Pediatric Pharmacology
Objectives:

At the end of this lesson, the student should be able to:

1. Calculate dosages for pediatric patients.
2. Differentiate between adult and pediatric doses of the same medicine.
3. Calculate dosages based on route of administration.

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In looking through the updated Lubbock EMS protocols (10-1-05 - 9-30-06), it becomes apparent that the old saying "Children are not little adults" certainly applies to emergency medicine. There are, however, some medications that are administered identically and others that, while the dosage are calculated differently, the maximum dosage is the same. This article will first look at some of the different medical conditions and doses and finish with different medications, similarities and differences according to the individual medical emergency.

R.S.I

The primary difference in pediatric pharmacology is the pre-medication with atropine. The dosage is 0.01 mg/kg to a max of 1 mg. and applies to all patients under the age of 16. The other difference is in pre-medication with lidocaine in patients with head injuries which is 0.5 mg./kg., one half the dose required for adults. The other three drugs in the Lubbock E.M.S. protocol for R.S.I. are identical with the adult dosages and are as follows; Etomidate: 0.3 mg/kg to a max of 40 mg., Versed: 0.1 mg./kg. to a max of 10 mg., and Sux: 2 mg/kg

Pain Control

The primary drug used for pediatric pain control is morphine administered at 0.1 mg./kg. to a max of 3 mg. If the patient is allergic to morphine, the option is Demerol 1 mg./kg. to a max of 50 mg. and should be administered in conjunction with Phenergan administered at 0.5 mg. /kg. to a max of 12.5 mg. Phenergan should never be administered to patients under the age of 2.

Respiratory Distress

In pediatric respiratory distress, both nebulized treatments are identical to the adult dosage, that being Albuteral 2.5 mg./3cc and Xopenex 1.25 mg. The differences come in the IV and SQ drugs. Lasix 1 mg./kg IV to a max of 40 mg. Morphine, as in pain treatment, is administered IV at 0.1 mg/kg. to a max of 3 mg. Epi 1:1,000, 0.01 mg./kg. to a max of 0.15 mg. Decadron is administered at 0.6 mg./kg. to a max of 20 mg. SIVP.

Bradycardia

In pediatric bradycardia, the frontline drug is Epi 1:10,000 administered IV or IO at 0.01 mg./kg. or 0.1 cc/kg. to a max of 5 cc or Epi 1: 1,000 administered ET at 0.1 cc/kg. to a max of 0.5 cc per dose. In either route of administration, the dose should be repeated every 3-5 minutes. Atropine is the secondary drug at 0.02 mg./kg. IV to a max of 1 mg. in patients 0-8 years and 2 mg. in patients 9-15 years and may be repeated every 3-5 minutes.

SVT

With SVT in pediatrics, it is important to remember that the rates differ from adults (> 150/min.) In infants the rate must exceed 220 and in children the rate must be greater than 180. Adenosine remains the frontline drug administered at 0.1 mg./kg. to a max of 12 mg. Should cardioversion be necessary, the dosage is 0.1 mg./kg. to a max of 2.5 mg. IV Versed.

V- Tach with a Pulse

In pediatric V-tach with a pulse, Amiodorone is the frontline drug, with a perplexing exception. The dosage is 5 mg./kg. to a max of 15 mg./kg. administered over 20 to 60 minutes. Since we rarely have patients in our care for longer than 20 minutes, it may be advisable to contact medical control and let them make the call. If cardioversion becomes necessary, Pre medication with Versed should be administered at 0.1 mg./kg. to a max of 2.5 mg., the same as with SVT. If the patient is intubated, Lidocaine can be administered 2 mg./kg. to a max of 6 mg. and can be given every 3-5 minutes. Remember, it is inappropriate to administer two different anti- arrhythmics.

Asystole or P.E.A.

With a pediatric patient in Asystole or P.E.A., the doses and concentrations of Epinephrine differ depending on the route of administration. In a patient where an IV or IO has been established, the first dosage is Epinephrine 1:10,000 administered at 0.1 mg./kg. to a max of 1 mg. If the Epinephrine is to be administered via an ET tube, Epinephrine 1:1,000 should be administered at 0.1 mg./kg. to max of 1 mg. All subsequent doses should be Epinephrine 1:1,000, administered at 0.1 mg/kg. to max of 1 mg. and should be administered every 3-5 minutes.

Post Resuscitation and Cardiogenic Shock

Post Resuscitation and Cardiogenic shock in a pediatric patient should Be treated first with a fluid challenge of NS at a rate of 20 cc/kg. over 10 minutes. If Dopamine becomes necessary it should be administered at 5 mcg./kg/min.

Decreased L.O.C.

Certainly, in any patient with a decreased L.O.C., obtaining a good History is vital to a successful outcome. After obtaining a glucose level Of less than 70, a dosage of D25W should be administered at 2 cc/kg. D25W can be made by diluting D50 at a 1:1 ratio with N.S. If the glucose Level exceeds 70, Narcan should be administered at 0.05 mg./kg. to a max of 2mg.

Poisoning or Overdose

If Organophosphate poisoning is suspected, atropine should be Administered at 0.05 mg./kg. to a max of 2 mg., administered until symptoms resolve, every 10-15 minutes. In other cases, primarily with A known narcotic overdose, Narcan can be administered 0.05 mg./kg to A max of 2 mg.

Seizures

Pediatric seizures are quite common here at Lubbock E.M.S. No Doubt you have been on one within the past month. As with decreased L.O.C. patients, obtaining a blood glucose level will be helpful in determining which direction you go. If the level is below 70, D25W (D50W diluted at a 1:1 ratio with NS) can be administered at 2 cc/kg. to a max of 100cc. If the glucose level exceeds 70, then Valium becomes the first line drug. If an IV has been established Valium should be administered at 0.1 mg./kg. to a max of 5 mg. and can be repeated every 5 minutes. If an IV cannot be established, the Valium can be administered rectally at 0.5 mg./kg. to a max of 10 mg. per dose. If Valium fails to stop the seizure, and an IV is in place, Ativan can be administered at 0.1 mg./kg to a max of 2 mg. If rectal Valium was unsuccessful, in absence of IV

access, then Versed can be administered at 0.2 mg./kg. to a max of 5 mg., repeated at 0.1 mg./kg. every 10 minutes.

Allergic Reaction

Blood pressure and dyspnea will help you determine which agents will be used in the case of an allergic reaction. If the patient is maintaining a blood pressure over 90 systolic, then Benadryl should be administered at 1.0 mg./kg. to a max of 50 mg. In fact in all cases of anaphylaxis, Benadryl should be administered at the above dosage. If the patients blood pressure is less than 90 and is perfusing poorly then Epinephrine 1:10,000 should be administered at 0.01 mg./kg. to a max of 0.5 mg along with a wide open IV until the B.P. exceeds 90. If dyspnea is present, request Epinephrine 1:1,000 at a dosage of 0.01 mg./kg. to a max of 0.15 mg SQ. Albuterol can also be used at 2.5 mg. via nebulizer. If an IV is in place, Decadron should be administered at 0.6 mg./kg. to a max of 20 mg.

Hypovolemia

In the case of hypovolemia, a fluid challenge of NS at 20 cc/kg. should be administered over 10 minutes. Bear in mind that the NS should be administered with a microdrip set and be sure to obtain a good history to rule out other causes.

Neonatal Resuscitation

After delivering a patient, remember to establish the airway and ventilate at 40/min. That alone could save you and the patient the trouble of doing the following. If the pulse rate is less than 80, establish an IV an infuse 10 cc/kg. over 10 minutes. Epinephrine 1:10,000 administered at 0.01 mg./kg. should be administered IV or IO. If IV or IO access cannot Be obtained, then Epinephrine 1:10,000 should be administered at 0.1 mg./kg. ET. All subsequent doses should be administered, Epi 1:1,000 at 0.1 mg./kg. IV, ET or IO and repeated every 3-5 minutes as needed.

Sources

SPEMS Pre-Hospital Treatment Protocols for Paramedics
(10/1/05 through 09/30/06)