THAMES VALLEY & WESSEX NEONATAL OPERATIONAL DELIVERY NETWORK

GUIDELINE FOR THE NURSING CARE OF CHEST DRAINS ON THE NEONATAL UNIT.

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Related documents	**References** ASPH (2014) Pneumothorax -Drainage Guideline. Clinical Guideline Neonatal Unit. Ashford and St Peter's Hospital. Pp1-17. https://ashfordstpeters.net/Guidelines_Neonatal/Pneumothorax%20Nov%202014.pdf Bruschettini.M (2019) Needle aspiration versus intercostal tube draining for pneumothorax in the newborn. Cochrane database of Systematic reviews p1-33. CAHS (2023) Intercostal catheter Insertion and management, pp1-16.Child and Adolescent Health Service, Western Australia. CHS (2023) Management of Neonatal Pneumothorax- Guidelines, Canberra Health Services, pp1-17. Cusack, J.J (2021) UHL Chest Drain Insertion (Neonatal pigtail drain) V4, University Hospital Leicester, pp1-8. Found at https://secure.library.leicestershospitals.nhs.uk/PAGL/Shared%20Documents/Chest%20Drain%20Insertion%20UHL%20Neonatal%20Guideline.pdf Goelz.R et al (2021) Safely Inserting Neonatal Chest Drains, Neonatology, Nov 29th 2021, pp1-8. Found at; https://www.researchgate.net/publication/356642636_Safely_Inserting_Neonatal_Chest_Drains

	GOSH (2019) Chest Drains: information for families. Great Ormond Street Hospital. pp1-5 Found at ; https://www.gosh.nhs.uk/conditions-and-treatments/procedures-and-treatments/chest-drains/ Hatter.H and Leonard.E (2016) Chest Drain Management. Greats Ormond Street Hospital. Found at www.gosh.nhs.uk/health-professionals/clinical-guidelines/chest-drain-management Hong.Y.R (2012) Bronchial Perforation Complicating Endotracheal Intubation in an Extremely Low Birth Weight Infant,J Korean Soc Neonatol. 2012 Aug;19(3):154-157. Korean Jackson.A (2022 Seldinger chest drain insertion and management. NHSGGC-Guidelines. Found at; https://www.clinicalguidelines.scot.nhs.uk/nhsggc-guidelines/nhsggc-guidelines/neonatology/seldinger-chest-drain-insertion-and-management/ Manchester (2018) Chest Drains. Information for parents. Manchester University NHS Trust, pp1-2. NETS (2021) Drainage of Neonatal Pneumothorax- Nets V2. Practice Guideline. Pp1-8 Found at; https://www.schn.health.nsw.gov.au/_policies/pdf/2016-5002.pdf RCH (2016) Pneumothorax - Neonatal clinical guideline. Royal Cornwall Hospitals, NHS trust. Found at; https://doclibrary-rcht.cornwall.nhs.uk/DocumentsLibrary/RoyalCornwallHospitalsTrust/Clinical/Neonatal/Pneumothorax.pdf Radiopaedia (2017) Neonatal pneumothorax, Case contributed by Dr Jeremy Jones. found at https://radiopaedia.org/cases/neonatal-pneumothorax-4 Toland.U (2013) Procedure for pigtail chest drain insertion. Found at; http://www.southerntrust.hscni.net/pdf/Neonates.Procedure_for_chest_drain_insertion.pdf Van Meirt et al (2017) Suction versus no suction for chest drain management. Cochrane Database Syst Rev. Nov; 2017(11): CD009939. Published online 2017 Nov 30. Found at; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6486156/
Implications of race, equality & other diversity duties for this document	**This guideline must be implemented fairly and without prejudice whether on the grounds of race, gender, sexual orientation or religion.**

Chest Drain Guideline: Nursing Care on the Neonatal Unit

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1.0 Aim of Guideline Framework

- To provide a framework to ensure that all infants with a chest drain insitu, receive the highest standard of evidence based nursing care.
- Not included within this guideline is medical guidance on insertion or removal of a Chest Drain and/ or care of any other medical drainage device.

2.0 Scope of Guideline Framework

The guideline applies to all infants with a chest drain, within Thames Valley and Wessex Neonatal Network Operational Delivery Network.

Thames Valley		
Trust	**Hospital**	**Designation**
Oxford University Hospitals NHS Foundation Trust	- John Radcliffe Hospital, Oxford	NICU
Buckinghamshire Healthcare NHS Trust	- Stoke Mandeville Hospital, Aylesbury	LNU
Frimley Health NHS Foundation Trust	- Wexham Park Hospital, Slough	LNU
Milton Keynes University Hospital NHS Foundation Trust	- Milton Keynes General Hospital	LNU
Royal Berkshire NHS Foundation Trust	- Reading	LNU

Wessex		
Trust	**Hospital**	**Designation**
University Hospital Southampton NHS Foundation Trust	- Princess Anne Hospital	NICU
Portsmouth Hospitals University NHS Trust	- Queen Alexandra Hospital	NICU
Dorset County Hospital NHS Foundation Trust	- Dorset County Hospital, Dorchester	SCU
Hampshire Hospitals NHS Foundation Trust	- Basingstoke and North Hampshire Hospital	SCU (Temporary designation)
Hampshire Hospitals NHS Foundation Trust	- Royal Hampshire County Hospital, Winchester	SCU (Temporary designation)
Isle of Wight NHS Trust	- St Mary's Hospital	SCU
University Hospitals Dorset NHS Foundation Trust	- Poole Hospital	LNU
Salisbury NHS Foundation Trust	- Salisbury District Hospital	LNU
University Hospitals Sussex NHS Foundation Trust	- St Richard's Hospital, Chichester	SCU

3.0 Guideline Summary

A) **Chest Drain is required.**

- Ensure the medical team have informed parents of the baby's need for a chest drain, unless the procedure is performed as an emergency.

- Inform the nurse in charge of the baby's requirement for a chest drain, to ensure support and escalation of care- as appropriate.

- Ensure the baby is in an appropriate environment before the procedure is commenced. For example; suitable incubator, emergency equipment available, effective light source, screens for privacy, intensive care nursery, a second suction system is available.
- A nurse should make themselves available for the whole procedure, to provide comfort and containment to the baby.

- Each neonatal unit will have different equipment and may choose to do the procedure in a slightly different way, so you should ensure that you are familiar with the equipment used in your local area.

- Administer appropriate pain relief and allow time to take effect.

B) **Once a chest drain has been sited.**

- Record a set of observations- see the list on page 8. These will continue hourly whilst the drain remains insitu.

- Perform a range of safety checks- see list on page 8.

- Ensure the parents have been updated by the medical team and are aware the procedure is completed.

- Record the procedure in the nursing documentation and complete procedure/ invasive equipment forms – according to local policy.

C) **Ongoing care of a chest drain.**

- Regular assessment and continuous monitoring of the baby will be required. This includes;
    - a range of safety checks at the beginning of every shift- see list on page 9-10.
    - ongoing monitoring the baby baby's vital signs, with hourly documentation.
    - hourly assessment of drain site, drain activity and its effectiveness.
    - Monitoring for signs of possible deterioration- see list on page 10.

D) **After a drain is removed.**

- The baby should be monitored closely for signs of air re-accumulation- see list on page 11.
- Monitoring should be downgraded, according to clinical need of the baby.

4.0 Practice Guidelines

4.1 Background Information.

Chest drains (also known as under water sealed drains) are used in the management of infants, to remove air (pneumothorax), fluid (blood, pleural effusion, chyle) or pus (empyema) from the pleural (or occasionally the extrapleural) space. Their insertion should allow re-expansion of the lung and restoration of negative pressure in the thoracic cavity.

Chest drains can be sited routinely in theatre, but may also be required as a medically urgent or emergency procedure by a baby nursed on the neonatal unit. This is because the air or fluid leak which occurs in the thoracic cavity can becomes trapped under positive pressure in the pleural space. This can lead to collapse

of the lung and severe respiratory distress, and in the worst cases, to compression of the heart and large blood vessels. Venous return of blood to the heart, becomes significantly compromised, and if left untreated may result in cardiac arrest.

The aim of this guideline is to enable safe and competent management of a chest drain by nursing staff on a neonatal unit. Information is given about medical care of chest drains (such as insertion process) where it is useful for the nurse caring for the baby with or needing a chest drain, to have this knowledge. However, this guideline is not intended to give comprehensive information about medical care of a chest drain.

For clarity within the document the health professional inserting and providing medical care for the baby and its chest drain will be referred to as the doctor or medical team, and the health professional providing nursing care to the baby will be referred to as the nurse.

4.2 Definition of terms.

Pneumothorax- accumulation of gas in the pleural space.

Tension pneumothorax- gas in the pleural space resulting in the collapse of the lung and severe respiratory compromise.

Chylothorax- accumulation of chylous fluid in the peritoneal space.

Haemothorax- accumulation of blood in the pleural space.

Pleural effusion- accumulation of fluid in the pleural space

4.3 Preparation for insertion of a chest drain.

Medical responsibilities.

- If the baby's clinical status allows, the medical team will inform the parents of the baby's need for a chest drain. Where this is not possible, the baby's parents will be informed that the baby's condition has altered and that a chest drain has been sited, as soon as possible after stabilising the baby.

- The medical team will gather the equipment they require for the procedure, however if they are new to the unit they may need help with this. It is therefore a useful to make yourself aware in advance, of where this equipment is stored.

- If there is concern that the baby's clinical condition is deteriorating rapidly, and too much time will pass before a chest drain is sited. The medical team may decide to perform a needle thoracocentesis (needle aspiration) before insertion of a chest drain. This is a way to rapidly aspirate air or fluid from the affected pleural space using a cannula or butterfly needle, attached to a 3 way tap and syringe. The aim being to manage the air or fluid leak for a short time, and thereby keeping the baby stable for long enough that a drain can be inserted and secured.

Nursing responsibilities.

- Inform the nurse in charge of the baby's requirement for a chest drain. They will be able escalate the situation, if the baby begins to deteriorate. They may also choose to relocate the baby to a more intensive area in the nursery and will be able to help with the necessary preparation.

- First priority must be to ensure that baby is stable. If the baby's condition is deteriorating rapidly the nurse caring for the baby will need to focus on caring for the baby and a colleague will be required to gather all necessary equipment.

- Second priority is to make the preparations required for the insertion of a chest drain.

- Ensuring the baby is being nursed in a suitable incubator/ radiant warmer bed, which will allow good access for the procedure, ideally with height adjustment option, and ability to enable x rays with the baby insitu. Built in scales are also desirable- as the baby may not be able to be easily or safely removed from the incubator for a number of days.

- A thoracic suction (or negative pressure pump) with all tubing and connections will need to be set up, to connect to the chest drain/ bottle. This must be in addition to the 'usual' suction unit at the baby's bedside. This second suction can be set up in a spare wall suction port, where one is available. However when none is available, a 'splitting device' can be used to enable two suction systems to be used simultaneously from one wall suction port.

- In all but emergency situations the baby will be given pharmacological pain relief before the procedure. The protocol for pain relief will vary between neonatal units, but would usually include a bolus of intravenous morphine or fentanyl followed by a continuous infusion of morphine and sub cutaneous local anaesthetic- such as 1% lignocaine at the insertion site. If the baby is not already receiving IV morphine this will need to be prepared.

- The bed space should have been checked at the beginning of the shift, however, ensure there is a working suction with suitably sized suction catheters available. Ensure there is a bag/mask/valve appliance or neopuff available, attached to an oxygen/ air blender and with an appropriately sized face mask for the baby.

- Gather;
    - a chest drain bottle- type according to local use.
    - Sterile water for placing in draining bottle- with measuring syringe.
    - 2 clamps, to be at the bedside whilst the drain is in situ.
    - Local anaesthetic for medical team to use.
    - Tape/ forceps to secure the chest drain tubing in the bed space after insertion.
    - Light source for improved visualisation- depending on local environment/ nursery lighting.
    - Incontinence pad for placing under the baby to minimize contamination of the cot space and reduce disturbance of the baby after the procedure.
    - Screens to give privacy during the procedure.

- Remove unnecessary items from the baby's bed space- such as toys, gel pillows, to allow space for the procedure.

- Provide reassurance for parents/ carers and keep them informed as you make your preparations. Parents are not usually present when a chest drain is sited, so explain to them where they can wait, and reassure them that they will be updated as soon as possible after the procedure has occurred.

4.4 Siting a chest drain.

This guideline does not include instruction on how to insert a chest drain. However, staff caring for a baby with or needing a chest drain will often be involved with assisting the member of the medical team who is siting a chest drain, so should be aware of the guidance below;

Nursing responsibilities.

- This is not a one person procedure- you will need to ask a colleague to help you. Whenever possible, one nurse should make themselves available for the whole procedure, to provide comfort and containment to the baby.

- Flatten the bed surface.

- Depending on the planned location of the drain, position the baby so this part of the chest is uppermost and accessible- be guided by the medical team.

- As much as possible, try to give the baby some boundaries/ nesting to maintain comfort and provide security.

- Reposition the ECG electrodes and other monitoring probes to where they will be least in the way.

- It may be necessary to have one arm elevated away from the chest, try to support this with a 'sling' of bedding, or similar support. See photograph below;

Fig 1. Showing a method for securing the baby's arm away from the chest wall during chest drain insertion.

- Analgaesia should be administered, but allowing time to be effective before starting the procedure. This is approximately 10-20 mins for an intravenous morphine and intravenous fentanyl 2-5 minutes.

- Prepare the drainage bottle/ system used in your hospital. This usually requires the addition of a fixed amount of sterile water. Ensure this is done as cleanly as possible, the doctor performing the procedure that is already sterile, may be able to do this for you.

Medical responsibilities.

- This is a sterile technique- so they will be gowned and gloved and using a sterile field and sterile drapes over the baby.

- The doctor will prepare the equipment and confirm the planned location for the drain. They may mark the planned insertion site with a medical marker.

- They will perform skin preparation/ cleansing.

- They will infiltrate the insertion site with local anaesthetic.

- The preferred drain site is in the 4th or 5th intercostal space, above a rib (to avoid injury to intercostal vessels which run underneath the rib) in the mid axillary line. The nipple usually lies in the 4th intercostal space and can be used as a reference point, although it is important the drain is kept well clear of the nipple, to avoid scarring or damaging the nipple bud. See Image 1 and 2 below.

Image 1: Anatomical reference points for insertion of a chest drain.

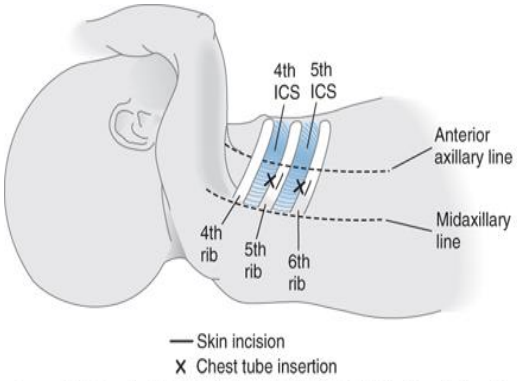
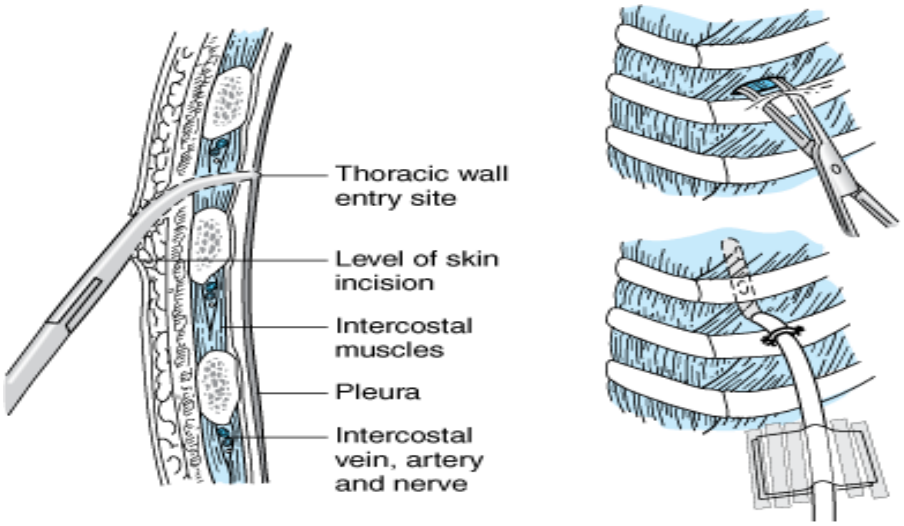


Image 2: Diagram showing internal position of a correctly placed chest drain.



- Depending on the type of drain used, they will either create a small incision to insert the drain (trocar) or simply advance the pointed tip of the drain (pig tail) directly through the skin and into the pleural space.

- Immediately after inserting the drain, they will want to remove the accumulated air. They may choose to aspirate the drain using a three way tap and syringe or they may choose to attach the drainage bottle/system immediately.

- If the drainage bottle/system is to be used, without touching the sterile end, pass the open end to the doctor, for attaching to the drain connection. The bottle needs to be kept upright to maintain the water seal, and must always be below the level of the drain insertion site, to prevent air going into the patient and causing a tension pneumothorax.

- One way to confirm the tube is in the correct space at the point of insertion, is to listen for air exiting under pressure or to look for humidity causing fogging in the tube. These are not easy signs to see, in practice, however, when the drain tubing is attached, bubbling and swinging can be more readily identified.

- Correct placement will always be formally verified by chest x ray.

- Each neonatal unit will have different equipment and may choose to do the procedure in a slightly different way, so you should ensure that you are familiar with the equipment used in your local area and the procedural approach most commonly taken.

- The drain will be secured to the baby's chest wall, either by suture to the skin, steri-strips and occlusive dressing or less commonly- by tape.

- The drain tubing will also require securing to the bed in two places. At the top near the baby so that the weight of the tubing does not cause drain dislodgement. This can be done by wrapping some fabric strapping tape, around the tubing then using a safety or similar to pin it, without tension, to the bedding. At the bottom, where the drainage bottle is, the bottle must be secured in an upright position. This is important both to retain the water seal, preventing air entering the baby's chest, and to stop spillage of any fluid that might drain.

- If not already connected to the drainage bottle- the drain will be connected using ANTT. This drain is usually connected to a low pressure suction system (or negative pressure suction pump/ Roberts pump), but not always. Check with the medical team what they prefer and what level they want the suction setting at.

4.5 Immediately post procedure.

- Medical team member - dispose of all sharps and used medical equipment.

- Return baby to a comfortable position, laid with drain site visible. If possible position the baby so that side of the chest where the pneumothorax was identified is elevated.

- Record a set of observations including
    - Heart rate.
    - Respiratory rate.
    - Blood Pressure.
    - Oxygen Saturation.
    - check insertion site.
    - check drain for bubbling, oscillation/ swinging, fluttering.
    - check for any fluid loss and record colour, volume and consistency.
    - Perform a blood gas check, within ½ hour of insertion.

- Safety check that
    - The monitoring alarms are turned on and set to appropriate limits.
    - The thoracic suction is working and is set to the intended suction pressure (usually between 5-20mmHg).
    - The water level in the water sealed system is at the correct level (according to local policy and individual device manufacturing instructions)
    - The drainage tubing is unclamped and open and it is unkinked and unobstructed.
    - The chest drain bottle is lower than the patient, and is secured in an upright position.
    - Two chest drain clamps are available at the bedside.
    - The time and date the bottle was put in place, are written clearly on the system/ bottle.
    - If more than one chest drain is in place, each one should be labelled with a number, usually in the order in which they were inserted. This will ensure clarity of documentation, and clear differentiation between the drain sites, and their activity- which could vary significantly.
    - Pain assessment should be completed, and action taken if required.
    - Ensure there is a prescription for pain relief and this is being given regularly, not prn.

- A full airway, breathing and circulation assessment should be done, including;
    - Bilateral breath sounds,
    - respiratory rate (if not ventilated,)
    - regularity, depth and ease of breathing.

- A chest x ray will be ordered to allow confirmation of position (see page 8 for example x rays.) After this the baby can be fully settled and left to rest.

- Ensure the parents have been updated about the completion of the procedure and the baby's condition.

- The procedure must be formally documented by the medical team, both in the medical record and usually on a procedure form This episode should also be recorded in the nursing record (this may include a nursing care plan- according to local policy).

Fig 2. Showing neonatal pneumothorax with chest drain in situ. (Radiopaedia, 2017)

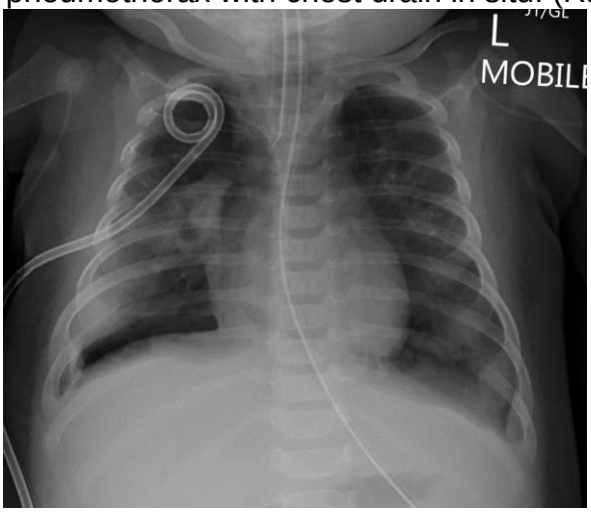
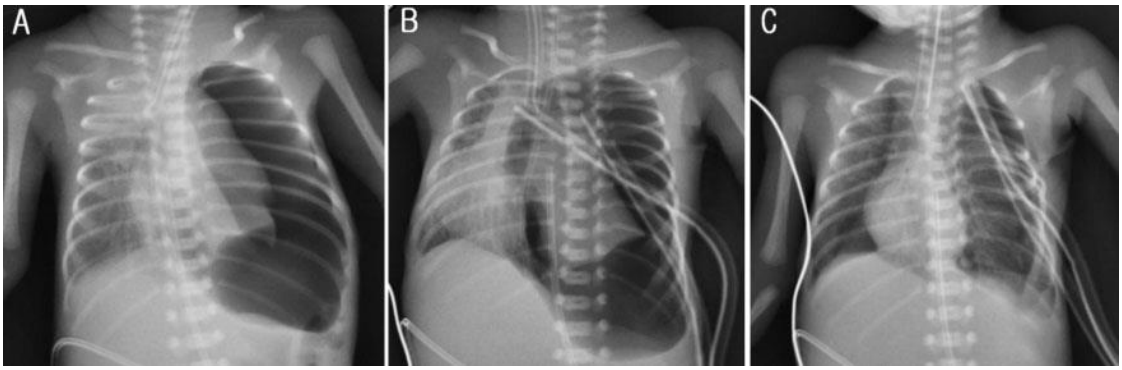


Fig 3- Showing a series of chest x rays, on an neonatal patient.
A -on day 3 a L sided tension pneumothorax developed,
B -this did not resolve, even following repeated chest drain insertions.
C -the high volume leak was resolved after repair of a main bronchus perforation. (Hong 2012)



4.6 Ongoing care of /maintaining the chest drain

- At the beginning of every shift check;
    - the emergency equipment in the bed space including working suction for respiratory use, Neopuff or bag/mask/ valve system attached to an oxygen/air blender and suitably sized face mask .
    - A working, appropriately sized stethoscope is available for auscultation.
    - Two chest drain clamps are available at the bedside.
    - The monitoring alarms are turned on and set to appropriate limits.
    - The thoracic suction is working, and is set to the intended suction pressure (usually between 5-20mmHg).
    - The water level in the water sealed system is at the correct level (according to local policy and individual device manufacturing instructions)
    - The drainage tubing is unclamped and open – if intended to be, and it is unkinked and unobstructed.
    - The chest drain bottle is lower than the patient, and is secured in an upright position.
    - The time and date the bottle was last changed- indicating when it will therefore require changing.
    - A full airway, breathing and circulation assessment should be done, including;
        - Bilateral breath sounds,
        - Respiratory rate (if not ventilated,)
        - Regularity, depth and ease of breathing.
        - Hr, Bp, Capillary refill, chest symmetry and chest movement, general body perfusion (appearance and feeling).

    - The current activity of the drain bubbling/ static/ swinging/ fluttering
    - The amount, colour and nature of any fluid drained.
    - The insertion site, ensuring the dressing is clean and dry, and that there are no signs of redness, swelling or skin breakdown.
    - That the drain has not moved either out or in, in relation to its original position. Clear length markings may be visible on the drain, and documented in the medical notes (ie 8cm marker line visible at skin entry site.) Where these are not present, each nurse at beside handover should be visually confirming the location of the drain with the oncoming nurse.
    - Any concerns about these checks should be reported to the medical team and the nurse in charge.

- Regular pain assessment should be performed (according to local policy), as a chest drain continues to be painful in the early post procedure period.

- Regular analgesia should be administered. This will vary depending on the medical condition of the patient, but would usually include a morphine infusion and regular IV paracetamol. If the drain remains in place for a number of days then some baby's appear to experience low levels of pain, and stopping or significantly reducing the morphine infusion may be appropriate. However they should continue to have their pain score regularly assessed and careful measures taken to minimised discomfort, such as effective securing of the drain to avoid movement at the insertion site, gentle handling and repositioning of the baby for cares and/or cuddles.

- If a baby is moved, lifted or repositioned, whilst the chest drain is in situ it would be usual practice to 'clamp off' drains during the procedure, and then reopened when the baby is settled. This is so that if the position of the drain is accidentally moved inside the baby, there will be no sudden changes to the chest caused by sudden suction changes in the tubing, or sudden air entry into the chest. However, if the chest drain is bubbling at a very high rate- due to a significant pneumothorax, it may not be possible to clamp the drain for any length of time, without compromising the lung inflation. In this situation it will not be safe to clamp the drain, even for a short period of time.

- It would be hoped that over time (from hours to days) the pneumothorax will gradually resolve. This will be seen by the air leak reducing and ceasing of activity in the chest drain underwater seal system. The drain can be removed, but usually this will be delayed by some hours to ensure that there is no sudden re-accumulation. In some units the drain will be clamped prior to removal to see if the baby's condition deteriorates. A chest x ray may also be performed.

- The baby should be monitored closely for signs of ineffective air drainage via the chest drain. A list of likely symptoms is shown below;

    - Increased respiratory distress, even on the ventilator.
    - Decreased or unequal air entry
    - Diminished chest wall movement
    - Deviated mediastinum (on xray)
    - Change in location of heart and lung sounds, when organs are moved by the location of air.
    - Increasing oxygen requirement/ falling oxygen saturations.
    - Increasing ventilatory requirements
    - Physiological instability (desaturations and bradycardias increasing)

- Any one of the complications listed above, should be discussed urgently with the medical team/ nurse in charge.

4.7 Removal of chest drain

- Removing the chest drain should be a planned event, using ANTT method.

- The baby's observations should be stable and the parents informed that this will be occurring.

- Analgesia should have been prescribed and administered, and given time to take effect. This is most likely to be intra venous paracetamol.

- Removal of the drain is a medical role, but nursing staff will be required to assist, in particular by positioning and supporting the baby.

- Position the baby, so that the drain is visible and accessible.

- Offer support to the baby before, during and after the procedure. Possibly including non-nutritive sucking, containment, swaddling as able, oral sucrose- as an additional comfort.

- The dressing will be removed using an adhesive remover, or following the dressing manufacturer's guideline.

- Any suture is removed from the skin.

- The trocar or pigtail catheter will be steadily withdrawn.

- A sterile dry dressing will be temporarily placed over the entry point, to prevent ingress of air.

- The entry wound will usually be sealed/ closed-over using steri-strips overlapped at the entry site in a star shaped, then covered in a bio-occlusive dressing, for visibility and to help reduce the risk of air ingress.
- The tip of the catheter/ trocar will be inspected, to ensure it is complete.

- The procedure must be documented in the medical notes, but should also be documented in the nursing record/ medical devices sheet as appropriate.

4.8 After removal of the drain

- Continuously monitor the baby

- Every hour ensure the parameters are monitored
    - Heart rate.
    - Respiratory rate.
    - Blood Pressure.
    - Oxygen Saturation.
    - Check wound site
    - Perform a blood gas check, within 4 hour of removal if observations stable.

- Down grade monitoring, according to clinical need of the baby

- The baby should be monitored closely for signs of air re-accumulation and any concerns reported to the medical team. These signs include;
    - Increased respiratory distress, even on the ventilator.
    - Decreased or unequal air entry
    - Diminished chest wall movement
    - Deviated mediastinum (on xray)
    - Change in location of heart and lung sounds, when organs are moved by the location of air.
    - Increasing oxygen requirement/ falling oxygen saturations.
    - Increasing ventilatory requirements
    - Physiological instability (desats and bradys increasing)

4.9 Potential complications of chest drains

- Perforation of abdominal or intrathoracic organs.
- Pleural infection introduced.
- Damage to the intercostal nerve, artery or veins
- Conversion of a pneumothorax to a haemo-pneumothorax
- Resulting intercostal neuritis/neuralgia
- Chest tube kinking, clogging, or dislodging from the chest wall.
- Persistent pneumothorax.
- Persistent or unexplained air leak in the tube
- Subcutaneous emphysema, usually at tube site.
- Recurrence of pneumothorax upon removal of the chest tube
- Lung fails to expand due to plugged bronchus/ bronchoscopy required.

4.10 Parents

- Staff should provide parents with information about their baby and its chest drain, according to their individual needs and preferences. Information they are likely to want to know includes;
    - The general purpose of a chest drain
    - If a new chest drain is sited, or needs to be sited, and why.
    - If a chest drain is removed.
    - The baby's underlying condition and any complications experienced by their baby which relate to the condition or chest drain.

- Parents often find it helpful to be shown their baby's chest x ray by the medical team, as part the explanation.

- Inform parents that their baby can enjoy and benefit from comfort care in the incubator, even with a chest drain in situ. Encourage parents to give 'hand hugs', talk, sing and read to their baby.
- Some babies will be well enough to have a cuddle, with a chest drain in place. In particular those babies who are stable, longer term or who have a drain in to drain fluid, rather than to drain a pneumothorax. The baby may need to come out on a pillow or mattress, and remain flat on parent's knee, rather than being held in skin to skin.

4.11 Staff education/ training

- Staff should receive training and assessment of competence in care of neonates requiring a chest drain, at the appropriate point in their progression through the unit.
- Only staff who have documented competence should care for a baby with or requiring a chest drain.
- Staff should take responsibility for maintaining their knowledge and skill in caring for a baby requiring a chest drain. However, they should be supported in clinical practice by the nurse in charge or experienced colleagues/ practice educators.

4.12 Resources

- Resources should be available to enable best practice in chest drain care.
- Staff using equipment should inform the nurse in charge if equipment levels are noted to be running low.
- Staff should know how to access the unit, nursing and medical guidelines for care of a chest drain.

4.13 Audit

- Audit is an important part of monitoring clinical care, which aims to help raise standards and promote best practice.
- Staff should be willing to participate with audit that is occurring on the unit relevant to chest drains and their use and care. This is most likely to take the form of benchmarking practice or auditing compliance with chest drain policy.

Version Control:

Version	Date	Details	Author(s)	Comments
First	Jan 2018	Draft	KR (Chair)	Ratified 4.12.2019
Second	October 2023	Updates made-for review Feb 24	KR	Ratified 21.03.2024
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