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# Initiating Maintenance IV Fluids

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## Overview

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Hospitalized patients frequently require the administration of intravenous (IV) fluids to maintain their fluid and electrolyte balance. Certain medical conditions that preclude oral fluid intake may necessitate IV fluid administration, with or without electrolytes, to prevent hypovolemia, dehydration, and electrolyte imbalances. Pre-surgical and pre-procedure patients who require anesthesia are often required to be NPO (*i.e., nil per os*; Latin for "nothing by mouth") to prevent aspiration and to maintain hydration during the procedure. Post-surgical and post-procedure patients may also require IV fluid administration to increase intravascular volume following surgical blood loss.

IV fluids can be delivered by different types of administrations sets: gravity flow infusion devices, which rely on gravitation force to push the fluid to the patient's bloodstream, or infusion pumps, which use a pump mechanism that generates positive pressure. While administering maintenance IV fluids using an infusion pump is the most common approach, facility policy; availability of infusion pump equipment; and other limitations, such as a power outage, may necessitate the use of IV gravity tubing. This video describes the approach to initiate maintenance IV fluids using gravity tubing, as well as how to calculate and set the infusion drip rates.

## 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 used.
2. At the bedside computer, log into the patient's electronic health record and review the patient's medical history, intake and output balance, vital signs, skin turgor, mucus membranes, and serum laboratory results. This review is conducted to confirm that the patient requires continuous IV fluid administration (also called maintenance IV fluids).
3. At the bedside computer, pull up the Medication Administration Record (MAR).
4. Review the patient's MAR for maintenance IV fluid orders, including the type of maintenance IV fluid and the rate of administration. The ordered fluids and the administration rate must be appropriate for patient's condition, admitting diagnosis, and fluid and electrolyte status.
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 maintenance IV fluid bag. 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 gravity IV tubing.

### 4. Prime the IV tubing. The purpose of the priming is to make sure that the air in the IV tubing is fully replaced with the fluids to be infused. This is to ensure that no air enters the patient's bloodstream.

1. Open the packaging of the IV fluid bag and IV tubing.
2. Holding the IV tubing in your non-dominant hand, slide the roller clamp towards the narrow clamp end to occlude the tubing, and then place the tubing on the counter. Clamping the tubing will prevent air from being pulled into the tubing or fluid from leaking out of the tubing once the IV fluid bag is accessed and inverted.
3. Holding the bag in your non-dominant hand, grasp the IV bag port with your index finger and the thumb of your non-dominant hand at the point that the IV bag port is connected to the IV bag.
4. With your dominant hand, grasp the rubber pigtail that covers the IV bag port and pull, removing the pigtail; drop the rubber pigtail on the counter. Take care not to touch the IV bag port opening. If this occurs, the IV fluid 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, remove the protective cover from the IV tubing spike and drop the cover on the counter.
6. While continuing to hold the IV bag as described in steps 4.2 and 4.3, hold the IV spike between your thumb and the index finger of your dominant hand and insert the spike into the IV bag port using a gentle twisting motion.

7. With your non-dominant hand, invert the IV fluid bag and hold it near eye-level while holding 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 fluid.
8. With your thumb and the index finger of your dominant hand, roll the clamp onto the larger end of the clamp to open the tubing. This will allow fluid to flow freely into the tubing and air to be pushed out of the tubing.
9. When the fluid has reached the end of 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 of the clamp with your thumb 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 for Acquiring Medications from a Medication Dispensing Device" video.

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

1. If an IV pole is not available in the patient room, acquire one to take into the room.
   Administration

## 7. Upon first entering the patient's room, set the IV fluid, tubing, and additional supplies down on the counter and wash hands, as described in step 1.1.

## 8. 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.

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

## 10. Hang the IV fluid and connect the IV tubing to the peripheral IV catheter (PIV).

1. Holding the IV fluid bag in your dominant hand, align one of the hooks at the top of the IV fluid pole with the hole at the top of the IV fluid bag; allow the IV fluid bag to hang.
2. Inspect the IV fluid line for air. If the line has air, repeat steps 4.7-4.9 to remove the air from the IV fluid line.
3. Remove the paper ties from the IV tubing.
4. Wash hands, as described in step 1.1, and put on clean gloves.
5. Cleanse the PIV needleless injection site.
    1. Open an alcohol wipe and hold it with your dominant hand.
    2. Holding the PIV needleless injection site with your non-dominant hand, wrap the alcohol wipe around it 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 PIV needleless injection site with between your thumb and the forefinger of your non-dominant hand, grasp the IV 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. Attach the connection port of the tubing to the needleless port of the PIV 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.
8. Calculate the IV drip rate.
    1. Multiply the amount of fluid, in milliliters, to be administered each hour (*i.e.,* from the medication orders) by the drop factor (*i.e.,* the number of drops per milliliter of solution delivered from a drip chamber) and divide by 60 min. This will give you the number of drips per minute. The drop factor varies for different types and manufacturers of IV tubing and can be found on the IV tubing packaging.
    2. Divide the number of drops per minute by 4. This will give you the number of drops per 15 s.
9. Set the IV drip rate.
    1. Hold a watch with your non-dominant hand next to the drip chamber of the IV tubing.
    2. Holding the IV 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 drip rate by rolling the clamp to increase or decrease the number of drops until the number of drops that occur within 15 s meets the number of drops calculated in step 10.8.2.
10. Re-assess the PIV fluid site for leaking or swelling. Ask the patient if he/she is experiencing any pain as the IV fluid enters the line. The patient may report a cool feeling, which is expected.

## 11. Document the maintenance IV fluid 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 maintenance IV fluid was connected, and the peripheral IV site assessment findings.

## 12. Discard waste in the appropriate receptacles.

## 13. 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 initiating maintenance IV fluids using gravity tubing. It is important to remember that maintenance IV fluids are a medication, so the five "rights" and three checks must be followed to prevent a medication error. It is also important to assess the patient's IV site and fluid status throughout the administration of the maintenance IV fluid to prevent IV site complications and iatrogenic fluid overload. Common errors associated with administration of maintenance IV fluids include: neglecting to reassess the patient's condition to confirm the continued need for maintenance IV fluids, failing to perform the assessment of the peripheral IV site, and overlooking changes in provider orders regarding the type of maintenance fluid and/or the fluid administration rate.