

Objective: This workshop will review the dosing and administration of common medications used in pediatric patients in the field and during resuscitation. It will include demonstration and rotating hands-on stations where participants can practice using the Broselow tape, drawing up the medications, and discuss administration routes. We will use case scenarios to troubleshoot common issues encountered in administering medications to children including patient cooperation and options for alternate routes of medication administration.

Case 1: Status Epilepticus

Mother calls EMS for her 3 year old child who is actively seizing. You arrive on the scene and the patient is not actively convulsing.

What do you do?

- Answer:
- Assess the patient’s breathing, vital signs, mental status
 - Breathing is deep but regular
 - HR is 108 (ask if that is normal for a child this age—yes)
 - Pulse ox is 98%
 - Very sleepy, responding to pain
 - Place on O2, check glucose, and temp
 - Glucose: 160 (ask why it might be high—typical for seizures)
 - Temp: 103 (ask how they check a temp, what if the baby was 7 months, how would they check a temp)
 - Find out what meds might have been given and basic history
 - No meds given
 - History of febrile seizures

You load him into the back of the truck on your stretcher and now he starts with a generalized seizure.

What do you do?

- Answer:
- Protect the airway:
 - Place on their side (why?—to prevent aspiration)
 - Be ready with suction—secretions, vomiting
 - Broslow
 - Give seizure medication—discuss routes

Route	Dose	Benefits	Downsides
IV	Ativan (Lorazepam) 0.1mg/kg IV push, max 4mg	Onset: Within 5 min May repeat every 10 min Longer clinical effect compared to diazepam	Must dilute with NS 1:1 Hypotension Respiratory depression
	Versed (Midazolam) 0.1mg/kg IV push, max 5mg	Onset: 1-5min	Shorter duration of action compared to other BZD’s Hypotension Respiratory depression
IM	Ativan 0.1mg/kg, max 4mg	Do not dilute	
	Versed IM: 0.1-0.3mg/kg, max 6mg Intranasal: 0.2-0.3mg/kg, max 10mg	Onset: 5min Preferred if no IV access	*Must divide intranasal dose between both nares*
Rectal	Diazepam 0.5mg/kg of IV formulation, max 20mg	Available in Diastat-Rectal Gel Onset: 2 – 10 minutes	Duration:15 – 30 min (Highly Lipid soluble, short duration)

Discussion points:

What if the glucose had been 30?

Give dextrose, discuss routes (oral, IV)

Dextrose 50%: 1 – 2ml/kg or Dextrose 25%: 2 – 4 ml/kg, Infuse over 15 minutes

To make D25, dilute D50 with equal volume of Normal Saline

Glucagon Kit 1mg/mL IM <12 y/o 0.5mg, >12 y/o 1mg

Recheck glucose for longer transport

What if the patient had been apneic?

Discuss intubation based on Broslow

Use the Bag Valve Mask

ETT size

Medications

What if the patient continued to seize after 1st dose of medication?

Discuss time to onset for medication based on route

Considerations for repeat dosing

Participant skills:

-Make sure they can demonstrate the recovery position for seizure patients

-Make sure they can use the broslow tape

-Make sure they understand how to prepare and administer medications used in this scenario (including rectal diazepam)

Case 2: Status Asthmaticus

Father calls EMS after picking up his 5yo from school because he is breathing fast.

What do you do?

Answer:

Assess the patient's breathing, vital signs, mental status

- Breathing is fast and noisy

- HR is 108, RR is 50 (ask if this is normal for age—no), pulse ox is 88%

-Appears tired and short of breath

Place on O2 and listen for breath sounds

-Poor air movement, some mild expiratory wheeze in the bases

Find out what meds might have been given and basic history

-Has been coughing for past few days with runny nose, given albuterol at bedtime

-Patient not diagnosed with asthma (he was given an inhaler for his cold per father), everyone in the family has asthma.

ALWAYS ASK ABOUT FOOD ALLERGIES SO YOU DON'T MISS ALLERGIC REACTION

Start albuterol nebulizer and consider steroids for long transport (discuss routes for administration, oral/IM/IV and indications for route ie severe respiratory distress is contraindication for oral administration)

Discussion points:

-What if the patient had inspiratory noises instead of expiratory noises?

Consider racemic epinephrine for stridor

Review age range for croup (6mo-6yr)

-What if the patient had wheeze on just one side, was 2 years old, and was playing with older brothers legos... what is highest on your differential and what would you do differently?

Foreign body

Keep the child calm (avoid IVs, neb treatments, or anything else that would agitate the child)

Participant skills:

- Make sure they know how to give an IM injection
- Make sure they know strategies to help effectively deliver nebulizer medications to pediatric patients
- Make sure they can use the broslow tape
- Make sure they understand how to prepare and administer medications used in this scenario

Case 3: Pain in a Trauma Patient

Father calls EMS for his 18 month old son when he was trampled on at the playground by older kids.

What do you do?

- Answer:
- Assess the patient's breathing, vital signs, mental status
 - Patient is screaming but does not appear to be in respiratory distress
 - Patient HR is 180 (screaming), pulse ox is 100% and RR is difficult to assess due to agitation
 - Patient is inconsolable
 - Look for obvious signs of trauma (this may include bruising, swelling, abrasion, bleeding)
 - Patient has deformity of the right thigh
 - Check distal pulses (present)
 - Splint for comfort
 - Find out what meds might have been given and basic history
 - No meds given
 - Otherwise healthy

Despite splinting and other comfort measures, the child remains extremely distressed and inconsolable.

What do you do?

- Place child on pulse ox and administer pain medications
- Discuss dose and importance of adequate pain control in children.

Opioid Administration

Route	Drug	Dose	Onset	Side effects
IV*	Morphine	0.05-0.1mg/kg, max 10mg	Rapid, peak in 20 min	Respiratory depression Nausea/Vomiting Itching
	Fentanyl	1-2mcg/kg, max 100mcg	Rapid	
IM*	Morphine	0.1-0.2mg/kg, max 10mg	10 min, peak in 30-60 min	
IN	Fentanyl	1.5mcg/kg, max 100mcg	5min, duration 30min -1hr	

May repeat pain medications every 30 minutes to 1 hour

Do not place in injured extremity

Discussion points:

- After administering the pain medication, the patient seems less irritable and is responding to father. Then suddenly he becomes less responsive, even to pain. What should you consider?
 - Check dose administered for pain medication
 - Recheck vital signs: HR has gone up—would you expect this with opioid medication (no)

-Consider blood loss—pediatric patients can lose enough blood with a femur fracture, even if it is a closed fracture, to cause hypotensive shock. Give fluids immediately (discuss fluid resuscitation).

Participants skills:

-Make sure they are comfortable administering IM, IV, and IN medications

Case 4: Anaphylaxis

A mother calls EMS after her 11 month old ate a bite of her toddler's peanut butter cookie and developed a rash.

What do you do?

Answer:

Assess the patient's breathing, vital signs, mental status

-Breathing is "noisy" and the patient is drooling (discuss importance of asking mom if this is normal breathing or if they child had been drooling previously, since at this age it might be baseline)

-Patient HR is 140, pulse ox is 98% and RR is 55 (ask if this is normal for age, HR maybe, RR is mildly tachypneic)

-Patient is alert but crying and difficult to console

-Diffuse raised red rash (ask about most likely cause of rash—hives/allergic reaction)

Find out what meds might have been given and basic history

-No meds given

-Mom thinks this is the first time that the baby has had peanut butter and multiple people in the family have severe food allergies.

Broslow the patient and call medical control for permission to give diphenhydramine

-What is the dose for diphenhydramine? **1mg/kg PO, IV, and IM, max 50mg. Available in 50mg/mL vial**

-What routes can it be given and how do you decide which route to use? (oral, IV, IM.... mental status, persistent emesis, stable versus unstable patient, other medications necessary all determine route of administration)

You tried to give diphenhydramine but the patient started vomiting multiple times.

What does this patient have and what other complications should you be prepared for?

Answer: Anaphylaxis (2 organ systems involved, skin and GI tract)

Other possible complications:

-Wheezing (the child is tachypneic, make sure to listen for lung sounds)

If the child is wheezing what would you give?

Albuterol 2.5mg if <20kg or 5mg if >20kg

-Stridor

If the child has stridor what would you give?

Racemic Epi 0.5mL of 2.25%

-Facial swelling

Discussion Points:

-Make sure to let medical control know if any of the above symptoms are present because other medications may be necessary. What other medications would you think about and be prepared to give?

Epinephrine

Epinephrine **1:1,000** 0.01mg/kg/dose IM, max 0.5mg/dose

Available in ampule, must use filter needle!

Steroids

Solumedrol (Methylprednisolone) 2mg/kg, max 60mg

Participant skills:

- Make sure they know how to give an IM injection
- Make sure they know strategies to help effectively deliver nebulizer medications to pediatric patients (swaddling)
- Make sure they can use the broslow tape
- Make sure they understand how to draw up medications used in this scenario