Preventing Infusion Errors
Review of Infusion Calculations

Medication errors threaten patient safety and are associated with increased morbidity, mortality and healthcare costs. Infusion errors are among the most serious of all medication errors because of the immediate bioavailability of the drug when administered intravenously. In addition, IV medications are often considered "high alert" medications with narrow therapeutic ranges contributing to the seriousness of the error.
Often times we rely on technology to ensure that the medications or fluids we are delivering to our patients are infusing a the correct rate. But what if your pump fails or you have to start an infusion before the pump arrives? Or if you have to provide weight based dosing? Or you have to infuse a medication from the IV E-kit?

- ✓ Always perform calculations to verify the dose is correct.
- ✓ Always perform calculations to verify the electronic infusion device or rate flow control device (Dial-a-flow™) is infusing at the prescribed rate.
- ✓ Always have another nurse double check your math.

A math error can be a deadly and costly mistake!

1. CALCULATING AN HOURLY IV RATE

Example: 1000 ml 0.9% NS to infuse over 8 hours

Volume to be infused
Total infusion time (in hours) =Hourly IV Rate

100 mL
8 hrs = *125 mL /hr*

2. CALCULATING DROPS PER MINUTE USING HOURLY RATE:

Example: 1000 ml Lactated Ringers at 125 ml/hr.
Drop factor is 10 gtts/ml (this can be found on the packaging of your IV tubing)

Hourly rate x drop factor (gtts/mL)
Time (in minutes) = gtts/minute

125 mL/hr x 10 gtts/mL
60 min. =*21 gtts/min.*

3. CALCULATING DROPS PER MINUTE USING TOTAL INFUSION TIME

Example: 1000 ml 0.9%NS to infuse over 10 hrs.
Drop factor is 10 gtts/ml.

Volume (mL's) x drop factor (gtts/mL)
Total infusion time (in minutes) = gtts/minute

1000 mL x 10 gtts/m
10 hr x 60 min. = *17 gtts/min.*

4. CALCULATING AMOUNT NEEDED FROM VIAL OR AMPULE

Example: Vial contains 600 mg/4 ml.
Order is for 300 mg every 8 hrs.
What volume do you need?

Desired dosage (mg's) x Volume on hand (mL's)
Dose on hand (mg's) =x mL's

300 mg x 4 mL *1200*
600 mg *600 = 2 mL's*

5. CALCULATING WEIGHT BASED DOSAGES IN ML/HR

Example: Order is to Infuse 5mcg/kg/min. Resident is 170 lbs. Concentration is 2000 mcg/mL. Electronic infusion devic delivers in mL/hr.

Step 1	**Step 2**	**Step 3**	**Step 4**
Convert lbs. to kg.	Multiply kg by dose	Calculate mcg/hr	Calculate mL/hr
lbs *170* **2.2 = kg** 2.2 = 77 kg	**kg x dose =mcg/min** *77 kg x 5 mcg* *=385 mcg/min*	**mcg/min x 60 minutes/hr** *385 mcg/min x 60 min/hr* *= 23100 mcg/hr*	**mcg/hr ÷ concentration=mL/** *23100 mcg/hr ÷2000 mcg/mL* *=11.55 mL/hr*