLORIDE	mmol/L	98-108		80-122	65-140
BUN	mg/dL	Age		4-50	3-140
		0	5-15		
		2 Y	7-18		
		16 Y	5-15		
GLUCOSE	mg/dL	Age		40-300	20-450
		0	40-80		
		1 M	60-110		
		1 Y	70-110		
		16 Y	60-110		
IONIZED CA	mmol/L	1.12-1.32		0.74-1.57	0.25-2.50
pH (ARTERIAL)		Age			6.8-8.0
		0	7.29-7.45		
		>1 D	7.35-7.45		
PCO_2 (ARTERIAL)	mmHg	35-45			10-100
PO_2 (ARTERIAL)	mmHg	Age			0-800
		0	54-95		
		1 D	83-103		

ANALYTE	UNIT	REFERENCE RANGE			CRITICAL RANGE	LINEARITY RANGE
HEMATOCRIT	%	Age	MALE	FEMALE	20-60	10-75
		0	42-60	42-60		
		1 D	45-67	45-67		
		7 D	42-66	42-66		
		14 D	39-63	39-63		
		1 M	31-55	31-55		
		2 M	28-42	28-42		
		3 M	29-41	29-41		
		6 M	33-39	33-39		
		2 Y	34-40	34-40		
		6 Y	35-45	35-45		
		12 Y	37-49	36-46		
		>18 Y	41-53	36-46		
HCO_3* (ARTERIAL)	mmol/L	Age				1-85
		0-2 D	13-22			
		2 D - 1 M	20-27			
		1 M - 16 Y	23-30			
		>16 Y	24-30			
TCO_2* (VENOUS)	mmol/L	19-24				1-85
SBE* (ARTERIAL EXTRACELLULAR)	mmol/L	-2 to +3				N/A
ANION GAP* (VENOUS)	mmol/L	10-20				-10 to 20
sO_2 *	%	95-99				N/A

ANALYTE	UNIT	REFERENCE RANGE			CRITICAL RANGE	LINEARITY RANGE
HEMOGLOBIN*	g/dL	Age	MALE	FEMALE	6-20	3-26
		0	13.5-19.5	13.5-19.5		
		1 D	14.5-22.5	14.5-22.5		
		7 D	13.5-21.5	13.5-21.5		
		14 D	12.5-20.5	12.5-20.5		
		1 M	10-18	10-18		
		2 M	9-14	9-14		
		3 M	9.5-13.5	9.5-13.5		
		6 M	10.5-13.5	10.5-13.5		
		2 Y	11.5-13.5	11.5-13.5		
		6 Y	11.5-15.5	11.5-15.5		
		12 Y	13-16	12-16		
		18 Y	13.5-17.5	12-16		

* Calculated values

CLINICAL SIGNIFICANCE:

Analyte	Some Causes of Increased Values	Some Causes of Decreased Values
Sodium	Dehydration Diabetes insipidus Salt poisoning Skin losses Hyperaldosteronism CNS disorders	Dilutional Hyponatremia (cirrhosis) Depletional Hyponatremia Syndrome of inappropriate ADH
Potassium	Renal glomerular disease Adrenocortical insufficiency Diabetic Ketoacidosis (DKA) Sepsis In vitro hemolysis	Renal tubular disease Hyperaldosteronism Treatment of DKA Hyperinsulinism Metabolic alkalosis Diuretic therapy
Chloride	Prolonged diarrhea Renal tubular disease Hyperparathyroidism Dehydration	Prolonged vomiting Burns Salt-losing renal disease Overhydration Thiazide therapy
Ionized Calcium	Dehydration Hyperparathyroidism Malignancies Immobilization Thiazide diuretics Vitamin D Intoxication	Hypoparathyroidism Early neonatal hypocalcemia Chronic Renal Disease Pancreatitis Massive blood transfusions Severe malnutrition

Analyte	Some Causes of Increased Values	Some Causes of Decreased Values
BUN	Impaired renal function Prerenal azotemia (e.g. shock) Postrenal azotemia GI bleeding High protein diet	Pregnancy Severe liver insufficiency Overhydration Malnutrition
Glucose	Diabetes mellitus Pancreatitis Endocrine disorders (e.g. Cushings syndrome) Drugs (e.g. steroids, thyrotoxicosis) Chronic renal failure Stress IV glucose infusion	Insulinomea Adrenocortical insufficiency Hypopituitarism /Massive liver disease Ethanol ingestion/Reactive hypoglycemia Glycogen storage disease
pH	Respiratory alkalosis Metabolic alkalosis	Respiratory acidosis Metabolic acidosis
PCO_2	Acute Respiratory Acidosis: • Depression of respiratory center • Suppresses neuromuscular system • Pulmonary disorders • Inadequate mechanical ventilation	Respiratory Alkalosis: • Increased stimulation of respiratory center • Hypermetabolic states • Mechanical hyperventilation
	Chronic Respiratory Acidosis: • Decreased alveolar ventilation • Hypoventilation Compensation in metabolic alkalosis	Compensation in metabolic acidosis

PO_2	Breathing oxygen-enriched air	Carbon-monoxide exposure Pulmonary disorders Myocardial infarction Congestive heart failure
HCO_3	Primary metabolic alkalosis Primary respiratory acidosis	Primary metabolic acidosis Primary respiratory alkalosis
Hematocrit	Dehydration Burns Impaired ventilation Renal disorders	Hemolytic anemia's Iron deficiency Marrow depression Blood loss

MEDICAL CONTROL AUTHORIZATION

It is standard operating procedure for all Chippewa Valley Regional (CVR) Patient Care Staff to follow these guidelines to the best of their ability. Any cares requiring Medical Control Authorization must have “on-line” medical control and must be within the Scope of Practice for the assigned Patient Care Provider. This is not only to provide oversight for CVR staff but to assure the best available pre-hospital and interfacility care to our patients.

In the extreme case where Medical Control is not available, due to external or internal disaster, communications failure, geographic concerns for Cell Phone or Radio Communications, or other non-foreseen condition where contact with medial control is not available; CVR Care Providers may still operate within their Scope of Practice and within the limits of these guidelines.

In the event where medication or procedure requiring Medical Control Authorization is needed to preserve the life of a patient in the prehospital or interfacility environment, and it is not possible to contact medical control, the CVR Care Provider may elect to utilize these medications/procedures **ONLY IF:**

- It is determined and documented that other, more standard treatment modalities are ineffective, or causing the patient’s condition to deteriorate
- Patient Condition is such and documented that rapid transport to the nearest Hospital Emergency Department would prove detrimental without immediate intervention of the medication or procedure in question
- It is determined and documented that all available means to contact medical control have failed
- The required medication or procedure is within the Scope of Practice for the CVR Care Provider.

Contact with Medical Control MUST be made as soon as communications have been reestablished or the limiting factors have been mitigated. The patient care report is then to be submitted to CVR command staff for immediate investigation.