Answers to Practice Problem Set #1

1. A mom comes in to your pharmacy and asks you about a medication for her 3-year-old son, who has this season's "crud" on top of his usual mild allergy to dust. Questioning reveals that the child's nasal secretions are profound, causing him to cough so much that he is throwing up. Mom wants to know if there is anything you can recommend that would help him out. You decide to recommend a generic form of Benadryl elixir (diphenhydramine) to help dry up his secretions. Dosage recommendations in your pediatric textbook are 1.25mg/kg po q4-6h prn NTE (not to exceed) 100mg/day for kids 2-5 years of age. The elixir comes in 12.5mg/5ml. Mom estimates this child weighs about 30 pounds. She only has a teaspoon at home and so cannot use metric measurements. Please recommend a dose for this mother to give the child.

Dose: 1 tsp (1.25 tsp or 1.5tsp are also OK)

$$\text{30 lb} \times \frac{\text{1 kg}}{\text{2.2 lb}} \times \frac{\text{1.25 mg}}{\text{kg}} \times \frac{\text{5ml}}{\text{12.5mg}} = \text{6.8ml - can round up or down}$$

2. One week later, the mother presents you with a prescription for the same child, who, it appears, has now been diagnosed with otitis media (middle ear infection). The prescription is for amoxicillin suspension, and the doctor merely wrote "dose per weight" for directions. Usual directions for dosing this medication are 30-50mg/kg/day, with a dosing interval of 8 hours and a usual duration of therapy being 10 days. This product is available in 125mg/5ml and 250mg/5ml (each product reconstitutes to a total of 150ml). Please tell me which product you will dispense and what directions you will place on the label for this mom to give. Remember that she only has a teaspoon at home.

Product/Directions: 250mg/5ml : Take 3/4 teaspoonful 3 times a day for 10 days.
125mg/5ml : Take 1 1/2 teaspoonfuls 3 times a day for 10 days.

$$\text{30 lb.} \times \frac{\text{1 kg}}{\text{2.2 lb}} \times \frac{\text{40mg}}{\text{kg/day}} \times \frac{\text{1 day}}{\text{3 dose}} \times \frac{\text{5ml}}{\text{250mg}} = \text{3.6ml/dose (7.2ml/dose for 125mg/5ml)}$$

3. A terminal cancer patient has been prescribed MS Contin (sustained-release morphine sulfate) 30mg po TID, and Morphine Sulfate 10mg po q2h prn breakthrough pain. At an interview with the patient, you learn that his pain has been increasing and he is now using his prn morphine at a rate of 2 doses before taking his MS Contin dose (so MS Contin is only giving him pain relief for approximately 4 hours). MS Contin comes in 15mg, 30mg, 60mg, and 100mg and is usually given every 8-12 hours. Please recommend a new dosing regimen for this patient which should help get his pain under control.

MS Contin dose and directions: 60mg po TID (45mg po TID also OK but not as optimal)

$$\text{scheduled: } \frac{\text{30mg}}{\text{dose}} \times \frac{\text{3 doses}}{\text{day}} = \frac{\text{90 mg}}{\text{day}} \quad + \text{prn: } \frac{\text{10 mg}}{\text{dose}} \times \frac{\text{6 doses}}{\text{day}} = \frac{\text{60 mg}}{\text{day}}$$

total current needs: 150mg/day; you will want to round up, rather than down, since the whole point will be to get his pain under control with no extra prn doses needed. Therefore, you will want to go to 60mg po TID.

4. You are mixing gentamicin (an aminoglycoside antibiotic) solution for intravenous infusion. The usual dosing range is 1.5-2mg/kg. Because the patient has pneumonia and you want good pulmonary penetration of the drug, you have chosen a dose of 1.7mg/kg for this 180 pound patient. Because the stock solution of the drug is 40mg/ml, it is traditional and appropriate to round off the dose to the nearest 10mg. What dose will you mix for this patient and how much stock solution will you need in order to compound it?

Dose: 140mg IV q8h

$$\text{180 lb} \times \frac{\text{1 kg}}{\text{2.2 lb}} \times \frac{\text{1.7 mg}}{\text{dose}} = \frac{\text{139 mg}}{\text{dose}} \approx \frac{\text{140 mg}}{\text{dose}} \times \frac{\text{1 ml}}{\text{40mg}} = \text{3.5ml stock solution}$$

Stock solution needed: 3.5 ml of 40mg/ml solution

5. A patient has been receiving Thyroid 2 grain po qd for hypothyroidism. Her physician decides to convert her to levothyroxine (trade names: Synthroid, Levothroid), another thyroid preparation, which is available in 0.025mg, 0.05mg, 0.075mg, 0.1mg, 0.125mg, 0.15mg, 0.175mg, 0.2mg, and 0.3mg tablets at your pharmacy. He calls you for a dose recommendation and you note that 1 grain of thyroid is equivalent to 60µg of levothyroxine. What will your dose regimen recommendation to this physician be?

levothyroxine dose: 0.125mg po qd
levothyroxine = ltx

$$\frac{60\ \mu g\ ltx}{1\ grain\ thyroid} \times \frac{2\ grain\ thyroid}{day} \times \frac{1\ mg}{1000 \mu g} = \frac{0.12mg\ ltx}{day} \approx \frac{0.125\ mg}{day}$$

6. A patient has been prescribed a triamcinolone inhaler (trade name: Azmacort) at a dose of 3 inhalations QID. This inhaler contains 240 inhalations. The patient generally gets her prescription filled once a month (about every 30 days). Is she compliant with her medication instructions? If not, what dose, on average, does it appear she is using?

Compliance: yes
(circle one) **no**; **average use appears to be: 2 inhalations QID or 4 inhalations BID**

$$240\ \frac{inhalations}{inhaler} \times \frac{1\ day}{4\ doses} \times \frac{1\ dose}{3\ inhalations} = 20\ \frac{days}{inhaler}$$

but she is getting filled every 30 days, so not compliant

dose, on average, that she is using:

$$240\ \frac{inhalations}{inhaler} \times \frac{1\ day}{4\ doses} = 2\ \frac{inhalations}{dose}$$

or

$$240\ \frac{inhalations}{inhaler} \times \frac{1\ dose}{4\ inhalations} \times \frac{1\ inhaler}{30\ days} = 2\ \frac{doses}{day}$$

7. A patient is taking K-Dur, a potassium product that is available as 10mEq tablets. He takes one of these tablets daily. Because he is cost-conscious, he has decided to substitute bananas, a good source of potassium, for the K-Dur. One medium banana contains approximately 420mg of potassium. How many bananas will he have to ingest daily in order to equal his KDur tablet intake?

1 banana(s)

notes : MW of K = 39 mg/mmol Eq wt = 39 mg/mEq, since valence = 1

10 mEq KCl = 10mEq K^+ and 10mEq of Cl^-

$$\frac{10\ mEq\ K}{day} \times \frac{39\ mg\ K}{mEq} \times \frac{1\ banana}{420\ mg\ K} = \frac{0.93\ bananas}{day} \approx \frac{1\ banana}{day}$$

8. A diabetic patient who has recently moved to the US from Canada presents you with his blood glucose diary. His most recent blood glucose concentration is 5.2mmol/L. You know that in the US, the "normal" fasting blood glucose range is 70-110mg/dL. Please determine what his latest blood glucose concentration is in mg/dL.

94 mg/dL so he is within the normal range

$$\frac{180\ mg}{mmol} \times \frac{5.2\ mmol}{L} \times \frac{1\ L}{10\ dL} = \frac{93.6\ mg}{dL} \approx \frac{94\ mg}{dL}$$

9. Standard insulin dosing for newly-diagnosed diabetic patients is 0.5u/kg. This is usually given as a combination of regular (immediate-acting) and NPH or Lente insulin, which are longer-onset, longer lasting forms of insulin. In general, a 2:1 ratio of NPH to regular insulin is used, with 2/3 of the total dose administered in the morning, and 1/3 of the total dose administered in the evening. Please calculate a dosing regimen for a newly-diagnosed 65kg patient.

15 units NPH and 7 units regular insulin given subcutaneously qAM

7 units NPH and 4 units regular insulin given subcutaneously qPM

$$0.5\ \frac{\text{unit/kg}}{\text{day}} \times 65\ \text{kg} \approx 33\ \frac{\text{units}}{\text{day}}$$

a) 2:1 of NPH: regular = 3 parts total

$$\text{b) NPH} = 33\ \frac{\text{units}}{\text{day}} \times \frac{2\ \text{parts NPH}}{3\ \text{parts total}} = 22\ \frac{\text{units}}{\text{day}}$$

$$\text{regular} = 33\ \frac{\text{units}}{\text{day}} \times \frac{1\ \text{part reg}}{3\ \text{parts total}} = 11\ \frac{\text{units}}{\text{day}}$$

$$\text{c)}\ \frac{22\ \text{units NPH}}{\text{day}} \times \frac{2/3\ \text{daily dose}}{\text{qAM}} \approx 15\ \frac{\text{units NPH}}{\text{q AM}}$$

22 - 15 units = 7 units qPM

$$\frac{11\ \text{units reg}}{\text{day}} \times \frac{2/3\ \text{daily dose}}{\text{qAM}} \approx 7\ \frac{\text{units}}{\text{q AM}}$$

11 - 7 units = 4 units qPM

10. Procainamide is a drug used to suppress and prevent irregular heartbeats. Many patients begin therapy acutely with an infusion in the hospital and then are converted to the oral form when they go home. Please recommend a dosing regimen for a 70kg patient who is receiving procainamide infusion, 2mg/minute in the hospital. Products to choose from include Procan SR 250mg, 500mg, 750mg, and 1000mg tablets. These tablets are usually given QID. The one hitch in this dosing schemata is that patients receive 15% less of the drug when they take it orally versus when they receive it intravenously (this drug therefore has a bioavailability of 85%). You will need to account for this loss of drug in your calculations. (hint: the patient will need to receive MORE drug orally than intravenously, so your daily oral dose should be HIGHER than your daily intravenous dose).

I recommend a dosage regimen of Procan SR 750 mg po QID

$$\frac{2\ \text{mg}}{\text{minute}} \times \frac{60\ \text{minutes}}{\text{hr}} \times \frac{24\ \text{hrs}}{\text{day}} \times \frac{1\ \text{day}}{4\ \text{doses}} \times \frac{100\%\ \text{IV procainamide}}{85\%\ \text{oral procainamide}} = \frac{847\ \text{mg}}{\text{oral dose}}$$