



Chest Drain Management - Clinical Practice Standard

1. Purpose

The purpose of this policy is to establish minimum practice standards for the care and management of chest drains throughout the WA Country Health Service (WACHS).

Removing unwanted variation in clinical practice and following best practice guidelines has been found to reduce inappropriate care (overuse, misuse and underuse) thus improving health outcomes, reducing preventable harm and decreasing wastage.

For children, refer to Perth Children's Hospital Clinical Practice Manual:

- [Chest Drain Management](#)

2. Scope

All medical, nursing, midwifery and allied health staff employed within the WACHS.

All health care professionals are to work within their scope of practice appropriate to their level of training and responsibility.

Further information may be found via [HealthPoint](#) or the [Australian Health Practitioner Regulation Agency](#) as appropriate.

3. Procedural Information

Where care requires specific procedures that may vary in practice across sites, staff are to seek senior clinician advice. Procedural information within the appendices of this Clinical Practice Standard (CPS):

[Appendix 1: Flowchart – Insertion of chest drain decision](#)

[Appendix 2: Insertion of chest drain procedure](#)

[Appendix 3: Management of chest drain suction](#)

[Appendix 4: Changing the chest drain system](#)

[Appendix 5: Troubleshooting](#)

[Appendix 6: Removal of chest drain](#)

[Appendix 7: Indwelling pleural catheter \(IPC\)](#)

[Appendix 8: Pleural aspiration](#)

4. Considerations

Potential life threatening complications can occur with:

- Blockage of a chest tube - canister and tubing (from chest drain to canister) should be changed immediately
- Disconnection of the chest tube - from either [the patient](#) or [chest drain canister](#) (refer to the troubleshooting section using links provided)

Chest drains should only be clamped in carefully considered circumstances (refer to [clamping of chest drains](#))

Clamping a pleural drain is contraindicated in any patient receiving positive pressure ventilation or Non-Invasive Ventilation.¹³

Clamping of chest drains

The following carefully considered circumstances are indicated for clamping a chest drain in the short term:

- briefly when changing a drainage system
- when positioning of the patient requires the drain canister to be elevated above chest level
- when an indwelling pleural catheter valve is leaking
or
- at the request of the medical officer.

Clamping may result in a tension pneumothorax or surgical emphysema¹².

Two sets of chest drain clamps (with rubber or plastic protection) should remain with the patient at all times, in case of accidental disconnection of drainage system from chest drain (refer to [Appendix 5: Troubleshooting](#)).

Do not clamp tubes when transporting patient with a chest drain in situ¹².

Prior to drain removal a Medical Officer may request a 'Clamping Trial' to detect small air leaks not immediately obvious at the bedside. This should not be for a prolonged period of time (≤ 6 hours for alert patients)^{17,18,19}. These patients must remain in the clinical area and be closely observed for signs of respiratory distress for the duration of the clamping trial. Immediately unclamp if signs of clinical deterioration¹² and notify medical officer. Post removal X-ray to be taken within 3 hours.

Transport of patients via air

For patients being flown out by Royal Flying Doctor Service (RFDS) or helicopter, consideration should be given to the chest tube drainage system in place and its suitability for flight. During the RFDS pre-flight assessment staff should discuss the type of drainage system in place with the assessing doctor to determine if a change of drainage system is needed.

The system in place may be suitable however there are circumstances where RFDS may change over the drainage system to a more suitable system. E.g. generally drains filled with water (UWSD) are changed to a more suitable system like a Pneumostat™ or Atrium Express™ mini drain for the flight (these drains are generally provided by RFDS, however this should be confirmed during the pre-flight assessment conversation).

Pre-flight discussions regarding suitability of chest drainage systems with Helicopter transport provider should also be considered.

Other considerations

Staff are to comply with:

- The *5 Moments for Hand Hygiene* ([Hand Hygiene Australia](#))
- WACHS [Infection Prevention and Control Policy](#)
- specific requirements in the use of personal protective equipment and clothing.

Ensure:

- the patient has received information relating to the intended procedure, and has given appropriate consent;
- patient identification and procedure matching processes are undertaken.
- to maintain patient privacy and dignity;
- to offer the presence of a chaperone where appropriate to patient and clinician requirements;
- to provide the opportunity for an accredited interpreter and/ or Aboriginal Liaison Officer where appropriate to the patient's language or communication requirements. (See WA Health Language Services Policy MP 0051/17).

5. General Information

The procedure of inserting a pleural drain into the pleural cavity to drain air or fluid may be performed as a lifesaving emergency procedure, as a planned procedure post-surgery or as part of the medical management of patients with pleural disease.¹³

The principal purpose of chest drains is to maintain cardiorespiratory function and haemodynamic stability by draining the pleural and mediastinal spaces of air, blood or other fluids. All chest drainage systems are based on the basic principles of providing passive or suction drainage of air and fluids, while maintaining sterility and preventing outside air from entering the thoracic cavity.

The decision to use needle aspiration or pleural drain should consider the operator's experience/ competence in each of these procedures. A summary flowchart for insertion of chest drain (including consideration of pleural aspiration) is contained in [Appendix 1](#).

The Chest Drain System

Several chest drain systems are used within WACHS. Chest drain systems include three components:

- A **one way valve** (usually water) which allows air to exit from the pleural space on exhalation and prevents air from entering the pleural space or mediastinum on inspiration
- A **drainage chamber** which collects the fluid drained from the chest
- A **vent** which has two functions as it allows air to escape from the system or facilitates the application of suction to the chest drainage system.

A low resistance one way valve allows air/fluid to escape from the patient without the possibility of return. Any positive pressure greater than 2cmH₂O will be expelled to atmosphere.

The Rocket[®] chest drain (Figure 2) contains an anti-foaming agent which reduces foaming, as air bubbles through drain contents.

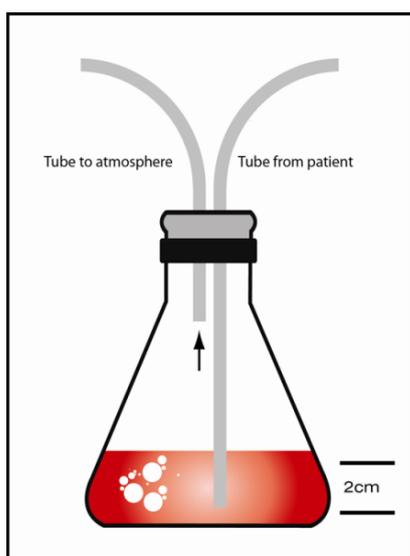


Figure 1: Single Bottle concept



Figure 2: Example - Rocket[®] chest drain

Triple bottle system

Traditionally, the triple bottle chest drainage systems have the three components in three separate bottles but these systems are bulky and therefore seldom used.

Commercially produced plastic multi chamber chest drainage systems are available to replace the bulky alternative and consist of a collection chamber, an underwater seal and a suction regulating device, which is either wet or dry suction. See Figure 4 for example.

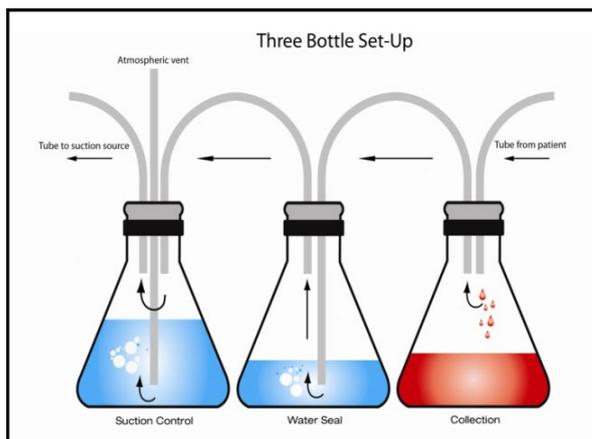


Figure 3: Triple bottle concept



Figure 4: Example - Oasis® chest drain canister

Drain suction is regulated by a dial on the drain. When connected to wall suction, a bellow expands to indicate degree of suction set. Refer to [Appendix 3: Management of chest drain suction](#).

Types of catheter

The choice of catheter required is dependent of the primary reason for insertion. Those used in the management of trauma or following surgical intervention can differ from those used for drainage of pleural effusion or pneumothoraces.^{2,3}

Chest drain	Size	Insertion	Indications	Removal
Large Bore Intercostal Catheters (ICC)	18 - 36 French	Inserted intra-operatively or through an incision using blunt dissection. NB: 18 French may also be inserted using a Seldinger technique	Chest surgery or trauma for drainage of viscous pleural fluid such as blood (haemothorax), air and blood (haemopneumothorax), pus (empyema) or lymphatic fluid (chylothorax)	Requires two nurses
Small Bore Pleural Drains	12 – 16 French	Inserted with guide wire and dilators using a Seldinger technique	Drainage of air (pneumothorax) or drainage of less viscous pleural fluid	Requires one nurse If closing suture present, two nurses are required

Chest drain	Size	Insertion	Indications	Removal
Indwelling Pleural Catheters (IPC)	16 French	Tunnelled chest drains incorporating a Dacron cuff inserted using a combination of Seldinger and blunt dissection techniques guided by thoracic ultrasound	Long-term management of malignant pleural effusions associated with mesothelioma or other lung malignancies. IPCs can be capped and accessed intermittently to drain pleural fluid	A surgical procedure performed by Physicians only

Table 1: Chest drain sizes and indications¹²

- A chest drain should be connected to a drainage system that contains a valve system to prevent fluid or air from entering the pleural space¹²
- Chest drainage systems should not be raised above the chest height unless needed for positioning patient (chest drain should then be clamped for the short period required)
- If chest drain is tipped over, should be turned upright immediately.¹²

Pain Management and Activity

- Administer analgesia as prescribed to ensure patient’s pain is well controlled. The patient should be able to deep breath, cough and mobilise with minimal pain^{12,13}
- Assist patient, if required, to reposition regularly. Position patient with head of bed elevated 30-45° when supine in bed. Encourage deep breathing and coughing to promote drainage and re-expansion of lung^{12,13}
- Encourage the patient to mobilise and sit out of bed. Refer to Physiotherapy if mobility assistance is required^{12,13}
- Failure to adequately control pain may lead to decreased tidal volumes with subsequent hypoventilation, with risk of atelectasis and pneumonia. Observe the patient for clinical signs of infection. If present, notify Medical Officer.

Transporting Patient

- Do not clamp a chest drain for transport^{12,13}
- A patient with a chest drain connected to an underwater seal drainage system must have a nurse escort familiar with chest drain management when leaving ward area^{12,13};
- Ensure the canister is safely secured, remains upright and below the level of the patient’s chest¹⁴;
- Ensure the two clamps remain with the patient during transportation – in case of disconnection of the tubing from canister or drain tubing from chest drain.

6. Patient Monitoring

An individualised management plan is to be documented in the patient's health record as soon as practicable, and in relation to the specific requirements for clinical risk prevention and management. At a minimum, the plan must consider:

- patient history and presence of comorbidities
- diagnosis and treatments for clinical conditions
- medications, psychosocial and cultural factors that could influence patient monitoring
- site requirements, patient education and consent e.g. any restrictions to interventions associated with advance health directives (AHD) or similar;
- observations:

Patient assessment

- Comprehensive respiratory assessment using [IAPP](#) approach
- Frequency of core observations (T, BP, pulse, respiratory rate, SpO₂, and consciousness) are dependent upon the patient's clinical condition and medical orders
 - At a minimum, core observations are:^{12,13}
 - 30 minutely for 2 hours immediately post insertion, then
 - 4 hourly while the chest drain is insitu
 - Post removal of chest drain - refer to [Appendix 6: Removal of chest drain](#)
 - Observations outside of established parameters are escalated as per the WACHS [MR140A Adult Observation and Response Chart \(A-ORC\)](#) and the WACHS [Clinical Escalation of Acute Physiological Deterioration including Medical Emergency Response Policy](#)
- Closely observe respiratory status for signs of respiratory distress
- Check that air entry is equal and the trachea is midline.

Chest drain assessment

In adults >100ml of blood drained within 1-2 hours is very significant and must be reported to MO as the loss may need to be replaced¹³

- Chest drain observations are dependent upon the patient's clinical condition and medical orders
 - At a minimum, chest drain observations are:^{12,13}
 - 30 minutely for 2 hours immediately post insertion, then
 - 4 hourly while the chest drain is insitu

- Stop drainage and seek medical review if the patient develops discomfort, persistent cough, hypotension or vasovagal symptoms¹²
- Chest drain observations include swinging, bubbling, the amount and type of drainage and suction level¹³ and are recorded on the WACHS [MR129 Chest Drain Assessment and Observation Chart](#) (Exception – critical care areas that have specific documentation that includes the elements of the MR129). The chest drainage system should also be assessed for patency. The front page of the MR129 provides an explanation of each chest drain observation.

7. Equipment Required

- Specific equipment requirements are listed in the relevant [Appendices](#)
- Equipment must be appropriate for the age/size of the patient;
- Specific sites may have pre-prepared equipment packs where contents may vary
- Equipment must be checked, serviced and calibrated in accordance with manufacturer's recommendations to ensure reliability and accuracy.

8. Clinical Communication

Clinical Handover

Information exchange is to adhere to the Department of Health [Clinical Handover Policy](#) using the iSoBAR framework.

For patients being discharged into the community with an indwelling pleural catheter insitu – ensure appropriate handover has occurred with related services. Handover information to include:

- diagnosis
- reason for drain insertion
- plan of care – next drainage / drainage regimen
- patient / carer education given
- vital signs and drain/drainage history
- suture removal information.

For patients being transported by air, consideration should be given to the suitability of the chest drainage system in place – this is done during handover of information during the pre-flight assessment (refer to [transport of patients via air](#)).

Critical Information

Critical information, concerns or risks about a consumer are communicated in a timely manner to clinicians who can make decisions about the care.

Documentation

Failure to accurately and legibly record and understand what is recorded in patient health records contribute to a decrease in the quality and safety of patient care.

For insertion, document:

- sedation given and total local anaesthetic instilled
- depth of insertion and any complications
- type of tube inserted including serial number and bar code
- method of fixation and wound closure
- sutures that are required to be removed before tube removal.

Refer to WACHS [Documentation](#) CPS and [related forms](#).

Related Documents / Forms

- WACHS [MR129 Chest Drain Assessment and Observation Chart](#)
- WACHS [MR 140A Adult Observation and Response Chart \(A-ORC\)](#)
- WACHS [MR144 Fluid Balance Work Sheet](#)

Consumer information

There are a number of ways consumers can obtain specific information relating to hospital admissions, transfers and discharge from hospital. Relevant documents can be located via:

- [Procedure Specific Information Sheets \(PSIS\)](#) – R09 Inserting a Chest Drain

9. Compliance Monitoring

Regional evaluation, audit and feedback processes are to be in place to monitor compliance.

Failure to comply with this policy may constitute a breach of the WA Health Code of Conduct (Code). The Code is part of the [Employment Policy Framework](#) issued pursuant to section 26 of the [Health Services Act 2016](#) (HSA) and is binding on all WACHS staff which for this purpose includes trainees, students, volunteers, researchers, contractors for service (including all visiting health professionals and agency staff) and persons delivering training or education within WACHS.

WACHS staff are reminded that compliance with all policies is mandatory.

10. Relevant Legislation

(Accessible via: Government of Western Australia ([State Law Publisher](#) or [ComLaw](#)))

- *Carers Recognition Act 2004*
- *Health Practitioner Regulation National Law (WA) Act 2010*
- *Occupational Safety and Health Act 1984* (and Occupational Safety and Health Regulations 1996)
- *Privacy Act 1988*
- *State Records Act 2000*

11. Relevant Standards

- [National Safety and Quality Healthcare Standards](#) (First edition 2012)
1.7.1, 3.1.1
- [National Safety and Quality Healthcare Standards](#) (Second edition 2017)
1.27, 3.1, 8.6

12. Related WA Health Policies

- [WA Clinical Alert \(MedAlert\) Policy](#)
- [Recognising and Responding to Acute Deterioration Policy v1.1](#)
- [Clinical Handover Policy](#)
- [WA Health Consent to Treatment Policy](#)
- [Correct Patient, Correct Site and Correct Procedure Policy and Guideline for WA Health Services \(2nd Edition\)](#)
- [National Hand Hygiene Initiative in Western Australian Healthcare Facilities](#)
- [Western Australian Patient Identification Policy 2014](#)

13. Relevant WACHS documents

- [Clinical Escalation of Acute Physiological Deterioration including Medical Emergency Response Policy](#)
- [Clinical Observations and Assessments Clinical Practice Standard \(physiological, neurovascular, neurological and fluid balance\)](#)
- [MR129 Chest Drain Assessment and Observation Chart](#)
- [MR 140A Adult Observation and Response Chart \(A-ORC\)](#)
- [MR144 Fluid Balance Work Sheet](#)
- [Specimen Collection \(including Phlebotomy\) and Pathology Results - WACHS Clinical Practice Standard](#)
- [Waste Management Policy](#)

14. WA Health Policy Framework

[Clinical Governance, Safety and Quality Policy Framework](#)

15. Acknowledgement

Acknowledgment is made of the previous SMHS / WACHS site endorsed work used to compile this Chest Drain Management Clinical Practice Standard.

16. References

1. Mistry N, Bleetman A, Roberts KJ. Chest decompression during the resuscitation of patients in prehospital traumatic cardiac arrest. *Emergency Medicine Journal*. Oct 2009;26(10):738-740.
2. Fysh ET, Smith NA, Lee YC. Optimal chest drain size: the rise of the small-bore pleural catheter. *Seminars in respiratory and critical care medicine*. Dec 2010;31(6):760-768.
3. Cafarotti S, Dall'Armi V, Cusumano G, et al. Small-bore wire-guided chest drains: safety, tolerability, and effectiveness in pneumothorax, malignant effusions, and pleural empyema. *The Journal of thoracic and cardiovascular surgery*. Mar 2011;141(3):683-687.
4. Sharma L. Chest drains: Insertion. Adelaide, SA: The Joanna Briggs Institute; 2013: JBI Connect+. Accessed 27 June 2013.
5. Elsayed H, Roberts R, Emadi M, Whittle I, Shackcloth M. Chest drain insertion is not a harmless procedure - Are we doing it safely? *Interactive cardiovascular and thoracic surgery*. December 2010;11(6):745-748.
6. Funk GA, Petrey LB, Foreman ML. Clamping thoracostomy tubes: a heretical notion? *Proceedings (Baylor University. Medical Center)*. Jul 2009;22(3):215-217.
7. Hannaway N, Brown D, Monkhouse S. What is the correct way to remove a chest drain--on inhalation or exhalation, or does it not matter? *Nursing times*. May 4-10 2010;106(17):18.
8. Hunter J. Chest drain removal. *Nursing standard (Royal College of Nursing (Great Britain) : 1987)*. Jul 16-22 2008;22(45):35-38.
9. Sharma L. Chest drains: Removal. Adelaide, SA: The Joanna Briggs Institute; 2013: JBI Connect+. Accessed 27 June 2013.
10. Bruce EA, Howard RF, Franck LS. Chest drain removal pain and its management: a literature review. *Journal of Clinical Nursing*. 2006;15(2):145-154.
11. Given J. Management of procedural pain in adult patients. *Nursing standard (Royal College of Nursing (Great Britain) : 1987)*. Dec 8-14 2010;25(14):35-40.
12. Sir Charles Gardiner Hospital Nursing Practice Guidelines – [Chest Drain Management](#), 2017 [Accessed: 30 July 2018]
13. ACI. [Pleural drains in adults: a consensus guideline](#) v1.2. NSW Agency for Clinical Innovation; 2014. Avail from: [Accessed: July 2018]
14. [Havelock T, Teoh R, Laws D, Gleeson F. Pleural procedure and thoracic ultrasound: British Thoracic Society Pleural Disease Guideline 2010](#). *Thorax* 2010; 65(2). [Accessed: 6 August 2018]
15. Bhatnagar R and Maskell NA. Indwelling Pleural Catheters *Respiration* 2014;88:74-85. [Accessed 8 August 2018]
16. Lui MMS, Thomas R, Lee YCG. Complications of indwelling pleural catheter use and their management. *BMJ Open Respiratory Research* 2016;3:e000123.doi:10.1136/bmjresp-2015-000123. [Accessed: 31 July 2018]
17. Paydar S, Ghahramani Z, Ghoddusi Johari H, et al. Tube Thoracostomy (Chest Tube) Removal in Traumatic Patients: What Do We Know? What Can We Do? *Bulletin of Emergency & Trauma*. 2015;3(2):37-40. [Accessed 23 August 2018]
18. Rasheed MA, Majeed FA, Ali Shah SZ and Naz A. Role of Clamping Tube Thoracostomy Prior to Removal in Non-Cardiac Thoracic Trauma *Journal of Ayub Medical College Abbottabad-Pakistan* 2016;28(3):476-479 [Accessed 23 August 2018]

19. Imtiaz T, Majeed FA, Raza A, Rahim K, Saeed Y, Imran M Is Chest Tube Clamping Necessary before Removal *Pak Armed Forces Medical Journal* 2016: 66(4):591-94
20. American Association of Critical Care Nurses (AACN) CCRN (Adult) Certification [Nursing Assessment of the Respiratory System](#) Chapter 12; Lesson 2 [Accessed 23 August 2018]

17. Definitions

Carer	Carers provide unpaid care and support to family members and friends who have a disability, mental illness, chronic condition, terminal illness, an alcohol or other drug issue or who are frail aged (Carers Australia, 2015)
Consumer	A person who uses, or may potentially use, health services. Depending on the nature of the health service organisation, this person may be referred to as a patient, a client, a consumer, a customer or some other term. Consumers also include families, carers, friends and other support people, as well as representatives of consumer groups
IAPP Approach	<p>Inspection: Looking at the patient and observing them as they breathe, taking note of the rate, rhythm, depth, and effort of breathing</p> <p>Auscultation: listening to both lungs using a stethoscope</p> <p>Palpation: putting hands on the patient to feel whether their respiratory anatomy is normal or abnormal;</p> <p>Percussion: using the middle finger of your dominant hand to firmly and quickly tap the middle finger of your non-dominant hand against your patient's chest.</p>

18. Appendices

[Appendix 1: Flowchart – Insertion of chest drain decision](#)

[Appendix 2: Insertion of chest drain procedure](#)

[Appendix 3: Management of chest drain suction](#)

[Appendix 4: Changing the chest drain system](#)

[Appendix 5: Troubleshooting](#)

[Appendix 6: Removal of chest drain](#)

[Appendix 7: Indwelling pleural catheter \(IPC\)](#)

[Appendix 8: Pleural aspiration](#)

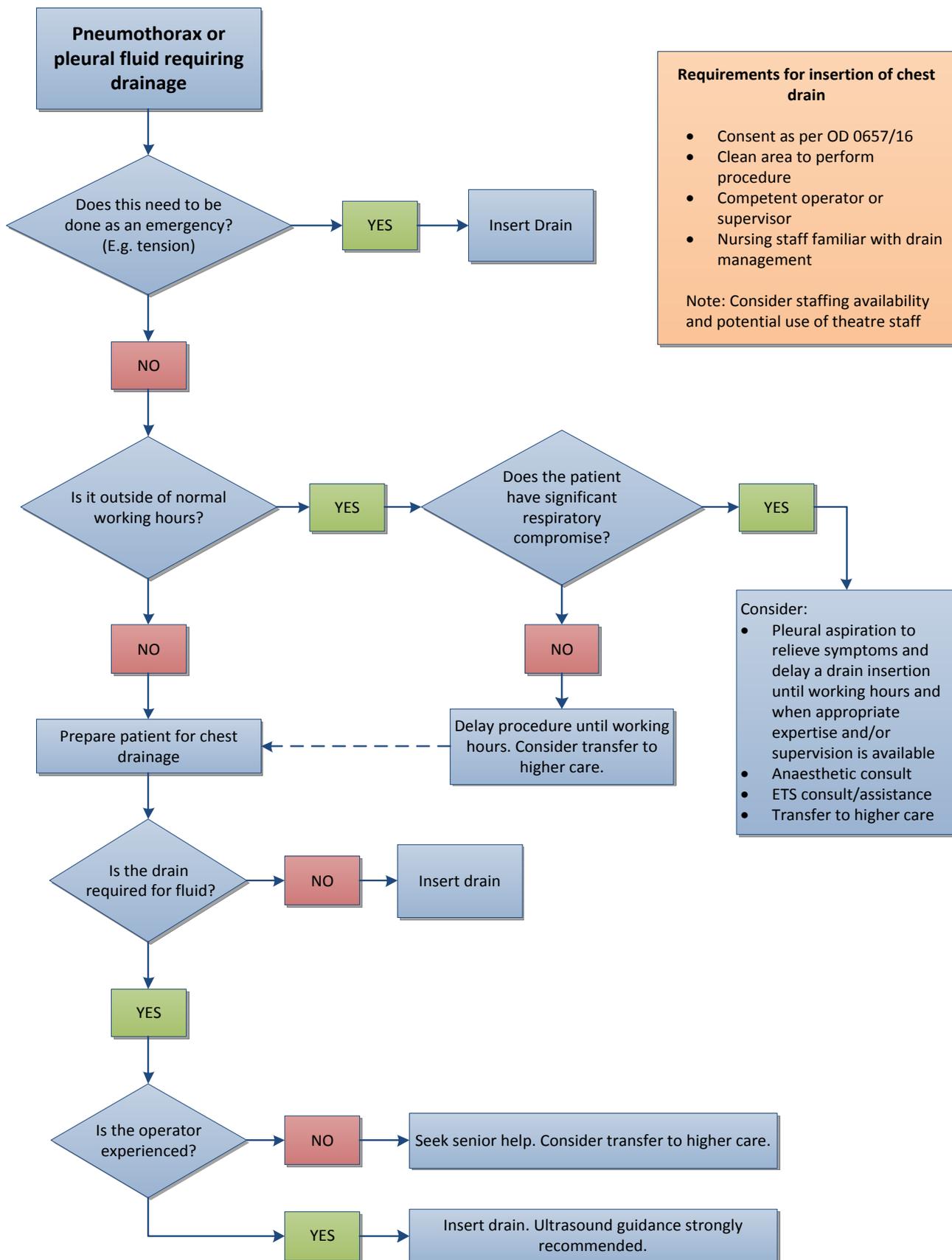
**This document can be made available in alternative formats
on request for a person with a disability**

Contact:	Project Officer, Clinical Practice Standards (R.Phillips)		
Directorate:	Medical Services	TRIM Record #	ED-CO-15-94162
Version:	2.00	Date Published:	6 November 2018

Copyright to this material is vested in the State of Western Australia unless otherwise indicated. Apart from any fair dealing for the purposes of private study, research, criticism or review, as permitted under the provisions of the *Copyright Act 1968*, no part may be reproduced or re-used for any purposes whatsoever without written permission of the State of Western Australia.

Printed or saved electronic copies of this policy document are considered uncontrolled.
Always source the current version from [WACHS HealthPoint Policies](#).

Appendix 1: Flowchart - Insertion of chest drain decision



Requirements for insertion of chest drain

- Consent as per OD 0657/16
- Clean area to perform procedure
- Competent operator or supervisor
- Nursing staff familiar with drain management

Note: Consider staffing availability and potential use of theatre staff

Consider:

- Pleural aspiration to relieve symptoms and delay a drain insertion until working hours and when appropriate expertise and/or supervision is available
- Anaesthetic consult
- ETS consult/assistance
- Transfer to higher care

Adapted from: ACI. Pleural drains in adults: a consensus guideline v1.2. NSW Agency for Clinical Innovation; 2014

Printed or saved electronic copies of this policy document are considered uncontrolled. Always source the current version from [WACHS HealthPoint Policies](#).

Appendix 2: Insertion of chest drain procedure

Pre procedure key points^{12,13}

- Medical officer to explain procedure to patient and obtain written consent (refer to [WA Health Consent to Treatment Policy](#) for patients unable to give written consent)
- All persons involved in the insertion and management of chest tubes or drains should be adequately trained and supervised
- In the event that any aspect of a pleural drain procedure starts to go wrong or not as expected, stop immediately and escalate for assistance
- Pleural procedures should not take place out of hours except in an emergency
- Consider IV access prior to the procedure. The procedure and drainage of fluid may result in hypotension, necessitating fluid resuscitation or replacement;
- IV analgesia and/or sedation may be prescribed and administered by Medical Officer prior to insertion
- A 'Time out' period prior to insertion to confirm the correct side and site both clinically and radiologically should be undertaken
- Thoracic ultrasound should be available and used where intercostal catheters are inserted for drainage of pleural fluid
- Check coagulation profile prior to insertion or removal of a pleural drain
- Insertion or removal of pleural drain should be avoided in anticoagulated patients until international normalized ratio (INR) 50 x10⁹/L is achieved
- Tubing clamps (2 per tube), with rubber or plastic protection must remain with the patient at all times. Drains should only be clamped in certain circumstances by staff experienced in the management of chest drains¹² (refer to [clamping of chest drains](#))
- A Trocar should **not** be used in the insertion procedure as it is difficult to control and may cause damage to both intra-thoracic and intra-abdominal organs⁴
- Large effusions should be drained incrementally, draining no more than 1.5L in the first hour^{13,14} (unless for pleural effusion – consult with MO). Clamps are used to control the rate of drainage. Stop drainage if the patient develops discomfort, persistent cough, hypotension or vasovagal symptoms,¹⁴ and initiate review by medical officer:
 - Rapid drainage of pleural effusions may cause re-expansion pulmonary oedema.^{13,14} Typical signs of this are shoulder tip pain, coughing, sudden drop in blood pressure, and/or oxygen saturation, and increased respiratory rate and distress.¹⁴

Positioning the patient

The preferred position for standard pleural drain insertion is on the bed, head and trunk elevated 30–45 degrees and slightly rotated, with the arm on the side of the lesion behind the patients head or on the hips to expose the lateral decubitus position¹³ ([Figure 6](#)).

An alternative is for the patient to sit upright leaning over an adjacent table with a pillow under the arms or in the lateral posture ([Figure 6](#)).

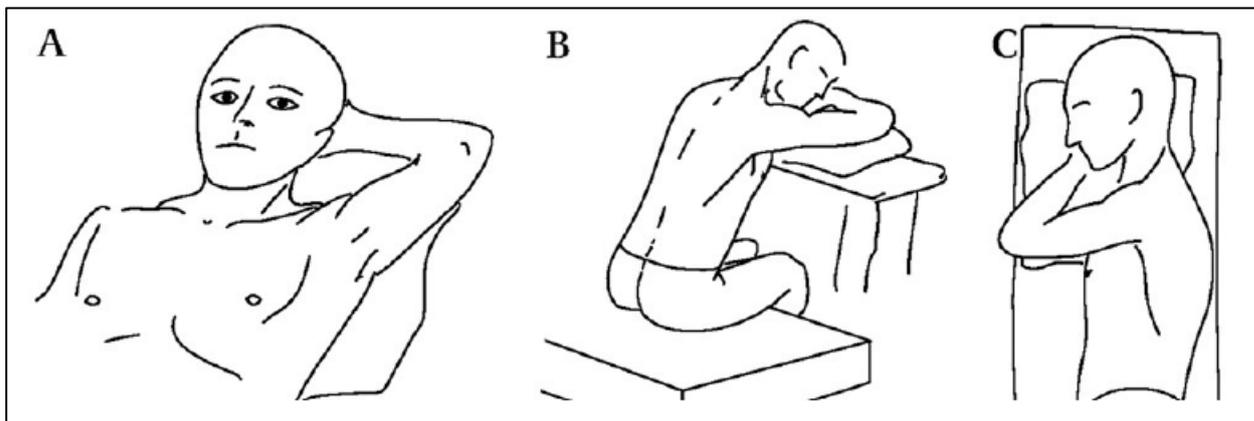


Figure 6: Common patient positions for chest drain insertion¹³

Equipment

- Sterile minor instrument pack
- Sterile draping pack (contains sterile gown)
- Sterile gloves - correct size for MO
- Chlorhexidine 2% in 70% Alcohol or Povidone Iodine 10% solution
- Local anaesthetic (lignocaine 1%, 2% or lignocaine with adrenaline as per MO)
- Sterile syringes 10mL x 2
- Sterile needles 25g and 21g x 2
- Sutures 0 silk with large curved needle
- Sterile scissors
- Tubing clamp for insertion (with rubber or plastic protection)
- >15cm tubing clamps with rubber or plastic protection x 2 per chest tube
- Chest drain catheter (*Size and type of catheter determined by underlying condition*)
- Chest drainage system (*Determined by required outcome*)
- 500ml sterile water for irrigation
- Adhesive stretch dressing
- Disposable size 15 blade scalpel.

Pre made insertion kits often include some of the above e.g. Seldinger Chest Drainage Kit.

Procedure (Assisting Medical Officer)

1. Perform hand hygiene and assist with set up of equipment (if needed – proceduralist may set up own equipment)
2. Perform and record core observations¹³
3. Assist patient into required position
4. Attach the patient to pulse oximeter, observing for deterioration in SpO₂ throughout the procedure¹³
5. Perform hand hygiene

6. Assemble equipment and assist medical officer maintaining a sterile field
7. Using aseptic technique prepare the required chest drainage system
8. Assist with insertion as required
9. Once inserted, connect to prepared chest drainage system
10. Place the drainage system below the level of the patient's chest
11. Apply dry dressing to insertion site (may not be required as proceduralist may apply)
12. Secure chest drain tubing to the patient's skin with adhesive stretch dressing (avoid unnecessary skin traction by not stretching the dressing during application to skin)
13. Hang the two tubing clamps from the chest drainage system
14. Ensure patient is comfortable
15. Dispose of waste and sharps as per [WACHS Waste Management Policy](#) (may not be required as proceduralist may dispose)
16. Commence post insertion [patient monitoring](#) – consider more frequent observations if sedation used or if clinically indicated¹³

Post procedure

Ensure [documentation requirements](#) have been met.

Chest X-ray to be taken immediately post insertion (within one hour¹³) and reviewed by medical officer following insertion of the chest drain catheter to assess:

- a. Position of the tip (may require repositioning by appropriate medical officer)
- b. Position of lowest drainage hole (need to ensure all drainage holes of the catheter are completely within the pleural cavity, to prevent air being drawn in). If position not suitable the catheter may need repositioning by appropriate medical officer
- c. For development of pneumothorax from insertion
- d. To decide if suction is required.

Dressing¹²

- Remove post-insertion dressing after 24 hours
- Inspect the insertion site for signs of infection, subcutaneous emphysema, or purulent pleural fluid. If present, notify the Medical Officer
- A wound swab should be taken if signs of localised infection are present (pain, redness, swelling or exudate)
- If there is a significant air leak from the insertion site, ensure the patient is reviewed by Medical Officer in respect to chest drain placement and suture placement
- Minor air leaks from the insertion site may require an airtight dressing Paraffin impregnated gauze wrapped around the chest drain at the insertion site and covered with a fenestrated dressing may assist in reducing the air leak¹³
- Ensure chest drain is secured to chest wall using adhesive tape to prevent kinking and pulling (tape around chest tube then onto patient's skin to avoid direct tube/skin contact).

Large bore chest drain:

- Using non-touch technique, clean drain sites every 24 hours and PRN with chlorhexidine 2% in alcohol 70% solution, allow to dry and apply a fenestrated dressing if sites are oozing and secure with tape. Leave site open if no ooze present.

Small bore chest drain:

- Using non-touch technique, clean drain sites every 48 hours and PRN with Chlorhexidine 2% in Alcohol 70% solution, allow to dry and apply a transparent semi-permeable dressing.

Indwelling Pleural Catheters:

- See [Appendix 7: Indwelling pleural catheters \(IPC\)](#).

Patient education following insertion

Educate the patient advising them of their responsibilities regarding care of the chest drain, including the importance of:

- maintaining the drainage system in an upright position and below the chest level especially when mobilising
- requesting adequate analgesia to allow effective deep breathing and coughing and to permit mobilisation
- avoiding kinking or obstruction of the chest drain tubing
- requesting assistance to mobilise if chest drain is on suction as suction tubing can pose a tripping hazard to patient and others
- remaining within the clinical area while chest drain is insitu. A nurse escort should accompany patient outside of the ward area¹²
- what to do / who to alert if the chest drain tube becomes disconnected from the drainage system or if the chest drain tube is accidentally removed from the chest/lung.

Appendix 3: Management of chest drain suction

The application of suction to chest drain systems aims to promote drainage of air, fluid or both from the pleural space. Suction should only be used as directed by the medical team responsible for the patients care.

A written or verbal medical order is required for the application or cessation of suction to a chest drain

Some drainage systems have inbuilt suction control mechanisms. These can be connected to highflow suction (with a minimum of -80mmHg) and the specific suction level is regulated on the drainage system canister e.g. Oasis Atrium® (see [Figures 12-15](#))

Low flow suction (20mmHg or 3kPa) is used when the drainage system is unable to regulate the level of suction, e.g. Rocket® drain. Suction pressure must not exceed -40cmH₂O or -5kPa^{12,13}.

In hospitals where high level wall suction gauges are available and low flow suction is needed, these should be changed to low suction gauges before any suction is applied to an underwater seal drainage system (UWSD) which requires low range 3-5kPa.

Staff should take care to accurately read suction pressure when selecting low wall suction pressure as mmHg or kPa on the dial.

High flow suction must remain available for emergency situations. Refer to [WACHS Airway Suctioning Clinical Practice Standard](#).

If there is only one wall suction connection in the clinical area, use of a Clements Duplex Suction Adaptor [also known as a 'Y suction connector'] (see figure 7) will be needed.

This allows for the connection of general emergency suction and specific high or low flow units.

When suction is discontinued, the suction tubing must be disconnected from the air outlet port on the drainage canister immediately after turning the suction off to allow the system to be vented to air. Failure to do so may lead to a tension pneumothorax^{12,13}.

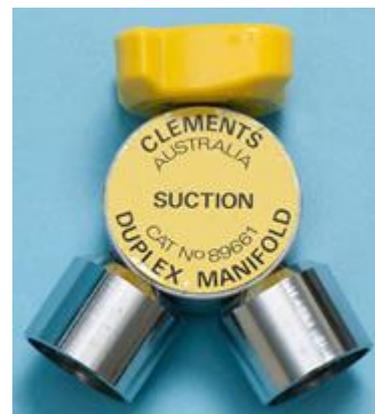


Figure 7: Clements Duplex Suction Adaptor

Application of Suction (for single bottle systems with NO inbuilt suction control mechanism)

Requirements

- 30m pack of suction tubing (consider patient condition and location and cut to length)
- Low-pressure thoracic suction regulator
- Clements duplex suction adaptor (if only one wall suction unit).

Procedure

1. Perform hand hygiene
2. Connect low-pressure thoracic suction regulator to wall suction outlet (use a Clements duplex suction adaptor if the bed space has only one wall suction outlet)
3. Connect the outer end of suction tubing to the low-pressure thoracic suction regulator
4. Connect the patient end of the suction tubing to the drainage canister as per the manufacturer's instructions
5. Dial required suction level slowly, assessing patient for pain.
6. Perform hand hygiene
7. Check the low-pressure thoracic suction regulator is set to the prescribed suction level with each set of chest drain observations and document appropriately.

Discontinuation of Suction (for single bottle system with NO inbuilt suction control mechanism)

Procedure

1. Perform hand hygiene
2. Turn suction off at the low-pressure thoracic suction regulator and disconnect the suction tubing from the air outlet port on the canister
3. Replace ventilation cap in the air outlet port
4. Discard suction tubing as per WACHS [Waste Management Policy](#)
5. Perform hand hygiene
6. Document appropriately.

Applying suction (triple bottle systems WITH inbuilt suction control mechanism)

- Prime the drainage canister according to manufacturer instructions
- If suction is prescribed, a suction regulator is not required unless there is only a single suction outlet. If this is the case, use the Clements duplex suction adaptor and a highflow suction regulator and dial up to -80mmHg or higher (as per MO orders)
- The suction tubing is connected to the top of the chest drain canister and the suction required is dialled up on the canister. The bellows will indicate sufficient suction for use (see Figures 13-15)
- Document appropriately.



Figure 8: Low flow thoracic suction regulator reads “LOW SUCTION ONLY”

Figure 9: High flow thoracic suction regulator reads “HIGH SUCTION – HIGH FLOW”

Figure 10: High flow suction regulator sample

The Oasis Atrium® is an example of a chest drainage system with inbuilt suction control mechanism that is used commonly within WACHS (see figure 4). Further information on attributes and management of the Oasis Atrium® chest drain system can be viewed at: <https://www.youtube.com/watch?v=bLf5WexvsEk>



Figure 11: High flow suction regulator setup secondary to emergency suction.

Figure 12: Typical setup for an Oasis Atrium® chest drain system with suction prescribed, high flow thoracic suction regulator setup secondary to emergency suction.

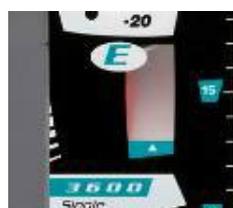


Figure 13: Suction dial set at -30cm H₂O of suction.

Figure 14: The suction indicator window. Bellows without suction applied i.e. no suction to UWSD = no expansion of bellows.

Figure 15: The expanded bellows to the triangle mark confirming adequate suction from the suction source.

Appendix 4: Changing the chest drain system

If the amount of fluid drainage is significant, the capacity for further air or fluid drainage may be impeded by the increasing hydrostatic pressure in the drainage collection canister.

Depending on the chest drainage system in situ, either the canister or both the tubing and the canister require changing. The single bottle chest drainage systems canister should be changed when the drainage is between 800 and 1000mL or as per MO request. The drainage system may also need to be changed if the chest drain tubing or drainage canister is damaged or substantial exudate is adhering to the tubing.¹²

If the patient's respiratory status is worsening, consider changing the drainage bottle sooner.¹²

In single bottle chest drainage systems canister and tubing should be routinely changed every 72 hours. The canister can be changed if required, prior to the 72 hours.

Suction (if in use) must be turned off prior to clamping the chest drain in preparation for changing the drainage bottle or tubing set. If left on and then clamped, this can create an increase in negative pressure applied to lung tissue when the chest drain is unclamped.¹²

Procedure

Prepare the drainage system by priming the underwater seal either with sterile water (single chamber system) or with the pre-packaged water (triple chamber system).

1. Perform hand hygiene
2. Gather equipment for the procedure
3. Perform hand hygiene and don PPE
4. Position new canister and wrapped end of tubing ready for connection
5. Remove any adhesive tape from along the connection nearest the drainage catheter
6. If chest drain is attached to suction, turn off and disconnect suction tubing from the air outlet port
7. Clamp the chest drain by cross clamping close to the patient with two forceps
8. Transfer existing chest drain tubing set into newly prepared drainage bottle using non-touch technique
9. Ensure the connections are secure
10. Unclamp the chest drain, check for swinging, bubbling and drainage.
11. Tape connection
12. Support tubing and ensure it is free from kinks and is not compressed
13. Reconnect suction if required. If not on suction, cover the air outlet port with the green ventilation cap
14. Dispose of waste: ensure drainage canister is intact for disposal (as per manufacturer's instructions). Discard canister with contents, tubing, other waste and sharps as per [WACHS Waste Management Policy](#)
15. Remove PPE and perform hand hygiene.
16. Document any further drainage since last measured, and, canister or drainage system change on the observation chart and [MR144 WACHS Fluid Balance Work Sheet](#).

Appendix 5: Troubleshooting

Accidental disconnection of chest drainage system from chest drain

There is potential for the connections between the chest drain and tubing to become disconnected. It is vital that this connection is re-established as urgently and cleanly as possible.

Equipment should be prepared as per canister change procedure. Clamping of the new tubing may be required but caution is advised.

Patient should be assessed for shortness of breath, pain and haemodynamic stability. Activate Medical Emergency Response as per local process if clinically indicated.

If chest drain was previously draining air or both air and fluid (pneumothorax or haemopneumothorax):

- Do not clamp
- Cover end of chest drain with sterile towel or gauze
- Call for assistance to obtain and setup a new chest drainage system and connect immediately.¹²

If chest drain was previously draining only fluid (pleural effusion):

- Cross-clamp the chest drain closer to the patient than the disconnection
- Cover end of chest drain with sterile towel or gauze
- Prepare and connect new chest drainage system immediately
- Unclamp immediately.¹²

Accidental removal of chest drain

In the event of accidental chest drain removal, the primary response is to initiate a Medical Emergency Response call as this is a potentially life threatening event.

- The application of a temporary external valve is the recommended first line treatment. This is achieved by the application of a plastic cover over the wound
- Remove the paper back from a sterile gauze pack and cover wound with both gauze and plastic
- Tape down three sides of the cover leaving an opening on the fourth (bottom) side, this allows expelled air to escape on expiration and prevents re-entry on inspiration
- Notify the relevant medical officer (if not already in attendance)
- Equipment for reinsertion of chest drain should be prepared as per [Appendix 1: Insertion of chest drain](#).



Figure 16: Sample of three sided taped dressing

Chest drainage system knocked over

If tipped over, the drainage system should be turned upright immediately.

Check the underwater seal remains intact – the distal end of the straw should be immersed in at least 2cm of water.^{12,13}

Surgical emphysema^{12,13}

Surgical emphysema is the presence of air under the subcutaneous layer of the skin and is characterised by the feeling of crackling or rice bubbles. On palpation surgical emphysema starts at the insertion site and can spread.

Report any developing or increasing surgical emphysema to the Medical Officer. This may be treated conservatively, or by applying suction or inserting a new chest drain.

Severe cases of surgical emphysema may cause changes in the patient's voice and facial appearance. Reassure patients and carers that it will not cause upper airway obstruction.

Continuous bubbling and frothing of drainage fluid

Continuous bubbling may be due to patient related factors (e.g. bronchopleural fistula if on positive end expiratory pressure [PEEP]) or as a result of a system leak within the chest drainage circuit (e.g. disconnected or loose system or displacement of pleural catheter resulting in drainage outlets being outside the body)¹³.

Air bubbles are normal at the end of expiration in a spontaneously breathing patient with a pneumothorax. Similarly, air bubbles are normal at peak inspiration in ventilated patients with a pneumothorax – no action is required for either of these situations¹³.

Management is aimed at correcting any system leaks if present. All connections should be checked for a secure seal. Reinforcing the site dressing with paraffin gauze may assist in reducing this, however expert advice should be sought.

Excessive bubbling within the drainage system may result in fluid travelling up the suction tubing towards the wall suction regulator. In the event of canister replacement refer to [Appendix 4: Changing the chest drain system](#).

Rocket™ chest drainage canisters are lined with an antifoaming agent, which significantly reduces foaming that may occur as air bubbles through the canister contents¹².

1mL of Simethicone 10% liquid can also be added to the canister to reduce foam formation^{12,13}

Excessive bubbling may indicate a large pleural leak. Continuous bubbling on inspiration and expiration may indicate a leak in the system, faulty connection or air leak at skin incision¹². Check all connections are secure. Then inspect the insertion site:

- If there is a significant air leak from the insertion site, a Medical Officer should review chest drain placement and consider additional suture placement.
- Paraffin impregnated gauze may be wrapped around the chest drain at the insertion site and covered with a fenestrated dressing to reduce minor insertion site air leaks^{12,13}
- If the cause cannot be identified, notify the Medical Officer

If the chest drain is on suction, an overflow system can be used if excessive bubbling or foaming is present and likely to track up the suction tubing^{12,13}

If the low-pressure suction regulator becomes contaminated with pleural fluid, the complete unit must be replaced. Place in sealed biohazard bag and send for cleaning¹² as per site processes.

Appendix 6: Removal of chest drain

Note: This section refers to removal of intercostal catheter or 'chest drain', not indwelling pleural catheters (IPC). Removal of IPC is a surgical procedure performed by specialist physicians.

Chest drains are generally removed when:

- radiological examination shows that the patient's lung has reinflated⁸
- drainage of fluid has ceased, or
- cessation of bubbling and oscillation (pneumothorax¹³).

The request for drain removal must be written in the patient's health record by the treating medical officer prior to its removal.

It is possible that patients may have multiple chest drain catheters in situ. If only one is to be removed it must be clearly identified and marked by the requesting medical officer prior to its removal.

Pre procedure key points

- Check for written orders for drain removal
- Review patient condition and coagulation status prior to ordering chest drain removal
- Check when anticoagulants were last given prior to drain removal in patients with anticoagulant therapy (The risk of haemorrhage will be reduced if removal of the drain occurs more than six hours since last dose of anticoagulants¹³)
- Consider giving analgesia to the patient as soon as the decision for removal is confirmed and documented
- Perform a pain assessment prior to removal and offer analgesia as required
- Check that a recent chest x-ray (if taken) has been viewed to ensure the lung is re inflated
- Identify if the small bore intercostal catheter has any self-retaining mechanism which will need unlocking / disabling and confirm the appropriate procedure for removing the intercostal catheter and suture
- Two nurses, one who has experience in this procedure, are required for large bore chest drain removal^{12,13}
- A post removal chest x-ray is a decision for the treating physician, but is recommended within 2 – 4 hours post removal of large bore chest drains¹²
- If a closing suture has been inserted for a small bore chest drain, follow large bore chest drain removal steps with two nurses
- If strong resistance is felt, cease attempted removal and notify senior nurse or medical officer for advice
- Consideration should be given to how 'breath holding' during the procedure is explained to the patient. Formal techniques (such as Valsalva Manoeuvre) may be difficult to teach and beyond the capability of many patients including those with cognitive or language barriers. Following explanation, have the patient demonstrate to check understanding.¹³

Equipment

- Trolley
- Sterile dressing pack
- Disposable non-sterile gloves
- Paper bag
- Suture cutter x1
- 2% Chlorhexidine in Alcohol 70% solution
- Paraffin impregnated gauze e.g. Jelonet[®] (large bore drain)
- Clear occlusive dressing (if small bore drain with no closing suture in place)
- Sterile gauze x 1
- Dry dressing x1 (i.e. Zetuvit[®])
- Adhesive tape e.g. Elastoplast[™] or Fixomul[™] (large bore drain)
- Waterproof protective sheet
- PPE including eye protection

Procedure

1. Explain procedure to patient and obtain consent
2. Administer analgesia if prescribed^{10,11}
3. Confirm if a second nurse is required for the procedure:
 - a. A second nurse **must assist** when removing large bore intercostal catheters (18-32Fr.)
 - b. A second nurse is not usually required when removing small bore catheters and drains (12-16Fr.)
4. Perform hand hygiene
5. Clean trolley with pre-diluted detergent or detergent wipe and allow to air dry
6. Gather equipment for procedure
7. If chest drain is attached to suction, turn off suction and disconnect suction tubing as per: [Disconnection of suction](#)
8. Describe, demonstrate and then ask patient to practice breath holding for removal, e.g. take a deep breath in and hold it. If patient is unable to perform breath hold, time removal of drain with exhalation
9. Perform hand hygiene and position patient in an upright position with head of bed elevated 35-40° to allow ease of access to the insertion site and place plastic backed protective sheet underneath patient adjacent to the insertion site
10. Don non-sterile gloves and remove dressing and anchor tape, discard dressing/tape and remove gloves
11. Perform hand hygiene and prepare sterile field: open procedure pack using corners and add sterile equipment onto sterile field using non-touch technique
12. Perform hand hygiene and don PPE (operator and assistant)
13. Prepare dressing by placing folded paraffin impregnated gauze onto centre of dry dressing

Then...

Two Nurse Removal Procedure for Large Bore Intercostal Catheters (18-32 French)¹²

14. Ascertain if a 'closing' suture is in place

15. Remove anchor suture from insertion site while supporting the chest drain
16. Loosely half tie closing suture
17. **Operator:** cover insertion site with prepared occlusive dressing and request the patient to perform breath hold. Once breath is effectively held, remove the chest drain in a swift, fluid motion and apply firm pressure over insertion site
18. Maintain pressure over site and instruct the patient to release their breath and breathe normally.
19. **Assistant:** tighten and re-tie the closing suture then secure the dressing with 2-3 lengths of adhesive tape while the operator continues to apply firm pressure until dressing secured¹³
20. Dispose of waste: ensure drainage canister is intact for disposal (as per manufacturer's instructions). Discard canister with contents, tubing, other waste and sharps as per WACHS [Waste Management Policy](#)
21. Remove PPE and perform hand hygiene
22. Record removal date, time and volume of drainage in patient health record and the observation chart
23. Clean trolley with pre-diluted detergent or a detergent wipe after use. Perform hand hygiene

Or... Single Nurse Removal Procedure for Small Bore Catheters and Drains (12-16 French)¹²

14. Remove the anchor suture from the insertion site while supporting the chest drain
15. Cover insertion site with prepared dressing and request the patient to perform breath hold. Once breath is effectively held, remove the chest drain in a swift, fluid motion and apply firm pressure over insertion site
16. Maintain pressure over site and instruct the patient to release their breath and breathe normally.
17. Apply clear occlusive dressing over the insertion site
18. Dispose of waste: ensure drainage canister is intact for disposal (as per manufacturer's instructions). Discard canister with contents, tubing, other waste and sharps as per [WACHS Waste Management Policy](#)
19. Remove PPE and perform hand hygiene.
20. Clean trolley with pre-diluted detergent or a detergent wipe after use. Perform hand hygiene.
21. Record removal date, time and volume of drainage in patient health record and the observation chart.

Post removal

- Dressing to remain intact for 48 hours to allow wound to seal
- If closing suture insitu, remove at 5 days post chest drain removal
- Observe and document for signs of:
 - respiratory distress/cardiovascular compromise
 - SaO₂ <94%
 - Increasing dyspnoea
 - Increased restlessness/anxiety
 - Tachycardia/hypotension
- Observations outside of established parameters are escalated as per the WACHS [MR140A Adult Observation and Response Chart \(A-ORC\)](#) and the WACHS [Clinical Escalation of Acute Physiological Deterioration including Medical Emergency Response Policy](#).

Appendix 7: Indwelling pleural catheter (IPC)

Indwelling Pleural Catheters (IPC) are silicone tubes that are tunnelled and secured subcutaneously (with a pro-fibrotic cuff), and end with a one-way valve. They are inserted into the pleura to manage recurrent symptomatic pleural effusions.¹²

Pleural fluid is drained into an underwater seal system on insertion. Once it has been confirmed no air leak is present, subsequent drainage may be completed using a 'male' luer lock drainage collection bag.

IPCs can be 'capped' off when pleural drainage is not required and accessed with drain specific connectors via a one way valve as required.¹²

The volume and frequency of drainage is to be advised by the physician and documented in the patient's health record.

Removal of an IPC is a surgical procedure performed by specialist physicians.

Accessing the 'Capped' Indwelling Pleural Catheter¹²

Requirements

- PPE including eye protection
- IPC drainage line (contains an IPC graduated connector)
- IPC replacement valve cap
- Chest drainage canister
- 500 mL sterile water for Irrigation
- Chest drain tubing set
- Dressing pack
- 2% chlorhexidine 70% alcohol large wipe
- Sterile scissors

Note: some items may not be required if using a Male luer lock 2L collection bag

Procedure

1. Perform hand hygiene
2. Clean trolley with pre-diluted detergent or a detergent wipe
3. Gather equipment for procedure
4. Perform hand hygiene and prepare sterile field: open procedure pack using corners and add sterile equipment onto the sterile field using non-touch technique
5. If using an underwater seal (UWS) system:
 - a. attach the IPC graduated connector to IPC drainage line
 - b. set up UWS system
 - c. cut off the graduated connector from end of chest drain tubing set with sterile scissors
 - d. attach the chest drain tubing to the IPC graduated connector on IPC drainage line



Rocket® IPC Pleural Catheter Copyright© 2013

Figure 17: courtesy SCGH¹² (2017)

6. If using drainage bag attach male luer lock collection bag directly to the IPC drainage line
7. Remove the access tip cover from IPC drainage line as per Figure 17. Close pinch clamp on line
8. Remove IPC cap by gently rotating anti-clockwise and pulling away as per Figure 18, discard cap
9. Using non-touch technique, scrub the one way valve for 30 seconds with a 2% Chlorhexidine 70% alcohol wipe. Use different areas of the wipe. Allow to air dry for 30 seconds
10. Gently insert the access tip of the IPC drainage line into the valve. It is normal to feel a little resistance as the one-way valve is breeched. Lock the two together by lining them up as shown in Figure 19 and rotating clockwise. You will hear a click.



Rocket® IPC Pleural Catheter Copyright© 2013

Figure 18: courtesy SCGH¹² (2017)

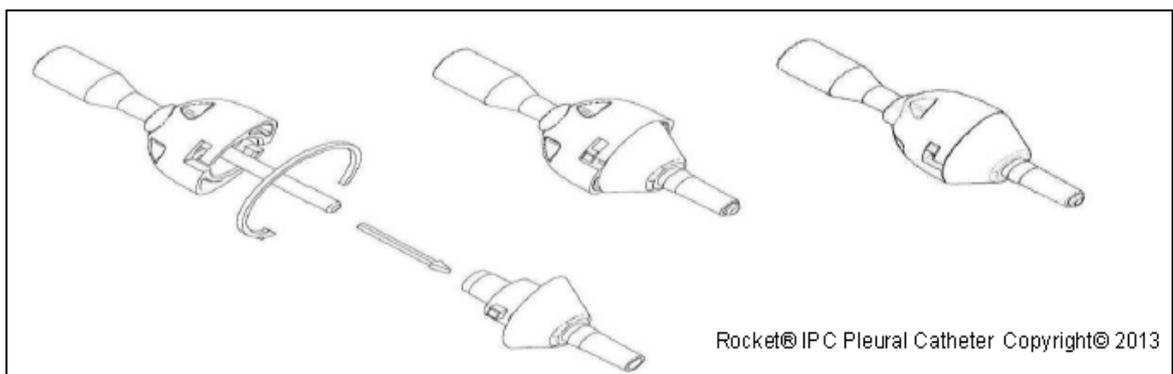


Figure 19: courtesy SCGH¹² (2017)

11. Attach chest drain tubing to IPC drainage line at the graduated connector and open pinch clamp
12. Allow drainage as per advised volume, document and monitor as per [patient monitoring section](#)
13. Large pleural effusions should be drained incrementally, draining a maximum of 1.5L in the first hour. Greater drainage may lead to re-expansion pulmonary oedema. Clamp the drain with pinch clamp following 1L drainage. Reassess core observations after 1 hour and if stable release pinch clamp to allow a further 500ml to drain. Continue to drain 500ml in each subsequent hour until drainage has slowed to < 500ml/hour then leave drain unclamped^{12,13}
14. Stop drainage if the patient develops discomfort, persistent cough, hypotension or vasovagal symptoms. Escalate if indicated as per [MR140A WACHS Adult Observation and Response Chart \(A-ORC\)](#) and the [WACHS Clinical Escalation of Acute Physiological Deterioration including Medical Emergency Response Policy](#)
15. Remove PPE, and perform hand hygiene.

'Capping the IPC'¹²

After drainage is complete the IPC will need to be capped off.

Requirements

- Personal protective equipment
- IPC replacement valve cap
- 2% Chlorhexidine 70% alcohol large wipe
- 2% Chlorhexidine 70% alcohol solution
- Fenestrated foam dressing
- Clear occlusive dressing
- Gauze
- Dressing pack
- Fixomul™

Procedure

1. Perform hand hygiene and don PPE. Disconnect the drain from the IPC by gently rotating the drainage line anti clockwise and gently pulling out the access valve in a smooth motion. The drain itself has a one way valve which automatically closes once disconnected
2. Using non-touch technique, scrub the one way valve for 30 seconds with a 2% Chlorhexidine 70% alcohol large wipe. Use different areas of the wipe. Allow to air dry for 30 seconds
3. Place a new catheter valve cap over valve and rotate it clockwise until it clicks into position
4. Clean around drain exit site with 2% Chlorhexidine 70% alcohol solution and allow to dry
5. Place fenestrated foam dressing around drain and gently curl drain around foam dressing as per Figure 20
6. Cover with gauze to prevent the occlusive dressing sticking to the drain directly and then cover with occlusive dressing
7. Protect edges of occlusive dressing with Fixomul™ to extend life of dressing
8. Dispose of waste:
 - a. UWSD system: To discard drainage canister, remove tubing set, and seal canister and air outlet port with the 2 red caps attached to canister. Discard canister with contents, tubing set, IPC drainage line and dressing materials as per [Waste Management Policy](#)
 - b. Male Luer lock 2L collection bag: Empty collection bag into clean measuring container and dispose of contents appropriately. Dispose of collection bag, IPC drainage line and dressing materials as per [Waste Management Policy](#)
9. Remove PPE and perform hand hygiene
10. Record drainage on [MR129 WACHS Chest Drain Assessment and Observation Chart](#) (and [MR144 WACHS Fluid Balance Work Sheet](#) if in use)
11. Change dressing weekly or PRN
12. Educate patient to use shower protectors to prevent dressing becoming wet.



Figure 20: Courtesy SCGH¹² (2017)

Considerations for patients/carers managing their IPC at home

- Ensure appropriate referrals have been made prior to discharge from hospital e.g. Palliative Care or Hospital Nursing Discharge Service (HNDS)
- Clinical handover requirements – refer to [Clinical Communication – clinical handover section](#)
- After initial insertion there may be two stitches in place these are removed by a health professional at separate times – the stitch at the incision site generally after 7 days and the stitch holding the IPC tube generally after 3 weeks
- Patients/carers undertaking their own care in the community will need education on:
 - Non-touch technique and effective hand washing
 - Keeping the site dry, and care of the site and surrounds
 - Drainage and dressing procedures
 - Disposal of equipment and fluid
 - Risks (and troubleshooting - if and as required)
 - 24hr contacts information for emergencies e.g. Palliative Care On Call phone numbers
 - How to obtain drainage packs
- Regular visits (generally weekly as a minimum) by WACHS provided outpatient services (e.g. Palliative Care or HNDS).

Appendix 8: Pleural aspiration

Consider IV access prior to the procedure. The procedure and drainage of fluid may result in re-expansion pulmonary oedema. IV analgesia and/or sedation may be prescribed and administered by Medical Officer prior to aspiration.^{12,13}

This procedure is undertaken by a trained experienced medical officer. Nurses assist with positioning the patient and in educating the patient to remain still throughout procedure and refrain from coughing.¹²

Requirements

- Fenestrated drape
- Sterile gown
- Sterile gloves
- Dressing pack / catheter pack
- Personal protective equipment
- Chlorhexidine 2.0% in Alcohol 70% or Povidone Iodine 10%
- 2 x 5 ml 1% Lignocaine
- 1 x 20 ml syringe
- 1 x 50 ml syringe 1 x blunt drawing up needle
- 1 x 26G ½" needle
- 1 x 21G 2" needle
- 1 x 14G 2" IV cannula or thoracentesis set
- 1 x 3 way tap
- 1 x male luer lock liquid collection bag
- Transparent occlusive dressing
- Pulse oximeter

Additional items

Check with MO prior to procedure if specimen collection/testing required

- Cytology bottles
- Sterile yellow screw top containers
- Blood culture bottles
- Arterial blood gas syringe

Procedure (Nurse assisting Medical Officer)

2. Perform hand hygiene
3. Clean trolley with pre-diluted detergent or detergent wipes
4. Gather equipment for procedure
5. Perform hand hygiene
6. Perform and record T, BP, pulse, respiratory rate and SpO₂, conscious state (core observations)
7. Monitor SpO₂ throughout procedure
8. Perform hand hygiene

9. Apply transparent occlusive dressing to aspiration site on removal of cannula using non-touch technique
10. Once pleural aspiration is complete: manage specimens in accordance with WACHS [Specimen Collection \(including Phlebotomy\) and Pathology Results - WACHS Clinical Practice Standard](#)
11. Perform and record core observations (T, BP, pulse, respiratory rate and SpO₂, conscious state) every 30 minutes for the first hour, then continue 4 hourly observations unless otherwise clinically indicated
12. Record drainage volume on [MR144 WACHS Fluid Balance Work Sheet](#) (if in use) or in the patient health record
13. Don PPE and dispose of waste (as per [Waste Management Policy](#))
14. Remove PPE and perform hand hygiene
15. Clean trolley with pre-diluted detergent or a detergent wipe after use and perform hand hygiene.