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Preparing and Administering Secondary Intermittent Intravenous Medications

URL: <https://www.jove.com/science-education/10288>

Overview

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Secondary intravenous (IV) infusions are a way to administer smaller volume-controlled amounts of IV solution (25-250 mL). Secondary IV infusions are delivered over longer periods of time than IV push medications, which reduces the risks associated with rapid infusions, such as phlebitis and infiltration. In addition, some antibiotic medications are only stable for a limited time in solution.

The secondary IV medication tubing is connected to the primary macrobore (large internal diameter) IV tubing and is therefore "secondary" to the primary infusion. The secondary solution bag is typically hung higher than the primary infusion bag and is subsequently "piggybacked" on top of the primary IV infusion. This higher position places greater gravitational pressure on the secondary IV solution. As a result, the primary infusion is temporarily paused until the secondary infusion volume has been delivered. This approach ensures that the medication is completely infused due to an immediate return of maintenance IV infusion in the IV line. The secondary IV infusion can be safely delivered when the patient's fluid volume status permits temporarily pausing the delivery of maintenance fluid and in hypervolemia patients.

This video demonstrates the administration of secondary intermittent IV infusion medications using an infusion pump and using gravity tubing without an infusion pump. This will include a review of acquiring the intermittent secondary IV infusion medication, priming the secondary IV tubing, preparing the patient, calculating the medication administration rate, and setting the secondary IV drip rate.

Procedure

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

1. Upon first entering the patient's room, disinfect your hands by washing with soap and warm water or applying a hand sanitizer. Apply vigorous friction for at least 20 s.
2. Review the electronic health record for the patient's medical history, allergies, admitting diagnosis, current conditions, and oral intake ability to confirm that the patient requires a secondary IV infusion.
3. At the bedside computer, pull up the Medication Administration Record (MAR).
4. Review the patient's MAR for the maintenance and secondary IV infusion orders, including the type of medication ordered, maintenance IV fluid, rate of administration, and compatibility of the medication and the maintenance IV fluid.
5. Leave the patient's room and wash hands as described above (step 1.1).

2. In the medication preparation area, acquire the ordered secondary intermittent infusion and complete the first safety check using the five "rights" of medication administration. Refer to the "Safety Checks for Acquiring Medications from a Medication Dispensing Device" video.

3. Acquire and prime the secondary IV tubing. Refer to step 9.8 for an alternate secondary priming technique.

1. Open the packaging of the secondary intermittent infusion bag (secondary bag) and secondary IV tubing. The secondary IV tubing set will include a plastic extension arm, with hooks on both ends. Set the extension arm on the counter while priming the secondary IV tubing.
2. Holding the secondary IV tubing in your non-dominant hand, slide the roller clamp towards the narrow clamp end to occlude the tubing and place the tubing on the counter. Clamping the tubing will prevent air from being pulled into the tubing and the loss of medication from the tubing once the secondary intermittent infusion bag is accessed and inverted.
3. Holding the bag in your non-dominant hand, grasp the secondary bag port at the point where it is connected to the secondary bag using your non-dominant thumb and index finger.
4. With your dominant hand, pull and remove the rubber pigtail that covers the secondary bag port and set the pigtail on the counter. Take care not to touch the secondary bag port opening. If this occurs, the secondary bag is contaminated and a new bag should be acquired.
5. Hold the secondary tubing spike with the middle finger and the base of your thumb, remove the protective cover from the spike with the tip of the same thumb and index finger, and drop the cover on the counter.
6. Holding the secondary bag as described in step 3.3, insert the secondary tubing spike using your dominant thumb and index finger into the secondary bag port, using a gentle twisting motion.
7. Invert the secondary bag and position it at near eye-level. Gently squeeze the IV drip chamber until it is 1/3 to 1/2 full of fluid.
8. With your dominant thumb and index finger, gently roll the clamp toward the larger end to open the tubing until the fluid just 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, occlude the tubing by rolling the clamp towards the narrow end using your thumb.

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

5. Acquire appropriate supplies, including a 10 mL of normal saline flush, alcohol wipes, and the plastic extension arm included in the secondary IV tubing. Discard the waste created during the preparation process.

Administration

6. Upon first entering the patient's room, set the secondary bag, tubing, and additional supplies down on the counter and wash hands, as described in step 1.1.

7. 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.

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

9. Hang the secondary intermittent infusion and connect the secondary tubing to the patient's primary IV fluid line.

1. If a primary infusion is running through an infusion pump, temporarily pause the infusion pump.
 1. ALTERNATIVE: If a primary infusion is running without an infusion pump, occlude the primary infusion by sliding the roller clamp of the primary tubing towards the narrow clamp end. This will prevent unintentional infusion of primary and secondary fluids into the patient.
2. Retrieve the plastic extension arm with hooks on both ends. Place one hook at the top of the IV fluid pole. Remove the primary fluid bag from the pole and hang it from the bottom hook of the plastic extension arm. Hang the secondary fluid bag from the IV pole.
3. Inspect the secondary tubing for air. If the line has air, continue with the following steps, and refer to step 9.8 for instructions on how to remove the air from the secondary tubing.
4. Wash hands, as described in step 1.1, and put on clean gloves.
5. On the primary tubing, locate the needleless injection site above the infusion pump.
 1. ALTERNATIVE: If gravity infusion is in use, locate the needleless injection site closest to the primary tubing drip chamber.
 2. Open an alcohol wipe and hold it with your dominant hand.
 3. Holding the primary tubing needleless injection site 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 site to dry while continuing to hold it with your non-dominant hand, taking care not touch the site.
6. While continuing to hold the same primary needleless injection site between your non-dominant thumb and forefinger, grasp the secondary 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.
7. Connect the secondary tubing to the primary tubing needleless injection port by gently pushing and twisting clockwise until it is secure.
8. ALTERNATIVE: Backflow priming.
 1. Remove the secondary bag from the IV pole.
 2. Hold the secondary bag lower than the primary infusion bag.
 3. With the thumb and index finger of your dominant hand, gently roll the clamp toward the larger end to open the tubing, just until the fluid starts to flow. This will allow maintenance IV fluid from the primary tubing line to flow into the secondary tubing and air to be pushed out of the tubing without the loss of medication.
 4. When the air has been cleared from the tubing, clamp the tubing by holding the clamp between the thumb and index finger of your dominant hand. Roll the clamp towards the narrow end using your thumb to occlude the tubing. At this point, the secondary drip chamber should be no more than 2/3 full.
 5. Return the secondary fluid to the IV pole and ensure that the primary fluid bag is returned to the extension arm hook, allowing it to hang lower than the secondary fluid bag.
9. Set the secondary intermittent infusion drip rate.
 1. Open the secondary IV tubing roller clamp by sliding the secondary clamp roller towards the larger end of the clamp.
 2. Locate the "Secondary" button on the infusion pump to program the secondary infusion rate. The "Secondary" button will allow you to program the rate of administration for the secondary infusion bag. Once the infusion is complete, the pump will automatically resume the primary infusion rate.

3. Push the "Start" button on the infusion pump and verify that the secondary infusion is running by noting drips falling in the drip chamber of the secondary infusion tubing.
 1. ALTERNATIVE: If gravity tubing is in use, calculate the secondary intermittent infusion drip rate based on pharmacy recommendations and/or information gathered from the nursing drug guide.
 2. Find the drop factor value on the IV tubing packaging. The drop factor varies for different types of IV tubing. Multiply the amount of fluid, in milliliters, to be administered each hour by the drop factor and then divide by 60 min. This will give you the number of drops per minute.
 3. Divide the number of drops per minute by 4. This will give you the number of drops per 15 s.
 4. Hold the primary IV tubing roller clamp in your dominant hand.
 5. Hold a watch with your non-dominant hand next to the drip chamber of the secondary IV tubing.
 6. Holding the primary IV roller clamp in your dominant hand, gently slide the clamp roller towards the larger end of the clamp while looking at your watch and then the drip chamber. Count the number of drops seen in the drip chamber. Adjust the drop rate by rolling the clamp to increase or decrease the number of drops until the number of drops that occur within 15 s matches the number of drops calculated.
10. Re-assess the peripheral IV catheter (PIV) fluid site for leakage or swelling. Ask the patient if he/she is experiencing any pain as the IV fluid enters the line.
 1. ALTERNATIVE: If gravity tubing is in use, note the time when the secondary infusion began. You will need to return to reset the infusion rate to the infusion rate ordered for the primary maintenance infusion.

10. Document the secondary intermittent 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 PIV where the secondary intermittent infusion was connected, and peripheral IV site assessment findings.

11. Discard any waste in the appropriate receptacles.

12. Leave the patient room. Upon exiting the room, wash hands, as describe in step 1.1.

Applications and Summary

This video details the process for administering secondary IV infusion medications using an infusion pump and, alternately, using gravity tubing. As with any IV medication administration, it is always safe practice to double-check the compatibility of solutions prior to administration. Some medications, such as Dilantin, may precipitate within different types of solution containing 5% dextrose (D5); therefore, referencing a compatibility program or nursing drug guide is recommended. Many IV medications can be highly damaging to venous structures. Thus, evaluating the IV patency prior to administration and continually monitoring the IV site of insertion during medication delivery is recommended at least every hour to assess for phlebitis and extravasation. During IV site monitoring, it is also recommended to continually monitor for side effects, hypersensitivity reactions, and anaphylaxis, as these are commonly associated with IV infusions.

Common errors associated with the administration of secondary intermittent IV medication infusions include neglecting to position the secondary IV infusion bag higher than the primary IV infusion bag, failing to open the secondary IV infusion clamp, failing to verify the compatibility of the maintenance IV fluid with the secondary IV infusion medication, and administering the secondary IV infusion medication at the incorrect rate. In addition, phlebitis and extravasation are common; therefore, continual monitoring is appropriate.

References

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