# Region IX (NWC EMSS) SOP 2009 Changes, rationales, & references

<table>
<thead>
<tr>
<th>Section</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>No changes</td>
</tr>
</tbody>
</table>
| **General assessment**   | **Going back to original terms for assessment:** Primary & secondary assessment under new national EMS education standards.  
  **Waveform capnography added as a ventilatory assessment is available**  
  Capnography measures the CO₂ concentration in exhaled gasses and provides a real-time assessment of respiratory, circulatory, and metabolic status. It is the gold standard to ensure tracheal placement of the ETT following intubation. It directly correlates with cardiac output, so is useful to determine the effectiveness of CPR compressions and the return of spontaneous circulation. An analysis of capnography waveforms can reveal if a patient is hyper or hypoventilating (particularly useful if a patient with head trauma needs temporary hyperventilation), has persistent bronchospasm (shark-fin shape), is experiencing a pulmonary embolus (dead space disease that blunts waveform) and others.  
  The System is moving towards mandatory waveform capnography by Dec. 2010.  
| **Initial Medical Care (IMC)** | **#4: Keep warm unless specified by protocol.** Changes in EMS practice around country. Some patients need to be kept warm; others may need therapeutic cooling in the future.  
  **#7. Pain management: Added as a general step in IMC**  
  **Nitrous oxide** added to IMC - general pain mgt section as optional drug; See drug profile.  
  **Fentanyl:** See drug profile  
  **#8. Nausea/Vomiting management added as a general step in IMC**  
  **Ondansetron (Zofran):** See drug profile  
  Very little research published on use of antiemetics by EMS. Standard of care in hospitals.  
  DeCamp, L.R. et al. (2008). Ondansetron therapy may improve outcomes in children with gastroenteritis.  
| **Radio report**          | No change                                                                                   |
| **Geriatric patients**   | **NEW**  
  - 75% of NWC EMSS patients are 65 and older with the number expected to rise over the next decade as the “baby boomers” reach retirement age.  
  - Loss of organ reserve capacity and normal changes of aging must be considered when assessing and treating this population. A table is included that outlines some of the major changes to consider and the SOP includes adaptations to be made in care.  
  - It also explains why we need to have a lower the threshold for field triage directly to a trauma center if injured.  
  - Review SOP independently and use January CE materials as reference. |
An increasing number of EMS patients meet the criteria of being morbidly obese based on body mass index. (See chart in SOP appendix)  
They have very special needs with respect to airway management, positioning, ventilatory support, & medication administration.

**Review SOP independently**


<table>
<thead>
<tr>
<th>Topic</th>
<th>Change</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Allergic reaction Anaphylaxis:</strong></td>
<td>Clarification on EMT-B use of epi pens and glucagon IN. EMT-Bs: see glucagon drug profile.</td>
<td></td>
</tr>
<tr>
<td><strong>Asthma/COPD</strong></td>
<td><strong>Asthma Rx differentiated from COPD. C-PAP added.</strong>  - Noninvasive pressure support ventilation (CPAP) is highly beneficial in the treatment of COPD with hypercapnia respiratory failure.  - Oxygen therapy should be used with caution because it may worsen hypercapnia in some patients. Patients with COPD may develop worsening hypercapnia following oxygen therapy. This is thought to be primarily a consequence of ventilation-perfusion mismatching. This is opposed to the commonly accepted concept of a reduction in hypoxic ventilatory drive. The exact pathophysiology remains controversial.  - Hypercapnia is best avoided by titration of oxygen delivery to maintain O2 sats in the low 90% range.  - (From elderly SOP) Respiratory failure w/ acute resp. acidosis is devastating. As pt compensates for “normal” hypercarbia, eliminate only the additional pCO2 of the acute respiratory failure. <strong>Don’t over-correct.</strong>  - If intubated and rapidly ventilated to an EtCO2 of 35-45 mmHg, pt may suffer lethal dysrhythmias from Ca binding. Slowly reduce PaCO2 (not more than 5 mmHg/hr) Minaoui, W., Byrd, R.P. (2009). Respiratory acidosis. Accessed online at <a href="http://emedicine.medscapre.com/article/301574">http://emedicine.medscapre.com/article/301574</a> New, A. (2006). Oxygen: kill or cure? Prehospital hyperoxia in the COPD patient. Emerg Med J, 23, 144-146. Accessed online Jan 20, 2009 at <a href="http://www.emj.bmj.com">www.emj.bmj.com</a></td>
<td></td>
</tr>
<tr>
<td><strong>Bradycardia with a Pulse</strong></td>
<td>IM route added for midazolam Fentanyl substituted for morphine</td>
<td></td>
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<tr>
<td><strong>Narrow QRS Complex Tachycardia</strong></td>
<td>Fentanyl substituted for morphine</td>
<td></td>
</tr>
<tr>
<td><strong>V tach with a pulse</strong></td>
<td>Fentanyl substituted for morphine</td>
<td></td>
</tr>
<tr>
<td><strong>VF SOP</strong></td>
<td>Clarification on defib sequencing and joule setting</td>
<td></td>
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</tbody>
</table>
VF & Asystole SOP:

- **ResQPod added to SOP**: AHA Guidelines 2005 for CPR & ECC: An impedance threshold device (e.g. ResQPod) is recommended as a Class IIa device. It is more highly recommended than any other device or drug and is used to increase circulation during CPR & for improving resuscitation rates. **Major point to remember**: Patients who begin to breathe on their own will have to overcome the “opening pressure” of the ResQPod’s resistance regulation system (about -10 cm H2O) before air will be allowed to enter the device. **Remove the device as soon as CPR is no longer needed**.

**Alternate airways** added as option

Emphasis on continuous compressions after advanced airway placed.

**Cooling patient after ROSC.**

Studies in animal models suggest that structural changes in ischemic cells may be reversible after longer cessation of brain blood flow if the “reperfusion injury” that beings immediately following restoration of circulation be blocked or blunted. Just after ROSC, there is often a brief period (several minutes) of hypertension and increased brain blood flow (hypertensive flush) likely caused by stress release of body’s own epinephrine and the administration of epi during resuscitation. Soon after, brain blood flow decreased, sometimes to zero, due to sludging or RBCs, vasospasm, and progressive intracellular edema with pinching of capillaries. This “reperfusion injury” involves production and accumulation of waste products (free radicals) that form as oxygen refuels the cells. Simultaneously increasing brain oxygen demand during the low or no flow state causes continuing injury to brain cells after ROSC. The brain can be protected by cooling with induced hypothermia.

**Right now**: do not actively warm these patients – **support hypotension with unwarmed fluids and dopamine**.

Future: Will investigate selective prehospital cooling with cold saline or perhaps selective head cooling and changing transport patterns to only take patients with ROSC to hospital with active cooling protocols following cardiac arrest.

**Asystole SOP**

- **NTG can be given every 3-5 min**
- **Note affirming no contraindication to NTG based on fast HR in pulmonary edema**
- **Morphine removed and midazolam (Versed) inserted for anxiety.**

Morphine’s role in patients presenting with pulmonary edema secondary to HF was traditionally thought to reduce preload and relieve anxiety. We lack good evidence that supports this. Multiple studies demonstrate morphine’s potential danger when used in pts with pulmonary edema. There is a trend toward higher intubation rates and ICU admissions in pts receiving morphine. Peacock et al compared outcomes of pts who did and did not receive morphine for acute decompensated HF in the ADHERE (Acute Decompensated Heart Failure National Registry) study (2008). They report a higher use of inotropes, longer hospitalization, higher need for mechanical ventilation, more IVU admissions and a greater mortality in the morphine group. Patients should receive NTG and CPAP.

The evidence of morphine’s deleterious effects in multiple studies mandates that all EMS systems strongly consider removing morphine from their protocols for presumed pulmonary edema.

**Acute abdominal/flank pain**

Fentanyl substituted for morphine.
<table>
<thead>
<tr>
<th>Dialysis/Chronic Renal Failure Emergencies</th>
<th>No change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altered mental status</td>
<td>Note that Narcan (naloxone) can be given by EMT-Bs IN – See drug profile Depending on the patient presentation and history, the following assessments have been referenced in the physical examination of a syncopal patient: stroke scale, 12-lead ECG, and orthostatic blood pressure. Some of the causes of syncope involve suspected ischemia or dysrhythmias in addition to vascular and blood-related; metabolic, neurologic, vasovagal and vasoactive causes. Current EMS literature and national experts recommend consideration of a 12-L if patient has had a syncopal episode. CE should provide the medics with the context in which the 12-lead should be considered. Limmer, D.D., Mistovich, J.J. and Krost, W.S. (2009). Beyond the basics: syncope. Accessed on line: <a href="http://www.emsresponder.com">www.emsresponder.com</a></td>
</tr>
<tr>
<td>Alcohol intoxication/withdrawal</td>
<td>Note that glucagon can be given by EMT-Bs IN IM route for Versed (midazolam) added</td>
</tr>
<tr>
<td>Diabetic/glucose emergencies</td>
<td>Note that glucagon can be given by EMT-Bs IN</td>
</tr>
<tr>
<td>Drug OD/Poisoning</td>
<td>Note that Narcan (naloxone) can be given by EMT-Bs IN IM route for Versed (midazolam) added</td>
</tr>
<tr>
<td>Cold emergencies</td>
<td>Fentanyl substituted for morphine</td>
</tr>
<tr>
<td>Near drowning</td>
<td>C-PAP added: If awake with good respiratory effort, yet congested and increased work of breathing. Same settings as in pulmonary edema.</td>
</tr>
<tr>
<td>Heat emergencies</td>
<td>IM route for Versed (midazolam) added</td>
</tr>
<tr>
<td>Hypertension/hypertensive crisis</td>
<td>Fentanyl substituted for morphine IM route for Versed (midazolam) added</td>
</tr>
<tr>
<td>Psychological emergencies</td>
<td>IM route for Versed (midazolam) added</td>
</tr>
<tr>
<td>Seizures</td>
<td>No change</td>
</tr>
<tr>
<td>Stroke/Brain Attack</td>
<td>No change – FYI: Time limit for intra-arterial lytics at hospital expanded in last 1½ months from 3 hours to 4.5 hours. May go longer in future.</td>
</tr>
<tr>
<td>Initial Trauma Care</td>
<td>▪ Assessment stages transition back to primary and secondary ▪ Level of consciousness obtained early by GCS as it determines receiving hospital and 2008 revision of Advanced Trauma Life Support Course advocates against use of AVPU as being too non-specific.</td>
</tr>
<tr>
<td>HEMORRHAGE CONTROL</td>
<td>&quot;No research has been published that supports elevation of an extremity or the use of pressure points to control hemorrhage&quot; (NREMTs EdNet Communicué, July 2008) Step has been removed from SOP. If direct pressure and pressure dressings fail to stem bleeding: add hemostatic dressings. The System selected QuikClot™</td>
</tr>
</tbody>
</table>
Mineral zeolite powder; 3-dimensional structure similar to a honeycomb; sifts molecules by size. When in contact w/ blood, takes in small molecules (water), leaves behind larger clotting factors and platelets in the wound that promotes coagulation. Currently used by the armed services.

Application of hemostatic dressing:
- Cover entire bleeding surface; including deep areas of wound with QuikClot dressing
- Apply direct digital pressure over dressing.
- If blood soaks through 1st layer, apply a 2nd layer
- Apply a pressure bandage (roller gauze or ACE wrap) to hold dressing in place.
- Do not remove blood-soaked bandages from a wound, it may cause more bleeding
- Do not give ASA, it can increase the bleeding
- Document number & type of hemostatic dressings used and effectiveness of hemostasis Inform OLMC that hemostatic dressings have been applied.

TOURNIQUETS
Preventable causes of death from penetrating trauma:
- Exsanguination from extremity injury
- Chest trauma resulting in a tension pneumothorax
- Airway impairment (distant 3rd)

"Tourniquet application is an effective and easily applied method for prevention of exsanguination in the military prehospital setting." "When applied properly the use of a tourniquet did not cause adverse outcomes." Trauma. (2003). 54(5Suppl):S221-5.

"Given the widespread use of tourniquets in ongoing military operations, it seems likely that tourniquets will transition to civilian use" [J Orthop Trauma. (2007), 21(4), 274-8.]

Studies indicate that early use of a tourniquet in prehospital settings improved control of extremity hemorrhage and may decrease mortality rates." "57% of deaths might have been prevented by earlier tourniquet use." [Author. (Feb. 2008). J Trauma, 64(2 Suppl), S28-37; discussion S37.]

"If external bleeding from an extremity cannot be controlled by pressure, application of a tourniquet is the reasonable next step in hemorrhage control." [Salomone, J. & Pons, P. (2007). PHTLS (181-190). St. Louis: Mosby-Elsevier.]

Tourniquets added as next step for uncontrolled extremity hemorrhage
The System selected the Combat application tourniquet (CAT)
- Windlass tourniquet
- Named best prehospital tourniquet (J of Trauma, suppl. 2008)
- 100% efficacy (U.S. Army Institute of Surgical Research)

Preferred features of a temporary tourniquet:
- Width > 1 inch
- Integrated mechanical augmentation (windlass, ratchet)
- Easily applied to upper or lower extremity in less than 1 minute
- No external power requirements (batteries)
- Light weight (<230 g) and minimal cube space
- Easy to train
- Must not slip during application
- Must have easy release and reapplication capability
- Must prevent accidental release
- Long shelf/storage life

Elements to document re: injury & tourniquet use:
- MOI: Blunt, penetrating
- Site of tourniquet application: arm, leg; right or left
- Measures used prior to tourniquet application
  - Direct pressure
  - Pressure dressing
  - Hemostatic dressings
- Time tourniquet applied
- Time tourniquet removed (if applicable)
- Who applied and/or removed tourniquet
- Success of hemorrhage control – any bleeding distal to tourniquet
- Total tourniquet time in minutes
- Whether patient required pain meds because of tourniquet pain
- Tourniquet-related complications if known
  - Ischemia damage
  - Compartment syndrome
  - Reperfusion injury
- Use of PASG de-emphasized for pelvic fractures. Wrap in sheet or pelvic binder.
- Fentanyl added for pain management.
- Helicopter use transitioned to system-specific as opposed to regional guidelines.

<table>
<thead>
<tr>
<th>Helicopter transport guidelines</th>
<th>Deleted. Will be System-specific in Region IX.</th>
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</thead>
</table>

### Trauma Triage & Transport Criteria

- **Ground transport time to a Level I TC** increased from 25 to 30 minutes to provide a small but significant increase to the margin allowed providers to transport to the most appropriate hospital for seriously injured patients.

  A revised prehospital triage and transport decision scheme was published in 2006 following input from injury-care providers, public health professionals, automotive industry representatives, and officials from federal agencies. A full report describing the process and rationale used by the Expert Panel was published by the CDC in January, 2009.

  The risk of death is 25% lower if a severely injured pt. receives care at a Level I TC.

  Multiple studies now confirm that MOI alone, without physiologic S/S or pattern of injury, is not a good predictor of patients who go on to have significant major trauma.

  **Step 1: Physiologic criteria**
  - Add a lower limit threshold for RR in infants (age <1 year) of < 20 breaths/min
  - Remove Revised Trauma Score < 11

  **BIGGEST CHANGE FOR US**

  - **NEW for us:** GCS 13 or less (assoc w/ head trauma) goes to a Level I

  **Rationale**
  - GCS < 13 associated w/ increased odds of major operation or death
  - Mortality rate 24.7% in pts w/ GCS < 14
  - **Peds study:** GCS of 12 or less had positive predictive value of 78% for identifying major injury.
  - “The totality of existing studies indicated that GCS is a reasonably predictive criterion for severe injury (ISS of > 15), risk of death, need for immediate surgical intervention, or other indicators).
  - “No studies have refuted the usefulness of GCS as a triage criterion, and no other measure of coma has been demonstrated to be more effective.”
  - GCS has been a triage criterion since 1986; EMS personnel are familiar with its use.
  - GCS scores can be calculated quickly and easily in the field and communicated to receiving hospitals as an effective summary measurement of closed-head injury while the pt is being transported, which can assist in the activation of needed additional ED personnel and resource before the pt’s arrival.
  - GCS plays an important role in outcomes research and should continue to be used.

  **Step 2: Anatomic Criteria**
- Add crushed, degloved or mangled extremity
- Change “open and depressed skull fractures” to “open OR depressed skull fractures”.
- Move combination trauma w/ burns and major burns to step four.

**Step 3: Mechanism of Injury Criteria**
- Multiple studies now confirm that MOI alone, without physiologic S/S or pattern of injury, is not a good predictor of patients who go on to have significant major trauma.
- Add vehicular telemetry data consistent w/ high risk of injury
- Clarify criteria for falls to include:
  - Adults: Falls > 20 feet (2 stories)
  - Children aged < 15 yrs: Fall > 10 ft or 2-3 times the child’s height
- Change “high-speed auto crash” to “high-risk auto crash” and modify to include any of the following:
  - Intrusion > 12 inches at occupant site
  - Intrusion > 18 inches at any site
  - Partial or complete ejection from vehicle
  - Death of another passenger in same passenger compartment
  - Vehicle telemetry data consistent with high risk for injury
- Revise “auto-pedestrian/auto-bicycle injury w/ significant (> 5 mph) impact” and “pedestrian thrown or run over” to “Auto vs. pedestrian/bicycle thrown, run over, or with significant (> 20 mph) impact
- Revise “motorcycle crash > 20 mph with separation of rider from bike” to “motorcycle crash > 20 mph”
- Remove “initial speed > 40 mph, major auto deformity > 20 in., extrication time > 20 min, and rollover”

**Step 4: Special considerations**
- Add “time-sensitive extremity injury, end-stage renal disease requiring dialysis, and EMS provider judgment”
- Add burns from Step 2
  - Burns without other trauma mechanism: consider triage to a burn facility
  - Burns with trauma mechanism: triage to trauma center
- Clarify aged < 5 years or > 55 years to read:
  - Older adults: risk of injury death increases after age 55 years
  - Children: Should be triaged preferentially to pediatric-capable trauma centers
- Change “patient with bleeding disorder or patient on anticoagulants” to “anticoagulation and bleeding disorders”
- Change “pregnancy” to “pregnancy > 20 wks”


For more information on the triage decision scheme, go to: [www.cdc.gov/FieldTriage](http://www.cdc.gov/FieldTriage)

**Hypovolemic/Hemorrhagic Shock**

Patients in shock need multiple parameters assessed. Changes in radial pulse character, systolic BP, and mental status occur only after significant reductions in stroke volume, just prior to the point of circulatory decompensation and CV collapse. They are not early indicators of hypovolemia. On average, a palpable but weak radial pulse is associated with a radial pulse of just greater than 80 mmHg.

Table added giving typical clinical presentations for the various classifications of hypovolemic shock.


**Traumatic arrest**

No changes Support for SOP:
# NWC EMSS SOP 2009 - Changes, rationales, & references

## Head trauma
- Typical 12-L ECG changes added for pts w/ traumatic brain injury and subarachnoid hemorrhage (SAH).
- IM route for Versed (midazolam) added

## Spine trauma
- Ventilatory failure imminent/present added as possible reason to intubate.
- Use of scoop stretcher to move a possible SCI pt added
- Interventions added for combative patients w/ possible SCI – review independently
- Positive & Uncertain MOI updated to correspond to trauma triage criteria
- Deep pressure added as a recommended pain stimulus
- Neurogenic shock & head tilt added as indicators of possible SCI.

## Chest trauma
- Level I destination updated to correspond to trauma triage & transport guidelines
- Open pneumothorax: 3 sided taping for occlusive dressing optional, not mandatory.
- Flail chest: CPAP added
- Contraindication for using ResQPod in presence of a flail chest added

## Eye emergencies
- Fentanyl substituted for morphine for pain management.
- **Central retinal artery occlusion**: Time since visual loss added (3 hours); note specifying this to be a time-sensitive patient added; note to monitor capnography to not exceed 45 if having patient rebreathe CO₂ added.

## Musculoskeletal trauma
- Fentanyl substituted for morphine
- IM route for Versed (midazolam) added

## Burns
- Fentanyl substituted for morphine

## Multiple patient incidents
- Substantial revision to bring protocols into NIMS compliance and organize section better.
- Review independently.

## Mass Casualty Incidents
- Same update to NIMS compliance; reference to SMART tags added

## Hazardous materials incidents
- Replaces Radiologic Exposures as being more global in scope. Whole page rewritten.
- Review independently.

## Weapons of mass destruction: Chemical agents
- Reorganized to put all info on chemical/nerve gas exposure on one page.
- Adds note to contact Resource Hospital for antidote supplies.

## Weapons of mass destruction: Biologic; pandemic flu
- Biologic and pandemic flu separated out with references

## Abuse/neglect: Domestic, sexual, elder
- No change.

## Trauma in pregnancy
- Page expanded to include pain management consideration.
- New point added to clarify nature of serial abdominal exams to be completed especially related to fetal heart tones, fundal height, vaginal bleeding and rupture of the bag of waters.
- Notes section added with caveats on caring for pregnant patients in general.
- Review independently.

## Childbirth
- Clarifications for intrapartum (during delivery) suctioning of baby. Added “Non-vigorous” as the requirement to intubate and suction infant born through meconium stained amniotic fluid. See newborn resuscitation.
<table>
<thead>
<tr>
<th>Newborn &amp; post-partum care</th>
<th>Note added to clarify transport considerations. Infant must be transported in an infant car seat and transported together with mother whenever possible. Not to be carried to OB unit in arms of EMS responders.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery complications</td>
<td>Delivery process for breech presentation clarified. Review independently. Uterine inversion: Added one attempt to replace uterus if only partially extruded.</td>
</tr>
<tr>
<td>Newborn resuscitation</td>
<td>In multiple studies, there has been no proven benefit for suctioning an infant with meconium aspiration using a suction catheter or intubation during delivery. The ACOG Committee on Obstetric Practice has recommended that “infants born through meconium-stained amniotic fluid (MSAF) should no longer receive intrapartum suctioning. The indication for selective intubation and tracheal suctioning of the nonvigorous infant includes only those who have one or more of these: depressed respirations, depressed muscle tone, and HR &lt; 100 bpm. The consistency of the meconium in the amniotic fluid (thin vs. thick) is no longer used to determine the need for tracheal suctioning. ACOG Committee on Obstetric Practice. (2007). ACOG Committee Opinion No. 379: Management of delivery of a newborn with meconium-stained amniotic fluid. Obstet Gynecol, 110(3), 739. Sawyer, T.L. &amp; Thompson, M.W. (2009). Meconium aspiration, prevention and management. (March 13, 2009). eMedicine from WebMD. Accessed online at <a href="http://emedicine.medscape.com/article/1413467">http://emedicine.medscape.com/article/1413467</a>.</td>
</tr>
<tr>
<td>Obstetrical complications</td>
<td>Ectopic pregnancy added as one of the conditions causing bleeding. Note added that permissive hypotension is contraindicated in pregnant women. Removed reference to PASG application for shock.</td>
</tr>
<tr>
<td>Pediatric patients</td>
<td>Conditions requiring rapid cardiopulmonary assessment and/or potential cardiopulmonary support updated slightly – review independently. Same primary/secondary assessment language changes as in adult protocols.</td>
</tr>
<tr>
<td>Peds IMC: Breathing</td>
<td>Added note to reduce anxiety if possible and to move pulse ox sensor to a central site if reading is abnormal.</td>
</tr>
<tr>
<td>Peds IMC: Circulation</td>
<td>• Added note to assess cap refill on a warm area of the body. <strong>Peds 12-L characteristics added:</strong> Peds ECGs can be challenging to interpret due to changes in the rate, rhythm, axis, intervals, and morphology from the neonatal period through childhood to adolescence. The changes result from maturation of the heart muscle with age. Up to 20% of peds ECGs may have clinically significant abnormal findings. HR: Varies w/ age, generally higher than in adults. Stroke volumes smaller, so cardiac output is maintained by higher HR. Analyze rates significantly outside of normal ranges for dysrhythmias. <strong>Intervals:</strong> Normal PRI &amp; QRS are shorter in children, possibly due to smaller cardiac mass. Be alert for conduction abnormalities in what looks like “normal” intervals or complex durations in young children. T waves normally inverted V1-V3 up to 8 yrs.) Chan, T.C., Sharieff, G.Q., &amp; Brady, W.J. (2008). Electrocardiographic manifestations: Pediatric ECG. J Emerg Med, 35(4), 421-430.</td>
</tr>
<tr>
<td>Peds pain management</td>
<td><strong>Optimal pain management</strong> requires expeditious pain assessment and the rapid administration of systemic opioid pain medication to patients in moderate to severe pain. This may occur through the IV route, which allows for rapid relief of pain and drug titration as necessary and provides a route for other medications. Delivery of pain medications through the IM route is painful both at the time of delivery and for days afterward and does not allow for titration of drug dose. Children are fearful of needles. Alternative routes of medication administrations including inhaled should be used whenever possible. <strong>Nitrous oxide</strong> is a potent analgesic that does not require venous access and is available on some EMS agencies. Nitrous oxide should be used in conjunction with appropriate selection guidelines and avoided in patients with pneumothorax, bowel obstruction, intracranial injury and cardiovascular compromise. Nitrous oxide can be used for anxiolysis (reduction of anxiety) during procedures such as IV access and splinting of fractures. <strong>Fentanyl</strong> substituted for morphine with note to call OLMC if child younger than age 2. <strong>FLACC scale</strong> added to appendix</td>
</tr>
</tbody>
</table>
### Changes, Rationales, & References

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Children with special needs</strong></td>
<td>Totally rewritten. Review independently. Separates BLS from ALS interventions; adds sections on chronic respiratory or cardiac problems, osteogenesis imperfecta; sickle cell disease; hemophilia; and leukemia. Adirim, T.A. &amp; Smith, E. (2006). Special children’s outreach and prehospital education. Sudbury: Jones &amp; Bartlett</td>
</tr>
<tr>
<td><strong>Peds Foreign Body Airway Obstruction</strong></td>
<td>No change.</td>
</tr>
<tr>
<td><strong>Peds Respiratory Arrest</strong></td>
<td>No change.</td>
</tr>
<tr>
<td><strong>Sudden Infant Death Syndrome</strong></td>
<td>No change.</td>
</tr>
<tr>
<td><strong>Peds Allergic Reaction</strong></td>
<td>Anaphylaxis: Added - titrate epi in max 0.1 mg increments q. 1 min up to total of 1 mg IVP/IO</td>
</tr>
<tr>
<td><strong>Peds Asthma</strong></td>
<td>No change</td>
</tr>
<tr>
<td><strong>Croup / Epiglottitis</strong></td>
<td>Note added to transport in sitting position if possible. Epiglottitis: Note added to anticipate rapid deterioration.</td>
</tr>
<tr>
<td><strong>Peds Bradycardia</strong></td>
<td>Fentanyl substituted for morphine</td>
</tr>
<tr>
<td><strong>Peds Narrow QRS Complex Tachycardia</strong></td>
<td>Clinical presentation of children &amp; infants with rapid tachycardias amended</td>
</tr>
<tr>
<td><strong>Peds V-Tach w/ Pulse</strong></td>
<td>HR for VT changed to greater than 120 in children. Note added that peds VT is uncommon and may be difficult to diagnose in small children due to narrower QRS complex. May go unrecognized until child acutely decompensates. Under IMC: added to assess for HF QRS is wide &gt;0.09 s children &gt; 3 years.</td>
</tr>
<tr>
<td><strong>Peds V-Fib &amp; asystole</strong></td>
<td>Same note as adult VF to use unwarmed fluids in ROSC</td>
</tr>
<tr>
<td><strong>Peds Altered Mental Status</strong></td>
<td>Note that EMT-Bs can give naloxone IN</td>
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<tr>
<td><strong>Peds Diabetic/Glucose Emergencies</strong></td>
<td>Note that EMT-Bs can given glucagon IN</td>
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<tr>
<td><strong>Peds Drug Overdose/ Poisoning</strong></td>
<td>Note that EMT-Bs can give naloxone IN</td>
</tr>
<tr>
<td><strong>Peds Carbon Monoxide Poisoning / Cyanide Poisoning</strong></td>
<td>Same clarification on decontamination as adult protocol.</td>
</tr>
<tr>
<td><strong>Peds Seizures</strong></td>
<td>Note added that IVs are not always needed on a postictal child. Consider need for IV. Explanation given about febrile seizures. Table added for types of seizures. They are not all treated with benzodiazepines (Versed).</td>
</tr>
<tr>
<td><strong>Peds Initial Trauma Care</strong></td>
<td>Same changes as adult ITC</td>
</tr>
<tr>
<td><strong>Peds Trauma Management of specific injuries</strong></td>
<td>Spine trauma: Note added on considering need for chemical restraint with Versed (midazolam) Burns: Fentanyl substituted for morphine.</td>
</tr>
<tr>
<td><strong>Suspected Child Abuse or Neglect</strong></td>
<td>No change</td>
</tr>
<tr>
<td><strong>Drug Appendix</strong></td>
<td>Updated for new drugs. Review independently.</td>
</tr>
<tr>
<td><strong>Pediatric drug calculations</strong></td>
<td>Morphine removed.</td>
</tr>
<tr>
<td>Change</td>
<td>Rationale</td>
</tr>
<tr>
<td>--------</td>
<td>-----------</td>
</tr>
<tr>
<td>Burn center referral criteria</td>
<td>Added – review independently</td>
</tr>
<tr>
<td>Fentanyl dosing table</td>
<td>Added</td>
</tr>
<tr>
<td>12 lead ECG lead placement &amp; evolving pattern of AMI on ECG</td>
<td>No change</td>
</tr>
<tr>
<td>FLACC pain scale</td>
<td>Added</td>
</tr>
<tr>
<td>Peds defib table</td>
<td>No change</td>
</tr>
<tr>
<td>Approved abbreviations</td>
<td>No change</td>
</tr>
<tr>
<td>Body mass index table</td>
<td>Added for morbidly obese patients</td>
</tr>
<tr>
<td>Differentials for SOB, HF &amp; asthma</td>
<td>Tables added as a reference from previous CE classes</td>
</tr>
</tbody>
</table>
## Definitions of obesity
- **Overweight**: >25 kg/m² BMI
- **Obese**: > 30 kg/m² BMI
- **Extreme or morbid obesity**: > 40 kg/m² BMI (See table in appendix)

### Physiologic changes with morbid obesity

#### Pulmonary changes
- Reduced pulmonary compliance
- ↑ chest wall resistance
- ↑ airway resistance
- Abnormal diaphragmatic position
- ↑ upper airway resistance

#### Cardiovascular changes:
- ↑ blood volume, but as a % of body wt, may be as low as 45 mL/kg
- ↑ stroke volume and stroke work index in proportion to body wt
- ↑ cardiac output and metabolic demand
- ↑ LV volume, which can lead to dilation and hypertrophy
- ↓ systemic vascular resistance
- ↓ myocardial compliance up to 35% of normal
- HTN augments pathophysiologic cardiac changes
- Obesity cardiomyopathy syndrome, i.e. HF w/ pronounced hemodynamic changes

#### Gastrointestinal changes:
- ↑ intraabdominal pressure
- ↑ volume of gastric fluid
- ↑ incidence of GERD and hiatal hernia

#### Musculoskeletal changes:
- Limited mouth opening capacity
- Short neck with limited mobility
- Decreased range of motion

### Physiologic changes in the elderly

#### Pulmonary
- Chest wall stiffens; calcification of costal cartilage: ↓ total lung capacity, ↓ lung elastic recoil, increase in work of breathing.
- Weaker muscles cause less efficient inhalation.
- Gas diffusion diminishes d/t loss of alveolar-capillary membrane surface area reducing pO₂ but no changes in pCO₂ if healthy.
- Impaired ventilatory effort related to inadequate pain relief.
- Decrease in gag and cough reflexes.

#### Cardiac
- HR decreases with age. # of pacemaker cells in SA node begins to decline by age 60 and about 10% are still functioning at age 75.
- Increased incidence of dysrhythmias. Up to 1/3 of all healthy older adults may be in atrial fib.
- **Vessel stiffening**: Calculations may occur in the aorta, coronary arteries, & other vessels. Vascular calcification reduces ability to vasconstrict: ↓ vascular compliance + ↑ resistance = ↑SBP
- Less responsive to catecholamines due to defects at catecholamine receptor sites.
- Myocardial stiffening decreases preload & SV; underfilling of ventricles leads to ↑ myocardial O₂ consumption.
- Cardiac output does not increase to compensate for increased O₂ needs. CO ↑ with an ↑ in LV end diastolic volume, not from an ↑ in contractile force.
- Oxygenation may be dependent on hemoglobin. Keeping Hg at normal or slightly elevated levels may improve O₂ carrying capacity and limit stress related to hypoxia.
- ↑ afterload leads to ↑ LV wall stress, LV hypertrophy and ↓ LV compliance.
- Reduced myocardial functioning ↑ the risk of heart failure in response to stress, shock and trauma.

#### Renal
- Fewer cortical nephrons, decreased ability to reabsorb Na and excrete H and K. It takes larger fluid volumes to clear the same amount of waste product or metabolite; ↓ glomerular filtration rate.
- Able to maintain normal acid-base balance as long as kidney perfusion maintained but may require larger amounts of fluid to do this

#### Brain/ Nervous system
- Delayed processing speed when performing tasks (verbal or manual)
- Brain wt and volume decrease. On ave., between 20-80 yrs, brain shrinks about 2%/decade (Raz et al, 2001)
- All neurologic systems affected by aging: sensorimotor, perception, and autonomic responses; i.e. visual perception, auditory perception, somatosensory perception, motor changes, thermoregulation
- Confusion is not normal. It is usually the first sign of something wrong – need to look for the cause.
- ↓ responsiveness to ANS, ↓ response to β agonists, ↓ response to stress; decreased perception of pain
Generic name: fentanyl citrate  
Trade name: Fentanyl  
Classification: Controlled substance schedule II (High abuse potential; accepted medical indications)  
- Pharmacologic: Synthetic opioid  
- Therapeutic: Narcotic analgesic  

Actions: Binds with and activates opioid receptors (primarily mu receptors) in the brain and spinal cord to produce analgesia and euphoria. Reduces anxiety, apprehension, and perception of pain.  

Advantages over morphine: Fentanyl does not affect hemodynamics, O₂ sats or GCS when used appropriately. Causes less hypotension, respiratory sedation and CNS depression than morphine.  
- Causes less histamine release than morphine.  
  - Histamine assays & skin wheal testing indicate that clinically significant histamine release rarely occurs.  
  - No clinically significant histamine release at doses up to 50 mcg/kg (1 mL/kg) – much higher than what we’re using.  
  - Histamine causes a variety of SE related to morphine use: pain & hives at injection site, facial itching, N/V from mucosal edema in the GI tract, and hypotension from vascular effects.  
  - Fentanyl has less emetic activity than morphine.  
  - Blunts stress-related hormonal changes at higher doses.  
  - Short action duration makes it ideal if physicians are concerned about masking pain symptoms that may hide illness or injury (peritonitis) despite overwhelming scientific opinion in the peer-reviewed medical literature that this is a myth.  

Pharmacodynamics:  
- Intravenous  
  - Onset: almost immediate  
  - Peak: minutes  
  - Duration: 30-60 min  
- Intramuscular (not preferred route)  
  - Onset: 7-8 min  
  - Peak: 15 min  
  - Duration: 1-2 hours  
- Intranasal using the MAD device  
  - Onset: 2 min - reflects good venous outflow from nasal mucosa and bypassing of liver, avoiding hepatic first-pass metabolism.  
  - Peak: 5-10 min: Need to wait at least 5 min before assessing need for additional IN or IV medication.  
  - Duration: 30-60 min  
  - Advantage: IN fentanyl can be given w/o delays inherent in placing an IV. In routine practice the IN drug can be given before IV insertion, resulting in effective earlier analgesia. IV may not be necessary for EMS.  

Indications: Identical to those of morphine  
Patients experiencing pain unrelieved by other palliative or pain relieving measures  

Dose & route: Critically important: Fentanyl is dosed in micrograms (mcg); morphine is dosed in milligrams (mg).  
- Prefix milli- refers to one thousandth; micro- refers to one millionth  
- Potency and dosage are not comparable terms; a 100 mcg dose of fentanyl has roughly the same analgesic effect as 10 mg of morphine.  
Dose should be individualized according to age, body wt, physical status, & underlying pathological conditions.  

0.5 mcg/kg slow IVP/IN/IO/IM (usual max single first dose: 50 mcg)  
- See chart at back of SOP for weight/dose calculations  
- May repeat 0.5 mcg/kg in 5 min to a max of 100 mcg by SOP  
- If pain persists contact OLMC  
- May repeat 0.5 mcg/kg every 5 min until a max total dose of 200 mcg  

Elderly and debilitated patients  
- Reduce total dose. May be more susceptible to adverse effects, e.g. respiratory depression & CV effects.  
- May also have related kidney or liver function impairment, resulting in lower clearance rates.  

Pediatric patients  
- The safety of fentanyl in children younger than two years of age has not been established. Only give per SOP to children over the age of two.  
- Dose: Same as adult by wt – 0.5 mcg/kg slow IVP/IN/IM/IO up to 100 mcg by SOP.  
- Call OLMC for pain management in children < 2 yrs or for orders for additional doses  

Reversal agent: naloxone (Narcan) 2 mg IVP/IN/IM
Precautions:  

**Hypoventilation**: Respiratory depression can cause a reduced ventilatory drive and reduced RR assoc. with a "sighing" pattern.
- Alterations in RR and alveolar ventilation may last longer than the analgesic effect. Increased doses = greater decreases in pulmonary exchange. Very large doses may produce apnea.
- Monitor VS, resp. depth before & after administration. Provide continuous SpO$_2$ and ETCO$_2$ (capnography) monitoring if available before and after drug administration.

**COPD**: Normal analgesic doses may suppress cough reflex and further decrease ventilatory drive to the point of failure!

**Alcohol & drugs of abuse**: May cause additive CNS & resp. depression and hypotension when used with alcohol, benzodiazepines or CNS depressants. Pts on chronic opioid therapy or with a Hx of opioid abuse may require higher doses to achieve an adequate therapeutic effect.

**Cardiac disease**: – May produce bradycardia d/t cholinergic effect; use with caution in pts with known bradydysrhythmias.

**Hepatic or renal disease**: – Prolonged clinical effects d/t impaired hepatic metabolism & renal excretion.

Contraindications:  

- Known hypersensitivity to narcotics
- Intermittent pain
- Significant hypoventilation or respiratory depression
- Acute or severe asthma
- Opioid intolerant
- Hypotension
- Myasthenia Gravis
- Altered mental status
- Patients who are taking depressant drugs

Use in pregnancy:  

Category C - inadequate studies to recommend routine use in humans.
- Based on animal evidence, it is unlikely that a single use would lead to birth defects.
- Not known if drug is excreted in human milk. Given the rapid breakdown, it's unlikely that emergency doses would have an adverse effect on an infant. Call OLMC for orders.

Adverse reactions:  

- Nitrous oxide has been reported to produce CV depression when given with high doses of fentanyl. Monitor closely.
- Unintentional overdose: PM exceeds recommended dosing without precautionary measures in place to predict obtundation and respiratory depression (capnography)

Drug interactions:  

- Amiodarone: Profound bradycardia, sinus arrest and hypotension have occurred when pts receiving Amiodarone were given fentanyl. Monitor carefully.
- **Beta blockers and calcium blockers**: Use fentanyl with caution in a pt who has received Verapamil since severe hypotension has been reported to occur.

Side effects:  

**Common**
- Dose-related decrease in RR; peak respiratory depressant effect of a single IV dose is 5-15 min following injection
- Bradycardia (may reverse w/ atropine)

**Uncommon**
- N / V (give ondansetron)
- Muscular rigidity (chest wall) or myoclonic movements in pts given large doses rapidly. Give slow IV. Muscular rigidity may be associated with reduced pulmonary compliance and/or apnea, laryngospasm or bronchospasm. If chest wall rigidity occurs, Rx w/ assisted or controlled ventilations and reversal with naloxone.
- Confusion, dizziness, euphoria, seizures
- Hives, itching, abd pain, flushing; hypotension, HTN
- Blurred vision, miosis (constricted pupils)
- Laryngospasm, diaphoresis, spasm of sphincter of Oddi
- Anaphylaxis

Support for fentanyl in the literature:  


### ONDANSETRON (on dan' se tron)

**Generic name:** ondansetron  
**Trade names:** Zofran  
**Classification:** Antiemetic (reduces nausea and vomiting)  
**Actions:** 5-Hydroxytryptamine (HT3) receptor antagonists  
Blocks the action of serotonin, a natural substance that may cause nausea and vomiting.  

**Therapeutic benefit:** Decreases the need for IVF and hospital admissions in children presenting to the ED for vomiting from gastroenteritis. Has been safely used in children as young as 1 month old for the treatment of postoperative or chemotherapy-associated nausea & vomiting and now, gastroenteritis.  

**Indications:** Nausea/vomiting  

**Onset of action:** 10 min  

**Duration of action:** 2-4 hours (depending on age and liver function)  

**How supplied:** Oral dissolve tablets (ODT) (4 mg), solution for IV push (4 mg/2 mL)  

**Dose & route:**  
- **Adults:** 4 mg oral dissolve tablet or 4 mg IVP. May repeat X 1 to a total of 8 mg PO or IVP.  
- **Children:** 0.15 mg/kg up to a total dose of 4 mg IVP over at least 30 sec; or 4 mg ODT  
  - Remove tablet from package just before giving dose.  
  - To open package, do NOT try to push the tablet through the foil backing of the blister. Use dry hands to peel back the foil backing.  
  - Gently remove tablet and immediately place on top of pt’s tongue.  
  - Tablet will dissolve in a few sec and can be swallowed with saliva.  

**Contraindications:** Hypersensitivity  

**Side effects:** Rare: Transient blurred vision after infusion  
Diarrhea in children  

**Precautions:** Phenylketonuria (PKU) pts: ODT contains aspartame that forms phenylalanine.
**NITROUS OXIDE**

**Generic name:** Nitrous oxide  
**Trade name:** Nitronox  
**Classification:** Ultra short-acting nonhalogenated inhalation sedative/analgesic agent first discovered to have analgesic properties in the late 1700s. Used by a dentist in the mid 1800s. First used in EMS in US in 1977. Lay people know it as “laughing gas”. Nitrous oxide is formed by the decomposition of ammonium nitrate to N₂O and water when heated to high temps. Gas is sweet smelling, non-irritating and colorless. It can be stored in compressed form in cylinders. Only inorganic gas used as an anesthetic in humans.

**Actions:** CNS depressant; dulls the senses, blunts perception of painful stimuli, produces a carefree attitude. Thought to potentiate release of endogenous endorphins that react with opioid receptors in the CNS to elevate pain threshold & create a feeling of relaxation and euphoria.

**Advantages** Little effect on CV system – mild vasodilation; HR & BP remain unchanged. No direct effect on skeletal muscle. **Does not require an IV**

**Pharmacodynamics:** Onset & duration: 2-5 minutes – thus almost immediate relief of pain. Equivalent analgesic effect estimated to require 10-15 mg of morphine. Metabolized & excreted in lungs.

**Indications:** Temporary relief of pain due to isolated extremity injury, burns, renal colic, cardiac chest pain when narcotics are contraindicated. Can use to reduce anxiety during procedures (IV access).

**Dose & route** Self-administered: Pt must be alert, able to follow directions and hold the demand valve mask to their face. Dose is adequate when mask drops out of their hand.

**Packaging:** Nitronox: 50/50 preset blended mixture of nitrogen and oxygen – can’t adjust ratios. Automatically shuts off N₂O if oxygen supply is depleted & automatically delivers 100% O₂ if nitrogen supply is depleted. Alarms activate if faults detected. Special connectors prevent disconnection of gas supply hoses. Scavenging system prevents leak into ambulance.

**Contraindications:** AMS, facial trauma – can’t hold mask to face.  
- It diffuses into spaces containing air 34 X faster than nitrogen can diffuse out - leading to potentially dangerous airspace expansion. Don’t use in pneumothorax, bowel obstruction, intracranial injury etc. Preexisting hypoxia, COPD.  
- Decompression sickness (bends caused by N₂ gas bubbles in the blood)  
- Never use in confined space or when administration set’s scavenging system appears to be nonfunctional – gas will accumulate, displace O₂ and overcome rescuers

**Use in pregnancy** Crosses placenta; can cause fetal depression particularly in the 1st trimester.

**Adverse reactions** Nitrous oxide has been reported to produce CV depression when given with high doses of fentanyl. Monitor closely.

**Side effects:** Good safety profile  
*Diffusion hypoxia* can occur when Rx with N₂O is terminated it pt breathes only RA. Rapid diffusion of gas back to the lungs causes alveolar hypoxia. S/S: nausea, lethargy, dizziness (hangover). Prevent by giving O₂ 15 L for several min after conclusion of N₂O therapy  
Abuse by EMS personnel

**Support for nitrous oxide in the literature:**  
Glucagon

**Generic name:** glucagon  
**Trade name:** Glucagen

**Classification:** Endogenous hormone synthesized by the alpha 2 cells of the islets of Langerhans in the pancreas.

**Actions:** Action opposes insulin. Increases blood glucose by promoting the breakdown of glycogen stores in the liver to glucose (glycogenolysis). The degree to which glucagon ↑ blood glucose is dependent on liver glycogen reserves. 
Relaxes smooth muscle of the GI tract
Nice to know only for EMT-Bs: Positive inotropic (increased strength of contractions) and chronotropic (increased heart rate) effects.

**Advantages**
Can be given IN. Does not require an IV or IM injection.

**Pharmacodynamics:** Max activity occurs w/in 30 min; glucose returns to normal or hypoglycemic levels w/in 1-2 hrs

**Indications:** Treatment of severe hypoglycemia: when vascular access is unsuccessful.
Cardiac stimulant in ß blocker and Ca channel blocker overdose when atropine and pacing are unsuccessful or contraindicated.

**Packaging:** Packaged as a powder (1 mg) to be mixed with 1 mL of diluent. DO NOT SHAKE.

**Dose & route**
- **Adult:** 1 mg IM/IN/IV/IO (See SOP for preferred route based on condition)
- **Peds:** 0.03 mg/kg IM/IN/IV/IO For Ca or beta blocker overdose: May repeat every 1-min up to a total dose of 3 mg IVP/IO/IN prn.

**Contraindications:** Adrenal gland dysfunction, malnutrition, chronic hypoglycemia, pancreatic tumors, pheochromocytomas (adrenal gland tumors), liver disease.

**Side effects:**
- Chest pain, palpitations
- Dizziness or lightheadedness
- Difficulty breathing
- Rash; itching
- Unusual weakness
- Muscle cramps
- Nausea/vomiting

**Precaution:** This is a very expensive drug. Do not mix unless you are certain that it will be used.
Naloxone

**Generic name:** naloxone  
**Trade name:** Narcan  
**Classification:** Narcotic antagonist (reversal agent)  
**Actions:** Reverses effects of opiate drugs, narcotics/synthetic narcotics: morphine, Dilaudid, Fentanyl, Demerol, Paregoric, Methadone, Heroin, Percodan, Percocet, Tylox, Nubain, Stadol, Talwin, Darvon  
**Advantages**  
Can be given IN. Does not require an IV or IM injection.  
**Pharmacodynamics:** Rapid acting. Should begin the reversal process in minutes.  
**Indications:** Narcotic/synthetic narcotic OD  
Coma of unknown etiology with respiratory depression and/or constricted pupils  
**Packaging:** 2 mg/2 mL  
**Dose & route**  
**Adults:** 2 mg IVP/IN/IO/IM.  
**Peds:** 0.1 mg/kg IVP/IN/IO/IM up to 2 mg single dose.  
Short acting, may repeat in 5 minutes if transient response.  
Half life of naloxone often shorter than half-life of narcotic; repeat dosing often required.  
**Contraindications:** Hypersensitivity  
**Side effects:** Combativeness  
↑ HR, ↑ BP  
Vent. arrhythmias, asystole, or seizures (opioid antagonists stimulate the sympathetic NS)  
Rare anaphylactic reactions & pulmonary edema have been reported after naloxone use  
**Precautions:** Administer cautiously/slow for in pts dependent on narcotics or infants of addicted moms; titrate slowly. May need to restrain in advance. Any narcotic OD patient who receives naloxone will begin the narcotic withdrawal response.  
Be prepared to deal with  
- a potentially unstable airway; increased airway secretions (mainly nasal)  
- tachycardia and hyperarousal; chest pain; SOB  
- diarrhea; emesis  
- agitation; violent behavior; and  
- Patients may experience intense pain during withdrawal  
- Fighters are usually concomitantly intoxicated; on crack; or on methamphetamines  
- The slower the course of reversal the easier it is to handle the side-effects rather than accelerating the process. Ventilate the patient to maximize oxygenation.  
- Increased dose needed for synthetics like Darvon. Hospitals may give Haldol 5 mg and Versed 2 mg IM (B52) for extreme agitation.  
- Rapid reversal of opiate in pts who took combination drugs including stimulants may result in rapid HR.
NWC EMSS Lab Skill Performance Record

MUCOSAL ATOMIZER DEVICE (MAD)

Name: 1st attempt: [ ] Pass [ ] Repeat
Date: 2nd attempt: [ ] Pass [ ] Repeat

Performance standard

<table>
<thead>
<tr>
<th>Verbalize the 6 rights of medication administration:</th>
<th>Performs w/o coaching</th>
<th>Performs w/ coaching</th>
<th>Needs additional practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ] Right person [ ] Right dose [ ] Right route</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ ] Right drug [ ] Right time [ ] Right documentation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Prepare the patient

Initiate Initial Medical Care. (IV not necessary if mild distress)
* Confirm need for drug (EMT-B may give glucagon or naloxone IN)
* Confirm the absence of allergy or contraindication to the drug if able

Explain drug actions and procedure to the patient (if conscious).

Explain side effects of medication to patient
* Inspect nostrils for problems that might inhibit absorption
  [ ] Trauma to nasal mucosa [ ] URI secretions [ ] Epistaxis
  [ ] Damaged mucosa from chronic cocaine use
  [ ] Severe hypotension or severe vasoconstriction

Prepare the equipment/medication

* Select the appropriate medication (high concentration/low volume)
  [ ] naloxone 1mg/1mL [ ] glucagon 1 mg/1 mL [ ] Fentanyl 1 mcg/2 mL
  [ ] midazolam 5 mg/1 mL [ ] MAD device [ ] Syringe
* Inspect the medication packaging to confirm the drug name, integrity of the medication packaging; color, clarity, & concentration, dose, and expiration date.

* Calculate appropriate amount of medication for administration
* Draw up into a syringe; expel air from syringe.

Procedure

* Place tip of MAD 1.5 cm within the nostril; seat firmly to avoid leaks.
* Briskly compress syringe plunger to give up to 1 mL of spray per nostril. If less than a total dose of 2 mL of liquid is to be given, divide the dose equally between nostrils. (The nose may leak fluid so have a gauze pad or towel ready to catch secretions).

If patient does not respond to IN naloxone within the time it takes to establish venous access and an airway is necessary, give naloxone 2 mg IVP as soon as the IV is started

Successful awakening eliminates need for further naloxone. Gradual awakening with adequate respiratory efforts: Continue to monitor for 3-5 min. Reassess need for second dose of IN naloxone.

If patient does not respond to IN Versed (midazolam) or Fentanyl in 5 minutes give addtl midazolam IN/IV/IM/O; or call OLMC for additional Fentanyl dose per SOP. Glucagon may not show improvement for 10-20 minutes.

* Record medication name, concentration, dose, route, and time administered
* Assess & record patient response to medication

Scoring: All starred (*) items must be answered/perform correctly in order for the student to complete this station. Any errors or omissions of these items will require a repeat.

Recommendation: [ ] Excellent knowledge of material; no coaching needed.
[ ] Satisfactory knowledge of material: minimal coaching needed.
[ ] Could not perform some points even with coaching; recommend practice/repeat.

Evaluator
<table>
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<tr>
<th>Weight (lbs)</th>
<th>Dose mg</th>
<th>Dose mg/mL</th>
<th>Dose mg</th>
<th>Dose mg/mL</th>
<th>Dose mg</th>
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<td>0.3 mL</td>
<td>0.03 mg</td>
<td>0.3 mL</td>
<td>75 mg</td>
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<td>0.6 mg</td>
<td>0.12 mL</td>
<td>0.45 mg</td>
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<td>0.12 mg</td>
<td>1.2 mL</td>
<td>0.06 mg</td>
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<td>150 mg</td>
<td>0.3 mL</td>
<td>1.2 mg</td>
<td>0.24 mL</td>
<td>0.9 mg</td>
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<td>1 mL</td>
<td>0.1 mg</td>
<td>1 mL</td>
<td>250 mg</td>
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<td>2 mg</td>
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<td>0.24 mg</td>
<td>2.4 mL</td>
<td>300 mg</td>
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<td>2.4 mg</td>
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<td>400 mg</td>
<td>0.8 mL</td>
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<td>4 mg</td>
<td>0.8 mL</td>
<td>3 mg</td>
<td>1.5 mL</td>
</tr>
<tr>
<td>48 lbs = 22 kg</td>
<td>110 mg</td>
<td>2.3 mL</td>
<td>0.44 mg</td>
<td>4.4 mL</td>
<td>0.22 mg</td>
<td>0.22 mL</td>
<td>550 mg</td>
<td>1.1 mL</td>
<td>4.4 mg</td>
<td>0.88 mL</td>
<td>3.3 mg</td>
<td>1.6 mL</td>
</tr>
<tr>
<td>53 lbs = 24 kg</td>
<td>120 mg</td>
<td>2.4 mL</td>
<td>0.48 mg</td>
<td>4.8 mL</td>
<td>0.24 mg</td>
<td>0.24 mL</td>
<td>600 mg</td>
<td>1.2 mL</td>
<td>4.8 mg</td>
<td>0.96 mL</td>
<td>3.6 mg</td>
<td>1.8 mL</td>
</tr>
<tr>
<td>57 lbs = 26 kg</td>
<td>130 mg</td>
<td>2.6 mL</td>
<td>0.52 mg</td>
<td>5.2 mL</td>
<td>0.26 mg</td>
<td>0.26 mL</td>
<td>650 mg</td>
<td>1.3 mL</td>
<td>5.2 mg</td>
<td>1 mL</td>
<td>3.9 mg</td>
<td>1.9 mL</td>
</tr>
<tr>
<td>62 lbs = 28 kg</td>
<td>140 mg</td>
<td>2.8 mL</td>
<td>0.56 mg</td>
<td>5.6 mL</td>
<td>0.28 mg</td>
<td>0.28 mL</td>
<td>700 mg</td>
<td>1.4 mL</td>
<td>5.6 mg</td>
<td>1.1 mL</td>
<td>4 mg</td>
<td>2 mL</td>
</tr>
<tr>
<td>66 lbs = 30 kg</td>
<td>150 mg</td>
<td>3 mL</td>
<td>0.6 mg</td>
<td>6 mL</td>
<td>0.3 mg</td>
<td>0.3 mL</td>
<td>750 mg</td>
<td>1.5 mL</td>
<td>6 mg</td>
<td>1.2 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70 lbs = 32 kg</td>
<td>160 mg</td>
<td>3.2 mL</td>
<td>0.64 mg</td>
<td>6.4 mL</td>
<td>0.32 mg</td>
<td>0.32 mL</td>
<td>800 mg</td>
<td>1.6 mL</td>
<td>6.4 mg</td>
<td>1.28 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75 lbs = 34 kg</td>
<td>170 mg</td>
<td>3.4 mL</td>
<td>0.68 mg</td>
<td>6.8 mL</td>
<td>0.34 mg</td>
<td>0.34 mL</td>
<td>850 mg</td>
<td>1.7 mL</td>
<td>6.8 mg</td>
<td>1.36 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>79 lbs = 36 kg</td>
<td>180 mg</td>
<td>3.6 mL</td>
<td>0.72 mg</td>
<td>7.2 mL</td>
<td>0.36 mg</td>
<td>0.36 mL</td>
<td>900 mg</td>
<td>1.8 mL</td>
<td>7.2 mg</td>
<td>1.44 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>84 lbs = 38 kg</td>
<td>190 mg</td>
<td>3.8 mL</td>
<td>0.76 mg</td>
<td>7.6 mL</td>
<td>0.38 mg</td>
<td>0.38 mL</td>
<td>950 mg</td>
<td>1.9 mL</td>
<td>7.6 mg</td>
<td>1.52 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>88 lbs = 40 kg</td>
<td>200 mg</td>
<td>4 mL</td>
<td>0.8 mg</td>
<td>8 mL</td>
<td>0.4 mg</td>
<td>4 mL</td>
<td>1 Gm</td>
<td>2 mL</td>
<td>8 mg</td>
<td>1.6 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>99 lbs = 45 kg</td>
<td>225 mg</td>
<td>4.5 mL</td>
<td>0.9 mg</td>
<td>9 mL</td>
<td>0.45 mg</td>
<td>4.5 mL</td>
<td>1.12 Gm</td>
<td>2.24 mL</td>
<td>9 mg</td>
<td>1.8 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>110 lbs = 50 kg</td>
<td>250 mg</td>
<td>5 mL</td>
<td>1 mg</td>
<td>10 mL</td>
<td>0.5 mg</td>
<td>5 mL</td>
<td>1.25 Gm</td>
<td>2.5 mL</td>
<td>10 mg</td>
<td>2 mL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>