

[Newborn Care Manual: Contents](#)

GASTRIC ASPIRATE SHAKE TEST

In the fetus, lung fluid is either swallowed or passes out of the mouth into the amniotic fluid. A sample of gastric aspirate collected from a newborn infant within 30 minutes after delivery consists mainly of swallowed lung fluid and amniotic fluid. Therefore, gastric aspirate can be used to assess whether surfactant is present in the infant's lungs at birth. If the gastric aspirate shake test indicates that surfactant is present, then the infant's lungs are mature and hyaline membrane disease is very unlikely. The gastric aspirate shake test should be done on all infants who develop respiratory distress within the first 30 minutes after delivery and in all infants who weigh less than 1500 g at birth.

Note that the gastric aspirate shake test is similar to, but not the same as, the bubbles test performed on amniotic fluid obtained by amniocentesis. In the bubbles test the amniotic fluid is not diluted and a different concentration of alcohol is used.

25-A THE EQUIPMENT NEEDED FOR THE GASTRIC ASPIRATE SHAKE TEST.

1. A F5 or F6 nasogastric tube.
2. Three 1 ml plastic syringes.
3. A clean glass test tube.
4. An ampoule of normal saline.
5. A bottle of 95% alcohol with a tight fitting top.
6. A rubber stopper or piece of Parafilm.

25-B COLLECTION OF THE GASTRIC ASPIRATE.

A nasogastric tube is passed after delivery and before the first feed is given. The stomach contents are aspirated into a plastic syringe. The sample of gastric aspirate must be collected within 30 minutes of birth. Thereafter the stomach contents consist of gastric secretion rather than swallowed lung fluid and amniotic fluid and, therefore, may give an incorrect result with the shake test.

25-C THE METHOD OF DOING THE SHAKE TEST.

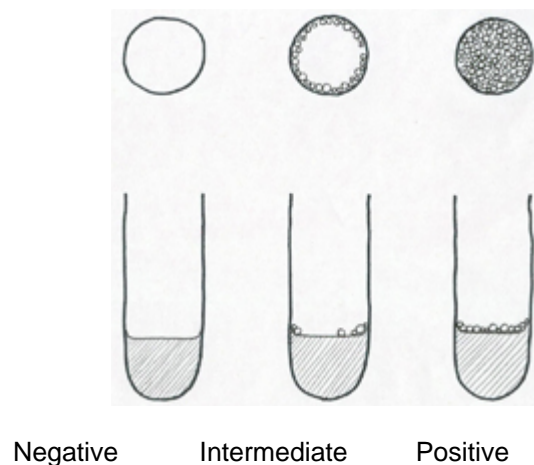
1. Inject 0,5 ml of gastric aspirate from the syringe into a clean glass test tube.
2. Aspirate 0,5 ml of saline into a second clean syringe and inject the saline into the test tube containing the gastric aspirate.
3. Close the end of the test tube with a rubber stopper or piece of Parafilm and shake the 1 ml mixture of gastric aspirate and saline well for 15 seconds. Remove the stopper or Parafilm.
4. Aspirate 1 ml of 95% alcohol into the third clean syringe and inject the alcohol into the test tube containing the gastric aspirate-saline mixture.
5. Again close the test tube with the stopper or Parafilm and shake the 2 ml mixture of gastric aspirate, saline and alcohol well for a further 15 seconds.
6. Let the test tube stand upright for 15 minutes and then examine the surface of the fluid to decide the result of the shake test.

25-D EVALUATING THE RESULT OF THE SHAKE TEST.

The result of the shake test is determined by observing the number of bubbles present on the surface of the mixture after it has been allowed to stand for 15 minutes:

1. If no bubbles are present then the test is **NEGATIVE**. This result indicates that the infant's lungs are probably immature and that very little surfactant is present. As a result, the infant is at high risk of developing hyaline membrane disease.
2. If bubbles are seen around the top of the fluid but not enough bubbles are present to completely cover the surface, then the test is **INTERMEDIATE**. This result indicates that only some surfactant is present in the lungs and the infant may still develop mild hyaline membrane disease.
3. If bubbles are present right across the surface of the fluid, then the test is **POSITIVE**. This indicates that the lungs are mature and are producing adequate amounts of surfactant. Any respiratory distress that the infant might develop is very unlikely to be due to hyaline membrane disease.

Figure 25-A. The method of evaluating the shake test.

**25-E PROBLEMS WITH THE SHAKE TEST.**

1. The gastric aspirate must be collected within 30 minutes after delivery. If collected later than this the shake test may give an incorrect result. If a preterm infant or infant with respiratory distress is to be transferred to a level 1 or 2 unit, it is advisable to collect a sample of gastric aspirate soon after delivery and to send it with the infant.
2. The exact amount of gastric aspirate, saline and alcohol must be measured correctly.
3. The test tube must be clean.
4. The test tube must be closed with a rubber stopper or piece of Parafilm before shaking. Covering the opening with your finger may give a false positive result, which means that no surfactant is present even though the test is positive.
5. The alcohol must be 95%. Always close the top of the alcohol bottle immediately after use as this keeps the alcohol concentration constant. If the top is left off, the alcohol absorbs moisture from the air. As a result, the concentration of the alcohol will fall.
6. You must always mix the gastric aspirate with saline first before adding the alcohol or you will get an incorrect result.
7. You must wait for 15 minutes before reading the result. Examining the number of bubbles earlier may give a false positive result. Reading the result too early is the commonest mistake made when doing the shake test.
8. If the gastric aspirate is blood or meconium stained you should not do the shake test as the result may be falsely positive.

USING AN APNOEA MONITOR

An apnoea monitor (or apnoea alarm) is an electronic apparatus used to detect apnoea in a newborn infant. If the infant stops breathing the monitor will alarm to attract the attention of the nursery staff. The apnoea can then be treated immediately.

25-F THE COMPONENTS OF AN APNOEA MONITOR.

A number of different types of apnoea monitor are available but they all have a similar function and consist of 3 parts:

1. THE MONITOR UNIT.

The monitor unit is powered by electricity via a power cable which is plugged into a wall plug. It also has a battery which should be replaced periodically. The monitor can be switched on or off. A jack is present, usually at the back of the monitor, to plug in the lead from the sensor pad. When the monitor alarms a red light flashes and a high pitched noise is made. Some monitors also indicate the respiratory rate or have a yellow light that flashes with each breath. At the back of the monitor the duration of apnoea needed to activate the alarm can be set at 10, 15 or 20 seconds. Usually the monitor is set to alarm after 20 seconds of apnoea.

2. THE SENSOR PAD.

The infant lies prone (chest down) or supine (back down) on a flat, solid sensor pad. The modern sensor pad is easier to use than the earlier air filled mattress. In some models skin electrodes are used instead of a sensor pad. The sensor pad should be cleaned with a detergent solution before it is used on another infant.

3. THE LEAD CONNECTING THE SENSOR PAD TO THE MONITOR UNIT.

The monitor unit is attached to the sensor pad by a thin wire lead. If the infant is in a closed incubator, take the connecting lead out of an incubator port. Do not let the hood rest on the lead as this may damage the lead.

25-G USING AN APNOEA MONITOR.

The method of using an apnoea monitor is as follows:

1. Plug the connecting lead of the sensor pad into the monitor.
2. Plug the power cable into the power source and switch the wall plug on.
3. Place the sensor pad in the incubator or bassinet so that it will lie under the infant's chest or back. Cover the pad with a thin sheet or blanket only.
4. Set the apnoea period to 20 seconds.
5. Switch on the monitor.
6. Make sure that the monitor registers the infant's breathing.
7. The monitor can be tested by removing the sensor pad from under the infant. After 20 seconds the alarm should register.

25-H COMMON PROBLEMS WITH AN APNOEA MONITOR.

1. If the infant is only partially on the pad or has moved off the pad, the alarm will repeatedly trigger.
2. If the apnoea period is set at less than 20 seconds the alarm may trigger repeatedly during normal periodic breathing.
3. Often the alarm is switched off while the infant is removed for a feed and is not switched on again when the infant is placed back in the incubator or bassinet.
4. If the sensor pad is covered with a thick blanket it may not detect breathing movements and, therefore, may trigger repeatedly.

Examine the apnoea monitors in your nursery and identify the different components. If you are still not able to operate an apnoea monitor after completing this skills workshop, please get a senior staff member or maintenance technician to help you.

TRANSILLUMINATION OF THE CHEST

Transillumination of the chest is a simple and easy method of diagnosing or excluding a large pneumothorax. It is far quicker than waiting for a chest X-ray.

25-I THE TRANSILLUMINATION LIGHT.

A very bright, mobile, cold light (fibre-optic light) is needed. The light shines through the end of a flexible tube. The tube is attached to a light box which is powered by a cable from an electrical wall plug. Although expensive, a transillumination light is an important piece of equipment in a level 2 or 3 nursery.

25-J METHOD OF CHEST TRANSILLUMINATION.

1. Make the nursery as dark as possible by switching off the ceiling lights and closing the curtains or blinds. If this is not possible, use a black cloth of 1 metre by 1 metre. The cloth can be used to cover the infant and the examiner's head thereby producing a miniature dark room.
2. Turn the infant into the supine position (chest upwards).
3. Switch on the cold light to the brightest setting.
4. Hold the light firmly against the infant's skin in line with the axilla (armpit) and about half way down the chest.
5. Observe whether that side of the chest transilluminates well (lights up). Normally only the skin about 1 cm around the light will transilluminate and form a halo.
6. Repeat by holding the light against the infant's skin in the midclavicular line and half way down the chest.
7. Always transilluminate both sides of the chest and compare the degree of transillumination on both sides.

If only one side of the chest transilluminates well then a pneumothorax is present on that side of the chest. If both sides of the chest transilluminate equally poorly then a pneumothorax is probably not present. A small pneumothorax may be missed especially if it is not possible to darken the nursery and the infant is term with thick skin.

An obvious pneumothorax on transillumination should be treated immediately. Do not wait for a chest X-ray to confirm the diagnosis. However, if the result of the transillumination is uncertain and the infant is not severely distressed a chest X-ray should first be asked for.

EMERGENCY NEEDLING OF A PNEUMOTHORAX

Inserting a needle to relieve a pneumothorax is an emergency procedure which should only be done if you are certain that a pneumothorax is present, if you have been trained in the procedure and if the infant has severe respiratory distress.

This procedure relieves the severe respiratory distress caused by a pneumothorax and is used while preparations are being made to insert a chest drain. Chest needling should only be done if the infant's life appears to be in danger. It should NOT be used to diagnose a pneumothorax as the needle may puncture the lung and actually cause a pneumothorax.

25-K THE METHOD OF NEEDLING A PNEUMOTHORAX.

1. Clean the skin over the side of the infant's chest with an alcohol swab.
2. Attach a 20 ml syringe to a scalp vein set.
3. Insert the needle in the midaxillary line between the fourth and fifth intercostal spaces. Push the needle through the skin and just above a rib. Remember that the blood vessels lie immediately below the ribs. When the needle enters the pleural space you will feel a "pop" as the needle punctures the pleura. Do not push the needle in any further.

4. Aspirate as much air as possible. If the syringe fills up with air, pinch closed the tubing of the scalp vein set, detach and empty the syringe, and again aspirate as much air as possible. Rather than having to remove the syringe, a 3-way tap can be used to expel the aspirated air. The infant's clinical condition should improve rapidly and the oxygen saturation increase after the air is aspirated. Some people prefer to hold the end of the scalp vein set under water in a small plastic dish rather than use a syringe. If a pneumothorax is present a gush of air escapes into the water followed by a steady stream of bubbles.
5. Once the air has been aspirated from the pneumothorax remove the needle before it damages the underlying lung. If the infant's respiratory distress again gets worse before a chest drain can be inserted, repeat the above procedure.
6. A chest X-ray should always be done after the chest has been needled to confirm or exclude the presence of a pneumothorax.

INSERTING A CHEST DRAIN

Treatment of a pneumothorax by inserting a chest drain is an invasive procedure and should only be done by a doctor who is trained and experienced in the technique. However, this section should still be read even if you are not going to learn the procedure.

Inserting a chest drain is the correct way to treat most pneumothoraces as needling the chest usually only improves the respiratory distress for a short time. Inserting a chest drain is a sterile procedure and, therefore, the person must scrub as for any minor surgical operation. The surgical equipment needed should be kept in a sterile pack and stored in the nursery so that it is always available in an emergency.

25-L EQUIPMENT NEEDED TO INSERT A CHEST DRAIN.

1. Mask, gloves and a sterile drape.
2. Chlorhexidine (Hibitane) and providone iodine (Betadine) solution together with 2 small dishes and small swabs.
3. A pointed scalpel blade.
4. A small pair of curved forceps (mosquito forceps).
5. A large pair of straight artery forceps.
6. 000 suture material attached to a curved, cutting needle.
7. A needle holder.
8. F10 and F12 intercostal drains. A trochar is NOT needed. If present, it must be removed and discarded.
9. A sterile suction bottle with plastic tubing to connect to the chest drain. A plastic connector should be inserted into the end of the tubing so that it can be easily attached to the intercostal drain.
10. If local anaesthetic is to be used, an ampoule of 1% lignocaine, a 2 cm syringe and a 26 gauge needle will be needed.

25-M METHOD OF INSERTING A CHEST DRAIN.

1. First prepare the underwater drainage bottle. Half fill with sterile water so that the drainage pipe is about 1 cm below the surface. Make sure that the connecting piping is correctly fitted to the bottle, and that the plastic connector is in place. Do not attach to the suction apparatus yet.
2. The infant should lie supine (chest up) with the side of the pneumothorax facing the operator. Undress the infant and keep the infant warm in an incubator, or preferably under a radiant warmer. The infant's arm should be held above the head to expose the side of the chest. It is useful to place a small, folded towel under the infant's back to turn the side of the chest slightly away from the operator. Usually the infant will need oxygen via a face mask or head box.
3. The operator should mask, scrub and wear surgical gloves. Clean the side of the chest with chlorhexidine and alcohol.
4. If local anaesthetic is used, infiltrate the skin between the fourth and fifth rib in the midaxillary line. Do not use more than 0,5 ml of 1% lignocaine. If possible, always use local anaesthetic.
5. Make a small (0,5 cm) incision parallel and between the fourth and fifth rib in the midaxillary line. Make sure that you are at least 2 cm away from the nipple as the breast bud may be damaged. A common mistake is to make too long an incision which later has to be stitched close.

6. By repeatedly opening and closing the small, curved forceps push through the intercostal muscle just above the fourth rib. Remember that the blood vessels lie immediately below the rib. A "pop" will be felt when the pleura is pierced. Do not remove the forceps when the pleural space is entered.
7. With your other hand pick up the chest drain. Open the small forceps as wide as possible and push the tip of the drain through the hole in the chest wall. Insert the drain 5 cm. If you are not able to get the drain in place, remove the small forceps and use them to pick up the drain so that the tip of the forceps is parallel to and holds the tip of the drain. Now push the tip of the forceps, still holding the drain, into the pleural space. If you are still not successful, enlarge the incision in the skin and try again. Do NOT use the trochar.
8. When the chest drain is correctly placed remove the forceps.
9. Attach the chest drain to the connecting tubing. The drain should "swing" well if correctly in place. If not, remove the drain and insert it again.
10. Often the skin incision will not need to be sutured closed. If the incision was too big however, close it with 1 or 2 interrupted sutures. There is no need to tie the sutures to the drain or to put on a dressing. Never use a purse-string suture as it may cause necrosis of the trapped skin.
11. Fix the chest drain in place with a "soccer post" made of adhesive strapping. (This method is fully explained in skills workshop 23).
12. When the drain has been successfully inserted, obtain a chest X-ray to determine whether the pneumothorax has been completely emptied. If the infant is on a ventilator or if the pneumothorax is not completely emptied, the underwater drainage bottle should be suctioned at -200 cm water pressure.

Usually the chest drain is left in place until the drain fills with serum and does not swing. Then clamp the drain for a further 6 hours. If the infant's clinical condition remains stable, the drain can be removed. Loosen the strapping and remove any sutures present. Pull the drain out and immediately cover the hole with a piece of sterile gauze that has been smeared with a thin layer of Vaseline. This provides an air tight seal and prevents an air leak through the incision. The gauze should be held in place for 24 hours with a strip of strapping. Usually there is no need to close the incision with a suture. The wound should heal rapidly and leave only a small scar.