POLICY:	**Ultrasound Guided Peripheral Intravenous (USGPIV) Insertion**
Program Area:	**Across Care Areas**
Section:	**General**
Reference Number:	**CLI.4110.PL.027**
Approved by:	**Regional Lead – Acute Care & Chief Nursing Officer**
Date:	Issued 2023/Aug/10 Revised 2025/Feb/20

Patients were engaged in the development of this policy.

PURPOSE:

To provide an evidence based standardized approach to ultrasound guided peripheral intravenous (USGPIV) insertion.

BOARD POLICY REFERENCE:

Executive Limitation (EL-02) Treatment of Clients

POLICY:

The standard of practice for peripheral intravenous (PIV) insertion is the visual inspection, palpation and landmark method. When this standard practice is unsuitable for clients with difficult intravenous access (DIVA), ultrasound guided peripheral intravenous (USGPIV) insertion is an alternate vascular access option. Only health care professionals (HCPs) that have this skill included in their standard scope of practice (ie., physicians) or HCPs with additional certification and competency in this skill will perform this specialized skill in Southern Health-Santé Sud (SH-SS). USGPIV insertion is not part of the standard scope of practice for nurses in SH-SS.

HCPs that require additional certification and competency to perform USGPIV insertion require supervisor/manager approval and completion of an SH-SS approved education program that includes three components:

1. On-line learning,
2. Classroom learning with simulated practice, and
3. Clinical practicum with a minimum number of successful USGPIV insertions.

HCPs with additional certification in USGPIV insertion maintain competency through annual requirements (tracking to be done at facility level):

- Completion of 20 self-reported successful insertions (10 every 6 months) documented on an "Ultrasound Guided Peripheral Intravenous Insertion Log (CLI.4110.PL.027.FORM.01)"; and

- Demonstration of a successful insertion under the observation of a USGPIV insertion colleague or mentor using the "Ultrasound Guided Peripheral Intravenous (USGPIV) Procedure Checklist (CLI.4110.PL.027.FORM.02)".

Some HCPs require more than the above requirements to maintain competency as determined through self-assessment or assessment/direction by others. HCPs with additional certification that are unable to maintain competency are not permitted to perform USGPIV insertions in SH-SS and will receive direction and follow up on a case by case basis.

DEFINITIONS:

Authorized Prescriber - a Health Care Professional who is permitted to prescribe medications and/or treatments as defined by provincial and federal legislation, his/her regulatory college or association, and practice setting.

Aseptic Technique - a set of infection prevention actions to protect patients from infection during invasive clinical procedures and maintenance of indwelling medical devices.

Aseptic Non Touch Technique (ANTT) - an international clinical practice standard that is a type of aseptic technique used for clinically invasive procedures that achieves demonstrated evidence based proof of reductions in Healthcare Associated Infections (HAIs) across care areas.

Competency - the ongoing ability of a Health Care Professional (HCP) to integrate and apply the knowledge, skills, judgment and personal attributes required to practice safely and ethically in a designated role and setting.

Health Care Professional (HCP) - refers to all Health Care Professionals (HCPs) including those regulated by the Regulated Health Professionals Act (RHPA) engaged in actions whose primary intent is to enhance health, including those who promote and preserve health, those who diagnose and treat disease, manage health and includes professionals with specific areas of competence.

Extravasation - the inadvertent infiltration of vesicant solution or medication into surrounding tissue.

Infiltration - the inadvertent administration of a non-vesicant solution or medication into surrounding tissues.

Vesicant - an agent capable of causing blistering, tissue sloughing or necrosis when it escapes from the intended vascular pathway into surrounding tissue.

IMPORTANT POINTS TO CONSIDER:

- A vascular assessment is performed on clients to determine the best vascular access method for meeting client care needs (ie., peripheral versus central vascular access). Factors that increase difficulty with locating veins include, but are not limited to:
    - Disease processes that result in structural vessel changes (ie., diabetes mellitus, hypertension),

    - History of frequent venipuncture and/or lengthy courses of infusion therapy,
    - Variations in skin between patient populations, such as darker skin tones and excessive hair on the skin,
    - Skin alterations, such as the presence of scars or tattoos,
    - Patient's age,
    - Obesity, and/or
    - Fluid volume deficit.
- Vascular access device complications include:
    - Phlebitis - See Table 1 - Phlebitis Scale and Table 2 - Visual Infusion Phlebitis Scale in Illustration section of Elsevier Skills: Intravenous Therapy: Ultrasound-Guided Initiation - CE (elsevierperformancemanager.com),
    - Infiltration and extravasation - See SH-SS "Extravasation Management of Non-Chemotherapeutic Medications" CLI.6010.SG.003 policy for further detail and "Extravasation List of Irritant Drugs" CLI.6010.SG.003.SD.01 for infuscate with irritant or vesicant potential,
    - Nerve injury - Immediately remove intravenous (IV) catheter if nerve damage related to insertion is suspected (ie., severe electrical shock-like pain, numbness or tingling),
    - Occlusion,
    - Infection - Vascular Access Devices (VADs) are a high risk to cause Healthcare Associated Infections (HAIs). Using Aseptic Non-Touch Technique (ANTT) during USGPIV insertion is best practice for reducing the risk of infection,
    - Catheter damage,
    - Air embolism,
    - Catheter associated deep vein thrombosis,
    - Malposition-Immediately remove IV catheter and apply pressure if an artery is inadvertently accessed, and/or
    - Catheter associated skin injury.
- Significant complications (ie., nerve injury, arterial puncture) are captured through the occurrence reporting process.
- Tourniquets are single patient use and are not applied for more than 2 to 3 minutes.
- An order from an authorized prescriber is required for infusion therapy.

PROCEDURE:

I. Preprocedural Assessment

- Review patient's health record:
    - Note documented allergies,
    - Patient age and physical condition, and
    - Assess the characteristics of the prescribed infusion therapy and the anticipated length of therapy to determine if USGPIV is the most appropriate VAD.
- Select insertion site:
    - Assess the condition of the skin and previous sites of venipunctures and/or infusion complications (ie., phlebitis, infiltration) and avoid these areas for USGPIV insertion, and

- Discuss arm preference with the patient and the recommendation for use of the nondominant arm to decrease accidental removal.

- Assess vasculature with ultrasound device:
  - Check that ultrasound machine battery is charged,
  - Ensure ultrasound probe is disinfected prior to patient use according to manufacturers' instructions and organizational policy,
  - Adjust ultrasound settings for orientation and visual display,
  - Perform hand hygiene,
  - Apply liberal amount of ultrasound gel to the patient's arm,
  - Without a tourniquet, apply probe to the skin: visualize and note the location of the veins, arteries, and nerves surrounding the proposed insertion site,
    - Apply light downward pressure with ultrasound probe. When compressed, arteries are pulsatile; healthy veins compress easily. Nerves appear as echogenic bundles adjacent to veins and arteries, and caution is used to avoid nerve stimulation.
    - Assess veins for vessel size, path, round shape, and compressibility without a tourniquet.
    - Assess depth of intended vessel for venipuncture.
    - Assess for adequacy of vessel size compared to proposed outer catheter diameter to promote hemodilution and preserve vessel health. See "Catheter to Vessel Ratio for Peripherally Inserted Central Catheters (PICCs) & Ultrasound Guided Peripheral Intravenous (USGPIV) Insertions (CLI.4110.PL.027.SD.01)".
    - Avoid selecting smaller vessels to prevent phlebitis and thrombosis.
    - Longitudinal or transverse views are an option to consider when placing vascular catheters with ultrasound. Surrounding structures are not visible in the longitudinal view.
  - Assessment of vessel depth is critical, because selection of the appropriate length catheter will prevent inadvertent infiltration.
  - Vessels > 0.5 cm deep have an increased risk for inadvertent infiltration as the result of the use of short catheters; choose catheters long enough to ensure at least two-thirds of the catheter length resides in the vein after insertion.
  - Power injection of ultrasound-guided VADs results in extravasation if sufficient catheter length does not dwell in the vessel.
  - Vessels > 1.5 cm below the surface of the skin is avoided and an alternative vascular access plan is developed.

II. Patient Education

- Prior to procedure, teach patient and family using the "Ultrasound Guided Intravenous (IV) Therapy - Teaching Handout (CLI.4110.PL.027.SD.02/CLI.4110.PL.027.SD.02.F)":
  - Purpose of USGPIV insertion, procedure, including risks and benefits,
  - Signs and symptoms of common complications,
  - How and to whom to report complications and
  - Rationale for use of ultrasound.

III. Preprocedural Preparation

1. Perform hand hygiene before direct contact with patient and subsequently as required throughout procedural steps.
2. Verify patient identity using two identifiers (ie., name and date of birth).
3. Obtain and review authorized prescriber's order for infusion therapy.
4. Obtain informed consent.
5. Disinfect work area with antimicrobial solution; allow it to dry completely.
6. Prepare for insertion, collect necessary insertion supplies, and set up sterile field.

IV. Insertion Procedure

1. Position patient for comfort and equipment for visualization of the vasculature.
2. Perform hand hygiene.
3. Prepare the insertion site:
    - If visibly soiled, cleanse with antiseptic soap and water.
    - Remove excess hair, if necessary, by clipping.
4. Apply topical anesthesia, if needed, unless there is an allergy or sensitivity to topical anesthetic.
    - Lidocaine 1% 0.2-0.3mL intradermal injection, or
    - EMLA cream (lidocaine/prilocaine 5 g)
5. Cleanse insertion site with 2% chlorhexidine, 70% alcohol solution using back and forth motion for at least 30 seconds; allow to dry completely.
    - Use an iodophor (ie., povidone-iodine) or 70% alcohol if chlorhexidine solution is contraindicated. Allow it to remain on skin 1.5 to 2 minutes or longer to completely dry.
    - Use aqueous chlorhexidine if there is a contraindication to alcohol-based chlorhexidine.
6. Prepare equipment:
    - Add supplies to sterile field.
    - Apply a bead of ultrasound gel to the ultrasound probe.
7. Apply tourniquet.
8. Do hand hygiene and apply sterile gloves.
9. Place sterile drape over patients arm.
10. Apply a small amount of sterile ultrasound gel to the prepped area.
11. Cover ultrasound probe with sterile probe cover.
12. Relocate the intended vein with the ultrasound probe, verifying it is non-pulsatile.
13. Place the tip of the catheter on the skin at a distance from the probe that will intersect the vein within the plane of the scan field as the catheter is advanced to the intended vein's depth. Pierce the skin using a shallow enough angle to allow for successful threading of the catheter into the vessel. Move the ultrasound probe toward the catheter to identify the catheter tip. Move the ultrasound probe and the needle in the same direction, keeping the needle tip in view on the screen as the catheter approaches the vein. Observe for dimpling of the tissue and vessel wall as the needle tip approaches and enters the lumen of the intended vessel. Make sure to keep the gel and probe away from the sterile catheter.
    - The tip of the catheter stylet appears as an echogenic white dot on the screen.

14. Align the path of the needle to enter the centermost superficial area of the vein wall and observe the needle tip entering the lumen of the vein. The needle tip remains in view at all times. If the inserter is unable to visualize the tip of the needle, move the probe, not the needle, to reestablish visibility. Otherwise, inadvertent nerve or arterial puncture could occur.
15. Confirm slow venous blood return is the color and consistency of whole blood.
    - If blood return is pulsatile, immediately abort the procedure by removing the needle and tourniquet and applying pressure to the area for 10 minutes or until hemostasis is achieved.
16. Place the ultrasound probe on the sterile field.
17. Decrease the angle of the catheter, advance the catheter into the vein and retract the catheter stylet according to manufacturer instructions.
18. Release tourniquet.
19. Attach needleless connector or other appropriate add-on device primed with preservative-free 0.9% sodium chloride.
20. Flush catheter.
    - If needed, retrieve probe from sterile field and position over catheter tip in the longitudinal view to ensure the catheter is properly seated in the vein and that inadvertent infiltration has not occurred during insertion.
21. Confirm blood return, lack of resistance to flush, and absence of swelling or tenderness at site.
22. Catheters placed in the antecubital space or within another area of flexion require joint stabilization to prevent infiltration/extravasation.
23. Consider use of a skin barrier for patients at risk for skin breakdown and apply a transparent semipermeable membrane (TSM) dressing over the insertion site.
24. For added securement, curl the extension set to the side and tape to the arm. Do not 'wrap' the tape around the extremity.
25. Discard used supplies in the appropriate receptacles.
26. Remove gloves and perform hand hygiene.
27. Label dressing with:
    - Insertion date and time
    - Gauge and length of device
    - Initials of inserter
28. Perform probe disinfection according to organizational policy and manufacturers' instructions.

Documentation

- Document in the patient's health record:
    - Use of USGPIV insertion,
    - Date and time of insertion, number of attempts, functionality of device, anesthetic used, inserter name/identification,
    - Identification of the insertion site by anatomical descriptors, laterality, landmarks, or appropriately marked drawings,
    - Catheter gauge and length,
    - Dressing and securement type,
    - Patient response to the procedure, and

- Patient education.

EQUIPMENT/SUPPLIES:

- Sterile gloves
- Peripheral IV with safety mechanism
- Single-use clippers or scissors for hair removal, if indicated
- Topical anesthetic, as indicated
- Securement device or method
- Short extension set, if not permanently attached to the catheter
- Needleless connector
- Preservative-free 0.9% sodium chloride prefilled syringe(s) or primed administration set
- Primed administration set (as appropriate).
- IV start kit or the following:
  - Single-use tourniquet
  - Antiseptic solution
  - Sterile alcohol-free skin barrier product
  - TSM dressing (preferred)
  - Sterile gauze and sterile tape for dressing, if indicated
  - Label
- For ultrasound:
  - Disinfected ultrasound probe
  - Sterile, single-use ultrasound gel packet(s)
  - Sterile ultrasound probe cover
  - Portable ultrasound machine

SUPPORTING DOCUMENTS:

CLI.4110.PL.027.FORM.01	Ultrasound Guided Peripheral Intravenous Insertion Log
CLI.4110.PL.027.FORM.02	Ultrasound Guided Peripheral Intravenous (USGPIV) Procedure Checklist
CLI.4110.PL.027.SD.01	Catheter to Vessel Ratio for Peripherally Inserted Central Catheters (PICCs) & Ultrasound Guided Peripheral Intravenous (USGPIV) Insertions
CLI.4110.PL.027.SD.02	Ultrasound Guided Intravenous (IV) Therapy - Teaching Handout
CLI.4110.PL.027.SD.02.F	Ultrasound Guided Intravenous (IV) Therapy - Teaching Handout – French

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