Answers to Practice Problem Set #2

1. Amphotericin B, an antifungal antibiotic, is infused intravenously. Dosing of the medication traditionally occurs in the following manner:
day 1, the patient receives 0.25mg/kg
day 2, 0.5mg/kg
day 3, 0.75mg/kg
1mg/kg daily thereafter.
Kidney damage is most likely to occur in patients who receive a total amphotericin amount of greater than 2gm. Please calculate how many days a patient weighing 160lbs can receive amphotericin B using the regimen outlined above, before becoming at risk for kidney toxicity.

28 days **160 lbs x 1 kg/ 2.2 lbs = 73 kg**

a) amount given in first 3 days: (0.25 + 0.5 + 0.75) mg/kg x 73 kg ≈ 110mg

b) 2000mg - 110mg = 1890 mg maximum recommended dose remaining

c) 1 mg/kg/day x 73 kg = 73 mg/day

d) 1890mg x 1 day / 73 mg = 25.8 days + 3 days = 28.8 days maximum
28 days will be OK; 29 days will be too long

2. A physician writes the following order for a hospitalized patient:

"Acetaminophen suppository 650mg prn oral temperature >101°F"

A nurse measures the patient's temperature and finds it to be 38°C. What is the patient's temperature in °F? What should the nurse do?

100.4 °F **(38° C x 9) / 5 + 32 = 100.4° F**

_____ the nurse should give the suppository
X the nurse should not give the suppository

3. You are asked to mix a "pain cocktail" for a patient. The prescription reads as follows:
methadone 5mg/5ml
hydroxyzine 25mg/5ml
qs with cherry syrup to 240ml.
You decide to use the following products: methadone syrup, 10mg/5ml, and hydroxyzine capsules, 25mg. Please note how much methadone syrup you will use to compound this prescription, how many hydroxyzine capsules, and approximately how much cherry syrup you will add.
_____ml methadone syrup, 10mg/5ml

_____hydroxyzine 25mg capsules

_____ml cherry syrup

a) methadone: 5 mg / 5 ml x 240ml x 5 ml / 10 mg = 120 ml methadone 10mg/5ml syrup

b) hydroxyzine: 25mg / 5ml x 240ml x 1 cap / 25mg = 48 capsules

c) cherry syrup: 240ml total preparation - 120ml methadone syrup ≈ 120ml cherry syrup, realizing that the powder from the hydroxyzine capsules will offset some of the cherry syrup needed

to summarize: You will place the contents of 48 capsules of 25mg hydroxyzine/capsule into a bowl (mortar, for those of you who have practiced in a pharmacy). Next, you will measure out 120ml of the methadone 10mg/5ml syrup. You will place this also in the bowl and mix well until the hydroxyzine powder is thoroughly incorporated into the methadone syrup. You will pour all of this mixture into an 8oz bottle and add cherry syrup to the bottle until you reach the 8oz mark. You will then shake gently to mix the cherry syrup with the methadone-hydroxyzine mixture (after putting the cap on, of course). Voila!

4. A patient is receiving an asthma medication, albuterol, via a metered-dose inhaler (MDI), which delivers 90 mcg of drug per actuation of the inhaler. Approximately 10% of the dose actually reaches the lungs. If the patient uses a special device called a spacer, he/she can double total amount of drug delivered. How much drug, in mcg, will the patient receive in one puff (actuation) of the inhaler if he/she uses a spacer?

18 µg albuterol **90 µg x 0.2 = 18 µg**
inhalation

5. The standard dose of albuterol used for nebulization (aerosolization) is 2.5mg. If a patient nebulizes this drug, approximately 10% of the drug solution will remain in the nebulizer (and will therefore be unavailable for nebulization). A patient usually inhales about 10% of the total solution nebulized (i.e. 1/10 of the time that the nebulizer is running, the patient is inhaling and the other 9/10 of the time the nebulized solution is just escaping into the surrounding air). Assuming that 10% of the amount that is inhaled is absorbed, how many actuations (puffs) of an albuterol MDI inhaler would be needed to equal the dose delivered by one use of the nebulizer?

approximately 1 puff albuterol MDI inhaler

a) 2.5mg - 10% = 2.25mg actually nebulized

b) 2.25mg x 10% = 0.225mg or 225µg actually inhaled

c) 225µg x 10% = 22.5 µg actually absorbed $\frac{18\ \mu g\ via\ MDI}{22.5\ \mu g\ neb} = \frac{0.8\ puffs\ MDI}{neb\ inhalation}$

6. A physician has ordered parenteral nutrition for a patient at 2L/day and wants the patient to receive 15mmol/L of phosphate and a daily dose of 60mEq of potassium. The vial of potassium phosphate contains 3mmol of phosphate and 4.4mEq of potassium per milliliter. The remainder of the potassium will be added as the chloride salt (potassium chloride stock solution contains 2mEq/ml). Please calculate how many milliliters of potassium to add to each liter of the IV solution as the chloride salt.

4 ml of potassium chloride

a) 15 $\frac{mmol\ PO4}{L}$ x $\frac{1ml\ KPO4}{3\ mmol\ PO4}$ x $\frac{4.4\ mEq\ K}{1ml\ KPO4}$ = 22 $\frac{mEq\ K}{L}$ added as PO4 salt (5 ml KPO4 solution)

b) 30 $\frac{mEq\ K}{L}$ - 22 $\frac{mEq\ KPO4}{L}$ = 8 mEq K left to add as chloride salt

c) 8 $\frac{mEq\ K}{L}$ x $\frac{1\ ml\ KCl}{2\ mEq\ K}$ = 4 ml KCl solution to add to each liter of TPN

7. A 68 year-old, 160-pound male patient with a serum creatinine of 1.1mg/dL is to receive gentamicin intravenously. Normal dosing for gentamicin is 1.5 - 2mg/kg q8h. One method of adjusting the dosage of gentamicin in patients with renal insufficiency is the Dettli method, which adjusts the dosing interval (not the dose) in the following manner:

$$\frac{0.693}{(CrCl \times 0.0024)+0.01} \times 3 = \text{dosing interval}$$

Calculate this patient's creatinine clearance and recommend a reasonable gentamicin regimen.

66 ml/min CrCl

I would recommend **gentamicin 120 mg IV q 12 h** for this patient

a) CrCl = $\frac{(140 - age)\ (IBW)}{(72)(S_{cr})} = \frac{(140 - 68)\ (73)}{(72)(1.1)} = 66$ ml/minute

b) $\frac{0.693}{(66 \times 0.0024)+0.01} \times 3 = \frac{0.693}{0.1684} \times 3 = 12$ hours = dosing interval

c) 1.5 - 2 $\frac{mg}{kg}$ dose x 76 kg = 114 - 152 $\frac{mg}{dose}$ note: I would choose 120mg for the dose but 130mg, 140mg, or 150mg would also be OK

8. Heparin is an anticoagulant (blood thinner) given intravenously to prevent thromboembolic (i.e. clot) events such as stroke and pulmonary embolism (blood clot in the lungs). Heparin comes premixed in a bag which contains 25,000 units in 500ml. If a standard infusion rate for a patient is 15 units/kg/hr, how many milliliters/hour will a 170 pound male receive? (round to the nearest whole milliliter)

23 ml/hr $\quad 15 \frac{units/kg}{hr} \times 170\ lb \times \frac{1\ kg}{2.2\ lb} \times \frac{500ml}{25{,}000\ units} = 23 \frac{ml}{hr}$

9. The regimen of choice for treatment of Pneumocystis carinii pneumonia in AIDS patients is 15-20mg/kg/day of the trimethoprim component of trimethoprim/sulfamethoxazole (trade names: Bactrim, Septra). A physician has decided to treat a 150-pound patient with the double-strength oral dosage form, which contains 160mg trimethoprim and 800mg sulfamethoxazole per tablet. Given that the total amount administered is usually divided into three or four doses per day, recommend a dosing regimen to the physician for this patient.

I would recommend 2 trimethoprim/sulfamethoxazole DS tablets to be given 4 times a day.

$\frac{15 - 20\ mg\ TMP}{kg/day} \times 150\ lb \times \frac{1\ kg}{2.2\ lb} \times \frac{1\ tablet}{160\ mg\ TMP} = 6.39 - 8.52 \frac{tabs}{day}$

8 tabs/day lies within this dosage range, and can be divided evenly by 4

10. A physician has ordered a patient to receive 1 and 1/4 grain of aspirin daily. How many mg of aspirin should be in the product that the patient takes?

81 mg $\quad 1.25\ grains \times \frac{65\ mg}{grain} = 81\ mg$