Advance IV Therapy Module

Example 1

A patient is to receive Lidocaine at 3mg/min. Supplied is a one liter bag of D_5W containing Lidocaine 4g. Calculate the infusion rate in mL/hr.

First, identify the doctor's order.

Doctor's order = $\frac{3mg}{\min}$

This is also known as the dose.

Second, identify the dose on hand (DOH).

Dose on hand = $\frac{4g}{1000mL}$

Supplied is Lidocaine 4g in a one liter (1000mL) bag of D_5W. This can be written as $\frac{4g}{1000mL}$.

Now solve for the infusion rate in mL/hr using dimensional analysis.

Doctor's order Conversion DOH Conversion Wanted Quantity

$$\frac{3mg}{\min} \times \frac{1g}{1000mg} \times \frac{1000mL}{4g} \times \frac{60\min}{1hr} = 45\frac{mL}{hr}$$

The infusion rate would be 45mL/hr.

Remember to set up your problem so that the proper units cancel.

EXAMPLE 2

A diabetic is to receive an infusion of insulin at 12 units/hr. The nurse prepares a 250mL bag of NS with 100 units of regular insulin. What is the infusion rate in mL/hr?

First, identify the doctor's order.

Doctor's order = $\frac{12units}{hr}$

This is also known as the dose.

Second, identify the dose on hand (DOH).

Dose on hand = $\frac{100units}{250mL}$

Supplied is 100 units of regular insulin in a 250mL bag of NS. This can be written as $\frac{100units}{250mL}$.

Now solve for the infusion rate in mL/hr using dimensional analysis.

Doctor's order DOH Wanted Quantity

$$\frac{12units}{hr} \times \frac{250mL}{100units} = 30\frac{mL}{hr}$$

The infusion rate would be 30mL/hr.

Remember to set up your problem so that the proper units cancel.

EXAMPLE 3

The doctor orders Heparin at 1800 units/hr. Available is 25,000 units in 250mL of solution. Calculate the infusion rate in mL/hr.

First, identify the doctor's order.

Doctor's order = $\frac{1800 units}{hr}$

This is also known as the dose.

Second, identify the dose on hand (DOH).

Dose on hand = $\frac{25{,}000 units}{250 mL}$

Supplied is 25,000 units in 250mL of solution. This can be written as $\frac{25{,}000 units}{250 mL}$.

Now solve for the infusion rate in mL/hr using dimensional analysis.

Doctor's order DOH Wanted Quantity

$$\frac{1800 units}{hr} \times \frac{250 mL}{25{,}000 units} = 18 \frac{mL}{hr}$$

The infusion rate would be 18mL/hr.

Remember to set up your problem so that the proper units cancel.

Calculating a dose based on weight.

EXAMPLE 4

The doctor orders Nipride 3mcg/kg/min to keep SBP < 140mmHg. The pharmacy supplies this in a 250mL bag of D_5W that contains 50mg of the drug. The patient weighs 56kg. Compute the dosage in mcg/min and the infusion rate in mL/hr.

First, identify the doctor's order.

Doctor's order = $\frac{3mcg}{kg\ \min}$

The doctor's order is given as 3mcg/kg/min. This can be written as $\frac{3mcg}{kg\ \min}$.

Second, identify the dose on hand (DOH).

Dose on hand = $\frac{50mg}{250mL}$

Supplied is a 250mL bag of D_5W that contains 50mg of the drug. This can be written as $\frac{50mg}{250mL}$.

Third, identify the patient's weight.

Patient's weight = $\frac{56kg}{1}$

The patient's weight given is 56kg. This can be written as $\frac{56kg}{1}$.

Now let's first solve for mcg/min using dimensional analysis.

Doctor's order Patient's weight Wanted Quantity

$$\frac{3mcg}{kg\ \min} \quad \mathbf{x} \quad \frac{56kg}{1} \quad = \quad \frac{168mcg}{\min}$$

The dose for this patient would be 168mcg/min.

Remember to set up your problem so that the proper units cancel.

Now that you know the dose for the patient, calculate the infusion rate in mL/hr using dimensional analysis.

Patient's dose Conversion DOH Conversion Wanted Quantity

$$\frac{168mcg}{1\min} \times \frac{1mg}{1000mcg} \times \frac{250mL}{50mg} \times \frac{60\min}{1hr} = 50.4\frac{mL}{hr} = 50\frac{mL}{hr}$$

The infusion rate would be 50 mL/hr.

Remember to set up your problem so that the proper units cancel.

To check your answer, back solve. You can do this by first solving for mg/hr using the dose calculated for the patient.

Dose Conversion Conversion = Wanted Quantity

$$\frac{168mcg}{1\min} \times \frac{1mg}{1000mcg} \times \frac{60\min}{1hr} = 10.08\frac{mg}{hr} = 10\frac{mg}{hr}$$

Using the dose for the patient based on their weight, they should receive 10 mg/hr.

To finish back solving, solve for mg/hr using the calculated infusion rate and the DOH.

DOH Infusion Rate = Wanted Quantity

$$\frac{50mg}{250mL} \times \frac{50mL}{hr} = 10\frac{mg}{hr}$$

Using the DOH and the infusion, the patient should receive 10 mg/hr.

Since both answers are equal to each other, your calculation is correct.

EXAMPLE 5

A patient weighing 252 pounds is to begin an infusion of dopamine at 5mcg/kg/min. The drug is supplied in a 250mL bag of NS that contains 400mg. What is the dosage in mcg/min and the infusion rate in mL/hr?

First, identify the doctor's order.

Doctor's order = $\frac{5mcg}{kg\ \min}$

The doctor's order is given as 5mcg/kg/min. This can be written as $\frac{5mcg}{kg\ \min}$.

Second, identify the dose on hand (DOH).

Dose on hand = $\frac{400mg}{250mL}$

Supplied is a 250mL bag of NS that contains 400mg. This can be written as $\frac{400mg}{250mL}$.

Third, identify the patient's weight.

Patient's weight = $\frac{252lb}{1}$

The patient's weight given is 252lb. This can be written as $\frac{252lb}{1}$.

Let's first convert the patient's weight from pounds to kilograms.

Patient's weight Conversion Wanted Quantity

$\frac{252lb}{1}$ x $\frac{1kg}{2.2lb}$ = 114.5 kg

Now let's solve for mcg/min using dimensional analysis.

Doctor's order Patient's weight Wanted Quantity

$\frac{5mcg}{kg\ \min}$ **x** $\frac{114.5kg}{1}$ **= 572.5** $\frac{mcg}{\min}$ **= 573** $\frac{mcg}{\min}$

The dose for this patient would be 573 mcg/min.

Remember to set up your problem so that the proper units cancel.

Now that you know the dose for the patient, calculate the infusion rate in mL/hr using dimensional analysis.

Patient's dose Conversion DOH Conversion Wanted Quantity

$$\frac{573mcg}{\min} \times \frac{1mg}{1000mcg} \times \frac{250mL}{400mg} \times \frac{60\min}{1hr} = 21.48\frac{mL}{hr} = 21\ \frac{mL}{hr}$$

The infusion rate would be 21 mL/hr.

Remember to set up your problem so that the proper units cancel.

To check your answer, back solve. You can do this by first solving for mg/hr using the dose calculated for the patient.

Dose Conversion Conversion = Wanted Quantity

$$\frac{573mcg}{\min} \times \frac{1mg}{1000mcg} \times \frac{60\min}{1hr} = 34.38\ \frac{mg}{hr} = 34\ \frac{mg}{hr}$$

Using the dose for the patient based on their weight, they should receive 34 mg/hr.

To finish back solving, solve for mg/hr using the calculated infusion rate and the DOH.

DOH Infusion Rate = Wanted Quantity

$$\frac{400mg}{250mL} \times \frac{21mL}{hr} = 33.6\ \frac{mg}{hr} = 34\ \frac{mg}{hr}$$

Using the DOH and the infusion, the patient should receive 34 mg/hr.

Since both answers are equal to each other, your calculation is correct.

EXAMPLE 6

A patient weighing 98 kg is to receive an infusion of dobutamine at 5mcg/kg/min. Available is 500mg in 250mL of solution. What is the dosage in mcg/min and the infusion rate in mL/hr?

First, identify the doctor's order.

Doctor's order = $\frac{5mcg}{kg\ \min}$

The doctor's order is given as 5mcg/kg/min. This can be written as $\frac{5mcg}{kg\ \min}$.

Second, identify the dose on hand (DOH).

Dose on hand = $\frac{500mg}{250mL}$

Supplied is 500mg in 250mL of solution. This can be written as $\frac{500mg}{250mL}$.

Third, identify the patient's weight.

Patient's weight = $\frac{98kg}{1}$

The patient's weight given is 98kg. This can be written as $\frac{98kg}{1}$.

Now let's first solve for mcg/min using dimensional analysis.

Doctor's order Patient's weight Wanted Quantity

$$\frac{5mcg}{kg\ \min} \times \frac{98kg}{1} = \frac{490mcg}{\min}$$

The dose for this patient would be 490mcg/min.

Remember to set up your problem so that the proper units cancel.

Now that you know the dose for the patient, calculate the infusion rate in mL/hr using dimensional analysis.

Patient's dose Conversion DOH Conversion Wanted Quantity

$$\frac{490mcg}{\min} \times \frac{1mg}{1000mcg} \times \frac{250mL}{500mg} \times \frac{60\min}{1hr} = 14.7\ \frac{mL}{hr} = 15\ \frac{mL}{hr}$$

The infusion rate would be 15 mL/hr.

Remember to set up your problem so that the proper units cancel.

To check your answer, back solve. You can do this by first solving for mg/hr using the dose calculated for the patient.

Patient's Dose Conversion Conversion = Wanted Quantity

$$\frac{490mcg}{\min} \times \frac{1mg}{1000mcg} \times \frac{60\min}{1hr} = 29.4\ \frac{mg}{hr} = 29\ \frac{mg}{hr}$$

Using the dose for the patient based on their weight, they should receive 29 mg/hr.

To finish back solving, solve for mg/hr using the calculated infusion rate and the DOH.

DOH Infusion Rate = Wanted Quantity

$$\frac{500mg}{250mL} \times \frac{15mL}{hr} = 30\ \frac{mg}{hr}$$

Using the DOH and the infusion, the patient should receive 30 mg/hr.

Since both answers are equal to each other, your calculation is correct.

EXAMPLE 7

A dose of 6mcg/kg/min is ordered to infuse IV to sustain the blood pressure of an adult weighing 75 kg. The supplied solution contains 500mg in 250mL of D_5W. Calculate the dose in mcg/min and the infusion rate in mL/hr.

First, identify the doctor's order.

Doctor's order = $\frac{6mcg}{kg\ \min}$

The doctor's order is given as 6mcg/kg/min. This can be written as $\frac{6mcg}{kg\ \min}$.

Second, identify the dose on hand (DOH).

Dose on hand = $\frac{500mg}{250mL}$

The supplied solution contains 500mg in 250mL of D_5W. This can be written as $\frac{500mg}{250mL}$.

Third, identify the patient's weight.

Patient's weight = $\frac{75kg}{1}$

The patient's weight given is 75 kg. This can be written as $\frac{75kg}{1}$.

Now let's first solve for mcg/min using dimensional analysis.

Doctor's order Patient's weight Wanted Quantity

$$\frac{6mcg}{kg\ \min} \times \frac{75kg}{1} = 450\ \frac{mcg}{\min}$$

The dose for this patient would be 450 mcg/min.

Remember to set up your problem so that the proper units cancel.

Now that you know the dose for the patient, calculate the infusion rate in mL/hr using dimensional analysis.

Patient's dose Conversion DOH Conversion Wanted Quantity

$$\frac{450mcg}{\min} \times \frac{1mg}{1000mcg} \times \frac{250mL}{500mg} \times \frac{60\min}{1hr} = 13.6\frac{mL}{hr} = 14\frac{mL}{hr}$$

The infusion rate would be 14 mL/hr.

Remember to set up your problem so that the proper units cancel.

To check your answer, back solve. You can do this by first solving for mg/hr using the dose calculated for the patient.

Dose Conversion Conversion = Wanted Quantity

$$\frac{450mcg}{\min} \times \frac{1mg}{1000mcg} \times \frac{60\min}{1hr} = 27\frac{mg}{hr}$$

Using the dose for the patient based on their weight, they should receive 27mg/hr.

To finish back solving, solve for mg/hr using the calculated infusion rate and the DOH.

DOH Infusion Rate = Wanted Quantity

$$\frac{500mg}{250mL} \times \frac{14mL}{hr} = 28\frac{mg}{hr}$$

Box 4

Using the DOH and the infusion, the patient should receive 28 mg/hr.

Since both answers are equal to each other, your calculation is correct.

EXAMPLE 8

The order is to infuse a solution of 50mg in 250mL D_5W at 0.8mcg/kg/min. Calculate the dose in mcg/min and the flow rate in mL/hr of a patient weighing 66 kg.

First, identify the doctor's order.

Doctor's order = $\frac{0.8mcg}{kg\ \min}$

The doctor's order is given as 0.8mcg/kg/min. This can be written as $\frac{0.8mcg}{kg\ \min}$.

Second, identify the dose on hand (DOH).

Dose on hand = $\frac{50mg}{250mL}$

The supplied solution contains 50mg in 250mL D_5W. This can be written as $\frac{50mg}{250mL}$.

Third, identify the patient's weight.

Patient's weight = $\frac{66kg}{1}$

The patient's weight given is 66 kg. This can be written as $\frac{66kg}{1}$.

Now let's first solve for mcg/min using dimensional analysis.

Doctor's order Patient's weight Wanted Quantity

$$\frac{0.8mcg}{kg\ \min} \times \frac{66kg}{1} = \frac{52.8mcg}{\min} = \frac{53mcg}{\min}$$

The dose for this patient would be 53 mcg/min.

Remember to set up your problem so that the proper units cancel.

Now that you know the dose for the patient, calculate the infusion rate in mL/hr using dimensional analysis.

Patient's dose Conversion DOH Conversion Wanted Quantity

$$\frac{53mcg}{\min} \times \frac{1mg}{1000mcg} \times \frac{250mL}{50mg} \times \frac{60\min}{1hr} = 15.9\frac{mL}{hr} = 16\frac{mL}{hr}$$

The infusion rate would be 16 mL/hr.

Remember to set up your problem so that the proper units cancel.

To check your answer, back solve. You can do this by first solving for mg/hr using the dose calculated for the patient.

Dose Conversion Conversion = Wanted Quantity

$$\frac{53mcg}{\min} \times \frac{1mg}{1000mcg} \times \frac{60\min}{1hr} = 3.18\frac{mg}{hr} = 3\frac{mg}{hr}$$

Using the dose for the patient based on their weight, they should receive 3 mg/hr.

To finish back solving, solve for mg/hr using the calculated infusion rate and the DOH.

DOH Infusion Rate = Wanted Quantity

$$\frac{50mg}{250mL} \times \frac{16mL}{hr} = 3.2\frac{mg}{hr} = 3\frac{mg}{hr}$$

Using the DOH and the infusion, the patient should receive 3 mg/hr.

Since both answers are equal to each other, your calculation is correct.

Titrations

EXAMPLE 9

A medication is ordered at a rate of 1-4mg/min. The solution strength is 2g in 500mL D_5W. What is the infusion rate range in mL/hr? What would the manual infusion rate be in gtt/min for a microdrip IV set (60gtt/mL)?

Doctor's order = $\frac{1-4mg}{\min}$

This is also known as the dose.

NOTE: The healthcare provider must change the flow rate of the drug from time to time depending on how the patient is responding and thus must constantly monitor the patient's vital signs in order to titrate the dose (rate of administration) of a drug correctly.

To do this, infusion rate must be calculated at the lower end of the range and then again at the higher end of the range to determine the rate of administration.

Second, identify the dose on hand (DOH).

Dose on hand = $\frac{2g}{500mL}$

The solution strength is 2g in 500mL D_5W. This can be written as $\frac{2g}{500mL}$.

Now solve for the infusion rate at the ***lower end*** of the range in mL/hr using dimensional analysis.

Doctor's order		Conversion		DOH		Conversion		Wanted Quantity
$\frac{1mg}{\min}$	x	$\frac{1g}{1000mg}$	x	$\frac{500mL}{2g}$	x	$\frac{60\min}{1hr}$	=	$15\frac{mL}{hr}$

The infusion rate at the lower end of the range would be 15mL/hr.

Remember to set up your problem so that the proper units cancel.

Now solve for the infusion rate at the ***higher end*** of the range in mL/hr using dimensional analysis.

Doctor's order		Conversion		DOH		Conversion		Wanted Quantity
$\frac{4mg}{\min}$	x	$\frac{1g}{1000mg}$	x	$\frac{500mL}{2g}$	x	$\frac{60\min}{1hr}$	=	$60\frac{mL}{hr}$

The infusion rate at the higher end of the range would be 60mL/hr.

Remember to set up your problem so that the proper units cancel.

The range is 15-60mL/hr.

Now let's calculate the drip rate (gtt/min) for the ***lower end*** of the infusion rate.

Infusion Rate Drop Factor Conversion Wanted Quantity

$$\frac{15mL}{hr} \times \frac{60gtt}{1mL} \times \frac{1hr}{60\,\text{min}} = \frac{15gtt}{\text{min}}$$

The drip rate for the lower end of the infusion rate is $\frac{15gtt}{\text{min}}$

Now let's calculate the drip rate (gtt/min) for the ***higher end*** of the infusion rate.

Infusion Rate Drop Factor Conversion Wanted Quantity

$$\frac{60mL}{hr} \times \frac{60gtt}{1mL} \times \frac{1hr}{60\,\text{min}} = \frac{60gtt}{\text{min}}$$

The drip rate for the lower end of the infusion rate is $\frac{60gtt}{\text{min}}$

The drip rate range is also 15-60 gtt/min

Calculate dosages using mg/kg and mcg/kg

EXAMPLE 10

A patient weighing 160 pounds is to receive a titrated infusion of a medication between 5-10mcg/kg/min. The supplied solution contains 100mg in 40mL of NS. What is the dose range in mcg/min? What is the manual infusion rate range in gtt/min for a microdrip IV set (60gtt/min)? The client stabilizes at 16mL/hr. What is the stabilizing dose in mcg/min?

First, identify the doctor's order.

Doctor's order = $\frac{5-10mcg}{kg\ \min}$

This is also known as the dose.

NOTE: The healthcare provider must change the flow rate of the drug from time to time depending on how the patient is responding and thus must constantly monitor the patient's vital signs in order to titrate the dose (rate of administration) of a drug correctly.

To do this, infusion rate must be calculated at the lower end of the range and then again at the higher end of the range to determine the rate of administration.

Second, identify the dose on hand (DOH).

Dose on hand = $\frac{100mg}{40mL}$

The supplied solution contains 100mg in 40mL of NS. This can be written as $\frac{100mg}{40mL}$.

Third, identify the patient's weight.

Patient's weight = $\frac{160lb}{1}$

The patient's weight given is 252lb. This can be written as $\frac{160lb}{1}$.

Let's first convert the patient's weight from pounds to kilograms.

Patient's weight Conversion Wanted Quantity

$\frac{160lb}{1}$ x $\frac{1kg}{2.2lb}$ = 72.7 kg

Using the conversion 1 kg = 2.2 lb we can determine the patients weight to be 72.7 kg.

Now let's solve for the dose at the ***lower end*** of the range in mcg/min using dimensional analysis.

Doctor's order Patient's weight Wanted Quantity

$$\frac{5mcg}{kg\,\min} \times \frac{72.7kg}{1} = 363.5\ \frac{mcg}{\min} = 364\ \frac{mcg}{\min}$$

The dose for this patient at the lower end of the range would be 364mcg/min.

Remember to set up your problem so that the proper units cancel.

Now let's solve for the dose at the ***higher end*** of the range in mcg/min using dimensional analysis.

Doctor's order Patient's weight Wanted Quantity

$$\frac{10mcg}{kg\,\min} \times \frac{72.7kg}{1} = \frac{727mcg}{\min}$$

The dose for this patient at the higher end of the range would be 727mcg/min.

Remember to set up your problem so that the proper units cancel.

Dose range 364-727 mcg/min

Now that you know the dose range for the patient, calculate the infusion rate in mL/hr at the ***lower end*** of the range using dimensional analysis.

Patient's dose Conversion DOH Conversion Wanted Quantity

$$\frac{364mcg}{\min} \times \frac{1mg}{1000mcg} \times \frac{40mL}{100mg} \times \frac{60\,\min}{1hr} = 8.7\ \frac{mL}{hr} = 9\ \frac{mL}{hr}$$

The infusion rate would be 9 mL/hr at the lower end of the dose range.

Remember to set up your problem so that the proper units cancel.

Now that you know the dose range for the patient, calculate the infusion rate in mL/hr at the ***higher end*** of the range using dimensional analysis.

Patient's dose Conversion DOH Conversion Wanted Quantity

$$\frac{727mcg}{\min} \times \frac{1mg}{1000mcg} \times \frac{40mL}{100mg} \times \frac{60\,\min}{1hr} = 17.4\ \frac{mL}{hr} = 17\ \frac{mL}{hr}$$

The infusion rate would be 17 mL/hr at the higher end of the dose range.

Remember to set up your problem so that the proper units cancel.

The infusion rate range is 9 – 17 mL/hr.

Now let's calculate the manual infusion rate (gtt/min) for the ***lower end*** of the infusion rate.

Infusion Rate Drop Factor Conversion Wanted Quantity

$$\frac{9mL}{hr} \times \frac{60gtt}{1mL} \times \frac{1hr}{60\,\text{min}} = 9\,\frac{gtt}{\text{min}}$$

The drip rate for the lower end of the infusion rate is $\frac{9gtt}{\text{min}}$

Now let's calculate the manual infusion rate (gtt/min) for the ***higher end*** of the infusion rate.

Infusion Rate Drop Factor Conversion Wanted Quantity

$$\frac{17mL}{hr} \times \frac{60gtt}{1mL} \times \frac{1hr}{60\,\text{min}} = 17\,\frac{gtt}{\text{min}}$$

The drip rate for the lower end of the infusion rate is $\frac{17gtt}{\text{min}}$

The manual infusion rate range is also 9-17 gtt/min

Lastly, let's determine the stabilizing dose in mcg/min using the patient's stabilizing rate of 16mL/hr.

Stabilizing Rate DOH Conversion Conversion Wanted Quantity

$$\frac{16mL}{hr} \times \frac{100mg}{40mL} \times \frac{1000mcg}{1mg} \times \frac{1hr}{60\,\text{min}} = \frac{666.67mcg}{\text{min}} = \frac{667mcg}{\text{min}}$$

The stabilizing dose for this patient would be 667mcg/min.

Remember to set up your problem so that the proper units cancel.

PRACTICE PROBLEM 1

The nurse must prepare an infusion at 20mg/hr. Supplied is 1 g in 500 mL of D_5W. Compute the infusion rate in mL/hr.

First, identify the doctor's order.

– answer 20mg/hr

The doctor's order is 20mg/hr. This is also known as the dose. It can be written as $\frac{20mg}{1hr}$

Second, identify the dose on hand (DOH).

answer 1g/500mL

Supplied is 1 g in 500 mL of D_5W. This can be written as $\frac{1g}{500mL}$.

Now solve for the infusion rate in mL/hr using dimensional analysis.

answer of 10

Doctor's order Conversion DOH Wanted Quantity

$$\frac{20mg}{1hr} \times \frac{1g}{1000mg} \times \frac{500mL}{1g} = \_\_\_\_ \frac{mL}{hr}$$

The infusion rate would be 10mL/hr.

Doctor's order Conversion DOH Wanted Quantity

$$\frac{20mg}{1hr} \times \frac{1g}{1000mg} \times \frac{500mL}{1g} = 10 \frac{mL}{hr}$$

PRACTICE PROBLEM 2

The nurse enters the room to assess the IV and notes that a client was ordered to receive an infusion at 750units/hr. The supplied bag contains 25,000 units in a 250mL bag of D_5W. The IV pump is set at 45mL/hr. Is this a correct setting for the dose ordered? If not, what is the correct setting indicated for the dose ordered?

First, identify the doctor's order.

– answer 750units/hr

The doctor's order is 750units/hr. This is also known as the dose. It can be written as $\frac{750units}{hr}$

Second, identify the dose on hand (DOH).

– answer 25,000units/250mL

The supplied bag contains 25,000 units in a 250mL bag of D_5W. This can be written as $\frac{25{,}000units}{250mL}$.

Now solve for the infusion rate in mL/hr using dimensional analysis.

- answer of 8

Doctor's order DOH Wanted Quantity

$$\frac{750units}{1hr} \times \frac{250mL}{25{,}000units} = \_\_\_\_ \frac{mL}{hr}$$

Remember to set up your problem so that the proper units cancel.

After two tries with incorrect answer, "The infusion rate would be 8 mL/hr."

Doctor's order DOH Wanted Quantity

$$\frac{750units}{1hr} \times \frac{250mL}{25{,}000units} = 8 \frac{mL}{hr}$$

Was the IV pump set at the correct infusion rate? Yes or no

– answer is no

The infusion rate on the IV pump was set at 45mL/hr. This is not the correct rate that was determined. The IV pump should have been set at 8 mL/hr. The answer is no.

PRACTICE PROBLEM 3

Ordered is an infusion at 6mcg/kg/min. Available is 500mg contained in 0.5L bag of NS. The patient weighs 150 pounds. Calculate the infusion rate in mcg/min and mL/hr.

First, identify the doctor's order.

– answer 6mcg/kg/min

Remember this is also known as the dose.

The doctor's order is 6mcg/kg/min. This is also known as the dose. It can be written as $\frac{6mcg}{kg\ \min}$

Second, identify the dose on hand (DOH).

– answer 500mg/500mL

Remember this is what is supplied or available to you.

After two tries with incorrect answer, "Available is 500mg contained in 0.5L bag of NS. This can be written as $\frac{500mg}{500mL}$. Remember 1 L = 1000 mL therefore, 0.5 L = 500 mL."

Third, identify the patient's weight in ***kilograms***.

– answer 68.2 kg

Remember to convert from pounds to kilograms.

The patient's weight given is 150lb.

Patient's weight Conversion Wanted Quantity

$$\frac{150lb}{1} \quad x \quad \frac{1kg}{2.2lb} \quad = 68.2\ kg$$

The patient weights 68.2 kg."

Now let's solve for mcg/min using dimensional analysis.

– units should also cancel – user should be able to type in answer of 409

Doctor's order Patient's weight Wanted Quantity

$$\frac{6mcg}{kg\,\min} \times \frac{68.2kg}{1} = \_\_\_\_ \frac{mcg}{\min}$$

Remember to set up your problem so that the proper units cancel.

After two tries with incorrect answer, "Remember to set up your problem so that the proper units cancel.

Doctor's order Patient's weight Wanted Quantity

$$\frac{6mcg}{kg\,\min} \times \frac{68.2kg}{1} = \frac{409mcg}{\min}$$

The dose for this patient is 409 mcg/min."

Now solve for the infusion rate in mL/hr using dimensional analysis.

- answer of 25

Patient's Dose Conversion DOH Conversion Wanted Quantity

$$\frac{409mcg}{\min} \times \frac{1mg}{1000mcg} \times \frac{500mL}{500mg} \times \frac{60\,\min}{1hr} = \_\_\_\_ \frac{mL}{hr}$$

After two tries with incorrect answer, "The infusion rate would be 25 mL/hr using the dose for the patient based on their weight."

Patient's Dose Conversion DOH Conversion Wanted Quantity

$$\frac{409mcg}{\min} \times \frac{1mg}{1000mcg} \times \frac{500mL}{500mg} \times \frac{60\,\min}{1hr} = 25\ \frac{mL}{hr}$$

PRACTICE PROBLEM 4

A patient weighing 125 pounds is to receive a drug at 2mcg/kg/min. Available is 500mg in 250mL of D_5W. Calculate mcg/min and mL/hr.

First, identify the doctor's order.

– answer 2mcg/kg/min

After two tries with incorrect answer, "The doctor's order is 2mcg/kg/min. This is also known as the dose. It can be written as $\frac{2mcg}{kg\,\min}$."

Second, identify the dose on hand (DOH).

– answer 500mg/250mL

If correct, "Correct!"
If incorrect, "Try again. Remember this is what is supplied or available to you."

After two tries with incorrect answer, "Available is 500mg in 250mL of D_5W. This can be written as $\frac{500mg}{250mL}$."

Third, identify the patient's weight in ***kilograms***.

– answer 56.8kg

After two tries with incorrect answer, "The patient's weight given is 125lb.

Patient's weight Conversion Wanted Quantity

$$\frac{125lb}{1} \quad x \quad \frac{1kg}{2.2lb} \quad = 56.8 \text{ kg}$$

The patient weights 56.8 kg."

Now let's solve for mcg/min using dimensional analysis.

- answer of 114

Doctor's order Patient's weight Wanted Quantity

$$\frac{2mcg}{kg \text{ min}} \quad \mathbf{x} \quad \frac{56.8kg}{1} \quad = \_\_\_\_ \frac{mcg}{\text{min}}$$

After two tries with incorrect answer, "Remember to set up your problem so that the proper units cancel.

Doctor's order Patient's weight Wanted Quantity

$$\frac{2mcg}{kg \text{ min}} \quad \mathbf{x} \quad \frac{56.8kg}{1} \quad = \frac{114mcg}{\text{min}}$$

The dose for this patient is 114mcg/min."

Now solve for the infusion rate in mL/hr using dimensional analysis.

– answer of 3

Patient's Dose Conversion DOH Conversion Wanted Quantity

$$\frac{114mcg}{\min} \text{ x } \frac{1mg}{1000mcg} \text{ x } \frac{250mL}{500mg} \text{ x } \frac{60\min}{1hr} = \_\_\_\_\_ \frac{mL}{hr}$$

The infusion rate would be 3 mL/hr using the dose for the patient based on their weight.

Patient's Dose Conversion DOH Conversion Wanted Quantity

$$\frac{114mcg}{\min} \text{ x } \frac{1mg}{1000mcg} \text{ x } \frac{250mL}{500mg} \text{ x } \frac{60\min}{1hr} = 3 \frac{mL}{hr}$$

PRACTICE PROBLEM 5

An adult has an order for 250mg in 500ml D_5W to infuse between 0.5 and 0.7 mg/kg/hr. The patient weighs 82kg. This patient stabilizes at 75mL/hr. What is the dose range the flow rate range and the stabilizing dose/hr?

First, identify the doctor's order.

– answer 0.5-0.7mg/kg/hr

The doctor's order, or the dose, is to infuse between 0.5 and 0.7 mg/kg/hr. This can be written as $\frac{0.5-0.7mg}{kghr}$

Remember the infusion rate must be calculated at the lower end of the range and then again at the higher end of the range to determine the rate of administration.

Second, identify the dose on hand (DOH).

– answer 250mg/500mL

After two tries with incorrect answer, "The supplied solution contains 250mg in 500ml D_5W. This can be written as $\frac{250mg}{500mL}$."

Third, identify the patient's weight.

– answer 82kg

After two tries with incorrect answer, "The patient's weight given is 82kg. This can be written as $\frac{82kg}{1}$.

Now solve for the dose at the ***lower end*** of the range in mg/hr using dimensional analysis.

– answer of 41

Doctor's order Patient's weight Wanted Quantity

$$\frac{0.5mg}{kghr} \times \frac{82kg}{1} = \_\_\_\_ \frac{mg}{hr}$$

After two tries with incorrect answer, "The dose for this patient at the lower end of the range would be 41mg/hr. "

Doctor's order Patient's weight Wanted Quantity

$$\frac{0.5mg}{kghr} \quad \textbf{x} \quad \frac{82kg}{1} \quad = \quad \frac{41mg}{hr}$$

Now solve for the dose at the ***higher end*** of the range in mg/hr using dimensional analysis.

– answer is 57

Doctor's order Patient's weight Wanted Quantity

$$\frac{0.7mg}{kghr} \quad \textbf{x} \quad \frac{82kg}{1} \quad = \quad \_\_\_\_ \; \frac{mg}{hr}$$

After two tries with incorrect answer, "The dose for this patient at the lower end of the range would be 57mg/hr."

Doctor's order Patient's weight Wanted Quantity

$$\frac{0.7mg}{kghr} \quad \textbf{x} \quad \frac{82kg}{1} \quad = \quad \frac{57.4mg}{hr} = \frac{57mg}{hr}$$

Now that you know the dose range for the patient, calculate the infusion rate in mL/hr at the ***lower end*** of the range using dimensional analysis.

- answer is 82

Patient's dose DOH Wanted Quantity

$$\frac{41mg}{hr} \quad \textbf{x} \quad \frac{500mL}{250mg} \quad = \quad \_\_\_\_ \; \frac{mL}{hr}$$

The infusion rate would be 82mL/hr at the lower end of the dose range.

Patient's dose DOH Wanted Quantity

$$\frac{41mg}{hr} \quad \textbf{x} \quad \frac{500mL}{250mg} \quad \textbf{= 82} \; \frac{mL}{hr}$$

Now that you know the dose range for the patient, calculate the infusion rate in mL/hr at the ***higher end*** of the range using dimensional analysis.

answer is 114

Patient's dose DOH Wanted Quantity

$$\frac{57mg}{hr} \text{ x } \frac{500mL}{250mg} = \_\_\_\_\_ \frac{mL}{hr}$$

The infusion rate would be 114mL/hr at the higher end of the dose range.

Patient's dose DOH Wanted Quantity

$$\frac{57mg}{hr} \text{ x } \frac{500mL}{250mg} = 114 \frac{mL}{hr}$$

The infusion rate range is 82-114mL/hr.

What is the patient's stabilizing rate?

- answer is 75mL/hr

If correct, "Correct!"
Remember this is the rate given that the patient stabilizes at.

This patient stabilizes at 75mL/hr. It can be written as $\frac{75mL}{1hr}$.

Lastly, determine the stabilizing dose in mg/hr using the patient's stabilizing rate.

- answer of 38

Stabilizing Rate DOH Wanted Quantity

$$\frac{75mL}{1hr} \text{ x } \frac{250mg}{500mL} = \_\_\_\_\_ \frac{mg}{hr}$$

After two tries with incorrect answer, "The stabilizing dose for this patient would be 38 mg/hr.

Stabilizing Rate DOH Wanted Quantity

$$\frac{75mL}{1hr} \text{ x } \frac{250mg}{500mL} = 38 \frac{mg}{hr}$$

PRACTICE PROBLEM 6

An infusion containing 50mg in 250mL of D_5W is infusing at a rate of 46mL/hr. The patient weighs 175 pounds. What is the dosage infusing in mcg/kg/min?

Normally you are given the doctor's order. In this problem, you will determine what the doctor's order is in mcg/kg/min using the dose on hand and infusion rate and the patient's weight.

First, identify the infusion rate.

– answer 46mL/hr

Remember this is the rate the medication is infusing at.

After two tries with incorrect answer, "The infusion rate is given as 46mL/hr. This can be written as $\frac{46mL}{1hr}$."

Second, identify the dose on hand (DOH).

– answer 50mg/250mL

Remember this is what is supplied.

After two tries with incorrect answer, "The supplied solution contains 50mg in 250ml D_5W. This can be written as $\frac{50mg}{250mL}$."

Third, identify the patient's weight in ***kilograms***.

– answer 79.5 kg

Remember to convert from pounds to kilograms.

The patient's weight given is 175lb.

Patient's weight Conversion Wanted Quantity

$$\frac{175lb}{1} \times \frac{1kg}{2.2lb} = 79.5 \text{ kg}$$

The patient weights 79.5 kg."

Now solve for mcg/kg/min using dimensional analysis.

– answer 2

Infusion rate DOH Conversion Conversion Patient's weight Wanted Quantity

$$\frac{46mL}{1hr} \times \frac{50mg}{250mL} \times \frac{1000mcg}{1mg} \times \frac{1hr}{60\,\text{min}} \times \frac{1}{80kg} = \_\_\_\_ \frac{mcg}{kg\,\text{min}}$$

Remember to set up your problem so that the proper units cancel.

Infusion rate DOH Conversion Conversion Patient's weight Wanted Quantity

$$\frac{46mL}{1hr} \times \frac{50mg}{250mL} \times \frac{1000mcg}{1mg} \times \frac{1hr}{60\,\text{min}} \times \frac{1}{79.5kg} = 2\,\frac{mcg}{kg\,\text{min}}$$

PRACTICE PROBLEM 7

A patient weighing 235 pounds must receive 5mg/kg over 30 minutes. Supplied is a syringe with 500mg in 10mL of solution. What is the infusion rate in mL/hr?

First, identify the doctor's order.

– answer 5mg/kg/30min

Remember this is also known as the dose.

After two tries with incorrect answer, "The doctor's order is 5mg/kg over 30 minutes. This is also known as the dose. It can be written as $\frac{5mg}{1kg\,30\,\text{min}}$."

Second, identify the dose on hand (DOH).

– answer 500mg/10mL

Remember this is what is supplied or available to you.

After two tries with incorrect answer, "Supplied is a syringe with 500mg in 10mL of solution. This can be written as $\frac{500mg}{10mL}$."

Third, identify the patient's weight in ***kilograms***.

– answer 106.8 kg

Remember to convert from pounds to kilograms."

After two tries with incorrect answer, "The patient's weight given is 235lb.

Patient's weight Conversion Wanted Quantity

$$\frac{235lb}{1} \times \frac{1kg}{2.2lb} = 106.8\ \text{kg}$$

The patient weights 107 kg."

Now solve for the infusion rate in mL/hr using dimensional analysis.

- answer of 21

Doctor's Order DOH Conversion Patient's Weight Wanted Quantity

$$\frac{5mg}{1kg\,30\,\text{min}} \times \frac{10mL}{500mg} \times \frac{60\,\text{min}}{1hr} \times \frac{106.8kg}{1} = \_\_\_\_ \frac{mL}{hr}$$

Remember to set up your problem so that the proper units cancel.

After two tries with incorrect answer, “The infusion rate would be 21 mL/hr using the dose for the patient based on their weight and the time to infuse it at.”

Doctor’s Order DOH Conversion Patient’s Weight Wanted Quantity

$$\frac{5mg}{1kg\,30\,\text{min}} \times \frac{10mL}{500mg} \times \frac{60\,\text{min}}{1hr} \times \frac{106.8kg}{1} = 21\,\frac{mL}{hr}$$

PRACTICE PROBLEM 8

An infusion of a drug is progressing at 22 mL/hr. The strength supplied is 50mg in 250mL. If the patient weighs 170 pounds, what is the dosage received in mcg/kg/min?

Normally you are given the doctor's order. In this problem, you will determine what the doctor's order is in mcg/kg/min using the dose on hand and infusion rate and the patient's weight.

First, identify the infusion rate.

– answer 22mL/hr

Remember this is the rate the medication is infusing at.

After two tries with incorrect answer, "The infusion rate is given as 22mL/hr. This can be written as $\frac{22mL}{1hr}$."

Second, identify the dose on hand (DOH).

– answer 50mg/250mL

Remember this is what is supplied.

After two tries with incorrect answer, "The supplied solution contains 50mg in 250ml D_5W. This can be written as $\frac{50mg}{250mL}$."

Third, identify the patient's weight in ***kilograms***.

– answer 77.3 kg

Remember to convert from pounds to kilograms.

After two tries with incorrect answer, "The patient's weight given is 170 lb.

Patient's weight Conversion Wanted Quantity

$$\frac{170lb}{1} \quad x \quad \frac{1kg}{2.2lb} \quad = 77.3 \text{ kg}$$

The patient weights 77.3 kg."

Now solve for mcg/kg/min using dimensional analysis.

– answer 1

Infusion rate DOH Conversion Conversion Patient's weight Wanted Quantity

$$\frac{22mL}{1hr} \times \frac{50mg}{250mL} \times \frac{1000mcg}{1mg} \times \frac{1hr}{60\,\text{min}} \times \frac{1}{77.3kg} = \_\_\_\_ \frac{mcg}{kg\,\text{min}}$$

Remember to set up your problem so that the proper units cancel.

After two tries with incorrect answer, "Remember to set up your problem so that the proper units cancel.

Infusion rate DOH Conversion Conversion Patient's weight Wanted Quantity

$$\frac{22mL}{1hr} \times \frac{50mg}{250mL} \times \frac{1000mcg}{1mg} \times \frac{1hr}{60\,\text{min}} \times \frac{1}{77.3kg} = 0.95 \frac{mcg}{kg\,\text{min}} = 1 \frac{mcg}{kg\,\text{min}}$$

PRACTICE PROBLEM 9

The doctor orders a dose of 8mcg/kg/min IV for a 198 pound patient. The pharmacy supplies 100mg in 100mL of NS. What is the infusion rate in mL/hr?

First, identify the doctor's order.

– answer 8mcg/kg/min

Try again. Remember this is also known as the dose.

After two tries with incorrect answer, "The doctor's order is 5mg/kg over 30 minutes. This is also known as the dose. It can be written as $\frac{8mcg}{1kg1\min}$."

Second, identify the dose on hand (DOH).

1 – answer 100mg/100mL

Remember this is what is supplied or available to you.

After two tries with incorrect answer, "The pharmacy supplies 100mg in 100mL of NS. This can be written as $\frac{100mg}{100mL}$."

Third, identify the patient's weight in ***kilograms***.

– answer 90 kg

Remember to convert from pounds to kilograms.

After two tries with incorrect answer, "The patient's weight given is 198 lb.

Patient's weight Conversion Wanted Quantity

$$\frac{198lb}{1} \quad x \quad \frac{1kg}{2.2lb} \quad = 90\ kg$$

The patient weights 90 kg."

Now first solve for mcg/min using dimensional analysis.

- answer 720 mcg/min

Doctor's order Patient's weight Wanted Quantity

$$\frac{8mcg}{kg\ \min} \quad \mathbf{x} \quad \frac{90kg}{1} \quad \mathbf{=} \quad \_\_\_\_ \frac{mcg}{\min}$$

Remember to set up your problem so that the proper units cancel.

The dose for this patient would be 720mcg/min.

Doctor's order Patient's weight Wanted Quantity

$$\frac{8mcg}{kg\,\min} \times \frac{90kg}{1} = \frac{720mcg}{\min}$$

Now that you know the dose for the patient, calculate the infusion rate in mL/hr using dimensional analysis.

- answer is 43

Patient's dose Conversion DOH Conversion Wanted Quantity

$$\frac{720mcg}{\min} \times \frac{1mg}{1000mcg} \times \frac{100mL}{100mg} \times \frac{60\,\min}{1hr} = 43\,\frac{mL}{hr}$$

Remember to set up your problem so that the proper units cancel.

After two tries with incorrect answer, "The infusion rate would be 43 mL/hr using the dose for the patient based on their weight and the time to infuse it at."

PRACTICE PROBLEM 10

A drug is infusing at 25mL/hr for a patient weighing 50 kg. The supplied solution contains 250mg in 250mL. What is the dosage in mg/kg/hr?

Normally you are given the doctor's order. In this problem, you will determine what the doctor's order is in mcg/kg/min using the dose on hand and infusion rate and the patient's weight.

First, identify the infusion rate.

1 – answer 25mL/hr

Remember this is the rate the medication is infusing at.

After two tries with incorrect answer, "The infusion rate is given as 25mL/hr. This can be written as $\frac{25mL}{1hr}$."

Second, identify the dose on hand (DOH).

– answer 250mg/250mL

Remember this is what is supplied.

After two tries with incorrect answer, "The supplied solution contains 250mg in 250mL. This can be written as $\frac{250mg}{250mL}$."

Third, identify the patient's weight in ***kilograms***.

– answer 50 kg

This is given in the problem.

After two tries with incorrect answer, "The patient's weight given is 50 kg."

Now solve for mg/kg/hr using dimensional analysis.

– answer 1

Infusion rate DOH Patient's weight Wanted Quantity

$$\frac{25mL}{1hr} \times \frac{250mg}{250mL} \times \frac{1}{50kg} = \frac{\quad}{\quad} \frac{mg}{kghr}$$

Remember to set up your problem so that the proper units cancel.

After two tries with incorrect answer, “Remember to set up your problem so that the proper units cancel.

Infusion rate DOH Patient’s weight Wanted Quantity

$$\frac{25mL}{1hr} \times \frac{250mg}{250mL} \times \frac{1}{50kg} = 1\frac{mg}{kghr}$$