Resuscitation of Newborn Babies

Dr David Curnock, Visiting Paediatrician, Berega Hospital, Tanzania and Emeritus Consultant Paediatrician, Nottingham University Hospitals, UK[a].

Introduction

Many newborns, especially in developing countries, die unnecessarily because health staff have not had the opportunity to learn how to give simple resuscitation. Birth asphyxia (failure to establish breathing at birth) accounts for about 900 000 deaths each year and is one of the primary causes of early neonatal mortality[1]. However resuscitation can be successful in low-resource settings. For example, in Dahanu, India, the stillbirth rate dropped from 18.6% to 9% over a three-year period with introduction of a traditional birth attendant training programme in which neonatal resuscitation was a central component[1].

Sub-Saharan Africa has one of the highest rates in the world of so-called stillbirths. Many of these are due to birth asphyxis, and many can be prevented. For example, in Berega Hospital in Tanzania, of the 539 babies born in 2006, 43% needed help at birth. This article, based on experience in Tanzania, explains how to resuscitate newborns. The guidelines are summarised in a chart that can be laminated and put in the labour ward – see below.

Steps to resuscitate newborn babies

Before birth

Before any birth check that you have the following equipment, and that the bag is working correctly.

Equipment

- Clock or watch
- Warm dry towels
- Firm stable surface
- Bag and mask (masks in 3 sizes)
- Suction

Drugs

Of the babies who will respond to resuscitation, only a very small number (less than 1%) will need drugs in addition to the bag & mask and chest compressions described below. The drugs are sodium bicarbonate, adrenaline and dextrose. If you have them then get them out together with an umbilical catheter through which they are given, but if you do not have the drugs or the catheter remain confident because your resuscitation will be successful without them.

As soon as the baby is born

1. Start the clock or look at your watch
2. Dry the baby with warm dry towels. Babies are small and wet and get cold quickly.
3. Assess the baby

Assess the baby

Assess:

- colour
- tone
- breathing
- heart rate

Decide if the baby falls into group 1, 2 or 3.

Group One – the baby is healthy

- Colour goes from blue to pink.
- There is good tone.
- Breathing is regular.
- Heart rate is >100.

Group Two – the baby needs help

- The colour is blue.
- There is moderate tone.
- Breathing is inadequate.
- Heart rate is <100.

Group Three – the baby is in danger and needs immediate lung inflation

- The colour is blue or white.
- The baby is floppy.
- The baby is not breathing.
- Heart rate is <60.

What to do

Group 1

Hand the baby, dried and covered, to the mother. Then allow skin to skin contact and make sure the baby starts suckling with an hour.

Group 2

- Open the airway. In the unconscious baby airway obstruction is usually due to loss of pharyngeal tone rather than foreign material in the airway:
  - Hold the head in the neutral position (i.e. with the eyes looking directly up at the ceiling: be careful not over-extend the neck).
  - Do you need chin lift/jaw thrust?
- If the baby is still not breathing give inflation breaths – see Box 1. The heart rate usually responds to lung inflation. If there is no heart rate response, check for chest movement. About 95% of babies needing resuscitation will recover within a minute or two *once air enters the lungs*.
- Re-assess. If the lungs are inflating (i.e. the chest is moving) but the heart beat is still <100 and not improving, start chest compressions – see Box 2.

[a] For more information contact David Curnock at dcurnock at doctors.org.uk

Group 3

- Open the airway. Check the airway position: do you need chin lift / jaw thrust?
- Give 5 inflation breaths. Check the chest is moving.
- Check the heart rate. If it is less than <60, or <100 and not improving, start chest compressions – see Box 2.
- Re-assess.
  - If the baby is improving:
    - stop chest compressions when heart rate is >100
    - stop bagging when respiratory rate >30
  - If the baby is not improving:
    - check airway, breathing, and circulation.
    - if the chest is moving well with the bagging and the chest compressions are being performed, but the heart rate is not improving, then consider drugs: Insert an umbilical venous cannula, and give IV:
      - Sodium Bicarbonate (4.2%) 2ml/kg
      - Adrenaline (1 in 10,000) 0.1ml/kg
      - Dextrose (10%) 5ml/kg
- If after 20 minutes of resuscitation the baby is not breathing and there is no pulse, stop resuscitation and explain to the mother that the baby has died. Give the baby to the mother to hold.

Resuscitated babies

Reassess before transferring to the maternity ward:

- Check the baby's temperature.
- Explain to the mother about the resuscitation.
- Write in the case notes what you have done.

The ABCD of resuscitation
Airway
Breathing
Circulation
(Drugs)

Case history from Berega Hospital, Tanzania

Following a neonatal resuscitation teaching session one morning, that evening one of the Assistant Medical Officers who run the hospital was passing the Labour Suite when the midwife called out that she had a baby who was not breathing (Apgar 4). Up until then such babies had been left to die because no-one had had any resus training. The AMO thought he'd try what he had been taught that morning and to his surprise the baby responded to the bag and mask and started breathing. When the baby was checked the next morning he was fine, with no abnormal neurological signs, and later that day went home as normal. Altogether a very satisfying experience for the AMO and midwife, not to mention the mother!

Mother and her resuscitated baby (Berega Hospital, Tanzania)

References

1. Spector JM & Daga S. *Preventing those so-called stillbirths* Bulletin of the World Health Organization 2008, 86 (4) 315-316

Box 1. Inflation breaths

Five breaths each sustained for 2-3 seconds at 30cm of water pressure -
(the pressure of bag blow-off valve is set at this pressure)
Have head in the neutral position.
Ventilate at approximately 30 breaths per minute.
Bag and mask inflation is usually effective.
Only about 1 in 500 babies do not respond to inflation and need intubation.
The heart rate usually responds to lung inflation.

Box 2. Chest compressions

You want to move oxygenated blood from the lungs to the coronary arteries -
(it is not far and it will not take long).
If the chest is not moving it is not being inflated.
Do not start chest compressions until the chest is being inflated.
Do three compressions to one breath.
90 compressions co-ordinated with 30 breaths in one minute

RESUSCITATION OF NEWBORN BABIES

Dry and cover

Assess:
colour
tone
breathing
heart rate

Group One	Group Two	Group Three
Blue ⟶ Pink **Good tone** Breathing regularly Fast heart rate >100 ↓ *Dry and cover the baby* *Hand to mother*	Blue Moderate tone Breathing inadequate Slow heart rate <100 ↓ *Dry the baby* *Open the airway* *?Inflation breaths* *Re-assess*	Blue or White Floppy No breathing Heart rate <60 ↓ *Dry the baby* *Open the airway* *Give 5 inflation breaths* *Re-assess* *Do you need help?*

For Group Three

- Check the airway position: do you need chin lift / jaw thrust?
- Check the inflation: is the chest moving?
- Check the heart rate: if it is less than <60, or <100 and not improving, start chest compressions co-ordinated with the breaths:
  3 compressions and then one breath, and then repeated quickly to give:
  90 compressions coordinated with 30 breaths in one minute.

If improving:

- stop chest compressions when heart rate >100
- stop bagging when respiratory rate >30

If not improving:

- check airway, breathing, and circulation.
- if the chest is moving well with the bagging and the chest compressions are being performed, but the heart rate is not improving, then consider drugs: Insert an umbilical venous cannula, and give IV:
  - Sodium Bicarbonate (4.2%) 2ml/kg
  - Adrenaline (1 in 10,000) 0.1ml/kg
  - Dextrose (10%) 5ml/kg

If, after 20 minutes of resuscitation, the baby is not breathing and there is no pulse, stop resuscitation and explain to the mother that the baby has died. Give the baby to the mother to hold.

After every resuscitation explain to the mother what you have done, and write in the case notes.

A chart to laminate and place in the ward. From Dr David Curnock, Visiting Paediatrician, Berega Hospital, Tanzania and Emeritus Consultant Paediatrician, Nottingham University Hospitals, UK. May 2008.