



Queensland Government

Queensland **Health**

Local activity manager manual

Skills training program: Insertion of chest tubes in adults



Skills training program: Insertion of chest tubes in adults

Local Activity Manager

This manual is for local delivery agents who are responsible for the overall planning and organization of the simulation component of the chest tube insertion program for doctors.

Table of Contents

SKILLS TRAINING PROGRAM: INSERTION OF CHEST TUBES IN ADULTS	1
OVERVIEW OF PROGRAM	3
ONLINE COMPONENT OF PROGRAM	4
SIMULATION COMPONENT OF PROGRAM	4
<i>Prerequisites</i>	4
FLOWCHART OF CHEST DRAIN INSERTION PROGRAM	5
ROLES AND RESPONSIBILITIES OF STAKEHOLDERS	6
LOCAL DELIVERY AGENCY	6
THE LOCAL ACTIVITY MANAGER	6
THE SIMULATION FACILITATOR	6
THE PROCEDURAL EXPERT	7
HOW TO ORGANISE SIMULATION SKILLS TRAINING	7
STAGE 1 - PLANNING A SIMULATION ACTIVITY	7
STAGE 1 - PLANNING A SIMULATION ACTIVITY	7
STAGE 2: LEAD UP TO SIMULATION ACTIVITY	8
STAGE 3: ON THE DAY	8
FLOWCHART FOR MANAGING A SIMULATION SKILLS TRAINING ACTIVITY	9
APPENDICES	10
ASSESSMENT TOOL 1A.....	11
CRITERIA SHEET FOR INSERTING LARGE BORE CHEST TUBE BY BLUNT DISSECTION	13
ASSESSMENT TOOL 1B.....	14
CRITERIA SHEET FOR INSERTING SMALL BORE CATHETERS BY SELDINGER TECHNIQUE	16
ASSESSMENT TOOL 2	17
EVALUATION SHEET FOR SIMULATION SKILLS TRAINING: INSERTION OF CHEST TUBES IN ADULTS.....	18

Overview of program

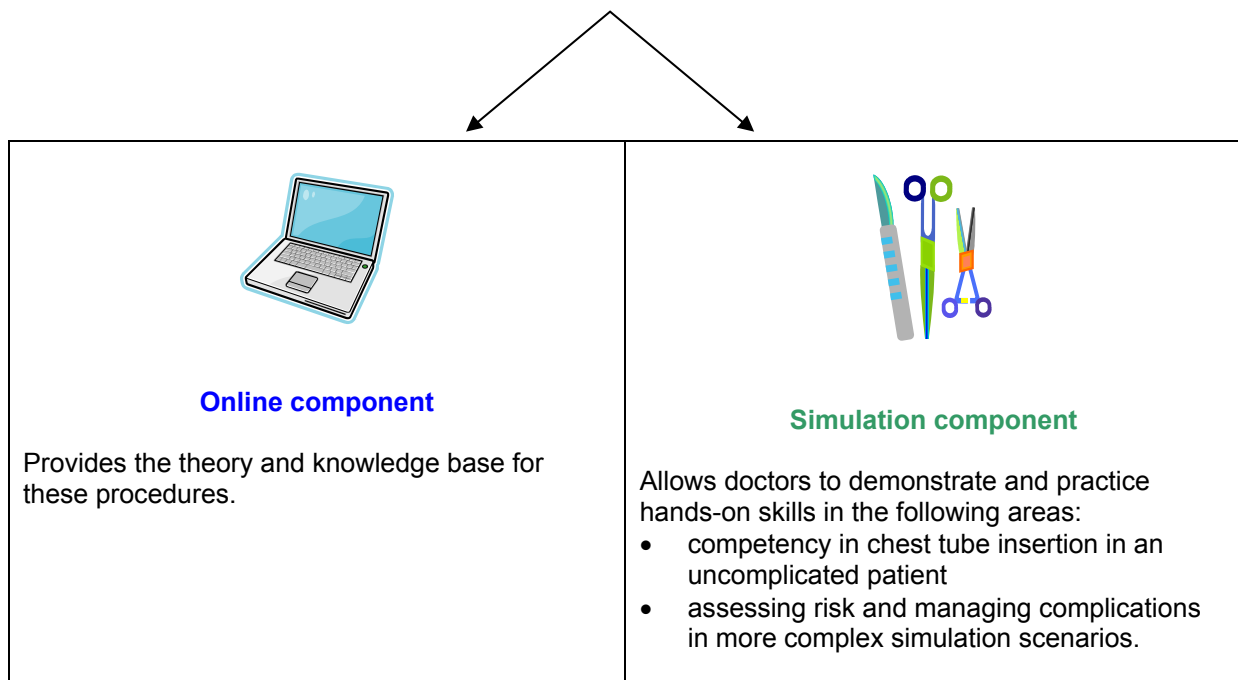
The insertion of a chest tube of any size and by any insertion method may result in significant iatrogenic injury. The objective of this program is to improve patient safety in clinical environments by advancing both the skills and clinical judgement of medical officers inserting chest tubes.

Online education and assessment tools for simulation training are available for:

- large bore chest tubes inserted by blunt dissection and
- small bore catheters inserted by Seldinger technique.

Doctors may wish to train in one or both techniques, depending on clinical practice at their institution.

The complete chest tube insertion program for doctors consists of two components:



Caution!

This program provides training in what is considered to be a safe, approach to inserting chest tubes. It does not represent a 'gold standard' or standard of care. Substantial variations in practice occur in clinical practice, which are likely to be of comparable safety and efficacy.

On-line education and simulation training do not replace the need for supervision/observation of chest tube insertion in patients prior to independent practice.

Online component of program

This simulation skills training has been designed to integrate with, and run in collaboration with, the online course:

'Insertion of chest tubes and management of chest drains in adults'.

This course is available for:

- Queensland Health staff at: http://www.sdc.qld.edu.au/course_chest_drain.php
- Others–
 - <http://www.safetyandquality.gov.au/our-work/healthcare-associated-infection/building-clinician-capacity>

Prior to undertaking simulation skill training, participants should consider completing the relevant online learning.

- All participants:
 - **'Assessing risk and minimising complications in chest tube insertion'**
- Less experienced candidates or failure to achieve required mark in the online assessment quiz
 - **'Anatomy refresher'**
 - **'Insertion of small bore catheter by Seldinger technique in adults'**
 - **And/or**
 - **'Insertion of large bore chest tube by blunt dissection in adults'**
- Completing the online assessment quiz and achieving a pass mark of 14/15 is **mandatory** and a prerequisite for attending simulation training. A copy of the online quiz with the result must be printed and taken to simulation training.

Simulation component of program

The simulation skills training has been designed in two parts. Doctors demonstrate and practice hands-on skills when:

- **Part 1.** inserting a chest tube in an uncomplicated patient
- **Part 2.** inserting a chest tube, assessing risk and managing complications in more complex simulation scenarios.

Prerequisites

1. Doctors attending the simulation component must tender proof of achieving a pass mark of 14/15 in the online assessment quiz.
2. Demonstrating competency in the standard technique for insertion of a chest tube in a mannequin is a prerequisite to proceeding to the more complex scenarios.

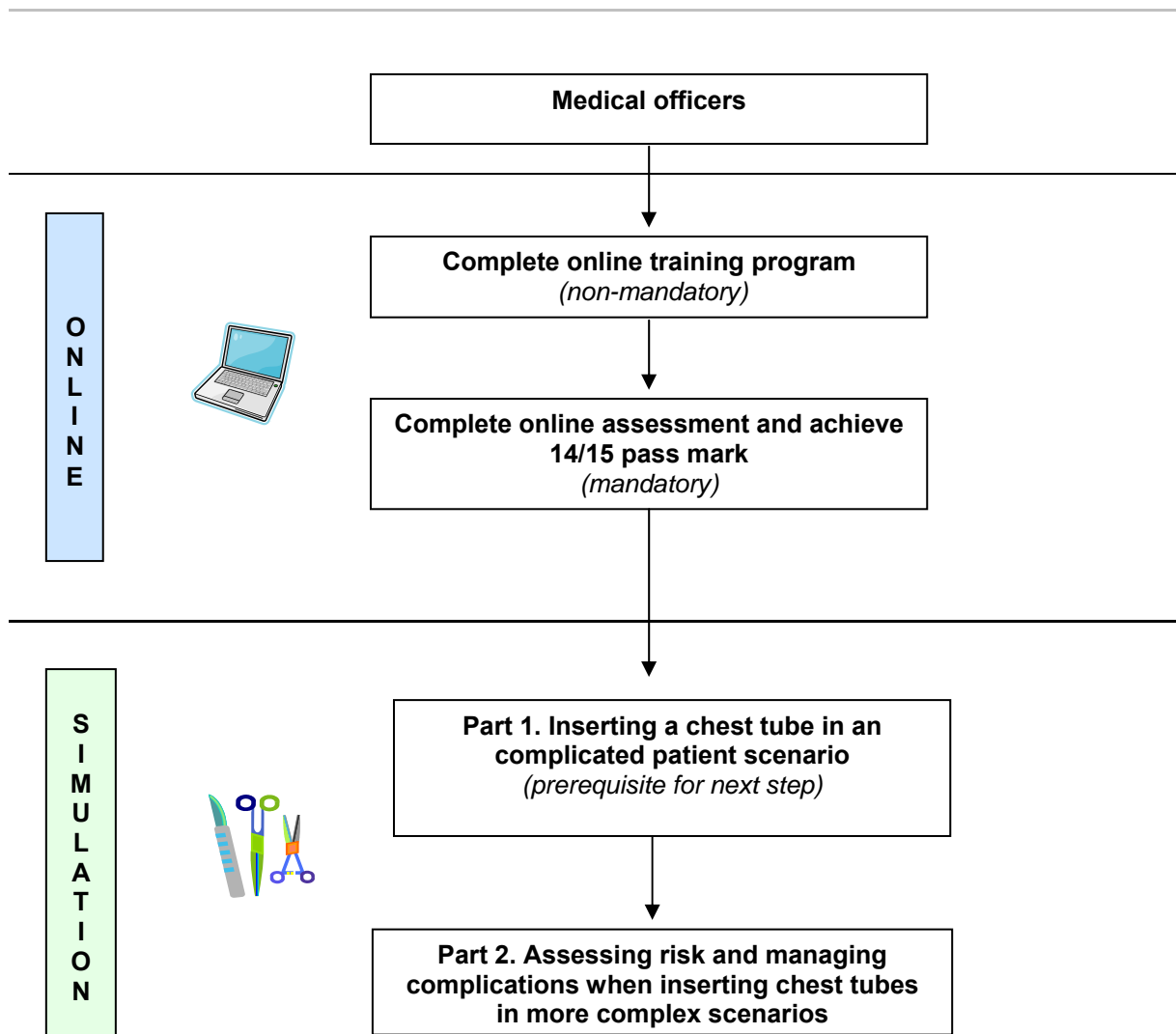


Golden Rule!

Completing the online assessment and achieving a pass mark of 14/15 is mandatory and a prerequisite to attending simulation training.

Flowchart of chest drain insertion program

Figure 1. Flowchart for chest drain insertion skills training for doctors



Roles and responsibilities of stakeholders

Local delivery agency

A local delivery agency (LDA) is any organisation that is committed to clinical education who is willing and able to undertake the responsibilities required of them to deliver the **'Insertion of chest drains in adults'** education program for doctors.

The Local Activity Manager

The Local Activity Manager is responsible for the overall planning and organisation of the simulation program on insertion of chest tubes.

The role of the Local Activity Manager is to:

- plan the activity
- ensure the appropriate Simulation Facilitator is available to set-up the simulation and assist with the scenarios
- ensure the appropriate Procedural Expert is available to conduct the simulation, assess participants and provide feedback on their performance
- ensure there is an appropriate venue and equipment available for carrying out the simulation
- ensure there is access to a suitable simulation mannequin
- provide information on the simulation program to participants.

The Simulation Facilitator

The Simulation Facilitator is appointed by the Local Activity Manager. The Local Activity Manager is responsible for the overall running of the simulation program on insertion of chest tubes. The Simulation Facilitator is responsible for the 'on the ground' organising of the activity and assisting in the scenarios. Simulation Facilitators are usually clinical educators, preferably nurses.

The Simulation Facilitator's role:

- Set-up the simulation room, equipment and mannequin in consultation with the Procedural Expert.
- Assist the Procedural Expert in carrying out the simulation scenarios.
- Assist the participant in the scenarios.

Selection criteria:

- clinical educator, preferably a nurse with experience in management of chest tubes and drains
- familiarity with the educational resources, program and simulation mannequin
- experience operating within a simulation environment (ideally this role would be undertaken by a nurse who will be working with the training participant – check previous pages).



Golden Rule!

The Simulation Facilitator should be familiar with all the information contained in the Simulation Facilitator's manual.

The Procedural Expert

The Procedural Expert is appointed by the Local Activity Manager. They have recognised expertise in inserting chest tubes, are responsible for selecting and conducting the simulation scenarios as well as assessing and providing feedback to participants on their performance.

The Procedural Expert's role:

- Part one
 - Demonstrate chest tube insertion for novice participants
 - Guide the participant through one or more practice runs
 - Assess and record the participant's skill on a final "run" using assessment tool 1A or 1B
- Part two
 - Select and undertake the simulation scenarios
 - Assess and record the participant's skill using assessment tool 2
- Provide feedback on the performance of the participant

Selection criteria:

- Advanced competency in inserting a chest tube and have procedural expertise that would be recognised by peers.
- Experience operating within a simulation environment
- Familiarity with both the online and simulation components of the chest tube insertion program

How to organise simulation skills training

Organisation of a simulation activity can be broken down into three stages:

- Stage 1 – Planning the Activity
- Stage 2 – Lead up to the planned activity
- Stage 3 – On the Day

The Local Activity Manager is mostly involved in Stage 1 and 2 of the organisation, while the Simulation Facilitator will be mostly involved in the organisation on the day.

Stage 1 - Planning a simulation activity

Organisation of a simulation activity can be broken down into three stages:

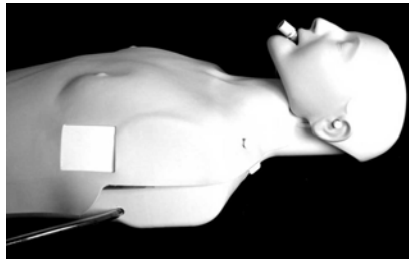
- Stage 1: Planning the activity
- Stage 2: Lead up to the planned activity
- Stage 3: On the day

The Local Activity Manager is mostly involved in Stage 1 and 2 of the organisation, while the Simulation Facilitator is mostly involved in the organisation on the day.

Stage 1 - Planning a simulation activity

The initial planning phase involves the following steps:

- Ensure there is access to a suitable simulation mannequin. The mannequin recommended for simulation training is the Super-Annie 1 or 2. The mannequin is manufactured by Richard Morris at Simcentral.



Contact:

Web: <http://www.simcentral.com.au>

Email: enquiries@simcentral.com.au

- Ensure there is access to a suitable venue. The ideal simulation environment is a room set up as a procedure room or ward environment.
- Decide on simulation format – standard procedure training run by clinical educators or non-standard procedure training, incorporating more complex clinical scenarios requiring involvement of a Procedural Expert.
- Identify participants.
- Select and appoint a Simulation Facilitator and, if required, a local Procedural Expert.
- Select date(s) and book venue.

Stage 2: lead up to simulation activity

Once the meeting has been planned the next steps are to:



- invite participants and ensure they are provided with information about the program and prerequisites to complete before the simulation activity
- ensure that both the Simulation Facilitator and Procedural Expert have access to the online education program and are provided with a Simulation Facilitator's manual and participant list
- finalise program with Simulation Facilitator:
 - ensure availability of venue, required equipment and mannequin
 - provide copies of assessment sheets, evaluation forms and record of attendance form (if required) to Simulation Facilitator.

Stage 3: On the day

On the day, the role of the Local Activity Manager is mainly to:

- support the Simulation Facilitator and Procedural Expert
- collect evaluation forms and record of attendance form (if required) from Simulation Facilitator, at the end of the event.

Flowchart for managing a simulation skills training activity

Time line	Stages	Tasks
Approx. 4 weeks 	1 Activity planning	Ensure access to simulation mannequin ↓ Decide on format ↓ Identify participants ↓ Select and appoint Simulation Facilitator and Procedural Expert ↓ Select date and venue
Approx. 4 weeks 	2 Lead-up to activity	Invite participants and provide them with program information ↓ Provide Simulation Facilitator and Procedural Expert with access to online program, Simulation Facilitator's manual and participant list ↓ Finalise program with Simulation Facilitator ↓ Ensure availability of venue, equipment and mannequin ↓ Provide copies of assessment sheets, evaluation forms and record of attendance forms to Simulation Facilitator
	3 On the day	Support the Simulation Facilitator and Procedural Expert ↓ Collect evaluation forms and record of attendance form (if required)
Time line	Stages	Tasks

Appendices

Forms available:

- Assessment tool 1A: Assessment sheet for inserting a large bore chest tube by blunt dissection
- Criteria sheet for inserting large bore chest tube by blunt dissection
- Assessment tool 1B: Assessment sheet for insertion of small bore catheter by Seldinger technique
- Criteria sheet for insertion of small bore catheter by Seldinger technique
- Assessment tool 2 - Global assessment for chest tube insertion in risk / complex scenarios
- Evaluation sheet for simulation skills training

Assessment tool 1A

Date:

Participant Name:

Procedural expert:

Assessment sheet for inserting large bore chest tube by blunt dissection

NOTE: Not all details can be simulated; however the participant must be able to fully describe these aspects (e.g. aseptic technique).	Completes step		Comments
	Yes	No	
Step 1: Select and mark the insertion site			
Performs risk assessment			
Checks consent			
Positions patient appropriately for chest tube insertion *			
Determines the insertion site using appropriate anatomical markers *			
Marks site of insertion with indelible marker			
Considers ultrasound guidance for some scenarios e.g. loculated effusion			
Step 2: Choose the chest tube and check equipment			
Checks that appropriate equipment is available, sterile, and on hand			
Selects appropriate sized tube without a trocar *			
Step 3: Prepare the patient			
'Time out' including consent, ID, labeling of x-rays (displayed) and confirm side and site for insertion by reviewing clinical signs and radiological investigations			
Considers premedication			
Obtains reliable venous access			
Ensures continuous oximetry			
Uses an assistant			
Use strict aseptic technique *			
Step 4: Infiltrate local anaesthetic			
Uses adequate volume of local anaesthetic - 3 mg/kg (lignocaine 1% - 20 ml / 70 kg) *			
Infiltrates skin, subcutaneous tissue, muscle, periosteum and pleura along superior surface of rib margin *			
Once inside pleural space aspirates with LA syringe to confirm right location and diagnosis			
Waits 3- 5 minutes for the local anaesthetic to take effect			

**Refer to criteria sheet for additional information.*

Assessment tool 1A cont.

Assessment sheet for inserting large bore chest tube by blunt dissection			
	Completes step		Comments
	Yes	No	
Step 5: Incise the skin and dissect to the pleura			
Makes a horizontal incision along the superior surface of rib margin, and parallel to it			
Inserts wound closure suture (a mattress / interrupted suture(s)) loosely across middle of wound			
Uses blunt dissection utilising artery forceps (or similar), to spread subcutaneous fat, and muscle			
Punctures parietal pleura with tip of forceps			
Ensures track through the intercostal muscles is wide enough to allow easy passage of chest tube (forceps or finger)			
Digitally examines thoracic cavity to ensure no underlying organs are present			
Step 6: Insert the chest tube			
Inserts chest tube using artery forceps or guided by a finger			
Ensures all side holes of chest tube are inside the pleural cavity			
Attaches chest tube to chest drain or clamps the tube, while suturing and dressings are completed			
Operator asked how they would clinically confirm correct placement of chest tube, and correct answer given *			
Step 7: Anchor the tube – suturing			
Uses stout, non-absorbable suture material such as Mersilene 0 or silk 1 on cutting needle to suture tube			
Secures tube with stay or anchoring suture			
Ties the loose ends of wound closure suture together at distal end and winds around tube near skin			
Secures tubing to skin in manner to facilitate drainage and reduce tube dislodgment, e.g. using a mesenteric tag of tape			
Step 8: Connect the tube to a drain			
If not already connected, removes protective cap from end of drainage tube to chest drain and connects chest tube to chest drain. If used, removes clamp on chest tube			
Tapes junction of chest tube and drainage tube to prevent separation, and ensures connection remains visible			
Step 9: Dress the site			
Uses appropriate dressing			
Step 10: Confirm tube placement			
Confirms tube placement with an x-ray			
Step 11: Document the procedure			
Ensures procedure is documented in patient chart			

* Refer to criteria sheet for additional information.

Criteria sheet for inserting large bore chest tube by blunt dissection

Step 1: Select and mark the insertion site	
Positions patient appropriately for chest tube insertion – discuss alternative sites	<p>Axillary approach</p> <ul style="list-style-type: none"> Recline patient on bed at 30-60 degrees, slightly rotated with the arm on affected side abducted to expose axillary area (hand behind head, hand on hip or arm away from body) or Sitting upright leaning over adjacent table on pillow or lateral decubitus <p>OR Second intercostal space in mid-clavicular line - recline OR Posterior insertion – leaning over adjacent table on pillow</p>
Determines the insertion site using appropriate anatomical markers (requires live model)	<p>Preferred position is through 4th or 5th intercostal space, midaxillary or anterior axillary line, in a region bounded by:</p> <ul style="list-style-type: none"> lateral border of pectoralis major anterior border of latissimus dorsi 5th intercostal space, and apex in the axilla <p>Second intercostal space</p>
Step 2: Choose the chest tube and check equipment	
Selects appropriate sized tube without a trocar	<ul style="list-style-type: none"> Pneumothorax: 20 – 24 Fr (6.7- 8 mm) Effusion/pus: 20 – 28 Fr (8 – 9.3 mm) Blood/pus: 32 Fr (10.7 mm)
Step 3: Prepare the patient	
Use strict aseptic technique	<p>Dons personal protective equipment (PPE):</p> <ul style="list-style-type: none"> sterile gown and gloves, mask and protective eyewear <p>Cleans patient's skin with 2 applications of alcoholic chlorhexidine or povidone iodine 10% w/v solution Drapes site with sterile drapes</p>
Step 4: Infiltrate local anaesthetic	
Uses adequate volume of local anaesthetic – 3 mg/kg (Lignocaine 1%-20 ml/ 70 kg)	<p>Ask operator how they calculated dose of anaesthetic. Use of adrenaline (pre-mix vial) allows up to 5mg/kg lignocaine to be used</p>
Infiltrates skin, subcutaneous tissue, muscle, periosteum and pleura along superior surface of rib margin	<p>Ask operator to explain what anatomical structures they need to infiltrate</p>
Step 6: Insert the chest tube	
Clinically confirms correct placement of chest tube	<p>Correct placement of the chest tube can be clinically confirmed by observing:</p> <ul style="list-style-type: none"> fogging of chest tube with expiration movement of air/fluid through tube 'swinging', 'tidalling' or 'oscillating' of fluid level in water seal chamber

Assessment tool 1B

Date: _____ Participant Name: _____ Procedural Expert: _____

Assessment sheet for the inserting small bore catheter by Seldinger technique			
NOTE: Not all details will be simulated, however the participant must be able to fully describe these aspects. (e.g. aseptic technique)	Completes step		Comments
	Yes	No	
Step 1 – Risk assessment			
Performs risk assessment			
Checks consent			
Step 2 – Select and mark the insertion site			
Positions patient appropriately for chest tube insertion *			
Determines the insertion site using appropriate anatomical markers *			
Marks site of insertion with indelible marker			
Considers ultrasound guidance for some scenarios, e.g. loculated effusion			
Step 3 – Choose the chest tube and check equipment			
Checks that appropriate equipment is available, sterile, and on-hand.			
Uses an assistant			
Step 4 - Prepare the patient			
'Time out' including consent, ID, labelling of x-rays (displayed) and confirm side and site for insertion by reviewing clinical signs and radiological investigations			
Considers premedication			
Obtains reliable venous access			
Ensures continuous oximetry			
Uses strict aseptic technique *			
Step 5 – Infiltrate local anaesthetic			
Uses adequate volume of local anaesthetic (3mg/kg Lignocaine 1% - 20ml / 70kg). *			
Infiltrates skin, subcutaneous tissue, muscle, periosteum and pleura along superior surface of rib margin. *			
Aspirates with LA syringe to confirm right location and diagnosis			
Waits 3- 5 minutes for the local anaesthetic to take effect			

* Refer to criteria sheet for additional information

Assessment tool 1B cont.

Assessment sheet for the inserting small bore catheter by Seldinger technique			
	Completes step		Comments
	Yes	No	
Step 6 – Insert small bore catheter			
Confirms intrapleural placement of introducer needle			
Equipment all inserted in same plane			
Guide wire not kinked or contaminated			
Ensures all side holes of catheter in pleural space			
Attaches 3 way tap and turns 'off to patient'			
Attaches chest tube to chest drain or clamps the tube or 3 way tap 'off to patient', while suturing and dressings are completed			
Step 7 – Anchor the tube – suturing			
Secures tube with stay or anchoring suture			
Acknowledges that anchoring device does not replace need to suture catheter			
Step 8– Connect the tube to a drain			
Attaches adaptor to catheter / 3 way tap			
Removes protective cap from end of drainage tubing of under water seal drain			
Connects catheter to chest drain.			
If used, removes clamp on chest tube or turns 3 way tap to connect pleural space to UWSD			
Tapes junction of chest tube and drainage tube to prevent separation, and ensures connection remains visible			
Operator asked how they would clinically confirm correct placement of chest tube and correct answer given *			
Step 9– Dress the site			
Uses appropriate dressing			
Step 10 – Confirm catheter placement			
Confirms catheter placement with an x-ray			
Step 11– Document the procedure			
Ensures procedure is documented in patient chart			

**Refer to criteria sheet for additional information*

Criteria sheet for inserting small bore catheters by Seldinger technique

Step 2: Select and mark the insertion site	
Positions patient appropriately for chest tube insertion – discuss alternative sites	<p>Axillary approach</p> <ul style="list-style-type: none"> Recline patient on bed at 30–60 degrees, slightly rotated with the arm on affected side abducted to expose axillary area (hand behind head, hand on hip or arm away from body) or Sitting upright leaning over adjacent table on pillow or Lateral decubitus <p>OR second intercostal space in mid-clavicular line – recline OR posterior – leaning over adjacent table on pillow</p>
Determines the insertion site using appropriate anatomical markers (requires live model)	<p>Preferred position is through 4th or 5th intercostal space, midaxillary or anterior axillary line, in a region bounded by:</p> <ul style="list-style-type: none"> lateral border of pectoralis major anterior border of latissimus dorsi fifth intercostal space, and apex in the axilla <p>Second intercostal space in mid-clavicular line</p>
Step 3: Prepare the patient	
Use strict aseptic technique	<p>1) Dons personal protective equipment (PPE):</p> <ul style="list-style-type: none"> sterile gown and gloves mask protective eyewear <p>2) Cleans patient's skin with 2 applications of alcoholic chlorhexidine or povidone iodine 10% w/v solution</p> <p>3) Drapes site with sterile drapes</p>
Step 5: Infiltrate local anaesthetic	
Uses adequate volume of local anaesthetic—3 mg/kg (Lignocaine 1%-20 ml/ 70 kg)	<ul style="list-style-type: none"> Ask operator how they calculated dose of anaesthetic Use of adrenaline (premix vials) allows up to 5mg/kg lignocaine to be used
Infiltrates skin, subcutaneous tissue, muscle, periosteum and pleura along superior surface of rib margin	<ul style="list-style-type: none"> Ask operator to explain what anatomical structures they need to infiltrate
Step 8: Insert the chest tube	
Clinically confirms correct placement of chest tube	<p>Correct placement of the chest tube can be clinically confirmed by observing:</p> <ul style="list-style-type: none"> movement of air/fluid through tube swinging, 'tidalling' or 'oscillating' of fluid level in water seal chamber

Assessment tool 2

Date:

Participant Name:

Procedural Expert:

Global assessment for chest tube insertion in risk / complex scenarios

Only use this section with simulation scenarios containing risks.

	Identifies risk			Verbalises a plan to minimise/eliminate this risk			Demonstrates mitigation (if applicable)	Endangers patient	Comments
	Correct	Correct with prompts	Incorrect	Correct	Correct with prompts	Incorrect	Tick if yes	Tick if yes	
Scenario with low to moderate level of risk/complexity									
List risk(s) included in scenario:									
Scenario with moderate to high level of risk/complexity									
List risk(s) included in scenario:									

Evaluation sheet for simulation skills training: Insertion of chest tubes in adults

Date of simulation exercise: _____
Location of simulation exercise: _____

Learning goals

Rank your achievement of each learning goal using the scale below:

- 1 - Unable to meet learning goal
- 3 - Able to meet the goal to a major extent
- 5 - Can confidently meet the goal

To what extent were you able to meet the learning goals?

- Be able to insert a chest tube in an uncomplicated patient using a standard technique
- Be able to identify and analyse the factors that may lead to complications when inserting a chest tube in an adult
- Be able to minimise a patient's risk of complications from chest tube insertion

Simulation exercise

To what extent did you find this simulation useful as a learning opportunity? (Tick one.)

- Very useful
- Fairly useful
- Not useful

To what extent was the simulation exercise clear and easy to follow? (Tick one.)

- Clear and easy to follow
- Mostly clear and easy to follow
- Unclear/difficult to follow

Did you complete the online units relevant to this simulation scenario, prior to attending? (Tick one.)

- Yes
- Unsure
- No

Did the online units help you to complete the simulation exercise? (Tick one.)

- Yes
- Somewhat
- No

Comments

Evaluation sheet for simulation scenario 1: assisting in inserting a chest tube cont.

Evaluation sheet

Practice

As a result of completing this simulation will you be making any modifications to your practice? (Tick one.)

- My practice will remain unchanged
- I confirmed my practice
- I plan to review my practice
- I plan to make modifications to my practice

Comments

Facilitator

Did the facilitator promote your learning?

- Yes
- Somewhat
- No

Comments

General comments

What features did you like/dislike about the simulation exercise?

How could this simulation exercise be improved?
