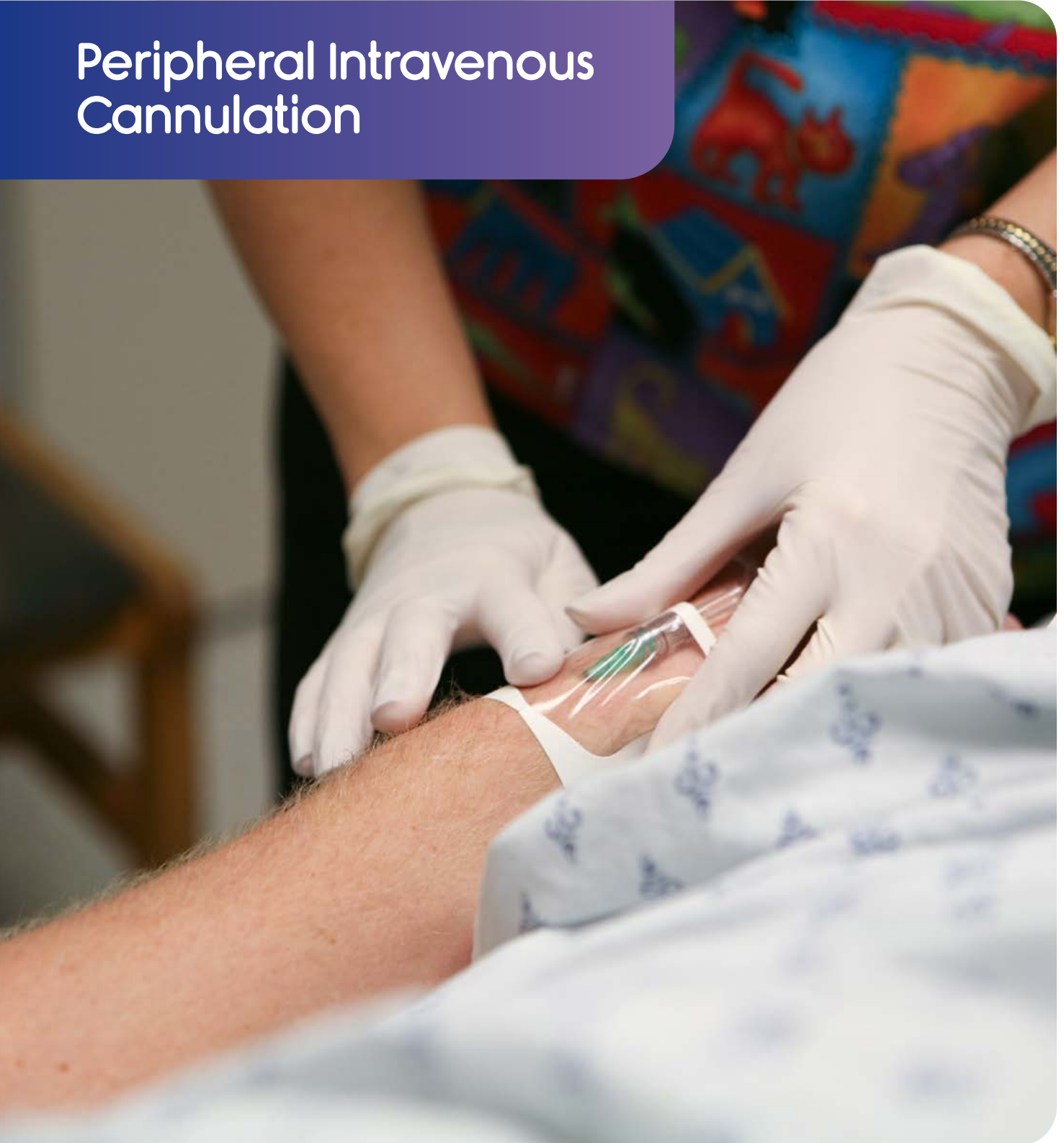


## Peripheral Intravenous Cannulation





In the spirit of reconciliation Premium Health acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respects to their elders past, present and emerging and extend that respect to all Aboriginal and Torres Strait Islander peoples today.

# OUR PROMISE



**Premium Quality,  
without compromise.  
It's the Premium Health  
promise.**



**Phillipa Wilson**

Founder & Managing Director of Premium Health

**Our Trainers are  
Experienced Nurses  
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Passionate about sharing  
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We pride ourselves on the depth  
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PUBLISHER: PREMIUM HEALTH  
WRITTEN BY: PHILLIPA WILSON

The technical information and techniques used for first aid management includes the latest knowledge from research and other relevant national and international professional bodies.

Special acknowledgement is given to the Australian Resuscitation Council for the information relating to their Guidelines.

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## Welcome to your course and Premium Health.

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The aim of this resource is to provide the essential knowledge and skills required in your training.

We select our Premium Health trainers and assessors carefully. All are either nurses or paramedics with appropriate training qualifications, technical expertise and experience.

# PERIPHERAL INTRAVENOUS CATHETER (PIVC) INSERTION WORKBOOK

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# TRAINING AND ASSESSMENT INFORMATION ABOUT YOUR COURSE

## Welcome

Welcome to your course and Premium Health. The aim of this workbook is to provide the essential knowledge and skills you require to perform IV cannulation..

## Helping you to succeed in your course

We believe learning should be an enjoyable and challenging process and we understand that each learner is different. A variety of methods such as class participation, group discussion, scenarios, workbook exercises and opportunities for practice will help you to achieve competency.

We select our Premium Health trainers and assessors carefully. All are either registered nurses or paramedics with appropriate qualifications, technical expertise and experience in both education and emergency first aid care to enable them to provide you with training. Where there are any difficulties with reading, writing, understanding English or a physical disability, training approaches can be varied to support learning and assessment.

## Learning outcomes

On completion of this course you will be able to:

- Explain the importance of a team approach to patients needing peripheral access and improving outcomes
- Identify legal and professional responsibilities related to the practice of intravenous cannulation
- Identify the reasons for inserting an intravenous cannula
- Identify patient education requirements
- Describe the basic anatomy and physiology of the superficial veins of the arms and hands
- Locate and name potential intravenous cannulation sites
- Locate and assemble required equipment for IV cannulation
- Apply appropriate techniques when practicing intravenous cannulation on a demonstration arm
- Demonstrate awareness of Infection Control guidelines
- Be aware of documentation requirements in relation to cannulation
- Identify potential complications and strategies to minimise these complications.

## Statement of Attainment and Currency

A Statement of Attainment will be issued upon successful completion of your course. The Australian Resuscitation Council recommends, and industry requirements often specify, a CPR and oxygen assessment be done every 12 months to ensure current competency.

## Evaluation of the course

An evaluation form is provided at the back of this workbook. Your feedback is vitally important to us as we use this as part of our continuous improvement cycle. We especially value any personal comments you would like to make. Please complete the evaluation sheet at the end of your course.

## Premium Health's Customer Service

We offer you an on-going service in relation to first aid information and invite you to call our office on **1300 72 12 92** or email us on [info@premiumhealth.com.au](mailto:info@premiumhealth.com.au).

For more information about Premium Health products, services and policies, access our website [www.premiumhealth.com.au](http://www.premiumhealth.com.au).

# PROFESSIONAL RESPONSIBILITIES IN PRACTICE

## UNDERSTANDING YOUR RESPONSIBILITIES

The insertion of peripheral IV cannula by nursing staff has become fairly commonplace in many organisations. Whilst this expansion to nursing practice is an advantage it is essential that nurses are aware of the professional and legal implications of undertaking invasive procedures.

Understanding your responsibilities when undertaking nursing procedures is of utmost importance, especially when you are performing a procedure that requires specialist skills and knowledge. As part of your Registration as a nurse you undertake to meet these professional responsibilities.

The Nursing and Midwifery Board of Australia (NMBA) regulates the practice of nursing and midwifery in Australia, and one of its key roles is to protect the public. The NMBA does this by developing registration standards, professional codes, guidelines and standards for practice that together establish the requirements for the professional and safe practice of nurses and midwives in Australia.

Professional Standard of practice goes beyond simply performing a task. It also encompasses the ability to utilise the knowledge, principles and judgement that underpin clinical practice procedures.

Some key points from the Code of Professional Conduct for Nurses in Australia are:

- Nurses must perform only those clinical procedures for which they have been educationally prepared and in which they have demonstrated competence
- Maintenance of knowledge and competence in performing clinical procedures is essential and it is the responsibility of the individual to ensure their competence is maintained through regular review
- Nurses are accountable for making professional judgements about when an activity is beyond their own capacity or scope of practice and for initiating consultation with, or referral to, other members of the health care team

## SCOPE OF PRACTICE

You are responsible for obtaining and adhering to organisational guidelines. You must have appropriate theory and skill preparation and maintain your individual accreditation in compliance with institutional or hospital guidelines. You must ensure you review your organisation's authorising document for IV cannulation and check the following points:

- ✓ Do the circumstances listed reflect common practice in your workplace?
- ✓ Is there a statement excluding patients with particular conditions?

Nurses should be aware of the policies and procedures of their employing organisation. However, it should be noted that acting within a guideline or policy statement of an employer, any other organisation or professional group does not relieve them of responsibility for their own acts and may not provide immunity in case of negligence.

## REGISTERED NURSE STANDARDS FOR PRACTICE (2016)

The Registered nurse standards for practice are the core practice standards that provide the framework for assessing RN practice. These standards replace the National competency standards for the registered nurse that were first published in 2006 by the Australian Nursing and Midwifery Council (ANMC) and adopted by the NMBA at the start of the National Registration and Accreditation Scheme (the National Scheme) in 2010.

### The Registered nurse standards for practice consist of the following seven standards:

- thinks critically and analyses nursing practice
- engages in therapeutic and professional relationships
- maintains the capability for practice
- comprehensively conducts assessments
- develops a plan for nursing practice
- provides safe, appropriate and responsive quality nursing practice
- evaluates outcomes to inform nursing practice

## PATIENT CONSENT

IV cannulation is an invasive procedure that requires more than a simple explanation and reassurance. Valid and informed consent must be gained from the patient or their legal guardian before the procedure is performed. It is your responsibility to ensure the patient has a good understanding of the need for the IV cannulation, what the procedure involves and the associated risks.

# INTRAVENOUS CANNULATION

A PIVC is a small flexible tube that is inserted through the skin into a small vein in the arm, hand or foot (peripheral vein). A PIVC is also known as a peripheral venous line or peripheral intravenous cannula and commonly referred to as an 'IV' or a 'drip'. PIVCs are usually inserted in the arm.

<https://www.safetyandquality.gov.au/publications-and-resources/resource-library/management-peripheral-intravenous-catheters-clinical-care-standard-2021>

## PIVC STATISTICS

- up to 70% of hospitalised patients require at least one PIVC at some point during their hospital stay
- between 4% and 28% of PIVCS inserted are not needed
- this increases to 50% in the emergency department, where a PIVC is often inserted 'just in case'
- up to 69% of PIVCS are associated with complications, leading to up to 90% of PIVCS if a patient has one PIVC failure, the risk of future PIVCs failing is greater

## PURPOSE OF INTRAVENOUS THERAPY

The purpose of intravenous therapy is to:

- administer fluids and electrolytes
- administer blood and blood products
- administer medication directly into a vein
- emergency access in patients at risk of medical emergencies and those undergoing investigative procedures

A peripheral cannula may be unsuitable where there is a need for:

- administration of particular irritant fluids or drugs (e.g. high osmolality solutions)
- excessively large volume transfusions
- high flow rate > 320ml/min

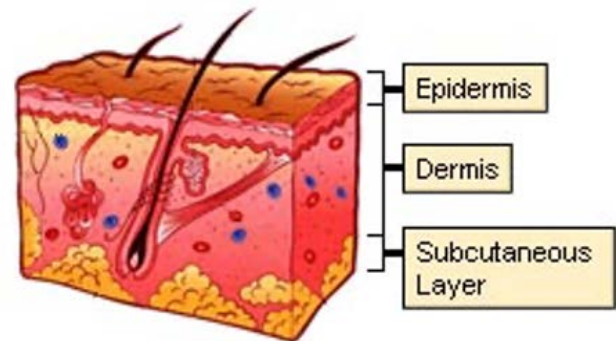
Insertion of a peripheral cannula for therapeutic or diagnostic purposes should only be performed on instruction from a medical officer and with consent from the patient.

## ANATOMY AND PHYSIOLOGY

A working knowledge of the skin and peripheral anatomical structures is necessary prior to commencing the procedure for IV cannulation.

## SKIN

<b>Epidermis</b>	Top protective layer that varies in thickness. Thinnest in the inner aspects of limbs and tends to thin with aging.
<b>Dermis</b>	Highly sensitive layer due to the large number of nerves which react to temperature, touch, pressure, and pain. Tends to be highly vascular as it contains many capillaries. Number of nerve fibres varies therefore certain IV sites may be more painful than others.
<b>Subcutaneous Tissue</b>	Lies between the two layers of skin may be a potential site of cellulitis if strict asepsis is not observed.



Layers of the skin

## BLOOD VESSELS

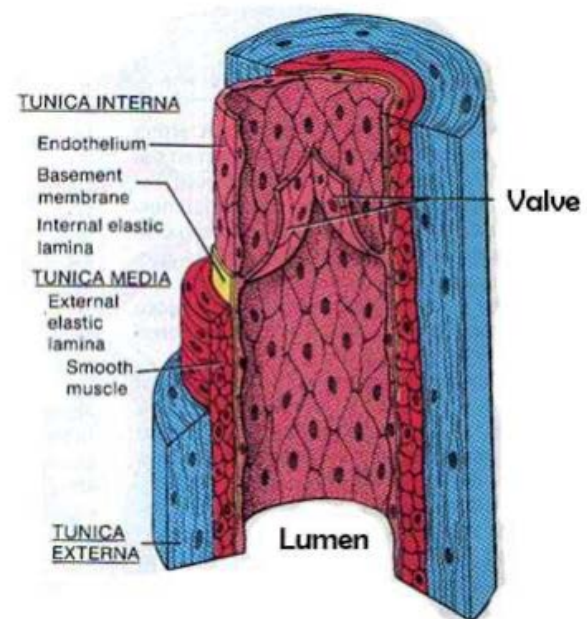
All blood vessels consist of three distinct layers all with specific characteristics.

<b>Tunica Externa (or Adventitia)</b>	<p><b>Outer layer</b></p> <p>Consists of connective tissue as well as collagen and elastic fibres that support and protect the veins. This is where the characteristic “pop” occurs when the vein is penetrated.</p> <p>In elderly patients changes may have occurred which make veins tortuous this often necessitate good skin traction in order to thread off the cannula.</p>
<b>Tunica Media</b>	<p><b>Middle layer</b></p> <p>This layer is composed of smooth muscle and elastic tissue. Nerve fibres located in this area constrict and dilate the vessel. Stimulation of this layer can cause vasospasm and it is generally where the patient feels pain. Prolonged tourniquet application may overstretch the vessel causing it to flatten.</p> <p>In elderly patients degenerative processes and the replacement of muscle fibres by collagen and fatty plaque may affect the vessels ability to dilate and constrict thus making it more difficult to access a vein in these patients.</p>
<b>Tunica Intima</b>	<p><b>Inner layer</b></p> <p>The inner layer and consists of a smooth, elastic endothelial lining. This surface allows for an uninterrupted flow of blood cells through the vein. The endothelial lining has several different functions, one of which is its immunologic properties that cause it to recognise foreign bodies within the vein.</p> <p>Damage to the endothelial lining or introduction of foreign material initiates an inflammatory response. Complications that may develop from damage to the tunica intima include phlebitis and thrombus formation.</p>

## VEINS

- approximately 2/3 of total blood volume is in the veins that 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
- can range in size from 1 millimeter to 1-1.5 centimeters in diameter

*Aberrant Artery:* A superficial artery located in an unusual place. This must not be mistaken for a vein. Infusion of chemicals causing vasospasm into an aberrant artery may cause permanent damage.



Vein structures

# INITIATING IV THERAPY

In order to initiate IV therapy it is necessary to consider the following:

- assessment of the patient's condition
- site selection
- selection of the most appropriate venepuncture device
- site preparation
- insertion procedure
- selection of an appropriate dressing and documentation

## EQUIPMENT REQUIRED

Tegaderm IV Starter (containing 2% Chlorhexidine /70% Alcohol swab nonwoven gauze and dressing towel)

- disposable gloves, protective eyewear
- size appropriate cannula
- a needle free valve port
- a extension set
- sterile steri strips
- a 10 ml syringe and 10 ml 0.9% sodium chloride
- if taking blood - syringe and blood tubes
- sharps container

## PATIENT ASSESSMENT

Before commencing the procedure the following points should be considered:

- does the patient have any bleeding disorder?
- is the patient taking any medication which might affect the procedure e.g. anticoagulants
- has the patient had iv therapy in the past if so did they experience any problems

## SITE SELECTION

Site selection is governed by several factors:

- age and size of the patient
- anatomical considerations
- clinical diagnosis and status of the patient
- condition of the veins
- indications for cannulation
- duration of therapy
- previous surgery
- diagnostic procedure to be performed. e.g. contrast
- condition of superficial skin

Site selection is often the deciding factor in the success or failure of cannulation and infusion therapy. Scrutiny of the veins in both arms is necessary before making a choice. It is usual to start with veins at lower levels in the arms and work upwards as IVC's are replaced.

**If the arm is affected by the following, the site for intravenous cannulation is NOT appropriate:**

- × Mastectomy or axillary clearance.
- × Oedema.
- × Clot.
- × Arteriovenous shunt/ fistula.
- × Scarred skin.
- × Infected areas.
- × Decreased sensitivity (E.g. hemiplegia).

Most superficial veins of the forearm and hand are accessible for cannulation, however because of location, size or condition may not be practical.

**Avoid:**

- ✗ Bruised areas.
- ✗ Veins below a previous IV insertion site.
- ✗ Flexion/ joint areas.
- ✗ The patients dominant hand.
- ✗ Sclerosed veins.
- ✗ Median cephalic veins.

**Consider:**

Non-dominant upper extremity is commonly chosen, because of comfort, reduced risk of dislodgement, and lower incidence of thrombosis or thrombophlebitis.

- ✓ Distal veins first.
- ✓ Veins in the patient's non dominant hand or arm if possible.
- ✓ Rotate sites.
- ✓ Use veins which are straight, soft and palpable.
- ✓ Consider where the catheter tip will sit.
- ✓ Choose veins which are **ROUND, FIRM, ELASTIC & WELL FILLED.**
- ✓ Utilise previous cannulation history to assist with/ pre-empt any problems.

**VENOUS DISTENSION - TOURNIQUET**

Venous distension is achieved by the application of a tourniquet. Sufficient pressure must be applied to impede venous blood flow while maintaining arterial blood flow. Please ensure radial pulsation is present at all times.

- Apply the tourniquet to mid forearm for dorsal veins and to the upper arm for veins in the forearm.
- Use minimal pressure on elderly patients and those with sclerosed veins.
- Ensure tourniquet clip is accessible for release.

For veins that do not fill sufficiently the following may be helpful:

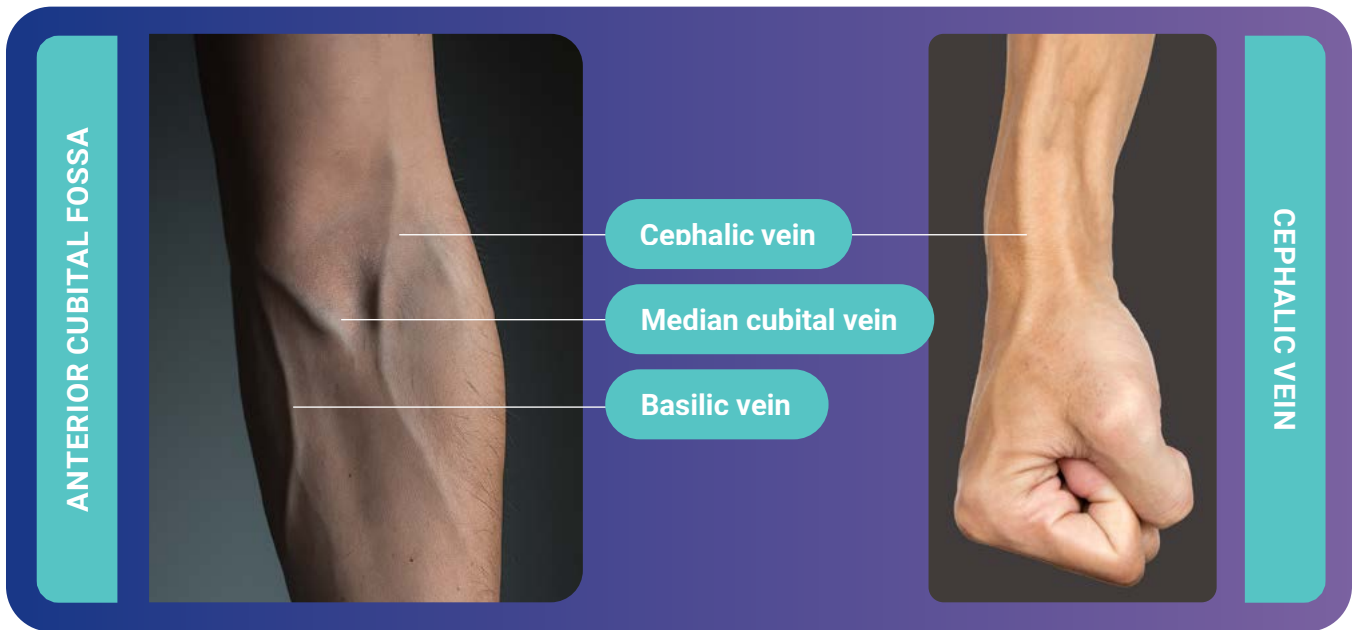
- Opening and closing the fist.
- Stroking of the area over the vein.
- Hanging the arm dependently.
- Application of heat over the entire arm for 10 – 20 minutes.

**VEIN SELECTION**

Below is a brief overview of veins in the arm and hand that may be useful in deciding which vein should be used.



Dorsum veins of hand



Vein	Location	Advantages:	Disadvantages:
Metacarpal vein	Back of the hand	✓ Easily accessible.	✗ Area has many nerve endings therefore the site is often painful.
		✓ Veins lie flat on the back of the hand.	✗ Often friable in the elderly.
		✓ Bones of the hand may act as splintage.	✗ Infiltration may occur easily.
Cephalic vein	Radial aspect of forearm and upper arm	<ul style="list-style-type: none"> <li>✓ Large veins and therefore will accommodate large bore cannula.</li> <li>✓ Location does not impair mobility.</li> </ul>	<ul style="list-style-type: none"> <li>✗ Vein may roll during insertion.</li> <li>✗ Difficult to locate in obese patients.</li> </ul>
Basilic vein	Origin in the ulnar part of the dorsal venous network. Ascends along the ulnar portion of the forearm.	<ul style="list-style-type: none"> <li>✓ May be useful when other veins have been exhausted.</li> <li>✓ Strong straight and suitable for large cannula.</li> </ul>	<ul style="list-style-type: none"> <li>✗ Inconspicuous position which may be overlooked. May need to flex the elbow and evaluate it for viewing.</li> <li>✗ Painful insertion.</li> </ul>
Median Cephalic vein	Located in the antecubital fossa	<ul style="list-style-type: none"> <li>✓ Large vein often visible and palpable.</li> <li>✓ Often used in emergency situations.</li> <li>✓ Well supported will provide easy access for a large bore cannula.</li> </ul>	<ul style="list-style-type: none"> <li>✗ Close proximity of the brachial artery.</li> </ul>
Accessory Cephalic vein	Runs along radial bone as a continuation of metacarpal veins of the thumb.	✓ Large vein suitable for large bore cannula.	✗ Maybe painful to insert.
		✓ Doesn't impair mobility.	✗ Sometimes difficult to position catheter flush with the skin.
		✓ Is usually stable without an arm board.	

## CANNULA SELECTION

### Peripheral venepuncture devices

The most commonly used device for peripheral IV therapy is the over the needle catheter. This consists of a plastic outer catheter with an inner needle that extends beyond the catheter.

The catheter is comfortable for the patient once in place. The device holds a radioactive thread for easy location by x-ray.

Most of these devices are available in a variety of lengths and gauges (see below).

When choosing a cannula size consider:

- purpose of the cannulation
- type of solution to be infused and required rate
- size and condition of the patient's veins
- expected duration

What to look for:

- ease of insertion
- causes minimum patient discomfort / indwelling trauma
- permits optimal flow rates. NB a small change in diameter has a large effect on the flow



### GUIDELINE TO SIZE SELECTION

Size	Hub Colour	Approximate Flow Rate	Common Application
14G	Orange	320ml/min	<ul style="list-style-type: none"> <li>• trauma and wherever large amounts of fluid are to be infused</li> </ul>
16G	Grey	200ml/min	<ul style="list-style-type: none"> <li>• trauma, major surgery major surgery, intra/post partum haemorrhage</li> </ul>
18G	Green	100ml/min	<ul style="list-style-type: none"> <li>• blood products, large volumes of fluid, CT contrast</li> </ul>
20G	Pink	65ml/min	<ul style="list-style-type: none"> <li>• general use / iv maintenance</li> <li>• iv antibiotics</li> <li>• iv analgesia</li> </ul>
22G	Blue	38ml/min	<ul style="list-style-type: none"> <li>• small or fragile veins</li> <li>• paediatric</li> <li>• most types of drug therapy - continuous intermittent or bolus</li> <li>• cytotoxic therapy</li> </ul>
24G	Yellow	24ml/min	<ul style="list-style-type: none"> <li>• small veins</li> <li>• for slow flow rates</li> <li>• neonatal</li> <li>• cancer services</li> </ul>

## SKIN PREPARATION

- Clip hair if necessary (do not shave).
- Put on gloves.
- Using a circular motion sterilise an area from inside out for approximately 5cms using a skin swab.

### Possible skin preparation solutions:

2% chlorhexidine gluconate in 70% alcohol

## PERFORMING CANNULATION

### Getting Started

#### Equipment

✓ Tegaderm IV Starter (containing 2% Chlorhexidine /70% Alcohol swab non-woven gauze and dressing towel).

✓ Disposable gloves.

✓ Protective eyewear.

✓ Size appropriate cannula.

✓ Tourniquet.

✓ Needle free valve port.

✓ Extension set.

✓ Sterile steri strips.

✓ 10ml syringe

✓ 10ml 0.9% sodium chloride.

✓ If taking blood: syringe and blood tubes.

✓ Sharps container.

- Ensure all equipment assembled.
- Ensure cannula packaging and contents are intact.
- Check the expiry date of cannula and the skin prep solution.
- Check IV orders and the purpose of cannulation.
- Explain the procedure to the patient in simple terms.

### Patient

- Assess patient status. Ensure the patient has no allergies.
- Ensure the patient is positioned and comfortable for the procedure.
- If patient's arm / hands are cold, warm with warm packs.
- 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 .

### Operator

- Ensure adequate lighting.
- Position the equipment for ease of use.
- Wash hands thoroughly.
- Decide how you will position yourself for the procedure (sitting is often easier and less back breaking).
- Prepare 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.

### Tourniquet

- Apply the tourniquet 5 – 15 cm above the vein.
- Ensure the tourniquet clip is positioned so it can be easily and quickly released.
- Apply sufficient pressure to impede venous flow without stopping arterial flow. Check for radial pulse.
- If further filling is necessary one of the following may be useful:
  - Stroke the vein lightly.
  - Ask the patient to open and close their hand.
  - Allow the arm to hang dependently.
  - Place the tourniquet further up the arm.

### Locating the vein

- Palpate the vein using one or two fingers and light pressure feeling for elasticity and filling.
- Aim for a round, firm, fully filled vein which rebounds when compressed.
- Once a suitable vein is located start the procedure.

### Skin preparation

- Using a circular motion sterilise an area from inside out for approximately 5cms using a skin swab.



## CANNULA INSERTION TECHNIQUE

### Insertion

- Examine the cannula prior to insertion to ensure no barbs etc.
- ✗ **DO NOT BREAK THE SEAL BY ROTATING THE CATHETER AROUND THE NEEDLE.**
- Hold cannula and rotate the barrel 360 degrees .
- Apply skin traction to immobilise the vein with non-dominant hand by stretching and holding the skin taut below the intended insertion site.
- Ensure cannula has bevel side UP and insert at approximately 25° degree angle .
- With the needle bevel side up and pointing in the direction of blood flow insert the cannula through the skin into the vein .
- Use an insertion angle of 15° for superficial veins, 25° - 30° angle for deeper veins.
- Insert the device with a smooth steady action usually you will feel resistance.
- You will see a flashback of blood in the chamber once you have pierced the vein .

**Note:** Always hold the flash chamber, not the coloured hub.

**Note:** Backflow may occur briefly if the cannula has penetrated through the back wall of the vein. Backflow may not be present if the patient is dehydrated or the vein is very small.

- Lower the needle until it is almost flush with the skin (this manoeuvre lifts the needle tip and prevents it from penetrating the back wall of the vein) .
- Advance tip a further 1-2mm, slide cannula smoothly over needle into vein up to cannula hub.
- Thread off the cannula until the inner needle is almost removed .
- Place the middle finger of your non dominant hand over the catheter tip and apply sufficient pressure to impede blood flow.
- Release the tourniquet whilst supporting the cannula.
- Stabilise the flash chamber and remove the inner needle.
- Flush the cannula with 5-10ml 0.9% sodium chloride to ensure patency and to confirm position .
- Secure the cannula using a sterile, transparent, semipermeable dressing and tape, ensuring that the site is not obstructed by tape.
  - A sterile, transparent, semipermeable 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
- Cap the cannula or attach IV fluids.

**Note:** If using a 3-way tap always attach to the cannula, other equipment such as J loops etc. should then be connected to the tap. This ensures the luer lock is connected to the cannula and ensures patients do not receive a bolus dose of medication should a drug infusion be running.



## TECHNIQUES TO REDUCE THE RISK OF PIVC-RELATED COMPLICATIONS

### DOCUMENTATION

Avoid inserting PIVCs when they are not needed in the first instance

Only insert a PIVC for medicines and fluids suitable for peripheral administration

Ensure that clinicians are skilled in inserting and maintaining PIVCs, where relevant to their scope of practice (for example, in adults or children)

Use standard precautions, including hand hygiene and aseptic technique when inserting or accessing a PIVC

Place the PIVC in a stable area – for example, in adults, an area of non-flexion such as the forearm; this will also help to reduce the discomfort associated with having a PIVC in place

Secure the PIVC to help prevent movement at the insertion site: consider the use of short extension tubing to minimise movement at the insertion site, particularly with intermittent use

Use sterile, transparent, semipermeable dressings to cover the insertion site and help minimise contamination

Promptly remove the PIVC if signs of redness or swelling develop, or another complication such as infection is suspected

Promptly remove PIVCs when no longer needed. If ongoing vascular access is required, replacement of PIVCs should be in accordance with the Australian Guidelines for the Prevention and Control of Infection in Healthcare.

- document in medical history:
  - 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
- document date and time of insertion on transparent dressing

A patient with a PIVC will have documentation of its insertion, maintenance and removal, and regular review of the insertion site.

To ensure that the plan of care for a patient's PIVC is clear and that decisions relating to the PIVC and its condition are accurately recorded and accessible to all clinicians involved in the patient's care.

Plan of care for a patient's PIVC The following should be recorded for all PIVCs\* intended to remain in situ and made accessible to all clinicians<sup>12,15,17,20-23,39</sup>.






Insertion

- why a PIVC is needed
- length and gauge of the PIVC
- where the PIVC is located
- who inserted the PIVC
- date and time of insertion (this should also be recorded on the label where required)
- infection prevention and control methods used (use of aseptic technique, dressing, and any issues arising during insertion). maintenance
- results of site assessments, including condition of the dressing
- any patient-reported changes
- care provided, including by whom and when. removal
- details about when the device is expected to be removed
- results of assessments of the need for the PIVC
- date and time the PIVC is removed, by whom and the for removal
- observations of the insertion site after removal.

### Checkpoints

- Wash hands thoroughly.
- Allow skin prep solution to dry completely .
- Sterile "no touch" insertion.
- Select most appropriate vein for the purpose of the IV.
- ✗ **DO NOT RE-INSERT THE NEEDLE INTO THE CATHETER AT ANYTIME.**
- Use the smallest gauge cannula possible to reduce mechanical irritation.
- Ensure the cannula is secured properly.
- Always document insertion thoroughly.

## PERFORMING AN IV CANNULATION

<b>Step 1</b>	<ul style="list-style-type: none"><li>➤ Position the arm so that it is comfortable for the patient and identify a vein.</li><li>➤ Apply the tourniquet 5 – 15 cm above the vein.</li></ul>	
<b>Step 2</b>	<ul style="list-style-type: none"><li>➤ Check the vein.</li><li>➤ Choose <b>round, firm, elastic and well-filled</b> veins.</li></ul>	
<b>Step 3</b>	<ul style="list-style-type: none"><li>➤ Clean the patient's skin with 2% chlorhexidine gluconate in 70% alcohol.</li></ul>	
<b>Step 4</b>	<ul style="list-style-type: none"><li>➤ Remove the needle cover.</li></ul>	
<b>Step 5</b>	<ul style="list-style-type: none"><li>➤ Insert the needle, bevel upwards at approximately 25° angle.</li></ul>	

## PERFORMING AN IV CANNULATION

### Step 6

- Flashback of blood is seen in the hub.



### Step 7

- Lower the needle until it is almost flush with the skin (this lifts the needle tip and prevents it from penetrating the back wall of the vein).
- Advance the rest of the cannula into the vein.



### Step 8

- Place a finger over the catheter tip and apply sufficient pressure to impede blood flow.
- Release the tourniquet.



### Step 9

- Stabilise the flash chamber and remove the inner needle.
- Cap the cannula.
- Flush the cannula with 5-10ml 0.9% sodium chloride to ensure patency and to confirm position.



### Step 10

- Apply a sterile, transparent, semipermeable dressing to the cannula.



## SITE MAINTENANCE

Site is inspected for signs of complications at least once per shift or every eight hours when accessing the device, and if the patient raises concerns. Patency is checked and flushing is performed at intervals according to local policy to assess device function and minimise risk of device failure.

### Check for:

- signs of pain, swelling or redness at the insertion site, by visual inspection through the transparent dressing and gentle palpation through the dressing
- the condition of the patient's veins, and whether they have become hardened or thrombosed.
- signs of localised or systemic infection
- leakage of fluid from the insertion site, signs of occlusion, infiltration or extravasation
- whether the PIVC remains appropriately dressed and secured

### Access

- Aseptic technique, when accessing the PIVC.
- Decontaminate needleless connectors before and after access with 70% alcohol or other solution recommended in current evidence-based or best-practice guidelines.

### Flush

- Flush the PIVC using a solution recommended in current evidence-based or best-practice guidelines and at intervals according to local policy, to maintain line patency.

## Recommendations for replacement of PIVCs

**Option 1:** Replace a PIVC every 72 hours

**Option 2:** Replace a PIVC based on clinical indication A strategy of replacing a PIVC when a clinical indication for replacement is identified (rather than routinely at 72 hours) may be considered.

This option is informed by a systematic review, first published in 2011 and updated most recently in 2015, which concluded that rates of bloodstream infection and thrombophlebitis were not significantly different when PIVCs were changed based on clinical indication rather than routinely replaced.

### Common reasons for problems

- poor tourniquet placement
- inadequate evaluation of vein condition
- stop / start technique
- stopping too soon after insertion needle enters the vein but not cannula
- failure to release the tourniquet quickly once vein cannulated
- wrong angle
- wrong size cannula or too much force

## COMPLICATIONS AND PREVENTIONS

COMPLICATION	SIGNS AND SYMPTOMS	POSSIBLE CAUSES	INTERVENTION
<b>Haematoma</b>	<ul style="list-style-type: none"> <li>tenderness at site</li> <li>bruised around site</li> <li>inability to flush</li> </ul>	<ul style="list-style-type: none"> <li>venepuncture device dislodged</li> <li>back wall of vein punctured</li> <li>wrong angle on insertion</li> </ul>	<ul style="list-style-type: none"> <li>Remove the venepuncture device.</li> <li>Apply pressure to the affected area.</li> <li>Select appropriate cannula vein size.</li> <li>Check technique.</li> <li>Use the best vein available.</li> </ul>
<b>Missed vein</b>	<ul style="list-style-type: none"> <li>no flashback</li> </ul>	<ul style="list-style-type: none"> <li>cannula not inserted on top of the vein</li> <li>vein inadequately anchored</li> <li>incorrect alignment visual distortion</li> </ul>	<ul style="list-style-type: none"> <li>Insert cannula directly on top of vein.</li> <li>Re – anchor the vein to maintain traction.</li> <li>Ensure accurate visualisation.</li> <li>Do not remove the needle as puncturing the skin is usually the most painful part.</li> <li>Withdraw your needle slightly (without taking the tip out of the skin), re-angle it, and try again.</li> <li>If unsuccessful, ask for assistance.</li> </ul>
<b>Cannula enters the vein but won't thread</b>	<ul style="list-style-type: none"> <li>flashback occurs but cannula won't thread</li> <li>unable to flush cannula</li> <li>painful manipulation</li> </ul>	<ul style="list-style-type: none"> <li>sclerosed vein</li> <li>resistance from valves</li> <li>cannula too large</li> <li>stylet withdrawn too far</li> </ul>	<ul style="list-style-type: none"> <li>Remove and select a larger vein.</li> <li>Attempt to float in the cannula.</li> <li>Use smaller gauge cannula.</li> <li>Ensure stylet inserted 50% prior to threading.</li> </ul>
<b>Phlebitis</b> Inflammation of the vein	<ul style="list-style-type: none"> <li>tenderness at tip of venepuncture device</li> <li>redness at tip of catheter and along the vein</li> <li>puffy over the vein</li> <li>vein hard on palpation</li> <li>elevated temperature</li> </ul>	<ul style="list-style-type: none"> <li>poor blood flow around venepuncture device</li> <li>friction from the catheter movement in vein</li> <li>venepunctures device left in vein too long</li> <li>solution with high / low ph or high osmolarity</li> </ul>	<ul style="list-style-type: none"> <li>Remove the device.</li> <li>Apply warm packs.</li> <li>Notify MO if patient has fever.</li> <li>Ensure appropriate size cannula is used.</li> <li>Tape securely to prevent motion.</li> <li>Ensure minimum amount of force on insertion.</li> </ul>

<b>Thrombosis</b>	<ul style="list-style-type: none"> <li>• painful, reddened and swollen vein</li> <li>• sluggish or stopped iv flow</li> </ul>	<ul style="list-style-type: none"> <li>• injury to endothelial cells of vein wall, allowing platelets to adhere and thrombus to form</li> </ul>	<ul style="list-style-type: none"> <li>➤ Remove venepuncture device.</li> <li>➤ Apply warm packs.</li> <li>➤ Watch for IV related infections; thrombi provide an excellent environment for bacterial growth.</li> <li>➤ Use proper venepuncture techniques to reduce injury to vein.</li> </ul>
<b>Thrombophlebitis</b> Thrombus formation in association with inflammation of the vein	<ul style="list-style-type: none"> <li>• severe discomfort</li> <li>• reddened &amp; hardened vein</li> <li>• puffy area over the vein</li> </ul>	<ul style="list-style-type: none"> <li>• thrombosis and inflammation</li> </ul>	<ul style="list-style-type: none"> <li>➤ Same as thrombosis.</li> <li>➤ Treat localised area.</li> <li>➤ Check the site frequently Remove venepuncture device at first sign of redness and tenderness.</li> </ul>
<b>Extravasation</b> The infiltration of a drug from an I.V. line into surrounding tissue	<ul style="list-style-type: none"> <li>• oedema and changes in the site's appearance</li> <li>• coolness of the skin</li> <li>• slowing of infusion</li> <li>• pain or a feeling of tightness around the site</li> <li>• possible consequences include necrotic ulcers, infection, disfigurement, and loss of function</li> </ul>	<ul style="list-style-type: none"> <li>• catheter erodes through the vessel wall at a second point</li> <li>• increased venous pressure causes leakage around the venepuncture site</li> <li>• when a needle pulls out of the vein</li> <li>• vesicant drugs/solutions may cause severe tissue injury</li> </ul>	<ul style="list-style-type: none"> <li>➤ Remove cannula.</li> <li>➤ Elevate affected arm.</li> <li>➤ Apply ice pack (early) or warm compress (late).</li> </ul>
<b>Venous spasm</b> Spasm of the vein wall	<ul style="list-style-type: none"> <li>• pain</li> <li>• slowing of the i.v. infusion</li> <li>• blanching at the insertion site</li> <li>• vein difficult to palpate</li> </ul>	<ul style="list-style-type: none"> <li>• patient anxiety</li> <li>• cold i.v. fluids</li> <li>• drug irritation</li> <li>• trauma to the vein during cannula insertion</li> </ul>	<ul style="list-style-type: none"> <li>➤ Apply warm compress.</li> <li>➤ Slow the infusion rate.</li> <li>➤ Reassure the patient.</li> </ul>
<b>Occlusion</b> Slowing or cessation of fluid infusion	<ul style="list-style-type: none"> <li>• i.v. not running</li> <li>• blood in the line</li> <li>• discomfort</li> </ul>	<ul style="list-style-type: none"> <li>• cannula not flushed</li> <li>• kinking of the cannula</li> <li>• back flow or interrupted flow</li> </ul>	<ul style="list-style-type: none"> <li>➤ Check for kinks in cannula.</li> <li>➤ Raise IV higher.</li> <li>➤ Remove cannula.</li> </ul>
<b>Infection</b>	<ul style="list-style-type: none"> <li>• tenderness and swelling</li> <li>• erythema/purulent drainage</li> </ul>	<ul style="list-style-type: none"> <li>• lack of asepsis</li> <li>• prolonged use of the same site</li> </ul>	<ul style="list-style-type: none"> <li>➤ Remove cannula.</li> <li>➤ Antibiotics may be required.</li> <li>➤ Documentation.</li> </ul>

## 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 .
- Follow Clinical care standards:

## CONCLUSION

IV cannulation is a learning process; every patient is different. Even with good preparation and experience you will have a few failures.

### Remember:

- don't let a few setbacks discourage you
- it is not a failure to ask somebody more experienced to cannulate a vein.



## APPENDIX 1: NATIONAL COMPETENCY STANDARDS FOR THE REGISTERED NURSE (ANMAC) - SAMPLE

### National competency standards for the registered nurse



#### Introduction

National competency standards for registered nurses were first adopted by the Australian Nursing and Midwifery Council (ANMC) in the early 1990s. The ANMC was a peak national and midwifery organisation established in 1992 to develop a national approach to nursing and midwifery regulation. The ANMC worked in conjunction with the state and territory nursing and midwifery authorities (NMRAs) to produce national standards – an integral component of the regulatory framework – to help nurses and midwives deliver safe and competent care.

The ANMC officially became the Australian Nursing and Midwifery Accreditation Council (ANMAC) on 24 November 2010. The name change reflected ANMC's appointment as the independent accrediting authority for the nursing and midwifery professions under the new National Registration and Accreditation Scheme (the [National Scheme](#)) that came into effect on 1 July 2010 (18 October 2010 in Western Australia).

With the onset of the National Scheme, the Nursing and Midwifery Board of Australia ([National Board](#)), took responsibility for the regulation of nurses and midwives in Australia, thus taking ownership of the national competency standards for registered nurses.

Since creation, these national competency standards have undergone periodic review and revision, which included extensive consultation with nurses around Australia. This helped to make sure the competency standards remained contemporary and congruent with legislative requirements.

The resulting standards, while different in some areas from the previous competency standards, remain broad and principle-based so that they are sufficiently dynamic for practising nurses and the nurse regulators to use as a benchmark to assess competence to practise in a range of settings.

#### What are the standards used for?

The national competency standards for the registered nurse are the core competency standards by which your performance is assessed to obtain and retain your registration as a registered nurse in Australia.

As a registered nurse, these core competency standards provide you with the framework for assessing your competence, and are used by the National Board to assess competence as part of the annual renewal of registration, to assess nurses:

- educated overseas seeking to work in Australia
- returning to work after breaks in service, or
- involved in professional conduct matters.

The National Board may also apply the competency standards in order to communicate to consumers the standards that they can expect from nurses.

Universities also use the standards when developing nursing curricula, and to assess student and new graduate performance.

These are YOUR standards — developed using the best possible evidence, and using information and feedback provided by nurses in a variety of settings. Included also are the principles of assessment to help you understand how these standards may be used to assess performance. We believe you will find them user-friendly and easy to understand.

#### Description of the registered nurse on entry to practice

The registered nurse demonstrates competence in the provision of nursing care as specified by registration requirements, National Board standards and codes, educational preparation, relevant legislation and context of care. The registered nurse practises independently and interdependently, assuming accountability and responsibility for their own actions and delegation of care to enrolled nurses and health care workers. Delegation takes into consideration the education and training of enrolled nurses and health care workers and the context of care.

The registered nurse provides evidence-based nursing care to people of all ages and cultural groups, including individuals, families and communities. The role of the registered nurse includes promotion and maintenance of health and prevention of illness for individuals with physical or mental illness, disabilities and/or rehabilitation needs, as well as alleviation of pain and suffering at the end stage of life.

The registered nurse assesses, plans, implements and evaluates nursing care in collaboration with individuals and the multidisciplinary health care team so as to achieve goals and health outcomes. The registered nurse recognises that ethnicity, culture, gender, spiritual values, sexuality, age, disability and economic and social factors have an impact

on an individual's responses to, and beliefs about, health and illness, and plans and modifies nursing care appropriately.

The registered nurse provides care in a range of settings that may include acute, community, residential and extended care settings, homes, educational institutions or other work settings and modifies practice according to the model/s of care delivery.

The registered nurse takes a leadership role in the coordination of nursing and health care within and across different care contexts to facilitate optimal health outcomes. This includes appropriate referral to, and consultation with, other relevant health professionals, service providers, and community and support services.

The registered nurse contributes to quality health care through lifelong learning and professional development of herself/himself and others, research data generation, clinical supervision and development of policy and clinical practice guidelines. The registered nurse develops their professional practice in accordance with the health needs of the population/society and changing patterns of disease and illness.

## Domains

The competencies which make up the National Board *National competency standards for the registered nurse* are organised into domains.

### Professional practice

This relates to the professional, legal and ethical responsibilities which require demonstration of a satisfactory knowledge base, accountability for practice, functioning in accordance with legislation affecting nursing and health care, and the protection of individual and group rights.

### Critical thinking and analysis

This relates to self-appraisal, professional development and the value of evidence and research for practice. Reflecting on practice, feelings and beliefs and the consequences of these for individuals/groups is an important professional benchmark.

### Provision and coordination of care

This domain relates to the coordination, organisation and provision of nursing care that includes the assessment of individuals /groups, planning, implementation and evaluation of care.

### Collaborative and therapeutic practice

This relates to establishing, sustaining and concluding professional relationships with individuals/groups. This also contains those competencies that relate to nurses understanding their contribution to the interdisciplinary health care team.

## National competency standards for the registered nurse

### Professional practice

Relates to the professional, legal and ethical responsibilities which require demonstration of a satisfactory knowledge base, accountability for practice, functioning in accordance with legislation affecting nursing and health care, and the protection of individual and group rights.

1. Practises in accordance with legislation affecting nursing practice and health care
  - 1.1 Complies with relevant legislation and common law:
    - identifies legislation governing nursing practice
    - describes nursing practice within the requirements of common law
    - describes and adheres to legal requirements for medications
    - identifies legal implications of nursing interventions
    - actions demonstrate awareness of legal implications of nursing practice
    - identifies and explains effects of legislation on the care of individuals/groups
    - identifies and explains effects of legislation in the area of health, and
    - identifies unprofessional practice as it relates to confidentiality and privacy legislation.
  - 1.2 Fulfils the duty of care:
    - performs nursing interventions in accordance with recognised standards of practice
    - clarifies responsibility for aspects of care with other members of the health team
    - recognises the responsibility to prevent harm, and
    - performs nursing interventions following comprehensive and accurate assessments.
  - 1.3 Recognises and responds appropriately to unsafe or unprofessional practice:
    - identifies interventions which prevent care being compromised and/or law contravened
    - identifies appropriate action to be taken in specified circumstances
    - identifies and explains alternative strategies for intervention and their likely outcomes

## National competency standards for the registered nurse



- identifies behaviour that is detrimental to achieving optimal care, and
  - follows up incidents of unsafe practice to prevent recurrence.
2. Practises within a professional and ethical nursing framework
- 2.1 Practises in accordance with the nursing profession's codes of ethics and conduct:
- accepts individuals/groups regardless of race, culture, religion, age, gender, sexual preference, physical or mental state
  - ensures that personal values and attitudes are not imposed on others
  - conducts assessments that are sensitive to the needs of individuals/groups
  - recognises and accepts the rights of others
  - maintains an effective process of care when confronted by differing values, beliefs and biases
  - seeks assistance to resolve situations involving moral conflict, and
  - identifies and attempts to overcome factors which may constrain ethical decisions, in consultation with the health care team.
- 2.2 Integrates organisational policies and guidelines with professional standards:
- maintains current knowledge of and incorporates relevant professional standards into practice
  - maintains current knowledge of and incorporates organisational policies and guidelines into practice
  - reviews and provides feedback on the relevance of organisational policies and professional standards procedures to practice
  - demonstrates awareness and understanding of developments in nursing that have an impact on the individual's capacity to practise nursing, and
  - considers individual health and wellbeing in relation to being fit for practice.
- 2.3 Practises in a way that acknowledges the dignity, culture, values, beliefs and rights of individuals/groups:
- demonstrates respect for individual/group common and legal rights in relation to health care
  - identifies and adheres to strategies to promote and protect individual/group rights
  - considers individual/group preferences when providing care
- clarifies individual/group requests to change and/or refuse care with relevant members of the health care team
  - advocates for individuals/groups when rights are overlooked and/or compromised
  - accepts individuals/groups to whom care is provided regardless of race, culture, religion, age, gender, sexual preference, physical or mental state
  - ensures that personal values and attitudes are not imposed on others
  - undertakes assessments which are sensitive to the needs of individuals/groups
  - recognises and accepts the rights of others
  - maintains an effective process of care when confronted by differing values, beliefs and biases
  - provides appropriate information within the nurse's scope of practice to individuals/groups
  - consults relevant members of the health care team when required
  - questions and/or clarifies orders and decisions that are unclear, not understood or questionable, and
  - questions and/or clarifies interventions that appear inappropriate with relevant members of the health care team.
- 2.4 Advocates for individuals/groups and their rights for nursing and health care within organisational and management structures:
- identifies when resources are insufficient to meet care needs of individuals/groups
  - communicates skill mix requirements to meet care needs of individuals/groups to management
  - protects the rights of individuals and groups and facilitates informed decisions
  - identifies and explains policies/practices which infringe on the rights of individuals or groups
  - clarifies policies, procedures and guidelines when rights of individuals or groups are compromised, and
  - recommends changes to policies, procedures and guidelines when rights are compromised.
- 2.5 Understands and practises within own scope of practice:
- seeks clarification when questions, directions and decisions are unclear or not understood
  - undertakes decisions about care that are within scope of competence without consulting senior staff

## National competency standards for the registered nurse



- raises concerns about inappropriate delegation with the appropriate registered nurse
  - demonstrates accountability and responsibility for own actions within nursing practice
  - assesses consequences of various outcomes of decision making
  - consults relevant members of the health care team when required, and
  - questions and/or clarifies interventions which appear inappropriate with relevant members of the health care team.
- 2.6 Integrates nursing and health care knowledge, skills and attitudes to provide safe and effective nursing care:
- maintains a current knowledge base
  - considers ethical responsibilities in all aspects of practice
  - ensures privacy and confidentiality when providing care, and
  - questions and/or clarifies interventions which appear inappropriate with relevant members of the health care team.
- 2.7 Recognises the differences in accountability and responsibility between registered nurses, enrolled nurses and unlicensed care workers:
- understands requirements of statutory and professionally regulated practice
  - understands requirements for delegation and supervision of practice, and
  - raises concerns about inappropriate delegation with the relevant organisational or regulatory personnel.
- 3.2 Uses best available evidence, nursing expertise and respect for the values and beliefs of individuals/groups in the provision of nursing care:
- demonstrates awareness of current research in own field of practice.
  - uses relevant literature and research findings to improve current practice
  - participates in review of policies, procedures and guidelines based on relevant research
  - identifies and disseminates relevant changes in practice or new information to colleagues
  - recognises that judgements and decisions are aspects of nursing care, and
  - recognises that nursing expertise varies with education, experience and context of practice.
- 3.3 Demonstrates analytical skills in accessing and evaluating health information and research evidence:
- demonstrates understanding of the registered nurse role in contributing to nursing research
  - undertakes critical analysis of research findings in considering their application to practice
  - maintains accurate documentation of information which could be used in nursing research, and
  - clarifies when resources are not understood or their application is questionable.
- 3.4 Supports and contributes to nursing and health care research:
- participates in research, and
  - identifies problems suitable for research.
- 3.5 Participates in quality improvement activities:
- recognises that quality improvement involves ongoing consideration, use and review of practice in relation to practice outcomes, standards and guidelines and new developments
  - seeks feedback from a wide range of sources to improve the quality of nursing care
  - participates in case review activities, and
  - participates in clinical audits.
4. Participates in ongoing professional development of self and others
- 4.1 Uses best available evidence, standards and guidelines to evaluate nursing performance:
- undertakes regular self-evaluation of own nursing practice

### Critical thinking and analysis

Relates to self-appraisal, professional development and the value of evidence and research for practice. Reflecting on practice, feelings and beliefs and the consequences of these for individuals/groups is an important professional benchmark.

#### 3. Practises within an evidence-based framework

##### 3.1 Identifies the relevance of research to improving individual/group health outcomes:

- identifies problems/issues in nursing practice that may be investigated through research
- considers potential for improvement in reviewing the outcomes of nursing activities and individual/group care
- discusses implications of research with colleagues participates in research, and

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