Title: Pediatric Medication Safety Practice Application

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Introduction (Voiceover #1):

In the Pediatric Medication Safety Interactive Vignette we looked at the complexity of the medication administration process in pediatrics. Now let’s practice calculating pediatric medication doses!

1. You are caring for a 5-year old patient who weights 22 kg. What is the hourly fluid maintenance requirement for this patient?
   1. 1540 ml
   2. 64.2 ml
   3. 128 ml
   4. 190 ml

This formula needs to be accessible/available for the first question:

**24-Hour Fluid Maintenance Requirement Calculation:**

100 ml/kg for the first 10 kg of body weight

50 ml/kg for the 2nd 10 kg of body weight

20 ml/kg for each additional kg of body weight

Correct Response (Voicover #2): That is correct. Great job!

Incorrect Response (Voiceover #3): That is incorrect.

Then insert Answer Voiceover clip.

Answer (Voiceover # 4):

Here’s How You Calculate the Answer:

First you need to determine the 24-hour fluid requirement: (Hint: Use your formula!)

1st 10 kg of body weight 100 ml/kg:

100 x 10 = 1000 ml

+

2nd 10 kg of body weight 50 ml/kg:

50 x 10 = 500 ml

+

For each kg over 20 kg an additional 20 ml/kg:

20 x 2 = 40 ml

(1000 ml + 500 ml + 40 ml) = 1540 ml/24 hours

Then you need to divide the 24-hour fluid requirement by 24 to determine the hourly requirement!

Divide 1540 by 24 (to get hourly rate)

**64.2 ml/hr**

1. The physician ordered Zosyn 825 mg q 6 hours for your patient. Your patient weighs 12 kg. According to your hospital’s drug reference book, the safe dose for Zosyn is 200 – 300 mg/kg/day. Is the ordered dose of Zosyn appropriate for your patient?
   1. Yes this is an appropriate dose
   2. No, the dose is 825 mg and should be 200 – 300 mg
   3. No, the dose is low for the recommended “safe” dose range
   4. No, the dose is high for the recommended “safe” dose range

Correct Response (Voicover #2): That is correct. Great job!

Incorrect Response (Voiceover #3): That is incorrect.

Then insert Answer Voiceover clip.

Answer (Voiceover # 5):

Here’s How You Calculate the Answer:

First you need to determine the total dose ordered for your patient over a 24-hour period:

If 825 mg is given every 6 hours – 4 doses will be given in a 24-hour.

825 mg x 4 = 3,300 mg/24 hours

Next determine the “safe” Zosyn dose for a 12 kg patient in a 24-hour period:

200 – 300 mg/kg/day is considered “safe”

200 mg/kg/day x 12 kg = 2400 mg/day

300 mg/kg/day x 12 kg = 3600 mg/day

So the safe dose range for a 12 kg patient over 24 hours is between 2400 – 3600 mg.

The dose ordered for your patient is 3,300 mg/24 hours.

**Yes this dose is SAFE!**

1. You are starting a continuous milrinone infusion on your 10 kg patient. Milrinone will run at 0.5 mcg/kg/min. The milrinone syringe contains 10 mg in 50 ml. What is the milrinone infusion rate (ml/hr)?
   1. 0.33 ml/hr
   2. 3.33 ml/hr
   3. 1.5 ml/hr
   4. 1.3 ml/hr

This formula needs to be accessible/available for the first question:

Drip Calculation Formula (mcg/kg/min):

Desired rate (mcg/kg/min) x 60 x Weight (kg)

Drug Concentration (mcg/mL)

Correct Response (Voicover #2): That is correct. Great job!

Incorrect Response (Voiceover #3): That is incorrect.

Then insert Answer Voiceover clip.

Answer (Voiceover # 6):

Here’s How You Calculate the Answer:

This can be a tricky calculation…the key is to break it down into steps!

The goal is to convert mcg/kg/min to mL/hr

First you need to convert your concentration:

10 mg in 50 ml

10 mg x 1000 = 10,000 mcg

10,000 mcg / 50 ml = 200 mcg/mL

Use the Formula:

Desired rate (mcg/kg/min) x 60 x Weight (kg)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Drug Concentration (mcg/mL)

Plug in your Values:

0.5 mcg/kg/min X 60 min/1 hr X 10 kg

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

200 mcg/mL

Remember to cancel like units.

The result is:

**1.5 ml/hr**

1. Your 13 kg patient has an order for Ampicillin 485 mg every 6 hours. The Ampicillin vial contains 500 mg of Ampicillin but it must be reconstituted at the bedside. After adding 1.6 of diluent, you have 250 mg/ml of Ampicillin. How many milliliters should you draw up for a 485 mg dose of Ampicillin?
   1. 2 ml
   2. 0.52 ml
   3. 1.94 ml
   4. 1.8 ml

Correct Response (Voicover #2): That is correct. Great job!

Incorrect Response (Voiceover #3): That is incorrect.

Then insert Answer Voiceover clip.

Answer (Voiceover #7):

Here’s How You Calculate the Answer:

Your desired dose is 485 mg Ampicillin

You have 250mg/ml in a 2 ml vial (You know it’s a 2ml vial because you have a total dose of 500 mg in the vial and the concentration is 250mg/ml!)

Desired dose: 485 mg / X ml

Concentration on Hand: 25o mg / 1 ml

485 mg 250 mg

\_\_\_\_\_\_ = \_\_\_\_\_\_

X ml 1 ml

485mg \* 1ml = 250 mg \* Xml

\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_

250 mg 250 mg

485 mg \* ml = X ml

\_\_\_\_\_\_\_\_

250 mg

1.94 ml = X ml

So you have to draw up **1.94 ml** to give a 485 mg dose of Ampicillin.

1. You are participating in emergency scenario simulation drills on your unit and you are responsible for drawing up emergency code drugs. The Epinephrine bristojet vial is a concentration of 1:10,000 (0.1mg/ml). Your patient weights 3 kg and the code “epi” dose is 0.01mg/kg. How many milliliters should you draw up?
   1. 0.3 ml
   2. 0.03 ml
   3. 3 ml
   4. 3.3 ml

Correct Response (Voicover #2): That is correct. Great job!

Incorrect Response (Voiceover #3): That is incorrect.

Then insert Answer Voiceover clip.

Answer (Voiceover #8):

Here’s How You Calculate the Answer:

The code dose of “epi” is 0.01 mg/kg. The patient weighs 3 kg so:

0.01 mg/kg x 3 kg = 0.03 mg is your dose

The epi vial has a concentration of 1:10,000 or 0.1 mg/ml.

Desired dose: 0.03 mg / X ml

Concentration on Hand: 0.1 mg / 1 ml

0.03 mg 0.1 mg

\_\_\_\_\_\_ = \_\_\_\_\_\_

X ml 1 ml

0.03 mg \* 1ml = 0.1 mg \* Xml

\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_

0.1 mg 0.1 mg

0.03 mg \* ml = X ml

\_\_\_\_\_\_\_\_

0.1 mg

0.3 ml = X ml

So you need to draw up **0.3 ml** of epi!

1. Bonus Question: Your colleague asks you to verify an insulin dose. The patient weighs 32 kg and is due to receive 16 units of Insulin (Regular). The nurse colleague hands you a 1 ml syringe with 0.16 ml drawn into it. Can you verify this is ready to administer?
   1. Yes, the dose is correct based on the concentration of Insulin
   2. No, the dose is incorrect
   3. No, the nurse has not prepared the dose using the appropriate equipment
   4. Yes, although the equipment is wrong, you are only responsible for verifying the dose

Correct Response (Voicover #9): That is correct; subcutaneous insulin is administered in an Insulin syringe specifically marked units not milliliters. This helps ensure the appropriate dose of insulin, no matter how small, is safely delivered to the patient. The nurse should have used an Insulin syringe to draw up 16 units of regular insulin. Great job!

Incorrect Response (Voiceover #10) That is incorrect. This was a trick question because subcutaneous insulin is administered in an Insulin syringe specifically marked units not milliliters. This helps ensure the appropriate dose of insulin, no matter how small, is safely delivered to the patient. The nurse should have used an Insulin syringe to draw up 16 units of regular insulin.

Closing (Voiceover #11):

Great job practicing your pediatric drug medication calculations. You have completed this activity. Please return to the course browser to continue with this module.