Current Drug Shortage Recommendations for KY EMS
November 16, 2017

- **Due to current emergency medication shortages of varying scope affecting the US and the Commonwealth of Kentucky, the following medication/dosing substitutions may be used by Kentucky Licensed EMS agencies while the shortage exists. A return to routine use of approved medical protocols is expected immediately upon availability of any medication required per approved protocol.**
- **Utilization of these medication/dosing substitutions are subject to appropriate training at the local level, and approval of the agency Medical Director.**
- **No prior approval from the Kentucky Board of Emergency Medical Services is required prior to implementation of these medication alternatives. These medication and dosing modifications have been approved by Julia Martin, MD, Kentucky EMS State Medical Advisor.**

<u>Cardiovascular Drug Classification:</u>

1. **Atropine 0.1mg/mL inj**
    a. Alternative Atropine 0.4mg/mL inj (2.5 mLs = 1mg: need to educate providers on change in concentration)
    b. Other treatment options for Bradycardia:
        i. Vasopressor medications (in order of preference)
            1. **<u>Epinephrine IV drip</u>** 0.02-0.2 mcg/kg/min titrated to a MAP greater than 65 mmHg **OR**
            2. **<u>Epinephrine by push dose</u>** (dilute boluses)
                a. Prepare 10 mcg/mL by adding 1 mL 0.1mg/mL Epinephrine (Carpuject) to 9 mL normal saline, then administer 10-20 mcg boluses (1-2mL) every 2 minutes titrated MAP greater than 65mmHg **OR**
            3. **<u>Norepinephrine</u>** 0.02-0.4 mcg/kg/minute IV titrated to a MAP greater than 65 mmHg
        ii. **Transcutaneous Pacing** – If pacing is performed, consider sedation or pain control.
2. **Dopamine**
    a. Research shows that for shock (septic, cardiogenic and neurogenic) norepinephrine is the preferred agent to treat hypotension with better outcome data.
    b. Vasopressors in order of preference for shock in adults:
        i. **<u>Norepinephrine</u>** drip: 0.02-0.4 mcg/kg/minute
        ii. **<u>Epinephrine by push dose</u>** (dilute boluses)

1. Prepare 10 mcg/mL by adding 1 mL 0.1mg/mL Epinephrine (Carpuject) to 9 mL normal saline, then administer 10-20 mcg boluses (1-2mL) every 2 minutes titrated MAP greater than 65mmHg

iii. **Epinephrine drip** 0.02-0.2 mcg/kg/min titrated to a MAP greater than 65 mmHg

3. **Epinephrine 0.1mg/mL solution:**
   a. Intravenous and Intraosseous epinephrine must be in a diluted 0.1mg/mL solution to avoid complications to the vasculature and minimize risk of over dosage and adverse cardiovascular effects in the higher dosages.
   b. **Epinephrine 1mg/mL** is available and can be diluted
      i. 1 mL of 1mg/mL epi diluted in 9mL of NS to make concentration of 0.1mg/mL.

Glucose Solutions:

1. **D50** (Glucagon and oral glucose solutions are still available)

	Alternative	Alternative
D50% 25 g (50mL) Vial /Syringe	Dextrose 10% 250mLs	Dextrose 5% 500mLs (D5W, D51/2NS, D5 LR)

2. **D5W**
   a. For glucose replacement see D50 alternatives
   b. For Intravenous solution, choose an alternative crystalloid (NS, LR, D5LR, D51/2NS)

IV Fluids:

1. **Normal Saline**
   a. **Ringer's Lactate**
      i. Can be use interchangeable with Normal Saline as intravenous solution
      ii. A balanced crystalloid solution
   b. **PlasmaLyte (Cost ~ 12.57 per liter)**
      i. Is a balanced crystalloid solutions similar to Ringer's Lactate
      ii. It closely mimics human plasma in its content of electrolytes, osmolality, and pH.
      iii. The advantages of PlasmaLyte include volume and electrolyte deficit correction while addressing acidosis.
      iv. It shares the same problems as most other crystalloid fluids (fluid overload, edema with weight gain, lung edema, and worsening of the intracranial pressure).

2. **D5W**
    a. For glucose replacement see Glucose replacement options
    b. For Intravenous fluid replacement see above

Benzodiazepines:

1. **Diazepam**
    a. Anticonvulsant Treatment
        i. IN/IM routes are preferred over rectal (PR), IV, or IO routes, if within the provider's scope of practice
        ii. If vascular access is absent: midazolam 0.2 mg/kg (maximum dose 10 mg), IM preferred, or IN
        iii. If vascular access (IV or IO) is present:
            1. Diazepam 0.1mg/kg IV or IO, maximum 4mg
            2. Lorazepam 0.1mg/kg IV or IO, maximum 4mg
            3. Midazolam 0.1mg/kg IV or IO, maximum 4mg
        iv. If none of these routes (IN/IM/IV/IO) of medication administration are in provider's scope of practice, diazepam 0.2 mg/kg PR (maximum dose 10 mg) is an acceptable route of administration

Pain Management:

1. **Fentanyl** and **Morphine**
    a. There are several different opioids that can be administered IV for acute, severe pain management. Fentanyl, Morphine and Hydromorphone are most common. If pain is not severe, consider non-narcotic alternatives.
    b. **Non-pharmaceutical** pain management techniques
        v. Placement of the patient in a position of comfort
        vi. Application of ice packs and/or splints for pain secondary to trauma
        vii. Verbal reassurance to control anxiety
    c. Consider use of oral analgesics as available and as permitted by direct medical oversight
        viii. **Acetaminophen** 15 mg/kg PO (maximum dose 1 g)
        ix. **Ibuprofen** 10 mg/kg PO for patients greater than 6 months of age (maximum dose 800 mg)
    d. **Ketorolac** (Toradol):
        x. In the setting of renal colic, Ketorolac is more effective than opioids
        xi. Adult dose: 15-30 mg IV
        xii. Ped dose (6 mo and older): 0.5 mg/kg up to max of 15 mg IV
        xiii. Geriatric dose: 0.5 mg/kg IV, max 15 mg.
    e. **Ketamine** in sub-anesthetic dose
        xiv. Will require provider training on medication and a submitted protocol

xv. KETAMINE 0.1 mg/kg IV/IO or 0.25 mg/kg IN (max IN dose 25 mg). IV dosing may be repeated every 10 min and IN doses may be repeated once in 30 min.
xvi. Sub-anesthetic (low) dose ketamine has demonstrated significant analgesic efficacy without the adverse effects associated with higher doses. While uncommon, ketamine administration may result in laryngeal spasm and/or increased salivation. Laryngeal spasm is transient and can be managed with positive pressure ventilation if need be.
xvii. As the dose related effect of ketamine transitions from analgesia to anesthesia, nystagmus emerges and as such, ketamine administration should be discontinued when nystagmus occurs.

f. IV Opioid dosing chart:

Opioid	IV dose	Duration of Action
Fentanyl	Adult: 50-100 mcg Ped: 0.5 – 1 mcg/kg (max 100mcg)	2 hours
Hydromorphone (Dilaudid)	Adult: 0.25- 2 mg Ped: 0.015 mcg /kg (max 2 mg)	3-5 hours
Morphine	Adult: 2.5-10mg Ped: 0.05-0.1 mg/kg (max 10mg)	3-4 hours

2. **Nitrous Oxide gas**
   No alternative available
   i. Will require a protocol and provider training.

Anti-emetics:

1. **Promethazine (Phenergan)**
   a. Alternatives:
      i. **Ondansetron** (Zofran) 4mg IV, PO, SL
      ii. **Diphenhydramine** 25-50 mg IV, PO

Misc:

1. **Sodium Bicarb**
   a. No good replacement for ACS and acute drug toxicity
   b. Some considerations are Hyperventilation and Hypertonic Saline
2. **Calcium Chloride** and **Calcium Gluconate**
   a. Most commonly used for cardiac arrest, Hyperkalemia with EKG Changes and calcium channel blocker overdose.
   b. Calcium chloride contains roughly 3 times about of calcium than Calcium gluconate. (1gm/10ml of Calcium Chloride ~ 3gm/30mL of Calcium Gluconate)
   c. No alternative for acute intravenous administration