Intravenous (IV) infusion pumps are the second method used to administer intravenous medications and fluids. See Figure \(\PageIndex{1}\) for an image of an IV pump. Infusion pumps provide an additional safeguard by using a pump to provide an exact amount of fluid per hour to prevent medications from being inadvertently administered too slowly or too quickly. While IV pumps are intended to improve patient safety, the nurse is still responsible for safely setting up the pump. The flow rate using IV pumps is typically calculated in mL/hour. There are many different types of infusion pumps, so the nurse should become familiar with the pumps used at the clinical agency and seek assistance when working with unfamiliar equipment. For additional information about IV infusions, see the "IV Therapy Management" chapter.
Practice Problem: Infusion by Pump (Example 1)

Let’s use the same information from the problem for the patient named Amber Gomez in the “IV Infusion by Gravity” subsection, but instead we will calculate the rate of infusion using an IV infusion pump.

Name: Amber Gomez, DOB: 08/26/19xx, Age 26, Allergies: NKDA, Weight: 50 kg

Prescription: Lactated Ringers 200 mL IV bolus over 2 hours

1. Start by identifying the goal units for which you are solving, which is mL per hour:

\[ \frac{\text{mL}}{\text{hour}} = \text{?} \]

2. Set up the first fraction by matching mL in the numerator. Look at the known information in the problem related to mL. The prescription is to administer 200 mL IV bolus over 2 hours, so put 200 mL in the numerator and 2 hours in the denominator:
\[
\frac{\text{mL}}{\text{hour}} = \frac{200\text{ mL}}{2\text{ hours}} \]

3. Because the units match the goal unit of mL/hour, divide the numerator by the denominator for the final answer:
\[
\frac{\text{mL}}{\text{hour}} = \frac{200\text{ mL}}{2\text{ hours}} = 100 \text{ mL/hr}
\]

Practice Problem: Infusion by Pump (Example 2)

Let’s practice another problem calculating flow rate via IV infusion pump, but this time the prescription states the rate in minutes instead of hours.

Patient Information:

Name: Ashley Hanson, DOB: 09/29/19xx, Age 21, Allergies: NKDA
Diagnosis: Dehydration

Prescription: Lactated Ringers 100 mL IV bolus over 30 minutes

1. Start by setting the goal units being solved. In this case, the pump will still be set for mL per hour:
\[
\frac{\text{mL}}{\text{hour}} = ?
\]

2. Set up the first fraction by matching the numerator to mL. Look for additional information in the problem related to mL. The order states that 100 mL should be administered over 30 minutes. Place 100 mL in the numerator and 30 minutes in the denominator:
\[
\frac{\text{mL}}{\text{Hr}} = \frac{100\text{ mL}}{30\text{ minutes}}
\]

3. Because the pump will be set in mL/hour, convert minutes to hours. Add a second fraction with the intent of crossing off minutes. Place minutes in the numerator so the units will cross out diagonally. Using the known equivalency of 60 minutes in an hour, plug in 60 minutes in the numerator and 1 hour in the denominator. Cross off units diagonally. Multiple across the numerators and the denominators, and then divide for the final answer in mL/hr:
\[
\frac{\text{mL}}{\text{Hr}} = \frac{100\text{ mL}}{30\cancel{\text{minutes}}} = \frac{60\cancel{\text{minutes}}}{1\text{ hour}} = \frac{100\text{ mL} \times 60}{30 \times 1\text{ hour}} = \frac{6000\text{ mL}}{30\text{ hour}} = 200\text{ mL/hr}
\]

Video Reviews of Calculating IV Infusion Rates:

IV Infusion
IV Bolus Calculations
Note

Review the following module within SWTC’s *Dimensional Analysis in Nursing* page for more information about solving weight-based problems.

Module 1.10

Please practice flow rate by infusion pump calculations below.

Query \( \PageIndex{1} \)