DISTRIBUTED SIMULATION PROJECT

Peripheral IV Cannulation

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Objectives
Having completed the IV cannulation workshop you will be able to:

• Describe the basic anatomy and physiology of the superficial veins of the arms and hands
• Locate and assemble required equipment for IV cannulation or venepuncture
• Perform a successful IV cannulation on the training arm
• Demonstrate awareness of Infection Control guidelines and O H & S practices as per organisation policy
• Be aware of documentation requirements in relation to cannulation
• Demonstrate critical thinking relevant to managing the risks and complications of IV cannulation
• Identify patient education requirements
Anatomy and physiology

• Approximately 2/3 of total blood volume is in the veins which transport deoxygenated blood to the heart from the tissues

• Veins are thin-walled, fibrous, have a large diameter and low pressure

• Veins contract to propel the blood through the vein towards the heart

• Some veins contain valves to regulate the one way flow to the heart (usually lower limbs)

• The skeletal muscle pump influences venous return

• Superficial and deep veins
Anatomy and physiology cont

Blood vessel walls have three layers

- Tunic Intima
  innermost, epithelial lining

- Tunic Media
  Elastic and Smooth muscle fibres and nerve supply

- Tunic Externa
  Outer coat
Anatomy and physiology \textit{cont}

Major veins of the arm

- Dorsal
- Cephalic
- Basilic
- Cubital Fossa
Anatomy and physiology
Anatomy and physiology cont
Cannulae

- 14G  • Large volume replacement
- 16G  • Rapid transfusion of whole blood or blood components
- 18G  • IV maintenance, NBM patients
- 20G  • IV analgesia
- 22G  • Paediatrics, elderly, chemotherapy patients
- 24G  • Paediatrics, neonates
Equipment

- Dressing/IV trolley with sharps container and waste bag
- Dressing pack
- Gloves (sterile)
- Alcoholic chlorhexidine
- Transparent semi permeable dressing
- Cannula (size depending on need)
- Giving and Extension set (and prescribed IV fluids)
- Water proof protective cover
- Syringe 10ml with 0.9% Normal saline
- Tourniquet
- Fluid balance sheet
Assessing & preparing the patient

- Check patient for baseline vital signs, diagnosis and allergies to medications, cleansing fluids & dressings
- Provide a clear explanation of the procedure including potential adverse and side effects
- A relaxed patient is generally easier to cannulate
- Assess the dominant/non-dominant side and check the veins for status and suitability
Preparing equipment

• Equipment should be gathered on trolley in treatment room with sharps container

• IV fluids should be prepared by priming the giving set

• The equipment should not be opened until in the patient’s room and patient education, assessment of vein and appropriate positioning has been attended
Positioning the patient

• If possible use the non dominant arm
• Raise bed prior to procedure
• Place the arm in a supported comfortable position
• Use a tourniquet to find vein but release it while you are getting equipment ready
• Position patient with pillows or towels
• Have IV trolley close by
Preparing vein

Warm veins by

- Rubbing
- Washing client’s hands under warm water
- Apply warmed towel
- If limb is warm ask the patient to gently clench and unclench their hand
- Or gently rub up and down the vein
Before inserting cannula

• The tourniquet is applied above the IV insertion site and should not be left on for more than 2-3 minutes

• Don gloves and clean site with appropriate solution using a circular outward movement

• Allow site to air dry or dry with sterile swab
Inserting the cannula

- Hold cannula and rotate the barrel 360 degrees
- Apply skin traction to immobilise the vein
- Ensure cannula has bevel side **UP** and insert at approximately 30 degree angle
- You will see a flashback of blood in the chamber once you have pierced the vein
- Then advance the cannula a few more millimetres and then flatten the cannula, stabilise the device and advance the cannula until at skin level
- Remove the stylet and apply pressure just beyond the catheter tip
Inserting the cannula cont

• Gently stabilise the cannula hub
• Release the tourniquet
• Attach the extension line
• Apply dressing and secure cannula
• Flush cannula with 5-10ml 0.9% sodium chloride to ensure patency
• Connect to IV fluid
• Dispose of sharps and waste
• Document in patient notes
Dressing

• A transparent sterile occlusive dressing is the optimal dressing to use
• Before applying dressing, ensure site is clean of blood and moisture
• Check with patient re allergies to dressings
Documentation

- Site of insertion - vein and arm/hand
- Type and gauge of cannula
- Date and time of insertion
- Type and amount of IV solution
- Reason for IV therapy

“Because of the invasive nature of I.V. therapy, patients may experience unexpected problems, even with diligent nursing care. Your careful documentation helps prove that the care you provided met the standard of care…” (Rosenthal, 2005, p.28)
Potential complications

• Extravasation
• Haematoma
• Phlebitis
• Venous Spasm
• Occlusion
• Thrombophlebitis
• Infection
Extravasation
The infiltration of a drug from an I.V. line into surrounding tissue.

Causes
• Catheter erodes through the vessel wall at a second point,
• Increased venous pressure causes leakage around the venepuncture site
• When a needle pulls out of the vein.
• Vesicant drugs/solutions may cause severe tissue injury

Signs & Symptoms
• Oedema and changes in the site's appearance
• Coolness of the skin.
• Slowing of infusion
• Pain or a feeling of tightness around the site.
• Possible consequences include necrotic ulcers, infection, disfigurement, and loss of function.

Intervention
• Remove cannula
• Elevate affected arm
• Apply ice pack (early) or warm compress (late)
Haematoma

Localised collection of extravasated blood, usually clotted, in an organ or tissue.

Cause

• Blood leaking out of the vein into the tissue due to puncture or trauma

Signs & Symptoms

• Swelling, tenderness and discolouration

Prevention

• Proper device insertion
• Pressure over site on removal of cannula

Intervention

• Apply appropriate pressure bandage, monitor the site
Phlebitis

Inflammation of the vein

Cause

• Poor aseptic technique
• High osmolarity I.V. infusions or drugs
• Trauma to the vein during insertion/incorrect cannula gauge
• Prolonged use of the same site

Signs & Symptoms

• Tenderness, redness, heat and oedema
• Advanced-induration, palpable venous cord

Intervention

• Remove cannula
• Apply warm compress
• Observe for signs of infection
• If phlebitis is advanced antibiotics may be required
Venous spasm

Spasm of the vein wall

Cause
- Patient anxiety
- Cold I.V. fluids
- Drug irritation
- Trauma to the vein during cannula insertion

Signs & Symptoms
- Pain
- Slowing of the I.V. infusion
- Blanching at the insertion site
- Vein difficult to palpate

Intervention
- Apply warm compress
- Slow the infusion rate
- Reassure the patient
Occlusion

Slowing or cessation of fluid infusion due to:
• Fibrin formation in or around the tip of the cannula
• Mechanical occlusion (kink) of the cannula

Cause
• Cannula not flushed
• Kinking of the cannula
• Back flow or interrupted flow

Signs & Symptoms
• I.V. not running
• Blood in the line
• Discomfort

Intervention
• Check for kinks in cannula
• Raise IV higher
• Remove cannula
Thrombophlebitis

Formation of a thrombus and inflammation in the vein, usually occurs after phlebitis.

Cause

• Injury to the vein
• Infection
• Chemical irritation
• Prolonged use of the same vein

Signs & Symptoms

• Tenderness/redness
• Heat/oedema
• Cordlike appearance of the vein
• Slowing of the IV infusion

Intervention

• Remove cannula
• Observe for signs of infection
• Change cannula frequently (48-72hrs)
Infection

Pathogen in the surrounding tissue of the I.V. site.

Cause
• Lack of asepsis
• Prolonged use of the same site

Signs & Symptoms
• Tenderness and swelling
• Erythema/purulent drainage

Intervention
• Remove cannula
• Antibiotics may be required
• Documentation
STOP!
CHECK.
FAIL!
Preventing complications

- Know your organisation’s policy on IV therapy
- Check and inspect the IV site regularly as per your facility policy
- Ask the patient how the IV site feels
- Document
- Troubleshoot at first sign
- Report any problems
Hints

Successful peripheral intravenous cannulation increases with:

- Meticulous attention to proper technique
- The use of proper equipment
- Familiarity with anatomy
- Knowledge of a variety of approaches to accessing peripheral veins
- Knowledge of the latest evidence in the area (this should drive your organisation’s policies around cannulation and IV management)
IV access decision tree

Infusion therapy process model


1. Therapy Consideration
   - Administration Rate
   - Nature of Fluids/Meds
     - pH
     - Irritant
     - Viscosity
     - Osmolarity
   - Duration
   - Purpose

2. Patient Consideration
   - Age
   - Mobility
   - Site of Care
   - Orientation
   - Disease State
   - Education Needs

3. Site Assessment & Evaluation
   - Access Limitations
   - Insertion Difficulty
   - Vein
     - Size
     - Valves
     - Location
     - Condition
     - Availability
   - Skin Status

4. Device Selection
   - Cost-in-use
   - Safety Features
   - Device Material
   - Risk Assessment
   - Patient Preferences
   - Therapy Considerations

5. Clinician Selection
   - Paramedics
   - Medical Officers
   - Registered Nurses
   - IV Nurse Specialist
   - Technicians

6. Site Preparation
   - Hair Removal
   - Local Anaesthetic
   - Appropriate Application
   - Antimicrobial Awareness

7. Insertion
   - Infection Control Practices
   - Safety Practices
   - Insertion Speed
   - Insertion Angle
   - Vein Dilation
   - Skin Traction
   - Needle Disposal
   - Catheter Advancement

Outcomes
1. Successful completion of infusion therapy
2. Reduced catheter related complications
3. Minimised number of venepunctures per patient
4. Reduced supply related costs
5. Reduced labour related costs
6. Patient satisfaction
7. Reduced exposure to blood borne pathogens

UTAS
References


• Institute of Health and Nursing Australia, IV cannulation video. [http://www.youtube.com/watch?v=WvA6LR_q8yQ](http://www.youtube.com/watch?v=WvA6LR_q8yQ)


