

Resuscitation of the newborn baby

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Importance of resuscitation

Oxygen is important for every part of the human body. Without it, the cells that make up our organs - brain and other body parts will die. Before birth, the fetus receives oxygen from the placenta. After birth, the umbilical cord is clamped and cut which stops the delivery of oxygen from the placenta. If the baby does not start breathing immediately after birth, she may even die due to lack of oxygen. A proper resuscitation helps the baby to attain normal breathing. Therefore, all health care providers should develop basic resuscitation skills.

An increased risk of breathing problems may occur in babies who are:

- o preterm
- o born after long traumatic labor
- o born to mothers who received sedation during the late stages of labor

However, it should be kept in mind that any baby may have breathing difficulties at birth. Therefore, it is important to be prepared for resuscitation in all deliveries.

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Learning objectives

In this lesson, you will learn about

- Assessment of baby at birth
- Performing steps of basic resuscitation using standard equipments
- Resuscitation of premature babies and babies born through meconium stained amniotic fluid
- The principles of post-resuscitation care

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Key to successful resuscitation

All health professionals who attend the mother at birth must be skilled at

resuscitation and know how to recognize babies at risk. They must:

- anticipate the need for resuscitation in each delivery
- be prepared with the necessary equipments that need to be checked prior to the birth of the baby.
- know what to do in what order
- be able to work quickly in coordination with another health care provider
- record the resuscitation details in the baby's case sheet.

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Preparation in the delivery room

When a baby has asphyxia, resuscitation must be started right away. If things are not prepared, much time can be lost before starting resuscitation. With this lost time a baby can become worse.

Preparations include having a warm room ($\geq 25^{\circ}\text{C}$), dry and warm delivery surface, proper place to do the resuscitation (preferably under a radiant warmer), towels, self inflating bag, masks, suction device, and a clock.

Important points about the equipment used for resuscitation:

- Equipment must be cleaned and checked after each delivery and checked again before the next delivery to ensure it is ready for use
- Broken equipment is dangerous and should be replaced
- Equipment must be of the appropriate size; pediatric and adult bag and masks cannot be used on newborn babies who have small and fragile lungs
- Volume of the bag should not be more than 240-500mL; should be able to generate a peak pressure of at least 35 cm of water
- If a mucus extractor is used the trap should be big enough (20 mL) to prevent aspirated fluid going into the resuscitator's mouth
- A mucus extractor with a bulb is NOT recommended because they are difficult to clean and might act as a source of cross infection
- Suction should not exceed a negative pressure of 100 mmHg or 130cm water
- Resuscitation can be done without having piped oxygen available
- If oxygen is available, it should be used; but avoid using 100% oxygen in premature babies

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Initial steps and assessment at birth

The steps to be taken at the time of birth include:

1. Deliver the baby on to mother's abdomen

A newborn baby should be delivered onto his mother's abdomen or into her arms. If the baby is not delivered onto his mother's abdomen, make sure there is a warm towel or cloth on the bed to put the baby on.

2. Note the time of birth and dry the baby

Keeping a baby warm at birth is a priority. The baby has to be dried with a warm towel. After drying, the wet towels or clothes should be replaced and the baby loosely wrapped in clean, dry and warm towels.

Drying the baby and wiping its eyes will take about 30 seconds, discarding the wet cloth and replacing it with a warm cloth will take about 10 seconds.

Breathing and warmth go together and breathing should be assessed whilst drying the baby. Drying itself often provides sufficient stimulation for breathing to start in mildly depressed newborn babies.

3. Assess the baby's breathing

The baby's breathing should be assessed whilst drying:

- Watch the way the baby's chest rises and falls.
- The chest should move equally on both sides with no difficulty, between 30 and 60 times in a minute.

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Assessment of breathing

When a baby's breathing is assessed one of four main behaviors may be seen. These are:

1. The baby is crying at birth

This baby does not need any help with its breathing. She can be given straight away to the mother to start skin-to-skin contact and breastfeeding.

Routine suctioning is not necessary if the baby is crying.

2. The baby is not crying, but his chest is rising regularly at 30 to 60 times per minute

This baby needs no help with his breathing as long as his chest is rising and falling equally on both sides around 30 – 60 times a minute and his color is good. This baby can be given straight to his mother for skin-to-skin contact. No suctioning is

necessary for this baby.

3. *The baby is gasping, does not breathe regularly and there are long pauses between each breath*

She needs immediate help to breathe. You MUST start resuscitation within 1 minute of birth.

4. *The baby is NOT breathing*

This baby needs immediate help with her breathing. You MUST start resuscitation within 1 minute of birth.

In the last 2 situations, resuscitation should be carried out immediately.

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Scenario 1

"A mother arrived at your maternity hospital and delivered a baby girl as soon as she reached the labor ward. The placenta followed the baby and mother was not bleeding;

The baby was pale. He was breathing and HR was 120/min."

Ask students to point Action?

After a gap, tell them: *'He does not require resuscitation. He should be delivered on to his mother's abdomen and dried with a warm cloth. Skin-to-skin contact (by placing him on mother's chest) and breastfeeding should be started immediately.'*

Reinforce the following messages:

- ONLY Routine care is required for a baby who is crying or breathing normally
- Even routine suctioning is not required for these normal babies

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Scenario 2

"A baby girl is born at your clinic after second stage of 60 minutes. The umbilical cord is short;

You see that the skin is pale .She is not breathing. You can feel a strong heart beat over 100/min."

Ask students to point Action?

After a gap, tell them: '*Since she is not breathing, the steps of resuscitation should be started immediately.*'

Before starting resuscitation,

- Tie and cut the cord
- Tell the mother that her baby is having difficulty beginning to breathe and that you are going to help her; tell her quickly but calmly.
- Remove the wet cloth or towel
- Lightly wrap the baby in a warm, dry towel or cloth
- Leave the face and upper chest free
- Transfer her to a warm clean and dry surface, preferably under a radiant warmer

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Positioning

This is done by

- Placing the baby on her back
- Positioning the head so that it is slightly extended (to open the airway)
- Placing a folded piece of cloth under her shoulders to help maintain this position (the folded cloth should not be too thick or thin - this may cause overextension or flexion which will close the airway)

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Clearing the airways

This is done by suctioning the mouth first and then the nose (Remember 'M' comes before 'N'):

- Gently introduce a suction tube (8 to 10 FG) to a length of about 5 cms into the baby's mouth
- Use suction while withdrawing the tube
- Next introduce the suction tube 3 cms into each nostril
- Use suction while withdrawing the tube
- Repeat suction if necessary (if there is a lot of mucus, amniotic fluid or

meconium) but not more than two times or for a duration exceeding 20 seconds.

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Dry, stimulate, reposition

Suctioning alone may stimulate the baby to start breathing. If she is still not breathing, try to stimulate her by gently flicking the soles or by rubbing the back twice. If breathing is still not established, bag and mask ventilation (BMV) has to be initiated. Before initiating BMV, reposition the baby's head so that the neck is slightly extended.

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Bag and mask ventilation: Selecting and testing the equipment

The self-inflating bag is designed to inflate automatically after it is squeezed; it does not require a compressed gas source to fill.

The resuscitation bag used in neonatal resuscitation has a safety mechanism in the form of a pressure release valve to guard against inadvertent transmission of excess pressure to the baby's lungs. This valve is generally set to release at 30 to 40 cm H₂O. If pressures greater than 30 to 40 cm H₂O are generated, the valve opens limiting the pressure being transmitted to the lungs of infant. The ideal size of the bag for neonates is 250 to 500 mL capacity.

The bag should be assembled and connected to oxygen so that it provides 90% to 100% oxygen. If a self-inflating bag is used, be sure the oxygen reservoir is attached.

To check a self-inflating bag, connect the mask to the bag; block the mask or patient outlet by making an airtight seal with the palm of your hand. Then squeeze the bag:

- Do you feel pressure against your hand?
- Can you force the pressure-release valve open?
- Is the valve assembly present and moving well?

If not

- Is there a crack or leak in the bag?
- Is the pressure-release valve missing or stuck or closed?
- Is the patient outlet completely blocked?

If your bag generates adequate pressure and the safety features are working,

while the mask-patient outlet is blocked, check to see:

- Does the bag re-inflate quickly when you release your grip?

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Bag and mask ventilation: Obtaining proper seal

Before initiating BMV,

1. Re-check the baby's position
2. Slightly re-position the baby so that its neck is extended
3. Put the folded piece of cloth under the baby's shoulders at this time
4. Place the correct mask size (Size 1 for a normal weight baby and size 0 for a small baby) on the baby's face so that it covers the baby's chin, mouth and the nose. While a mask that is too large covers the eyes and extends over the tip of the chin, one that is too small does not cover the nose and even the mouth effectively.

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Bag and mask ventilation: Procedure

1. Squeeze the bag attached to the mask with the thumb and two fingers
2. Squeeze and release the bag two or three times
3. Watch the baby's chest as the bag is squeezed. Does it rise as the bag is squeezed?
4. If the baby's chest is rising, the ventilation pressure is probably adequate
5. If the baby's chest is NOT rising, do the following steps:

<i>Possible cause</i>	<i>Action</i>
Blocked airway	Re-position the baby's head Do suction (if secretions are present)
Leakage of air around the mask	Check the seal around the mask; if it is not good, re-position the mask.
Inadequate pressure	Squeeze the bag harder (using more pressure)

6. Use oxygen if available; if not, use room air
7. Ventilate at a rate of 40 breaths per minute. Squeeze the bag (ventilate) at 40 times a minute until the baby starts crying or breathing

Count out loud. An easy way to count is to:

SQUEEZE – count aloud 'one hundred and one, SQUEEZE one hundred and

two, SQUEEZE one hundred and three, SQUEEZE’ and continue until you reach ‘one hundred and twenty’. You can then start again or continue with ‘SQUEEZE two hundred and one, SQUEEZE’

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When to stop BMV?

1. Assess the baby’s breathing: If the baby is breathing or crying, STOP VENTILATION
2. Count breathing: Count the number of breaths in a minute. If the baby is breathing at >30 times per minute, STOP VENTILATION
3. Look at the chest: Look particularly at how the baby breathes. Watch her chest movements. If the baby has regular breathing and there is NO chest ‘in-drawing’ (the skin between the ribs ‘sucked’ inwards making the ribs very prominent), STOP VENTILATION.

(If the baby has ‘in-drawing’ of the chest wall, it indicates that the baby is still having difficulty in breathing. Ventilation should be continued in this baby).

After stopping ventilation, place the baby gently between her mother’s breasts with skin-to-skin contact – so that she stays warm.

DO NOT leave this baby alone; make sure there is someone with him for at least the first hour. Monitor him every 15 minutes. Check if he is breathing normally and whether he is warm. Reassure the mother that her baby will probably be well.

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When to continue BMV?

Bag and mask ventilation has to be continued, if the baby is

1. Breathing at <30/min
2. Gaspings
3. Has severe chest in-drawing

In these instances, efforts should be made for immediate referral to a higher centre. Before referral, the family must be explained as to what happened; they should be informed about the need for continued ventilation and further care. Adequate arrangements should be done for continued ventilation during transport. A detailed referral form with proper documentation of the events

should be provided.

If the baby is NOT breathing even after 20 minutes of bag and mask ventilation, STOP ventilating the baby.

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Scenario 3

*"Baby girl born at 38 weeks following **thick meconium stained amniotic fluid** is noted to be limp and not breathing;*

*The baby is blue. He was **not breathing** and HR was 80/min"*

The following three parameters should be assessed at the time of birth for a baby who is born through meconium stained liquor: heart rate, breathing, and tone.

If the baby's HR is >100/min, has good muscle tone and strong respiratory efforts, she is said to be *vigorous*. This baby does not need resuscitation.

If any of these three parameters is abnormal in a baby, she is classified as *non-vigorous*. She needs assistance for initiating breathing at birth. A skilled health care provider who is able to intubate is needed to provide further assistance to this baby. All necessary equipments for intubation should be readily available.

Reinforce the following messages:

- Meconium stained depressed baby needs endotracheal suction prior to B&MV
- Routine suction of oro-pharynx is not recommended before delivery of shoulder

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Scenario 4

*"Mother admitted in maternity unit delivered a baby boy at **32 week** gestation on bed. The baby is limp and not breathing. You wheel the mother and baby to Labor room;*

*The baby is pale. He is **not breathing** and HR is 80/min"*

Babies who are born preterm are at risk for a variety of complications following birth; some of these risk factors may have contributed to them having been born preterm. Hence they need special precautions during resuscitation which include:

1. Being gentle

2. Using small size resuscitation bag and give small tidal volumes to move chest
3. Avoiding 100% oxygen and using blenders and oxygen saturation monitors
4. Avoiding rapid fluid bolus
5. Having more skilled personnel who are trained to administer intubation, chest compression, medications
6. Keeping CPAP back up ready
7. Keep umbilical catheter ready (for administering medications and fluids through the umbilical vein)

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Post-resuscitation management

Continuing care and monitoring of a baby after successful resuscitation include:

For the baby

- Baby's temperature should be maintained between 36.5 and 37.5°C. While hyperthermia is definitely harmful, unmonitored hypothermia can also be dangerous. Temperature maintenance is best ensured by keeping the mother and baby together, ideally in skin-to-skin contact position.
- Encourage the mother to breastfeed her baby as soon as (s)he is ready. This will help to prevent hypoglycaemia (a low blood sugar).
- Assess the baby's attachment at the breast; help the mother breastfeed if needed. Good suckling is a sign of recovery. If the baby is unable to suck effectively help the mother to express colostrum.
- Monitor the vitals including heart rate, respiratory rate, saturation, etc. If necessary, oxygen should be administered to maintain the saturation between 90 and 93%. For babies who are unable to breastfeed properly, IV fluids may have to be administered.
- Record what has happened in the baby's notes and in the labour record:
 - o the date
 - o the time of the resuscitation
 - o what has been done
 - o what was the outcome.

For the mother and family

- After resuscitation, explain to the mother and family what has happened and how the baby is now.

- Keep the mother and baby in the delivery room and DO NOT separate them.
- NEVER leave the woman and newborn alone. Monitor them every 15 minutes during the first hour.

The baby should be thoroughly examined before it is discharged from the delivery room. Tell parents that although the possibility of complications is low, there is still a small probability that the baby may have problems such as feeding difficulty or convulsions in the first few days.

Instruct them to take the baby to the nearest hospital if these problems occur. Encourage the mother to maintain skin-to-skin contact as much as possible in the next few days.

Recommended reading

- Basic Newborn Resuscitation: A practical guide. WHO/RHT/MSM/98.1
- WHO Essential Newborn Care course based on Pregnancy, Postpartum, and Newborn Care: a guide for essential practice:
www.who.int/making_pregnancy_safer/publications/en