7/26/21

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Med Exam – things to remember

- Read the question carefully. What is the question asking?
- Identify if the patient's weight is given in kilograms.
- Generally pediatric medications are based on kilograms. Convert pounds to kilograms if needed.
- PO, IV, etc. all have recommended dose ranges.
- Remember the drop (gtt) factor for electronic pumps is 60. You will always use 60 to determine your rate unless otherwise indicated in a question.
- Concentration = the amount of medication per milliliter of fluid administered IV. Usually this concentration is in milligrams per milliliter but may be in units, micrograms, etc. per milliliter.
- Exam questions may be fill in the blank as well as multiple choice.

1

Dilution / Concentration

- The Concept
  - The Amount Of A Substance In A Mixture Or Solution

- Ultimately, We Need To Know How Much Medicine Is Mixed In One Milliliter Of Fluid
  - Milligrams
  - Units
  - Mg PE (Phenytoin Equivalents)

Terms used Interchangeably

2 Dilution/Concentration is the Amount of Medication mixed in Solution.

We Need to Know how much Meds is mixed in one mL of Floid.

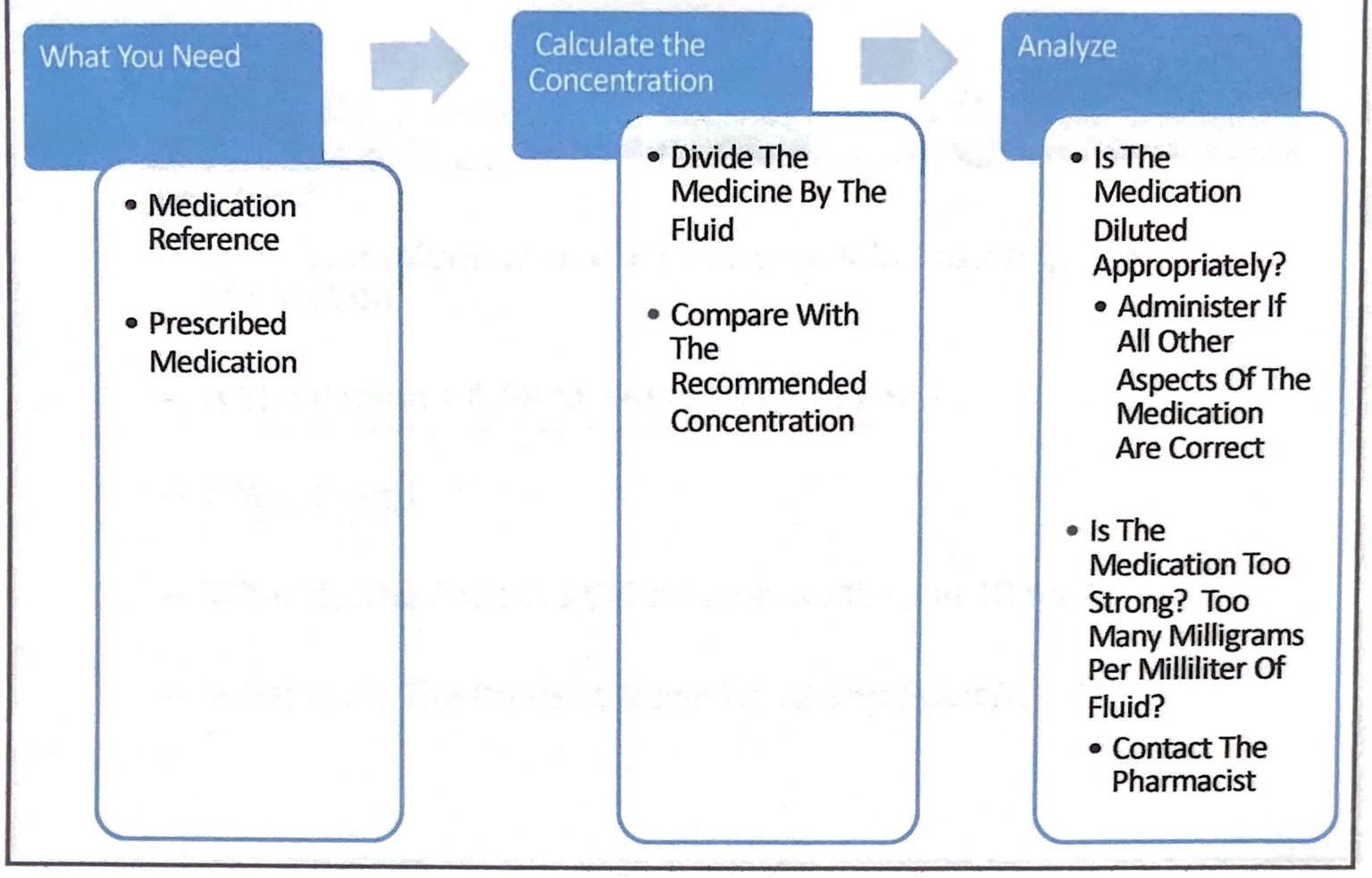
Ex: Mg such as 100 mg of Ceftriaxone
Units such as 10 units of Heparin
mg PE's such as 15 mg PE of fosphenytoin

Meds Rounded to 100th unless specified.

1

7/26/21

Summary: Calculating Dilution/Concentration



3

Must, May, & Concentration

- The Recommended Dilution / Concentration For A Medication Can Be Found In *Intravenous Medications* By Gahart & Nazareno - Under The Heading **DILUTION**
- Watch For Key Words
  - **May** Be Further Diluted
  - **Must** Be Further Diluted
  - **Concentration** Of
  - **Final Concentration** Of

The Medication may or may not be further diluted after drawing up. It does not have to be further diluted.

The Medication has to be further diluted after drawing it up. "Drawing up" means drawing the Med. out of manufactures vial.

Concentration of & Final Concentration are the most important terms. They take precedence over must or may be further diluted.

4

7/26/21

The Prudent Nurse will call the Pharmacy!

Must Be

- "A Single Dose Must Be Further Diluted With 50 to 100 mL Of The Same Solution And Be Given As An Intermittent Infusion."
  - Important Information For The Nurse Administering The Medication
  - Is The Patient's IVPB Mixed In 50 to 100 mL?
  - If Yes, Great!
  - What If...The Patient's Ceftriaxone Is Mixed In 10 mL?
  - What Does The Prudent Nurse Do At This Point?

5

Concentrations Of

These Terms take Precedence over the Terms "must or may be further diluted.

- Look For The Words "Concentrations Of" Or "Final Concentration" In The Medication Reference

Tells the Nurse how many mg/mL are recommended by manufacture

- "Concentrations Of 10 mg/mL To 40 mg/mL" Are Recommended For Intermittent Infusion."
  - Important Information For The Nurse Administering The Medication

The Prudent Nurse Looks for Words "Concentration of" or "Final Concentration" in the medication reference

6 Dilution Instructions for Ceftriaxone Contain this Sentence

In this Case the Medication Can be mixed in Less than 50mL or 100mL if Concentration falls within 10mg/mL to 40mg/mL

The Next Step

- The Next Step Is To Calculate The Concentration Of The Medication Received From The Pharmacy
  - Divide The Medication By The Fluid
  - 100 mg of Ceftriaxone Is Mixed In 10 mL Of Normal Saline

$$\frac{100\ mg}{10\ mL} = 10\ mg\ of\ ceftriaxone\ in\ each\ mL$$

- Compare With The Recommended Concentration
- "Concentrations Of" Directions Take Precedence Over "Must" Directions

7

Practice question #1

The IVPB you are to administer contains 350 mg of ceftriaxone mixed in 25 mL of Normal Saline.

350mg/25mL= 14mg/mL

The recommended range is 10mg to 40 mg per mL.

Does the dilution fall in the recommended range?

Yes

8 $\frac{350mg}{25\ mL} = 14mg/mL$

7/26/21

Practice question #2

Medication: Ranitidine 18 mg

Mixed in: 10 mL normal saline

What is the concentration of this medication?

18mg/10mL NS = 1.8mg/mL

9

Recommended Range

Recommended Dose Consists Of:

- Age Or Age Range Of Patient
- Dose
  - The Recommended Dose For Adults Is Usually Expressed In A Stated Dose
    - "1 to 2 Gm"
  - The Recommended Dose For Children Is Usually Based On The Child's Weight
    - "50 to 75 mg/kg"
- Frequency of Dose
  - How Often The Dose Can Be Administered

10

The Recommended Dose Elements Are.

1. The age or age range of the patient
2. The Amount of Medication required to produce desired effect
3. How often dose should be Admin.

Practice question #3

The pediatric dose for piperacillin sodium is 200 mg to 300 mg/kg/24 hours in equally divided doses every 4 to 6 hours. The patient weighs 30 kg. Which of the following is within the recommended range?

A. 2,000 mg every 4 hours
B. 1,200 mg every 4 hours
C. 1,450 mg every 6 hours
D. 6,000 mg every 6 hours

24hr/4 = 6 Times
24hr/6 = 4 Times
200mg x 30kg = 6,000mg/kg
300mg x 30kg = 9,000mg/kg
1,500 > 6hrs range
2,250
6,000/4 = 1,500
6,000/6 = 1,000
9,000/4 = 2,250
/6 = 1,500
6,000mg/day/6 = 1,000
9,000mg/day/6 = 1,500

11

Practice question #4

Calculation based on once a day dose.

Patient: 20 kg, 5-year-old

Prescribed Medication: 1,000 mg of ceftriaxone daily

Medication Reference

Recommended Dose: 50 to 75 mg/kg of body weight in 24 hours as a single dose or in equally divided doses every 12 hours. Do not exceed a total dose of 2 gm in 24 hours.

2gm = 2,000mg
50 x 20 = 1,000
75 x 20 = 1,500

Is the prescribed medication in the recommended range?

Yes it is

12

Practice question #5

Calculation based on BID dose.

Patient: 20 kg, 5-year-old

Prescribed Medication: 700 mg of ceftriaxone, BID.

Medication Reference

Recommended Dose: 50 to 75 mg/kg of body weight in 24 hours as a single dose or in equally divided doses every 12 hours. Do not exceed a total dose of 2 gm in 24 hours.

Is the prescribed medication in the recommended range? Yes, within Range

13

50 mg x 20Kg = 1,000 / 2 = 500mg
75mg x 20Kg = 1,500 / 2 = 750mg

Practice question #6

Which of the following is a recommended dose for a 30 kg child? The medication is vancomycin (Vancocin).

Medication Reference

Recommended Dose for Pediatric Patient: 40 mg/kg/24 hours equally divided and given every 6, 8, or 12 hours. Do not exceed 2 gm in 24 hours.

A. 200 mg every 6 hours
B. 400 mg every 8 hours
C. 100 mg every 12 hours
D. 1,200 mg every 24 hours

24 hrs / 6 = 4
24 hrs / 8 = 3
24 hrs / 12 = 2

40mg (30Kg) / 24hr = 1200mg/Kg

1,200mg / 4 = 300
1,200mg / 3 = 400
1,200mg / 2 = 600

14

A Review - Tubing Drop Factor

- Microdrip Infusion Set
  - 60 Drops (gtts) = 1 mL
  - 60 Minutes = 1 Hour, Therefore
  - gtts/minute = mL/hr

- IV Pumps Are Microdrip

- Macrodrip Infusion Set Drop Factor Will Vary. Check The Package!

15

VOLUME TO BE INFUSED X TUBING DROP FACTOR
= DROPS/MINUTE
INFUSION TIME IN MINUTES

For A Microdrip System: Drops/Minute = mL/Hour

Memorize

16

Practice question #7

- What Is The Recommended Rate Of Administration For A 25 mL IVPB To Be Given Over 30 Minutes? 25mL/0.5hr = 50mL/hr
- The IVPB Will Be Administered By IV Pump

17

Additional practice problems

1. **Patient:** A 6.5 kg, toddler, with the diagnosis of acute otitis media.

   Prescribed Medication: Administer 275 mg amoxicillin (Amoxil) every 12 hours

   Medication Reference Recommended Dose: Acute otitis media: 80 to 90 mg/kg/day divided every 12 hours

   Concentration of Suspension: Amoxicillin suspension 250mg / 5 ml

   The recommended range is 260 mg to 292.5 mg every 12 hours.

   The nurse will administer 5.5 ml of amoxicillin every 12 hours

6.5Kg(80)=520
6.5Kg(90)=585

$\frac{275mg}{250mg} \times 5$

18

50mg x 15 kg = 750mg
75mg x 15kg = 1,125mg

7/26/21

375 - 56.25

2. Patient: 15kg, 3-year-old

Prescribed Medication: Administer 1.1 grams of ceftriaxone (Rocephin) IV every 12 hours

1,100mg

Medication Reference
Recommended Dose: 50 to 75 mg/kg of body weight/24 hr as a single dose or in equally divided doses every 12 hours (25 to 37.5 mg/kg every 12 hours). Do not exceed a total dose of 2 gm/24 hours.

The nurse would:

A. administer the medication.

B. contact the primary care provider regarding a dose below the recommended range.

C. contact the primary care provider regarding a dose exceeding the recommended range.

375 - 412.5

19

3. Patient: 16 kg child

Prescribed Medication: 640 mg meropenem (Merrem), IVPB every 8 hours

Label on IVPB: Meropenem 640 mg in 25 ml normal saline.

Medication Reference
Recommended Dose: 40 mg/kg every 8 hours
Dilution/Concentration: 2.5 to 50 mg/ml
Rate of Administration: Intermittent infusion may be given over 15 to 30 minutes by IV pump

The prudent nurse will:

A. administer the medication at 50 ml/hr.
B. administer the medication at 125 ml/hr.
C. contact the pharmacist regarding the concentration.
D. contact the primary care provider regarding the ordered dose.

640mg/25ml

20

16kg
40mg/(16kg) Q8hrs = 640mg

640mg / 640mg x 25ml

4. Prescribed medication: Gentamycin sulfate 10 mg mixed in 50 mL normal saline every 8 hours.

Rate of Administration: Administer each dose over a minimum of 20 minutes or a maximum of 30 minutes.

The most appropriate rate for the nurse to set the IV pump is how many milliliters per hour?

A. 50
B. 75
C. 100
D. 160

10mg/50mL NS Q8hrs
50mL/0.5=100mL