



clab ICU
PROJECT

PREVENTING CENTRAL LINE INFECTIONS

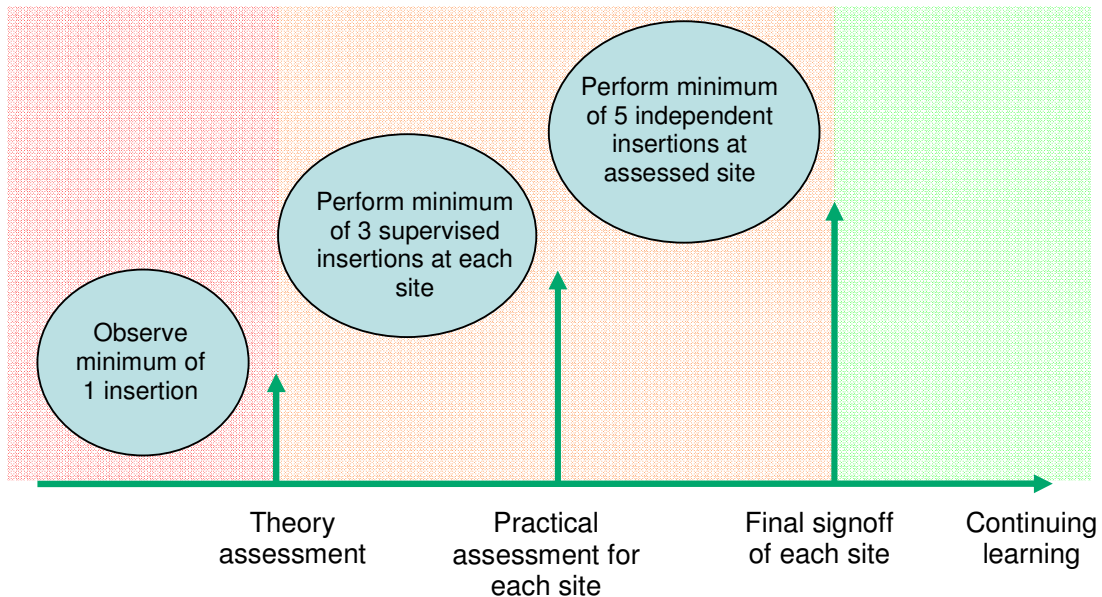
**TRAINING FRAMEWORK for clinicians
new to inserting CENTRAL LINES in NSW**

INTRODUCTION

This framework specifies the minimum knowledge and practical training requirements for the safe insertion of central venous catheters in adults in NSW and should be read in conjunction with the Central Venous Catheter Insertion Standard¹. The framework is outlined in Figure 1.

Central venous catheter insertion is a frequently performed invasive procedure with potential associated morbidity and rarely mortality. All clinicians new to inserting central lines in NSW must therefore complete a training program which has both knowledge and practical components.

Figure 1



SCOPE

This document is relevant to clinicians authorised to insert central venous catheters in the scope of their practice. This framework does not address issues relating to maintaining proficiency. The insertion of central venous catheters in infants is different and clinicians practising in that area require further training.

DEFINITIONS

Central Venous Catheters (CVC)

Intravascular devices with a tip ending in a major vein. Central lines are classified as either 'centrally inserted' where the skin entry point is on the trunk of the patient, or 'peripherally inserted' where the line is inserted through a limb vein.

Clinician

Medical or nursing clinician who is authorised to insert central venous catheters and is new to this procedure in NSW.

Supervisor

Senior clinician with experience inserting central venous catheters.

MINIMUM KNOWLEDGE REQUIREMENTS

Clinicians are required to acquire knowledge, observe central line insertion and successfully complete a knowledge assessment prior to attempting the practical requirements of this framework.



Knowledge

A CVC insertion elearning tool will be hosted by NSW Health and made available to support the knowledge requirements of this framework². Completion of the elearning tool will satisfy the minimum knowledge requirement and assessment components.

Where the elearning tool has not been implemented, or supplemental knowledge is required, the following reading is suggested:

- 1 Relevant anatomy of the neck, femoral triangle and subclavian region as illustrated by a standard anatomy book⁴.
- 2 Indications, contraindications and complications of CVC insertion as discussed in standard ICU texts⁵.

Observation

Clinicians are required to observe at least one central venous catheter insertion as performed by a supervisor prior to inserting a CVC. Observation of insertions at all sites, prior to attempting assisted insertions, is encouraged. Several clinicians may concurrently observe a CVC insertion.

Observation includes involvement in the decision making processes regarding site selection, Seldinger technique, anatomical landmarks, indications, patient issues, issues related to consent and line removal. The supervisor must be aware that the clinician is observing for training purposes and engage the clinician accordingly.

Knowledge Assessment

A clinician must demonstrate the following knowledge prior to progressing to practical components:

- 1 Identify surface anatomy: structures in antecubital fossa; large veins and anterior triangle of the neck; large veins of the leg and femoral triangle
- 2 State methods of rapidly securing vascular access in an emergency situation
- 3 Outline indications, contraindications and complications of central venous cannulation
- 4 Describe principles, routes and techniques of central venous cannulation

² Due for completion in October 2008 and available to all NSW Health staff

⁴ A suggested text is Moore KL and Dalley AF, 2006, Clinically Oriented Anatomy, fifth edition, Lippincott Williams and Wilkins

⁵ A suggested text is Bersten A, Soni N, and Oh T, 2003, Oh's Intensive Care Manual, fifth edition, Elsevier.

- 5 Summarise principles of aseptic technique and aseptic handling of invasive medical devices
- 6 Define standard precautions and preventative infection control techniques (hand washing, gloves, protective clothing, sharps disposal etc)
- 7 Describe the components required for central line insertion
- 8 Differentiate potential physiological alterations during insertion procedure
- 9 Explain complications of the technique, how to prevent/recognise them and initiate appropriate treatment
- 10 State indications for specific monitoring to ensure patient safety during an intervention/procedure
- 11 Chest x-ray interpretation and other methods of position confirmation
- 12 Discuss management and use of the device in situ including steps necessary to minimise the risks of complications
- 13 Explain indications and technique for removal
- 14 Outline indications for insertion of a tunnelled central venous catheter (e.g. for parenteral nutrition)
- 15 Discuss ultrasound techniques for vascular localisation

Sample questions relating to these elements are contained in [Appendix 1](#).

MINIMUM PRACTICAL REQUIREMENTS

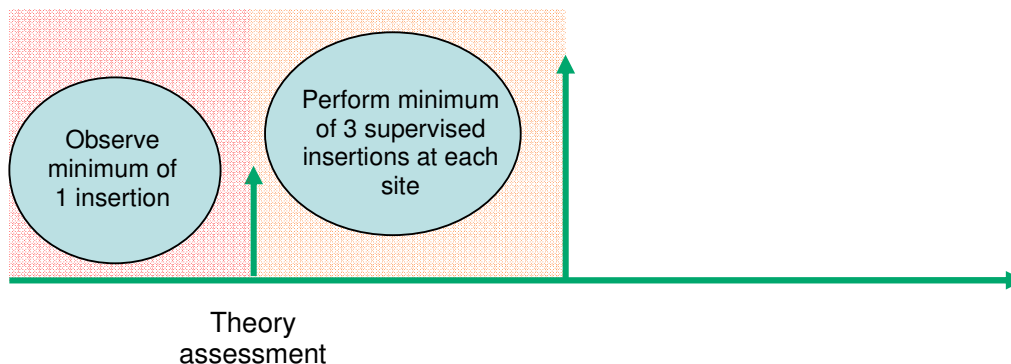
Clinicians are required to undertake assisted insertions, practical assessments and independent insertions at each site to fulfil requirements of the framework. Competence at each site is assessed individually. As such, a clinician may progress to independent insertion for each site at a different rate.

Clinicians must **not** proceed to independent insertions at a site prior to completing the assisted and assessment components for that site.

The number of assisted and independently inserted lines asserted in this document is not evidence based. Clinicians may require additional training where further learning needs are identified.

Assisted insertions

Clinicians must perform a minimum of three assisted insertions at the subclavian, internal jugular and femoral site with a scrubbed supervisor assisting. One simulated insertion may be completed at each site where appropriate facilities are available.



It is acknowledged that site selection is sometimes dictated by local policy. Where this is the case, the framework need only be applied to the permitted insertion sites.

This is a **minimum requirement** and supervisors may require a clinician undertake additional assisted insertions to develop proficiency prior to being assessed.

The supervisor of each assisted insertion should document feedback and learning needs identified during the procedure in the clinician's logbook, an example of which appears in [Appendix 2](#).

Assessment

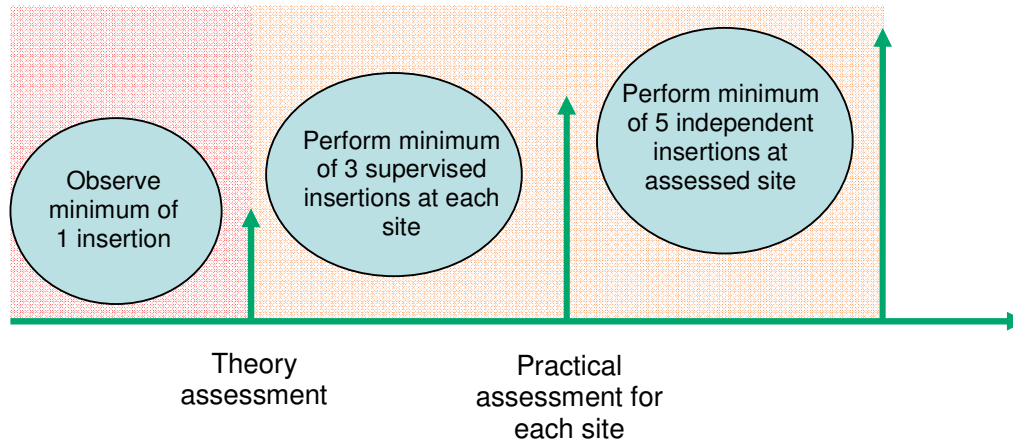
Clinicians must complete a practical assessment prior to performing independent insertion at a specific site.

A training tool to assist clinicians to prepare for assessment is provided in [Appendix 3](#). Supervisors must document successful completion of assessment in the clinician's logbook.

Independent insertions

Clinicians must independently insert a minimum of five central venous catheters at each site, with a supervisor immediately available to assist. Direct observation by a supervisor is not required.

The supervisor must review appropriate documentation subsequent to each insertion and complete the clinician's logbook.



Final Signoff

The Director of the Unit, or their delegate, is responsible for signing off that the clinician has demonstrated practice consistent with the Central Venous Catheter Insertion Standard and no additional learning needs have been identified.

RECOGNITION OF PRIOR LEARNING

Where a clinician can demonstrate prior relevant experience at inserting central venous catheters, the training requirements prior to independent insertion may be modified as follows:

- 1 Observation of one CVC insertion
- 2 A minimum of one supervised insertion at the subclavian, internal jugular and femoral site

CONFLICT RESOLUTION

Conflict arising from the application of this framework should be referred to the Unit Director or Clinical Stream Director.

DOCUMENT HISTORY

Version	Document development	Date
Draft 1	<p>Credentialing Guidelines for Medical Staff: Central Venous Catheter Insertion, Concord Repatriation General Hospital.</p> <p>Medical Officers Handbook on Central Venous Catheterisation, Liverpool Hospital,</p> <p>Credentialing of Medical Officers for Central Line Catheter Insertions, Gosford Hospital</p> <p>Australian Curriculum Framework for Junior Doctors, version 2.1, Confederation of Postgraduate Medical Education Councils (CPMEC)</p> <p>Competency Based Training in Intensive Care Medicine for Europe, European Society of Intensive Care Medicine</p>	Oct 2007
Draft 2	Revised based on discussion at CLAB ICU Learning Session	Nov 2007
Draft 3	Revised based on discussion at CLAB ICU Education and Training Workshop	Feb 2008
Draft 4	Revised based on discussion at 5 August Expert Group meeting	Aug 2008
Draft 5	Revised based on discussion at 25 August Roundtable Meeting with IMET and professional colleges including ACEM, ANZCA, ANZICS, JFICM, RACP	Aug 2008

APPENDIX 1 Sample questions

- 1 Describe the course and relations of the subclavian vein.
- 2 Describe the anatomy of the major veins of the upper thorax and right atrium.
- 3 Describe the anatomy of the femoral triangle.
- 4 List the indications for CVC placement.
- 5 List the contraindications for CVC placement. Consider the various insertion site options in your answer.
- 6 Outline methods to distinguish between an arterial and venous puncture.
- 7 On attempting placement of an internal jugular venous catheter, you inadvertently puncture the carotid artery. Describe your management.
- 8 After placement of a subclavian vein CVC on a ventilated patient, the ventilator starts alarming with "Hi Pressure" alarm and the oxygen saturations drop. Describe your management.
- 9 How do you determine whether a CVC is correctly placed?
- 10 Describe the advantages and disadvantages for each common CVC insertion site i.e. subclavian, jugular, femoral, peripherally inserted central line
- 11 Describe your approach to the assessment of a ward patient in whom you have been asked to insert a CVC
- 12 You are inserting a CVC in a ward patient and experience resistance when advancing the guidewire. State reasons for the resistance and what action you would take in this scenario.

APPENDIX 2 Central Venous Catheter Insertion Logbook

This logbook is to be completed by clinicians intending to be assessed in the insertion of central venous catheters in NSW. Clinicians should retain this logbook to ensure appropriate recognition of prior learning and attach evidence of successful completion of the knowledge component.

Assisted Insertions

Date	Insertion Site (✓)			Complications/Comments/Key learning	Supervisor name and signature
	Subclavian	IJ	Femoral		

Practical Assessment Signoff by Supervisor

..... has met the minimum trainings requirements to progress to independent insertion at the following site:

Date	Insertion Site	Supervisor name and signature	Designation
	Subclavian		
	Internal Jugular		
	Femoral		

Final Signoff by Unit Director or delegate

..... has successfully completed the minimum training requirements, consistent with the Central Venous Catheter Insertion Standard, and no additional learning needs are required for independent practice for the following sites:

Date	Insertion Site	Supervisor name and signature	Designation
	Subclavian		
	Internal Jugular		
	Femoral		

APPENDIX 3 Training Support Tool

Decision making/ Informed consent /Accountability /Attitude criteria	
1	Demonstrates appropriate prior knowledge for CVC insertion
2	Identifies the indications and contraindications for CVC insertion
3	Identifies patients appropriateness for CVC insertion and ensures correct site correct patient correct procedure
4	Provides explanation of the procedure to the patient and ascertains allergies
5	Reviews patient medication chart and recent blood results
6	Identifies issues related to consent
7	Operates within scope of practice, including statement of escalation procedure and appropriate consultation
8	Considers patient comfort throughout procedure and minimises patient distress
9	Demonstrates accountability for prevention of cross infection and self infection
10	Demonstrates correct use of devices
11	Identifies criteria of a suitable environment for CVC insertion
12	Promotes patient privacy, dignity and confidentiality
13	Describe indications for tunnelled intravenous catheterisation
Procedural preparation criteria	
1	Distinguishes appropriate support staff and defines roles
2	Selects appropriate site of insertion
3	Selects equipment necessary for line insertion
4	Prepares and positions patient appropriately
5	Attaches monitoring as required
6	Performs Hand Hygiene appropriate to task
7	Prepares for procedure using aseptic technique
8	Demonstrates the ability to don sterile gear
9	Demonstrates appropriate draping technique
10	Performs skin preparation with appropriate solution
11	Selects and ensures administration of appropriate premedication as required and observes response prior to commencing procedure (sedation and local anaesthetic)
Procedural criteria	
1	Arranges equipment and describes use
2	Inspects catheter for damage
3	Ensures guidewire is in working order
4	Prepares catheter for insertion in a manner that reduces risk of air embolus.
5	Palpates correct anatomical landmarks (refer below for ultrasound guided insertions)
6	Performs the procedure in a manner minimising the risk of complications
7	Inserts needle with bevel facing upwards
8	Advances needle slowly while maintaining negative pressure with syringe
9	Achieves flashback and advances guidewire to desired length
10	Dilates track using appropriate instruments
11	Controls guidewire and exit site whilst removing dilator, to avoid air embolus, blood loss and inadvertent guidewire removal
12	Insert catheter over guidewire to appropriate length
13	Maintains control of guidewire at all times
14	Removes guidewire
15	Aspirates and flushes all lumens with 0.9% Normal saline
16	Consider returning patient to comfortable position where appropriate
17	Confirms position of catheter tip in the desired vein
18	Secure catheter at insertion site
19	Applies sterile transparent semipermeable dressing
20	Records date and time on dressing
21	Minimise blood loss related to clinical investigations and procedures
22	Manages complication appropriately
Ultrasound Guidance	
1	Prepares ultrasound equipment
2	Demonstrates method of encasing ultrasound probe in sterile sleeve
3	Demonstrates ability to locate vessel using ultrasound guidance
4	Accesses vessel using ultrasound guidance
5	Completes procedure as above
Post procedural criteria	
1	Monitors patient and provides appropriate analgesia and aftercare
2	Disposes of contaminated waste materials appropriately
3	Remove protective equipment and wash hands
4	Confirms placement of thoracic catheters by CXR
5	Document procedure in patients health care record