Tidewater
EMS
Council, Inc.

2020 Protocol Updates and New Protocols

Protocol and App Design Updates

In 2018, the TEMS Education and Training Committee was tasked to consider what a new TEMS app would look like as we started to evaluate protocol revisions.

We took a survey and based on your input, “tweaked” the protocols. You liked our protocol format but with a splash of color. All protocols were reworked into the new format even if not revised.

In addition, starting in 2018, each protocol will be looked at, updated, and/or revised every 3 years.

Future App Design Concepts

- A more dynamic app with “hotlinks” or pop-ups to notes, procedures, medications, etc. is needed.

- App end goals include things like:
  - Tap a medication and be taken to the medication page for more information
  - Clicking on the pediatric icon for pop-up peds dosing
    - Handtevy implementation to occur at/near same time protocols debuted
  - Tap a procedure for how-to instructions
  - Pop-up treatment warnings

Protocol Design Concepts

The future app will take time to develop and we needed to update the protocols now. With that in mind, we figured out ways to update the protocols and work in a static mode (just like now) but be ready to work in a dynamic version later.

Key elements of the protocols include:

- Reduce clutter to make important items easy to find-especially at 0200 hrs
- Highlight key items with color
- Move training and educational information to reference pages
- Reduce redundancies and duplication
- Combine/delete protocols-including pediatrics when able
- Consistency with med dosing across protocols to reduce errors

Protocol Design Concepts

Legend of Symbols Changes

- <u>Skill boxes</u>
  - Certifications levels are given a box/color and if physician orders are required for a level, a “M” for medical control will be present. A box with no certifications means all levels can perform (based on your OMD/agency).

CO Monitoring
ETCO2 Monitoring
High Flow Oxygen
(All levels can perform)

M	Contact Medical Control

M E	Something that an EMT needs Physician Order for but others can do on Standing Order
A	
I	
P	

Protocol Design Concepts

- Other items
  - Exit to or Incorporate other protocols into your treatment plan are noted in green.

EXIT to APPROPRIATE Protocol

INCORPORATE other APPROPRIATE Protocol(s) ***as indicated***

  - Special notes are in yellow

Notes/Special things off to the side

  - AOV or very important items are blue or red.

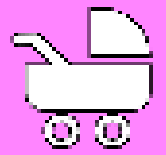
Treatment per Airway/Oxygenation/Ventilation Protocol

High Quality CPR
Apply AED/Defibrillator
as soon as possible

Protocol Design Concepts

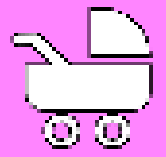
- Headers and footers
  - Include the title of the protocol, category, and the date it was last changed/updated
- Note Pages
  - Cleaned up to include Patient Goals (purple), Treatment notes/specifics/additional information (green), Special Considerations (black), and Pediatric notes and dosing (pink)
  - Defined sections/areas so you can target your reading

Protocol Design Concepts-Pediatrics



- Now labeled with pink and a baby carriage.
  - The teddy bear didn't translate well in a tiny box.
- Pediatric protocols are no longer in a separate section
- A protocol specific to pediatrics will have pink in the title and the baby carriage symbol in a pink box near the top of the page.
- Pediatric dosing is moved to the bottom of the Notes page for each protocol (unless you are in a pediatric specific protocol).
  - The future app will allow you to click on the baby carriage and take you directly to the peds dosing AND the Handtevy program is being implemented at the same time so peds dosing will likely be used there.

Protocol Design Concepts-Pediatrics



Medications/Treatments

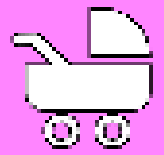
- All dosing in main protocol is adult (unless peds specific page)
  - If peds dosing is allowed, box will contain pink box with baby carriage
  - Peds dosing is in notes-look to bottom of notes page for specific peds notes and dosing
  - **<u>Use Handtevy app for specific peds dosing</u>**
  - If all peds dosing is physician order, M (medical control) will be next to pink box.

A I P 	If SBP less than 90 mmHg with signs of hypoperfusion, Obtain Vascular Access **250mL NS bolus IV/IO**

I P 	**Medication/procedure is not indicated for pediatric patients**

I P 	**Medication name, dose, route** with peds specific dose (see notes page)

Protocol Design Concepts-Pediatrics



- Pediatric notes look something like this. They are always at the bottom of the notes page, outlined in pink, labeled, and contain a pink box with baby carriage

PEDIATRICS

Treatment

- Pediatric patients should only receive **20mL/kg NS bolus IV/IO**
- SBP should be age specific. Hypotension can be considered for the following:
  - 0-30 days: SBP less than 60
  - 1 month-1 year: SBP less than 70
  - 1-10 years: SBP less than 70 + (2 x age in years)

Putting it together-Notes

GOALS

- Early recognition and appropriate treatment of cardiac arrest patients
- High quality CPR with minimal interruptions and early defibrillation
- Preservation of neurologic function and ROSC

TREATMENT

- H's and T's should be addressed AFTER first line medications such as epinephrine and amiodarone and can be added into the cardiac arrest cycle as indicated
- Utilize manual defibrillator as soon as trained provider arrives
- If BLS airway is adequate, priority is vascular access and medication administration

Secondary Anti-Arrhythmic: Administer **Lidocaine 1mg/kg IV/IO**. Can repeat once at 0.5 mg/KG IV/IO
Renal/Dialysis Patient with suspected hyperkalemia: Incorporate **Calcium chloride 1 gram IV/IO** over 3 minutes and **Sodium bicarbonate 1 mEq/kg IV/IO**. Flush well after administration.
Torsades: Administer **Magnesium sulfate 2 grams IV/IO in 100 mL NS** over 5 minutes

SPECIAL CONSIDERATIONS

- Once ALS airway in place, give continuous compressions and adequate breaths, avoid excessive ventilation
- CPR may still be required in the presence of an organized cardiac rhythm
- A moving vehicle may introduce artifact during AED analysis and may lead to inappropriate defibrillation
- Do not place defibrillation pads over transdermal patches and devices such as AICD, pacer, med ports, etc.

High Quality CPR - Push hard and fast, at least 100/min, ensure full chest recoil and minimize interruption in compressions, rotate compressors every 2 minutes and check rhythm during switch and Minimize time from last compression to defibrillation
Contraindications to CPR/AED - Rigor Mortis, Lividity, Injuries incompatible with life, DNR

PEDIATRICS

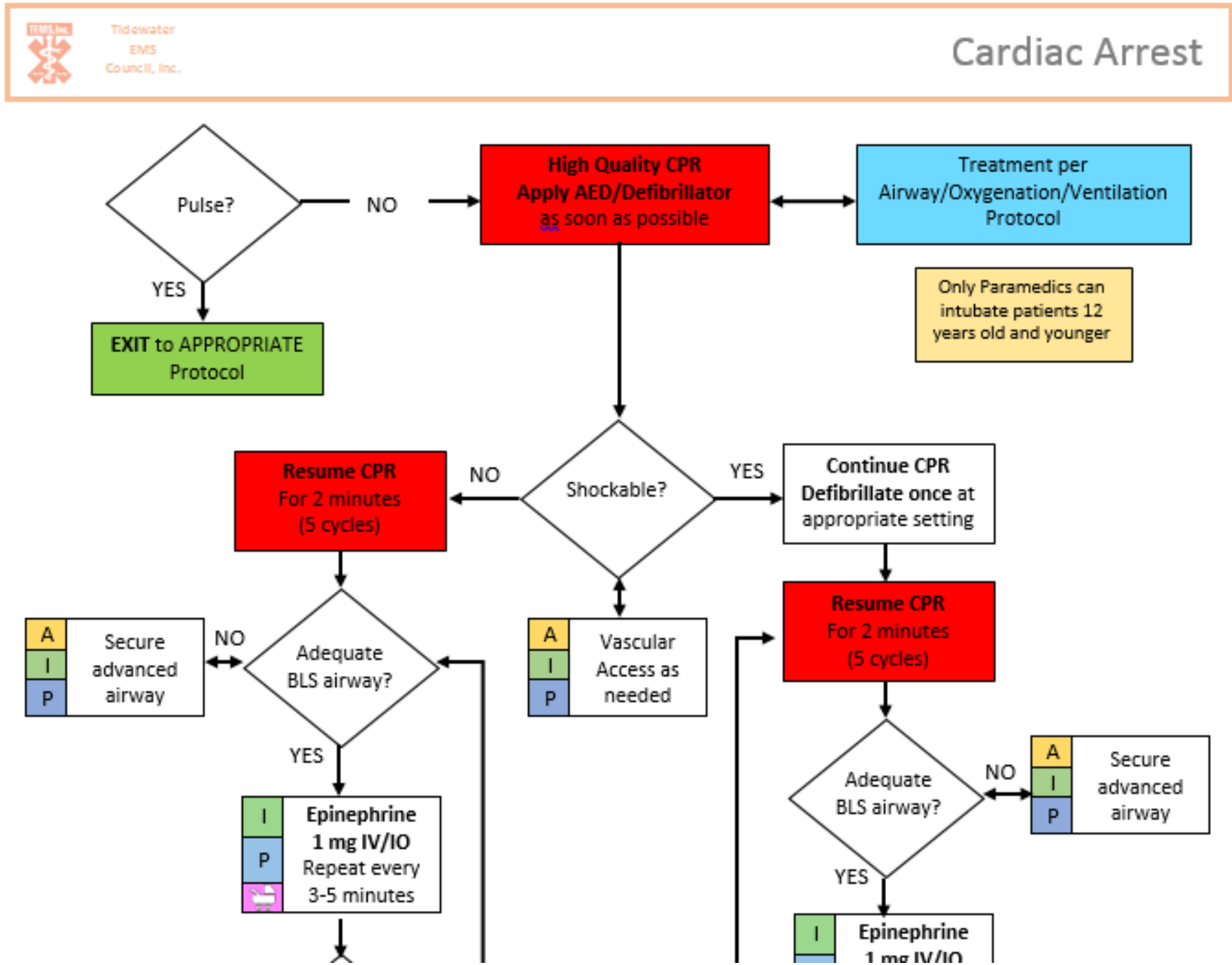
- Perform CPR if the HR is less than 60 with poor perfusion
- CPR for infants should be performed with the two-thumb encircling technique
- Defibrillation pads should not touch. Use anterior/posterior if needed.
- Endotracheal administration of medications should ONLY be used if IV/IO access cannot be obtained

AED: Pediatric for children less than 8 years is preferred but if unavailable, use adult AED
Defibrillation: 2 J/kg initial and subsequent at 4 J/kg
Epinephrine 0.01 mg/kg IV/IO up to max dose of 1mg every 3-5 minutes

- Endotracheal dose 0.1 mg/kg ETT of 1mg/1mL concentration

Amiodarone 5mg/kg IV/IO up to a max dose of 300 mg and may repeat once
Secondary Anti-Arrhythmic: Administer **Lidocaine 1mg/kg IV/IO**. Can repeat once at 0.5 mg/KG IV/IO
Renal/Dialysis Patient with suspected hyperkalemia: Incorporate **Calcium chloride 20 mg/mL IV/IO** over 3 minutes max dose 1 gram and **Sodium bicarbonate 1 mEq/kg IV/IO**. Flush well after administration.
Torsades: Administer **Magnesium sulfate 50mg/kg IV/IO in 100 mL NS** over 5 minutes max dose 2 grams

Putting it together-Protocol



Performance Indicators and Documentation

Performance Indicators previously noted at the bottom of the notes pages have been moved to a separate section and combined with documentation notes.

- Makes a great tool for assessment item review as well

New to TEMS

- **Protocols**
  - **Bleeding Control**
  - **Carbon MoNOxide / Cyanide**
  - **LVAD (Left Ventricular Assist Device)**
- **Reference/Procedure Pages**
  - **Existing Catheter Procedure**
  - **IV/EJ Procedure**
  - **Zoll Lifevest**
- **Medications**
  - **Ketamine**
  - **D10**
  - **Epinephrine “Push Pressor”**
- **<u>Pediatric age clarification---patients under the age of 15 years</u>**

Updated Protocols

- **Bites and Stings**
- **CBRNE/Hazmat**
- **Combative Patient**
- **Drowning/Submersion**
- **Hyper-Hypoglycemia**
- **Overdose**
- **Pain**
- **Pregnancy (Pre) Eclampsia**
- **Rehab**
- **RSI and Post RSI**
- **Sepsis**
- **Shock**
- **Intraosseous (Reference Page)**

- The following protocols were not updated but had minor clarifications/corrections or med/med dose changes made:
  - **AOV**
  - **Allergic Reaction/ Anaphylaxis**
  - **Breathing Difficulty**
  - **Cardiac Arrest**
  - **Chest Pain/ACS**
  - **Dialysis/Renal Failure**
  - **Seizure**
  - **Stroke**

Items Removed

- **Protocols**
  - **Vascular Access Protocol (now a Reference Page)**
  - **Behavioral Emergency (combined with Combative Patient/information in reference page)**
  - **Diving Protocol (combined with Drowning)**
  - **Pediatric AOV, Burns, Cardiac Arrest, Hyper/Hypoglycemia, Nausea/Vomiting, Pain, Seizure, Overdose (combined with Adult versions)**
- **Medications**
  - **Ativan**
  - **D50**

New Protocol-Bleeding Control

- New to TEMS incorporating aspects from Traumatic Injury and Dialysis/Renal Failure
- For dialysis shunt bleeding, attempt to control using finger tip pressure first
  - If required, DO NOT place tourniquet on shunt, ensure it is placed well above.
- OMD's have approved region wide use of hemostatic agents/gauze and wound packing (check with your agency/OMD)

New Protocol-Carbon MoNOxide/Cyanide

- New to TEMS – many agencies have been carrying Cyanokits in the field
- Suspected CO/Cyanide poisoning signs and symptoms are:
  - Hypotension not attributed to other obvious causes
  - Alerted mental status/Unconscious
  - Seizures
  - Respiratory/Cardiac arrest
- High index of suspicion for those exposed to products of combustion, regardless of ability to assess CO levels

- Hydroxocobalamin – 70 mg/kg IV/IO over 15 minutes – max 5g

New Protocol-LVAD

- New to TEMS due to the high volume of LVAD (Left Ventricular Assist Device) patients in the area
- LVAD Reference page removed and protocol created
- Based on current information from SNGH and manufacturer recommendations
- Protocol gives guidance for life saving treatment, but crews should still attempt to contact SNGH for individual treatment guidelines.
- Caregivers are given detailed instructions and information on device use-they are great resources
- Also, new Zoll Lifevest Reference page was added

Updated Protocol: Overdose

- Naloxone (Narcan) dose changed to 1mg per individual dose
  - May be given IN (by all levels), IM, IV
  - Titrate to improve respiratory drive-rate, depth, etc.
    - Effective dosing is indicated by the ability to breathe adequately, not an increased level consciousness
  - May repeat dosing as needed to maximum total dose of 4 mg
    - EMS doses can max at 4 mg on standing order
    - Prior doses by laypersons, PD, etc. do not count towards the max dose of 4 mg
      - All doses should be documented

Updated Protocol: Pain

- Ketamine added
  - Dosing is weight-based; May be given IV or IN
    - IV : 0.25 mg/kg (single max dose of 25mg)
    - IN: 0.5 mg/kg (max 25mg)
  - Standing Order
    - Must have pain scale greater than 5, GCS of at least 13, SBP greater than 90 mmHg AND no signs of hypoperfusion
      - AND must be 15 years or older
      - AND must have an isolated extremity injury OR burns with no airway compromise
    - Provide BLS pain control first: splinting, traction, ice, position of comfort, etc.
    - May also require implementation of Nausea/Vomiting Protocol
      - Gastrointestinal symptoms are usually not severe
  - Utilize cardiac, SpO2, and EtCO2 monitoring
    - HR and BP may increase as a side effect, however more serious cases could involve hypotension or bradycardia
    - Ensure equipment for airway management is at the ready

Updated Protocol - Rehabilitation

- Rated Perceived Exertion scale removed
  - 40 minutes of work on scene is now a benchmark for need of rehab
- Heart rate re-evaluation criteria increased to 110 bpm
  - Heart rate of 100 bpm often too low for practical application, heart rate routinely exceeds this during fire/EMS operations
  - Increase to 110 aligns with other protocols utilized by agencies nationwide
  - Recommended by Mike McAvoy - Technical Committee on Fire Service Occupational Safety and Health (NFPA 1584 revision)

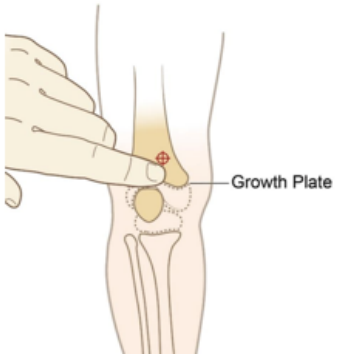
Updated Protocol: RSI and Post RSI

- Updated “standard” dosing for Adults: added “Small Adult”
  - NEW: Small Adult (less than 165 lbs/75 kg)
    - Etomidate 20 mg IV/IO
    - Rocuronium 80 mg IV/IO
  - Adults greater than/equal to 165 lbs (75kg) and pediatric dosing-No Changes
- Post Intubation Sedation dose changed to Midazolam (Versed) 2.5mg IV/IO EVERY 10 to 15 minutes
  - Administer sooner if signs of decreased sedation are present
    - Increasing heart rate, tearing from eyes, increased difficulty bagging, decreased oxygen sats, increased BP, spontaneous breathing

New Procedure-IV/IO

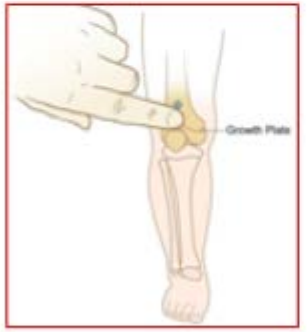
- Vascular Access protocol removed (converted to Procedure page), IO procedure page updated, and Existing Catheter Access procedure created.
  - Remember: EMT level providers may transport a patient with an IV if the IV was started by a doctor's office, nursing home, etc. and the patient requires BLS transport.
- IO-Site specific access and notes added
  - Distal femur added as Physician Order site in pediatric patients
    - Individual agencies and OMD will approve/provide training
  - Lidocaine administration for patients responsive to pain is included

insertion site is on the flat center aspect of the bone.



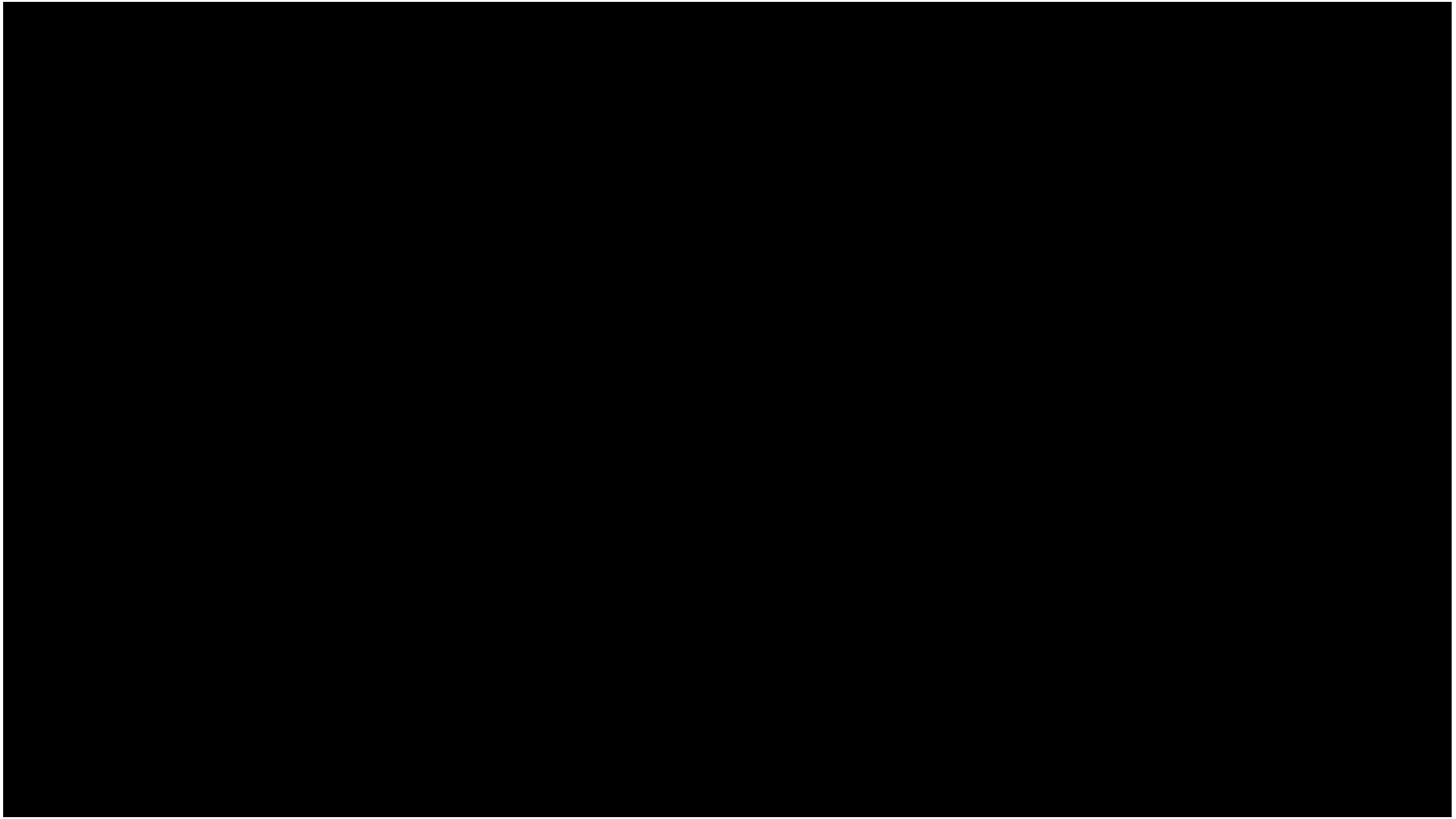
Distal Femur ***(Physician Order Pediatric only)***

- Secure the leg out-stretched to ensure the knee does not bend. Identify the patella by palpation. The insertion site is just proximal to the patella (maximum 1cm) and approximately 1-2 cm **medial** to midline.



Distal Femur

Proximal Tibia



Updated Protocol: Sepsis

- **Norepinephrine (Levophed) dosing changed across all protocols**
  - **Dose changed to 2-12 mcg/min IV/IO**
  - **May titrate to maintain SBP of 90 mmHg if IV fluids are not increasing BP**

- **Note: Most sepsis patients require large amounts of IV fluids (up to 30 mL/kg)**

New Procedure-Existing Catheter Access

- Existing Catheter Access (NEW) procedure added
  - Patient with immediate need for delivery of medications and/or fluid **(I, P)**
    - Inability to establish an adequate peripheral IV, EJ IV, or IO **AND**
    - Patient has existing venous catheter for medication or fluid administration **OR** Central venous access in a cardiac arrest patient **OR** existing catheter that is already accessed by a healthcare provider

Notes:

- Accessing an existing catheter is inappropriate for prophylactic access!
- Do not remove any existing medication infusions from access without verifying with online medical control.
- Aseptic technique and cleanliness is imperative due the nature of the access.
- Do not allow any air into catheter. Clamp lines (if clamps are present) before disconnecting from catheter.
- Do not allow IV fluids to run empty.
- PICC lines require 5ml of blood aspiration and central lines require 10ml.
- Do not use needles to access ports/catheters. They are needleless systems.

New Medication – D10

- D50 syringes being replaced with two (2) 250ml premixed bags of D10
- D10 will be for all ages
- Administer 125 mL using a macro drip set
- Reasons for removing D50
  - Drug shortage
  - D10 less of a shock to the diabetic patient
  - Less chance of extravasation injury
  - Less chance of hyperglycemia post administration
  - D10 just as effective as D50

- <u>Blood Glucose lower limit is now 70 mg/dL</u>

New Medication – Epinephrine "Push Pressor"

- Used for adult patients with profound hypotension who are nearing cardiac arrest (hemodynamically unstable) in anaphylaxis
  - Not for use in traumatic shock
  - Use only after administration of other anaphylaxis meds
- Has alpha and beta 1/2 effects so it is an inopressor
- **Do not give IV/IO cardiac arrest concentrations/doses (1 mg/10 mL) to patients with a pulse**
- Not for use in pediatric patients

New Medication – Epinephrine "Push Pressor"

- How to make
  - Waste 9 mL from the cardiac amp of epinephrine **OR** draw out 1 mL from cardiac epi in an empty syringe
    - Cardiac amp contains Epinephrine 100 mcg/mL (1mg/10 mL)
  - Add 9 mL of normal saline to syringe
  - Label syringe
  - Now you have 10 mL of Epinephrine 10 mcg/1 mL (0.01mg/1 mL)

- How to administer
  - Push 0.5 mL (5 mcg) IV/IO at a time
  - Repeat slowly and after BP checks to titrate a systolic BP of 90mmHg
    - Approximately every 1-5 minutes
    - Mix and start epinephrine/norepi drip if pressor support needs to continue

New to TEMS: Ketamine

- Ketamine is being introduced to the TEMS drug box. It is a new medication to the region.
- Proposed concentration is 50 mg/mL
- TEMS Protocol indications are for:
  - ADULT (15 years or greater)
  - Pain management of isolated extremity fracture and burns with no airway compromise *ONLY*
- *Single, one time dose with no repeat doses*

Ketamine Overview

- Non-barbiturate dissociative anesthetic
  - Ketamine produces hemodynamically stable anesthesia via central sympathetic stimulation without affecting respiratory function.
  - Mechanism of Action
    - Produces a cataleptic-like state in which the patient is dissociated from the surrounding environment by direct action on the cortex and limbic system. Noncompetitive NMDA receptor antagonist that blocks glutamate in the brain. Low doses produce analgesia and modulate central sensitization, hyperalgesia, and opioid tolerance. Reduces polysynaptic spinal reflexes. Has bronchodilation properties.
- **Uses**
  - Standard: Induction and maintenance of general anesthesia
  - Unlabeled uses: Complex regional pain syndrome, analgesia, sedation, treatment of depression
- **Pharmacokinetics**
  - Metabolized in liver, excreted primarily in the urine. Half life approximately 2-3 hours.
  - IV – onset 30 seconds, peak 5-10 minutes;
  - IM – onset 3-4 minutes, peak 12-25 minutes.
  - IN about 3 to 4 minutes, peak 12 to 25 minutes
    - Higher bioavailability since it does not undergo first pass metabolism in the liver
- Store between 20° to 25°C (68° to 77°F)

Ketamine Contraindications

- Contraindications
  - Pregnancy/breast feeding-safety and effectiveness not established
  - Patients with underlying conditions in which increased blood pressure would pose a risk of complications
    - Such as aortic dissection, uncontrolled hypertension, (pre) eclampsia, myocardial infarction, or aneurysms.
  - Prior hypersensitivity to the drug
- Relative Contraindications
  - Patients who have already received opioids
    - May cause prolonged recovery time and potentiate respiratory depression
  - Patients with schizophrenia due to the potential for exacerbating the underlying condition-even if properly managed on medications
  - Use in chronic alcoholics or the acutely alcohol-intoxicated patient- <u>may cause death</u>

Ketamine Precautions and Side Effects

- Overall wide margin of safety
- Psychological manifestations may include a wide range from pleasant, dream-like hallucinations to seeing colors and emergence reactions (as the medication wears off)
  - Emergence phenomenon has been reported in from 6% to 12% of patients.
  - Rarely, patients experience hallucinations. Emergence delirium may be reduced by decreasing the recommended dose of ketamine.
    - Once the critical dosage threshold of roughly 1 to 1.5 mg/kg when given intravenously (IV) or 3 to 4 mg/kg when given intramuscularly (IM) is reached, the characteristic dissociative state abruptly appears.
    - Sub-dissociative dosing (low dose ketamine) is dosed at 0.1 to 0.4 mg/kg IV
  - Emergence reactions are less likely with IN route
  - Minimize additional patient stimulation if at all possible in the presence of an emergence reaction
- Severe respiratory depression or apnea may result if IV administration is too rapid due to laryngospasm
  - In these situations, mechanical support of respiration is the preferred remedy

Ketamine Administration

- May cause drowsiness – Ensure the patient is in a supported position
- IN dose should be split between both nares and pushed rapidly to ensure atomization
  - Ensure nares are clean
- IV dose should be administer SLOWLY
  - Dilute in equal amount of Normal Saline (as a minimum)
  - Administer over 1-2 minutes
- If rare emergence reaction occurs, consult with medical control and consider administration of Midazolam (Versed).
  - Ensure IV lines are flushed well. Forms precipitate when mixed with barbitruates, benzodiazepines, and diazepam.
- If pain is not managed, consult with medical control to incorporate opiate based medications (morphine sulfate, Fentanyl)

Remember, individual patients may respond differently!

Ketamine Sources

- https://www.accessdata.fda.gov/drugsatfda_docs/label/2017/016812s043lbl.pdf
- https://www.ncbi.nlm.nih.gov/books/NBK470357/
- https://www.medicines.org.uk/emc/product/6935/smpc
- https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1553-2712.2000.tb01076.x