

Science Education Collection

Preparing and Administering Intermittent Intravenous Medications with an Infusion Pump

URL: <https://www.jove.com/science-education/10277>

Overview

Source: Madeline Lassche, MSNEd, RN and Katie Baraki, MSN, RN, College of Nursing, University of Utah, UT

Primary intermittent intravenous (IV) infusions are delivered alone as volume-controlled infusions, while secondary infusions are delivered with another IV fluid, usually maintenance fluids. Intermittent infusions are delivered over a specific amount of time, which is dictated by the type of medication, such as IV antibiotics. High-volume IV medications, anywhere from 50- to 500-mL infusions, are typically delivered using an infusion pump as either primary or secondary infusions. Infusion pumps deliver IV fluids in a volume-controlled manner, keeping medication side effects to a minimum and helping to prevent nurse medication errors. Careful review of the medication compatibility with maintenance fluids using an approved medication drug guide, pharmacy recommendations in the Medication Administration Record (MAR), and physician orders must be assessed prior to delivering an IV medication. This review will determine if primary or secondary delivery is appropriate based on the risk for patient harm, such as for concentrated electrolyte preparations like potassium.

Certain medical conditions that preclude oral fluid intake, specific medication preparations, or situations that require an increase in the blood concentration of the medication that is faster than possible through the GI tract may require IV medication administration. This video describes the approach to administer primary intermittent IV infusion medications using an IV infusion pump, including acquiring primary intermittent IV infusion medication, priming the IV tubing, preparing the patient, and programming the infusion pump. The infusion pump consists of a main pump PC unit (*i.e.*, the brain) and interlocking modules or channels in which the IV tubing is contained. While the procedure outlines the steps for a specific brand of infusion pumps, the general concepts and principles are consistent across infusion pump brands, although the steps may vary slightly from brand to brand.

Procedure

1. General procedure considerations (review in the room, with the patient).

1. Upon first entering the patient's room, wash hands with soap and warm water, applying vigorous friction for at least 20 s. Hand sanitizers may be used if the hands are not visibly soiled, but vigorous friction should also be applied.
2. At the bedside computer, log into the patient's electronic health record and review the patient's medical history, allergies, admitting diagnosis, current conditions, and oral intake ability. This review is conducted to confirm that the patient requires the administration of the primary intermittent IV medication infusion (hereto referred to as "IV infusion medication").
3. At the bedside computer, pull up the MAR.
4. Review the patient's MAR for maintenance IV fluid and IV infusion medication orders, including the type of IV infusion medication ordered, the type of maintenance IV fluid, the compatibility of the IV infusion medication and the maintenance IV fluid, and the rate of IV infusion medication administration. The IV infusion medication, IV infusion medication administration rate, and compatibility of the IV infusion medication with the maintenance IV fluid must be verified in an approved medication administration guide prior to administering the IV medication. For example, phenytoin is incompatible with all solutions containing dextrose and most other medications; therefore, it should be delivered as a primary intermittent infusion.
5. Leave the patient's room and wash hands, as described above (step 1.1).

2. Go to the medication preparation area (this area may be in a secured room or in a secured portion of the nurses' station) and acquire the ordered IV infusion medication. Complete the first safety check using the five "rights" of medication administration. Refer to the "[Safety Checks and Five Rights of Medication Administration for Acquiring Medications from a Medication Dispensing Device](#)" video.

3. Acquire infusion pump IV tubing (hereto referred to as "IV tubing").

4. Prime the IV tubing with the IV infusion medication fluid.

1. Open the IV tubing packaging.
2. Holding the IV tubing in your non-dominant hand, slide the roller clamp towards the narrow clamp end to occlude the IV tubing and then place the tubing on the counter. Clamping the IV tubing will prevent air from being pulled into the IV tubing and fluid from leaking out of the IV tubing once the IV infusion medication bag is accessed and inverted.
3. Hold the IV infusion medication bag port with your index finger and the thumb of your non-dominant hand.

4. With your dominant hand, grasp the rubber pigtail that covers the IV infusion medication bag port and pull, removing the pigtail. Set the rubber pigtail on the counter, taking care not to touch the IV infusion medication bag port opening. If this occurs, the IV infusion medication bag is contaminated, and a new bag should be acquired.
5. Pick up the IV tubing and hold the IV tubing spike between the middle finger and base of the thumb. With your thumb and index finger, slide the protective cover from the IV tubing spike and drop the cover on the counter. Take care not to touch the IV tubing spike. If this occurs, the IV tubing is contaminated and new IV tubing should be acquired.
6. While continuing to hold the IV infusion medication bag as described in step 4.3, hold the base of the IV tubing spike between your thumb and the index finger of your dominant hand. Insert the spike into the IV infusion medication bag port using a gentle twisting motion.
7. With your non-dominant hand, invert the IV infusion medication bag and hold it near eye-level. Hold the IV drip chamber between the index finger and thumb of your dominant hand and the tubing with your dominant hand. Gently squeeze the drip chamber until it is 1/3 to 1/2 full of IV infusion medication fluid.
8. Holding the tubing clamp in your dominant hand, use your thumb to gently roll the clamp toward the larger end to open the tubing, just until the fluid starts to flow. This will allow fluid to flow into the tubing and air to be pushed out of the tubing without the loss of medication.
9. When the fluid has reached the end of the tubing, clamp the tubing by holding the clamp in your dominant hand. Use your thumb to roll the clamp towards the narrow end of the clamp to occlude the tubing.

5. In the medication preparation area, complete the second safety check using the five "rights" of medication administration. Refer to the "Safety Checks and Five Rights of Medication Administration for Acquiring Medications from a Medication Dispensing Device" video.

6. Acquire appropriate supplies, including 10 mL of normal saline flush and alcohol wipes.

7. Dispose of the waste in the proper waste disposal receptacle.

Administration

8. Upon first entering the patient's room, set aside the IV infusion medication, tubing, and additional supplies and wash hands, as described in step 1.1.

9. In the patient's room, complete the third and final medication safety check, adhering to the five "rights" of medication administration. Refer to the "Preparing and Administering Oral and Liquid Medications" video.

10. Assess and flush the peripheral IV insertion site. Refer to the "Assessing and Flushing a Peripheral Intravenous Line" video.

11. Prepare the IV pump.

1. If an additional module is needed, hold the IV pump module next to the right or left side of the IV pump PC unit and align the connection points by gently tipping the top of the module up and towards the IV pump brain. Push the bottom of the module down and towards the pump until it clicks (*i.e.*, locks in place).
2. Holding the IV infusion medication bag in your dominant hand, align the one of the hooks at the top of the IV fluid pole with the hole in the top of the IV infusion medication bag and allow the bag to hang.
3. Inspect the IV tubing for air. If the IV tubing has air, repeat steps 4.7-4.9 to remove the air from the IV tubing, taking care not to lose a large amount of IV infusion medication. If a large amount of the medication is lost, a new IV infusion medication bag should be acquired.
4. Remove the paper ties from the IV tubing and the blue sheath covering from the IV infusion pump cartridge portion of the tubing.
5. Wash hands, as described in step 1.1, and put on clean gloves.
6. Prepare the IV infusion pump.
 1. Open the IV pump module door by lifting the module pump lever.
 2. Load the administration set of the IV tubing into the module by placing the upper fitment of the tubing into the module groove at the top of the infusion module and then sliding the safety clamp into its compartment near the bottom of the module.
 3. Close the IV pump module door and push down on the IV pump module door lever until it locks shut.
7. Connect the IV infusion medication IV tubing to the patient's peripheral IV.
 1. Open an alcohol wipe and hold it with your dominant hand.
 2. Holding the IV needleless injection port with your non-dominant hand, wrap the alcohol wipe around the site and scrub the site with friction and intent (as if you were juicing an orange) for at least 15 s. Allow the needleless injection port to dry while continuing to hold it with your non-dominant hand, taking care not touch the site.

3. While continuing to hold the needleless injection port between your thumb and the forefinger of your non-dominant hand, grasp the IV infusion medication tubing near the connection port using your dominant hand and remove the plastic cap, taking care not to contaminate the inner portion of the connection port.
8. Attach the IV infusion medication tubing connection port to the IV needleless port by pushing gently to insert the tip of the connection port into the center portion of the needleless injection site and turning the outer portion of the connection port clockwise.
9. Program the IV pump for the IV infusion medication.
 1. Push the "channel select" button on the IV infusion medication pump module.
 2. From the menu that appears on the module brain, choose "Basic Infusion."
 3. Program the mL/h according to the IV infusion medication orders.
 4. Open the IV infusion medication roller clamp by holding the IV infusion medication clamp tubing in your dominant hand and using your thumb to roll the clamp to the larger end, opening the tubing. This will allow the IV infusion medication to flow through the tubing.
 5. On the IV infusion medication module, select "start" to begin the infusion.
10. Re-assess the peripheral IV site for leakage or swelling. Ask the patient if he/she is experiencing any pain as the IV infusion medication enters the line.

12. Document the IV infusion medication administration in the patient's electronic health record.

1. In the patient's electronic health record, record the date, time, location/site of the peripheral IV where the IV infusion medication was connected, and the peripheral IV site assessment findings.

13. Discard any waste in the appropriate receptacles.

14. Leave the patient's room. Upon exiting the room, wash hands, as describe in step 1.1.

Applications and Summary

This video details the process for administering primary intermittent IV infusion medications using an infusion pump. It is important to assess the patient's IV site throughout the administration of the IV infusion medication to prevent IV site complications, such as extravasation or phlebitis. Because the medication directly enters the circulatory system, the patient should be closely monitored for medication side effects, hypersensitivity reactions, and anaphylaxis. Common errors associated with the administration of primary intermittent IV medication infusions include: failing to verify the compatibility of any maintenance IV fluid with the medication, if applicable; administering the medication at the incorrect rate for the medication concentration or patient condition; and failing to assess the patient for medication reactions.

References

1. Potter, P. A., Perry, A. G., Stockert, P. A., Hall A. Essentials for Nursing Practice, Eighth Edition. Elsevier. St. Louis, MO. (2015).