Complications of Peripheral Intravenous Therapy

When administering intravenous (IV) fluids or medications through a peripheral IV (PIV) site, one must institute preventive measures, be alert for signs and symptoms of complications, and know how to intervene if complications occur.

Infiltration

*Infiltration* refers to the leaking of IV fluid or medication into the tissue surrounding a vascular access device. This may be caused by improper placement of PIV, dislodgment of the catheter, damage to the patient vessel, or patient movement.

**Signs and symptoms**
- Swelling, discomfort, burning, and/or tightness at, near, or proximal to the insertion site
- Leakage from the insertion site
- Cool skin and blanching at the PIV site
- Decreased flow rate (gravity) or high-pressure/distal-occlusion alarms (infusion device)

**Prevention:**
- Select an appropriate site for PIV cannulation, avoiding areas of flexion.
- Use proper venipuncture technique and follow facility policy for securing PIV catheter.
- Observe the PIV site frequently, and advise the patient to report any swelling/tenderness at the site

**Management:**
- Upon first sign of infiltration, STOP the infusion and remove the device.
- Check patient pulse, capillary refill time, and elevate the limb.
- A warm or cool compress may be applied, depending on the infiltrated solution.
- Perform venipuncture in a different location and restart the infusion as ordered, after changing the IV tubing (per facility protocol).
- Check the site frequently, then document findings and interventions.

Extravasation

*Extravasation* refers to the leaking of vesicant drugs into the tissue surrounding a vascular access device. Extravasation can cause severe local tissue damage, delayed healing, infection, tissue necrosis, disfigurement, loss of function, and may result in amputation.

**Signs and symptoms:**
- Discomfort, burning, and/or tightness near PIV site
- Leakage from the PIV site
- Cool skin or blanching at/above the PIV site
- Blistering and/or skin sloughing surrounding PIV site
Prevention:
- Select an appropriate site for PIV cannulation, avoiding small and/or fragile veins, and avoiding areas of flexion.
- Avoid placing PIVs in extremities with preexisting edema or known neurological impairment.
- Be aware of vesicant medications. Examples include vancomycin, amiodarone, antineoplastic drugs (such as doxorubicin, vinblastine, and vincristine), hydroxyzine, promethazine, digoxin, and dopamine.
- Follow facility policy regarding vesicant administration via a PIV. Institution policy may require use of a central vascular access device (CVAD) for vesicant medications.
- Give vesicant drugs last, when multiple drugs are ordered, and strictly adhere to administration guidelines and techniques.

Management:
- Upon first sign of extravasation, STOP the infusion and remove the device, unless the catheter is needed to administer an antidote (as with specific vasopressors).
- Estimate the amount of extravasated solution and notify the prescriber.
- Administer the appropriate antidote according to facility protocol, as ordered.
- Elevate the extremity and perform frequent assessments of sensation, motor function, and circulation.
- Record the extravasation site, patient symptoms, estimated amount of extravasated solution, and treatment.
- Follow the manufacturer recommendations to apply either cold or warm compresses to the affected area.
- Perform venipuncture in a different location and restart the infusion as ordered, after changing IV tubing (per facility protocol).
- Continue to check the site frequently, then document findings and interventions.

Infection
*Infection* refers to local or systemic signs of infection in patients with a PIV in place.

Signs and symptoms:
- Pain, tenderness, redness, or discharge at or near PIV insertion site
- Body temperature elevation *may* be present

Prevention:
- Perform hand hygiene, don gloves, and use aseptic technique for PIV insertion
- Clean the site with approved skin antiseptic prior to PIV insertion, making sure to not touch the site again after it is cleaned.
- Ensure careful hand hygiene before contact with the infusion system or the patient.
• Clean injection ports with alcohol, using friction for 15 seconds, on all exposed surfaces prior to each use.
• Follow your facility-specific policy for dressing changes and changing of solutions and administration sets.

Management:
• At earliest sign of complications, stop infusion and notify prescriber.
• Remove the device, and culture the insertion site or catheter as ordered.
• Administer medications as prescribed, continuing to monitor patient vital signs.

Phlebitis
Phlebitis is inflammation of a vein and may be caused by chemical, mechanical, or bacterial insults to the vein lining. Chemical phlebitis is often associated with the infusion of acidic, alkaline, or high-osmolarity solutions. Mechanical phlebitis can result from trauma to the vein during the insert of a PIV, through the use of an inappropriately large PIV for the vein, or prolonged use of the same PIV site. Bacterial phlebitis may result from poor aseptic technique on insertion and may be related to emergent placement of PIVs.

Signs and symptoms:
• Pain, tenderness, warmth, erythema
• Swelling, induration, purulence
• Palpable venous cord

Prevention:
• Use proper venipuncture technique for PIV insertions.
• Use a trusted drug reference, or consult with the pharmacist for instructions on drug dilution.
• Monitor administration rates and inspect the PIV site frequently.
• Change the infusion site in accordance with facility policy.

Management:
• At the first sign of redness or pain, stop the infusion.
• Apply a warm, moist compress to the PIV site.
• Assess patient condition then document findings and interventions.
• If indicated, insert a new PIV at a different site, preferably on the opposite arm, using a larger vein or a smaller device and restart the infusion as ordered, after changing IV tubing (per facility protocol).

Hypersensitivity
Hypersensitivity reactions are immediate, severe reactions that can be life-threatening. Hypersensitivity reactions can be induced by medications and require prompt recognition and treatment.
Signs and symptoms:
- Sudden onset of fever
- Rash, urticaria
- Wheezing, bronchospasm
- Joint swelling

Prevention:
- Assess patient allergies prior to administration of medications
- For infants younger than three months, assess the allergy history of the mother, as maternal antibodies may still be present.
- Stay with the patient for the first five to ten minutes of any new infusion to detect early signs of hypersensitivity.
- When administering a new drug to the patient, monitor patient at intervals in accordance with facility policy.

Management:
- Discontinue the infusion and notify the prescriber immediately.
- Administer medications as ordered.
- Monitor the patient's vital signs and provide emotional support.

References:
