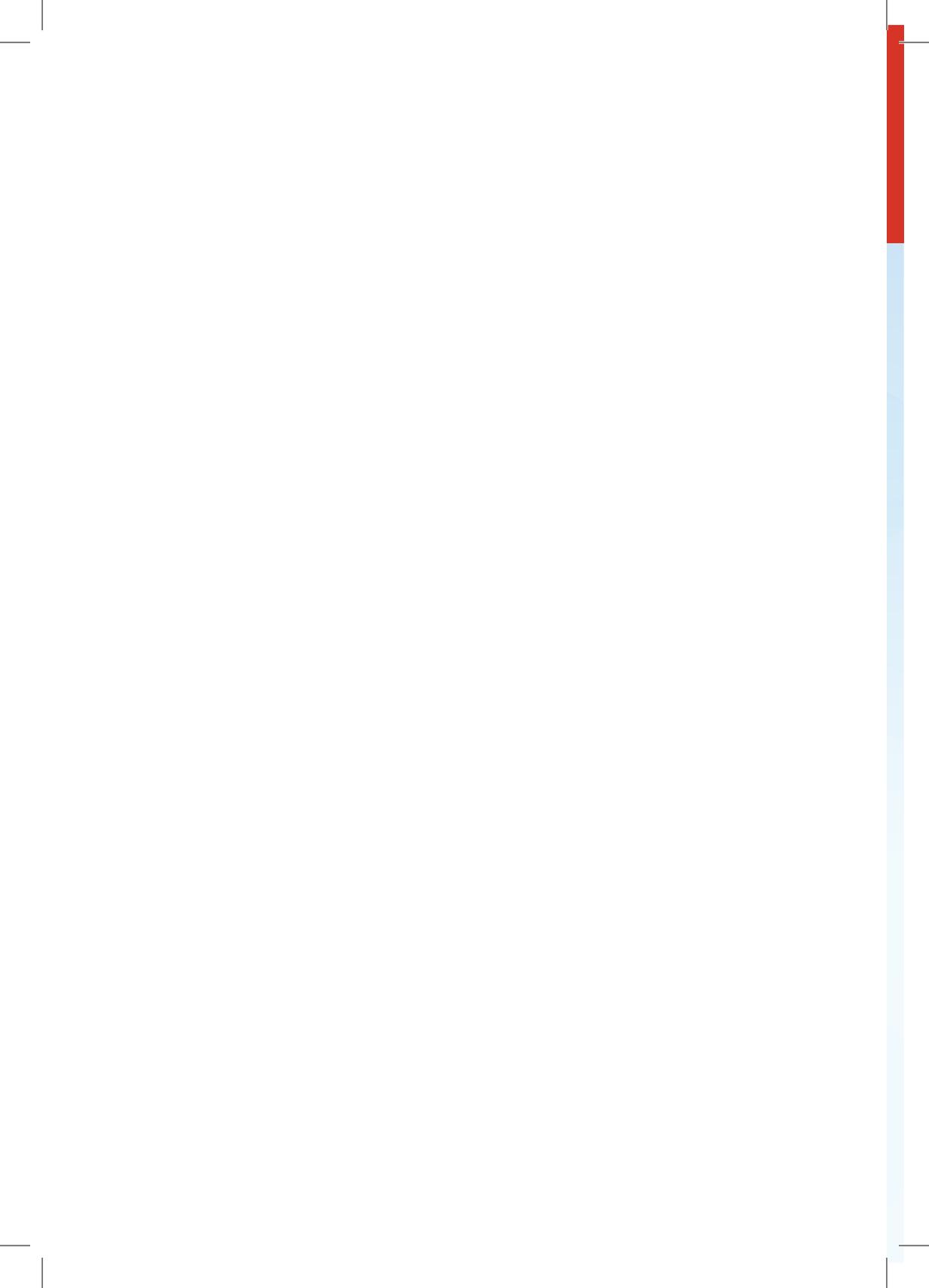


# HELPING BABIES SURVIVE LABOUR

*An educational programme to empower Ugandan midwives to save mothers' and babies' lives.*

## A LEARNER'S GUIDE





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# LABOUR AND BIRTH, SAVING MORE LIVES

## Introduction to this learner's guide

### *Why this guide?*

There are almost 1.2 million intrapartum stillbirths and 1 million neonatal deaths due to birth complications worldwide each year. Uganda, with an estimated 38.000 stillbirths and 46.000 neonatal deaths each year, is in the top 20 countries with the highest perinatal mortality . These are shocking numbers that need to be reduced. Most fresh stillbirths and many early neonatal deaths are caused by too little oxygen during labour. These babies have usually grown well and thrived during pregnancy, only to die or suffer serious brain damage during the few hours of labour. The aim of fetal monitoring during labour is to identify babies who develop complications in labour due to too little oxygen, so that labour and delivery can be actively managed in order to deliver a healthy baby.

### *Who is this for?*

This learning guide is for doctors, midwives and student doctors and student midwives working in Ugandan hospitals and clinics. This learning guide may be used as a self learning program or can be used as part of an in-service course. A facilitator's guide for this training guide is also available.

### *What does it teach?*

The goal of this training guide is to improve the outcomes for babies and mothers. The material will cover why a baby needs to be monitored during labour. It will tell how to monitor a baby, how to interpret your observations and recordings and most importantly, it will give guidelines on what to do when something is wrong.

This learning guide does not cover other pregnancy and birth related complications like pregnancy related illnesses, abnormal progress in labour, post partum hemorrhage and neonatal resuscitation.

### *How can it be used?*

This learning guide can be studied individually, or as part of a long-distance study module. But to make the course more effective, it is preferred to let a trained person facilitate the material. This can be done as a one day course or over 4 different sessions by using the different modules. The material may also be added to an existing course or used as a reference book during work.

# Module 1: Why monitor the baby?

## Objectives

After studying this module, you will be able to answer the following questions

- How do you assess fetal wellbeing during pregnancy?
- How do you assess fetal wellbeing during labour?
- What can cause stress to the baby during labour?
- How do contractions reduce the oxygen supply to the baby?
- How does the baby respond to contractions?

## Group Discussion in advance

Discuss your experiences with a small group of learners.

1. Do you know somebody who is disabled? Or who has a disabled child? How does that affect their daily life?

2. Do you know someone whose baby died during labour or in the late stages of pregnancy? How did this affect you?

Notes: \_\_\_\_\_

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You can make a difference. When you monitor a baby very well during labour, you can prevent birth-related disabilities and even intrapartum stillbirths!

## Fetal wellbeing during pregnancy

Fetal wellbeing is the general condition of the baby. If the fetal wellbeing is good during pregnancy the baby should grow and develop normally. With good fetal wellbeing the baby should be able to tolerate the normal stresses of labour and delivery. It is important to monitor the fetal condition both during pregnancy and labour to assess the fetal wellbeing. One can monitor the condition of a baby clinically during pregnancy assessing fetal growth, rate of growth of fundal height and fetal movements. Many midwives count the fetal heart rate during a routine pregnancy check up. The presence of a fetal heartbeat confirms that the baby is alive. Other fetal tests used to assess fetal wellbeing in the antenatal period are fetal kick charts, non-stress tests, contraction stress tests and biophysical profile.

## Fetal wellbeing during labour

One can tell that a mother is in labour when she has regular painful uterine contractions with one or more contractions every 10 minutes and cervical changes (effacement

**Fetal growth** is assessed by determining the increase in the size of the uterus. From 18 to 36 weeks of pregnancy, this is done by measuring and plotting the symphysis-fundus height.

**Fetal movements** are assessed by the mother, who should make a note of the number of times her baby moves.

and/or dilatation) or rupture of the membranes. During labour, the condition of the mother and the progress of labour should be monitored. It is also very important to monitor the condition of the baby. This can be done clinically through counting the fetal heart rate or by looking for meconium-stained amniotic fluid (liquor) once the membranes have ruptured.

There are four stages in labour.

1. From the onset of labour until the cervix is fully dilated.
2. From full dilatation of the cervix to the complete delivery of the infant.
3. From complete delivery of the infant to complete delivery of the placenta.
4. The 1 hour period after delivery of placenta



You cannot see the baby, so the fetal heart rate is used to monitor the condition of the baby during labour.

The first stage of labour can be divided into the latent and the active phase. The latent phase progresses to the active phase when the cervix is more than 4 cm dilated.

The baby should be monitored throughout the first three stages, and directly after birth, if the baby is alive and viable. If the baby is dead there is no reason for monitoring the fetal heart during labour.

Fetal heart monitoring means that the fetal heart rate should be regularly assessed from the onset of labour until complete delivery of the newborn, i.e. throughout the first and second stages of labour. Often the fetal heart rate is forgotten about during the second stage of labour. This is a serious error since the baby is at a high risk of developing hypoxia and acidosis, while the mother is actively pushing.

## ***Causes of fetal decompensation (fetal distress) for the baby during labour***

Fetal heart rate monitoring during labour can act as a screening tool to identify babies who are not responding well to the effect of decreased uteroplacental flow resulting in a decrease in oxygen, increase in carbon dioxide and decrease in pH (acidosis). When the changes in these values are significant, the baby begins to show changes in fetal

**Early decelerations are caused by head compression and are a normal response**

heart pattern (non-reassuring or abnormal fetal heart rate [FHR] patterns). One of the common non-reassuring FHR patterns occurs with compression of the fetal head during a contraction. During uterine contractions, especially during very strong contractions, the fetal head is squeezed. This may result in a slowing of the fetal heart rate (a deceleration) during the middle of a contraction, when the pressure in the uterus is highest. This slowing of the fetal heart rate during the middle of a contraction is called an early deceleration. These decelerations usually do not harm the baby. Good variability on a cardiotocograph (CTG) trace will be present if the baby is coping well during labour. An abnormal FHR pattern arises if there is a significant decrease

**Uterine contractions are the commonest cause of a decreased oxygen supply to the baby during labour.**

in the supply of oxygen to the baby. This is called fetal distress and the cause is too little oxygen which is more serious and can result in severe brain damage or death. The following conditions may reduce the oxygen supply to the baby.

**Persistent Uterine contractions (Tachysystole or hypertonus):** Uterine contractions are the commonest cause of a decrease in the oxygen supply to the baby during labour, because there is little maternal blood flowing through the placenta during a contraction. Tachysystole occurs if more than five contractions occur in a ten minute period. Hypertonus occurs if the contraction duration exceeds 120 seconds. In either case the baby may fail to adapt and a non-reassuring fetal heart rate pattern can be detected

**Chronically reduced blood flow through the placenta:** The placenta may fail to provide the baby with enough oxygen and nutrition due to a chronic decrease in the maternal blood flow through the placenta. Patients with pre-eclampsia have poorly formed arteries that provide inadequate amounts of maternal blood to the placenta. Reduced placental blood flow can also be caused by narrowing of the uterine blood vessels due to maternal smoking or chronic hypertension. Post maturity or prolonged pregnancy causes progressive placenta degeneration, also resulting in reduced blood flow.

**Abruptio placentae:** With a placental abruption, part or all of the placenta stops functioning because it is separated from the uterine wall by a retroplacental haemorrhage. In addition, the associated uterine spasm following a placental abruption severely reduces the maternal blood flow to those parts of the placenta which are still attached to the uterine wall. As a result, the baby does not receive enough oxygen.

**Cord prolapse or compression:** This stops the normal flow of blood from the placenta to the baby and back again. As a result, the transport of oxygen from the placenta to the baby is reduced.

## **How contractions reduce the supply of oxygen to the baby**

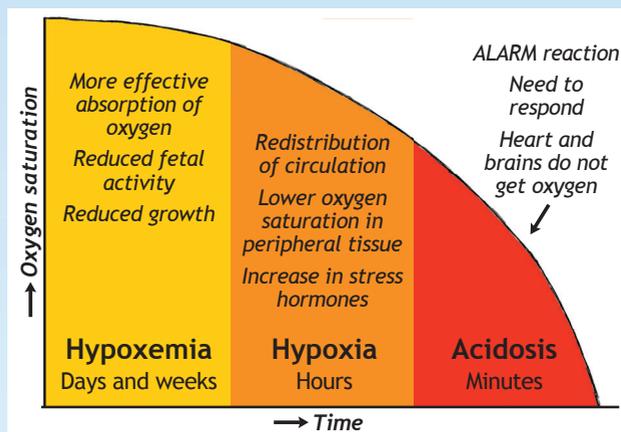
Contractions are the most common cause of a decreased oxygen supply to the baby during labour. This is because contractions can affect the oxygen supply to the baby in several different ways. Uterine contractions may reduce the blood flow from the mother through the placenta to the baby, due to the increase in intra-uterine pressure. A contraction of the uterus can also compress the maternal vessels that supply blood to and from the placenta. Lastly, a contraction can compress the umbilical cord through which the blood flows from the placenta to the baby. The maternal blood flow to the placenta depends on the maternal blood pressure, the resistance of the maternal blood vessels and the intra-uterine pressure. A fall in maternal blood pressure, increase in maternal vascular resistance or increase in intra-uterine pressure will reduce the flow of maternal blood to the placenta.

## **How a baby responds to contractions**

Normally oxygen-rich maternal blood flows to the placenta, through perfusion in the intervillous space oxygen and nutrients are transferred to the fetal blood. Fetal blood now carries this oxygen and nutrients from the placenta to the baby. After delivering nutrients and oxygen to the baby, the fetal blood flows back to the placenta, where the transfer of waste products and carbon dioxide back from the fetus to the maternal blood will take place. During normal contractions in labour there is no maternal blood flow to the placenta but usually enough oxygen is stored to supply the fetus. However, the supply of placental oxygen to the fetus may not be enough when:

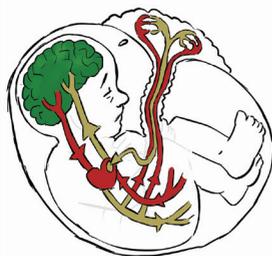
1. There is placental insufficiency due to reduced maternal blood flow to the placenta.
2. The contractions are prolonged.
3. The contractions are very frequent.
4. There is compression of the umbilical cord.

Through monitoring the baby during labour, a midwife or other front line worker can find out if a baby is getting too little oxygen during a contraction. A baby who has too little oxygen will usually slow its heart rate so that less oxygen is needed. This slowing of the heart rate will be accompanied by an increase in blood flow to the brain. In this way the baby can protect both its heart and brain.

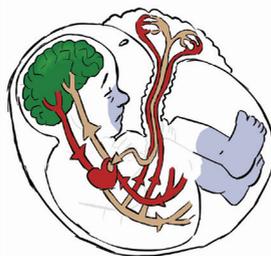


A reduction in the normal supply of oxygen to the baby causes hypoxemia, a shortage of oxygen in the arterial blood. This can lead to fetal hypoxia (a lack of oxygen in *the cells of the baby*). If the hypoxia is mild the baby will *be able to compensate and the fetal heart pattern does not change*. However, *moderate or severe fetal hypoxia* will result in the fetal heart rate pattern changing (*non reassuring fetal heart rate pattern*). *Severe, prolonged hypoxia may* eventually result in *fetal acidosis*, an increased acidity in the blood and other body tissue. Fetal acidosis can lead to fetal brain damage or even fetal death.

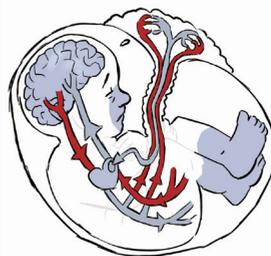
A baby can be in a mild state of hypoxemia for days or even weeks. This occurs for example when there are problems with the placenta. The baby will develop a more effective absorption of oxygen and be less active. When hypoxemia lasts for a long time, there will be reduced growth. It is important to correct this hypoxemia since the baby will be negatively affected. When the baby is in a state of hypoxia, action is required within hours or else the baby will have serious damage. There is redistribution of blood and the fetus will produce stress hormones. **However, when the fetus gets to a state of acidosis IMMEDIATE action is required since the brain and the heart get less, or even no oxygen at all. The fetus can only survive in this situation if the correct action is immediately undertaken.**



Hypoxemia -  
Low oxygen in  
arterial blood



Hypoxia -  
Low oxygen in peripheral  
tissue



Acidosis -  
Failure of  
central organs

## Module 2: How to monitor the fetal heart rate

### Objectives

After studying this module, you will be able to answer the following questions:

- What are the key assessments you need to do on the mother that can have an influence on the fetal heart rate?
- Which devices can you use to monitor the fetal heart rate?
- What are the advantages and disadvantages of each of these?
- How does the baby communicate fetal distress?
- How do you use the fetal heart rate monitor?
- How often do you need to observe the fetal heart rate during labour?
- Why does the baby respond with fetal distress?

### Group Discussion

Discuss your experiences with a small group of learners.

1. How do you identify problems for mother and baby during labour?
2. How does the baby 'communicate' that he or she is not doing well during labour?

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### Key assessments on mother

Before you even listen to the fetal heart rate, it is important to do some key assessments on the mother. Some important factors may be abnormal and influencing the baby's heart rate.

#### *Gestational age*

The baby's body shape and size changes dramatically during pregnancy. The fetal heart matures as the weeks of pregnancy go by and this will be reflected in the fetal heart rate. The younger the baby, the faster the heart rate. Premature babies may have heart rates that are higher than the norm at term (120-160 beats per minute (bpm) is the norm).

#### *Membranes rupture*

How long have the membranes been ruptured? The longer the membranes are ruptured before delivery of the fetus, the higher the risk of an infection for both mother and baby. An infection will increase the fetal heart rate. A combination of a low gestational age and prematurely ruptured membranes require extra caution. Make sure that for every case of prematurely ruptured membranes before the gestational age of 36 weeks antenatal steroid treatment is started. When

the membranes are ruptured and you find meconium stained liquor, extra caution is required. Meconium stained liquor can be a sign that the baby is hypoxic. When the amniotic fluids are in place, they work as a buffer between the uterus and the baby. When it is drained, the baby will experience more pressure from the contractions which may lead to changes in the fetal heart rate.

### *Maternal fever*

When the mother has fever, the fetal heart rate will be higher.

### **Devices one can use to monitor the fetal heart rate**

There are three different commonly used devices to monitor the fetal heart rate.

These are: the fetoscope (Pinard), the Doppler ultrasound fetal heart rate monitor (a 'doptone or doppler') and the cardiotocograph (CTG) machine. This last one may use either an abdominal Doppler ultrasound probe or an electronic fetal scalp clip. It also monitors the contractions using a pressure transducer. The fetoscope is widely used as a method for intermittent auscultation in low risk women in labour. One of the main reasons for this is that they are very cheap, easy to obtain and they don't require maintenance or consumables. However, the disadvantages make it unsatisfactory as it is difficult to reliably and accurately count the fetal heart rate, especially in obese women.



*A pinard*



*An example of a cardiotocograph*

In all primary-care situations and for many women delivering in a referral hospital, the Doppler is appropriate as it displays the heart rate and is comfortable and easy to use during and after

a contraction. However, the problem is that current Dopplers are often too expensive, or they rely on replaceable batteries or mains electricity which is not always available. A South African based not-for-profit organization, Powerfree Education Technology (PET-[www.pet.org.za](http://www.pet.org.za)), has developed a robust, hand powered fetal heart rate monitor. It can be produced at low cost and is fit-for-purpose in challenging environments. It does not depend on external electricity supply or even on batteries. When you need to use it, you just crank the handle on the back side for 30 seconds and you can listen to the baby's heartbeat. Another advantage of this method is that the mother can hear the baby's heart too which is very reassuring to the mother and gives her the extra bit of motivation that she needs to go through labour. Only when the baby is at high risk of distress during labour are there advantages of using a cardiotocograph. A cardiotocograph tracing (a cardiotocogram) also shows the variability of the fetal heart rate. This is the variation (speeding up and slowing down) in the fetal heart rate.



*PET's human-hand cranked fetal heart rate monitor*

	Pinard	Doppler Fetal Heart Rate Monitor	Cardiotocograph (CTG)
Advantages	<ul style="list-style-type: none"> <li>✓ Cheap</li> <li>✓ Simple</li> <li>✓ Easy to obtain</li> <li>✓ No maintenance</li> <li>✓ Intermittent auscultation is possible in low risk pregnancy in labour</li> </ul>	<ul style="list-style-type: none"> <li>✓ Easy to find and accurately display of the fetal heart rate</li> <li>✓ Comfortable for the mother</li> <li>✓ PET hand cranked Doppler can be used without depending on power from batteries or mains.</li> <li>✓ Intermittent auscultation is possible in low risk pregnancy in labour</li> </ul>	<ul style="list-style-type: none"> <li>✓ Presents more information</li> <li>✓ Provides a paper record</li> <li>✓ Continuous fetal monitoring</li> <li>✓ Easy to identify different types of fetal heart rate deceleration</li> </ul>
Disadvantages	<ul style="list-style-type: none"> <li>✗ Often difficult to find and hear the fetal heart</li> <li>✗ Often difficult to count the fetal heart rate</li> <li>✗ Uncomfortable for the mother, especially during a contraction</li> <li>✗ Not ideal for high risk pregnancy that require continuous FHR monitoring</li> </ul>	<ul style="list-style-type: none"> <li>✗ Expensive</li> <li>✗ Requires disposable batteries or mains electricity source (exception is the PET hand cranked Doppler)</li> <li>✗ Often difficult to obtain and service</li> <li>✗ Not ideal for high risk pregnancy that require continuous FHR monitoring</li> </ul>	<ul style="list-style-type: none"> <li>✗ Expensive to buy and maintain. Recording paper is expensive</li> <li>✗ Difficult to use and often not used correctly</li> <li>✗ Difficult to interpret the tracing correctly. Needs trained and experienced staff</li> <li>✗ Uncomfortable for the mother as she has to remain in bed</li> <li>✗ Requires reliable mains electricity source</li> <li>✗ Scalp clip invasive and contraindicated in HIV-positive women</li> </ul>

## Monitoring the fetal heart rate

Uterine contractions may decrease the maternal blood flow to the placenta, and thereby cause a reduced supply of oxygen to the baby, which can cause changes in the fetal heart rate. Therefore it is essential that the fetal heart rate is monitored during every labour. In practice, this means that the fetal heart pattern must be checked before uterine contractions to determine the baseline fetal heart rate, then again during and after the contraction. Documenting a fetal heart rate, without knowing if that rate was taken during or after contractions, is of very limited value.

The fetal heart rate assessed before, during and after a contraction is called the fetal heart rate pattern. This provides important information on the fetal condition.

The fetal heart rate of a baby from a low-risk patient who has had a normal pregnancy with normal observations on admission should be monitored hourly during the latent phase of labour and half-hourly during the active phase of labour. The baby should also be monitored after every effort of pushing in the second stage of labour. If there is a high risk of fetal distress, the fetal heart rate should be also be monitored hourly during the latent phase of labour and half-hourly during the active phase of labour. If fetal distress is suspected the fetal heart rate should be monitored at least every 15 minutes and directly after every effort of maternal pushing during the second stage of labour.

A midwife or frontline worker can use the changes in fetal heart rate pattern or the presence of meconium in the amniotic fluid to indicate whether the baby is likely to have fetal hypoxia (distress).

**When assessing the condition of the baby during labour, it is much better to observe the fetal heart rate pattern than to examine the liquor for meconium. The heart rate will always show an abnormal fetal heart rate pattern when a baby is distressed while there is not always meconium stained liquor present.**

**Meconium-stained amniotic fluid warns that there is a high risk of fetal distress.**

their fetal heart rates must be closely monitored. There is also a danger of meconium aspiration by the infant at delivery. When you find meconium in the liquor, ensure that there is a second person ready at birth to help with suction and resuscitation. The presence of meconium-stained amniotic fluid is important as it may indicate fetal hypoxia. The management of meconium-stained amniotic fluid does not depend on the consistency of the meconium.

As previously stated, it is more important to monitor the fetal heart rate patterns.

**The following patients would be regarded as high risk:**

#### **Mother**

- Women with medical problems during pregnancy, especially pre-eclampsia, chronic hypertension, antepartum bleeding and diabetes
- Women with clinical signs indicating chorioamnionitis (fever, abdominal tenderness and offensive vaginal discharge)
- Poor progress in labour
- Meconium stained liquor

#### **Baby**

- Multiple pregnancy
- Preterm labour
- Slow fetal growth or oligohydramnios (little amniotic fluid)

If possible, these high-risk patients should have continuous electronic fetal heart rate monitoring during labour with a cardiotocograph. If this is not possible, the fetal heart rate should be observed more frequently with a doptone. For a high risk birth, you should always organize to have a second person present at birth in case immediate resuscitation is required.

**The fetal heart rate must be assessed before, during, and after a contraction.**

## Method of monitoring the fetal heart rate

In order to do fetal heart rate monitoring correctly, it is very important to train yourself in feeling the position of the baby through the mother's abdomen. The fetal heart rate is usually heard the loudest at the side where the baby's back is. Some midwives find it helpful to mark with a pen a little cross on the mother's abdomen where they could hear the baby's heart best. However, the baby does move during labour which means that you often have to reassess the position of the baby.

The steps in monitoring the fetal heart are:

1) Ensure that the PET hand crank Doppler has enough energy. When you don't have access to batteries or mains power, crank the handle for a minute.

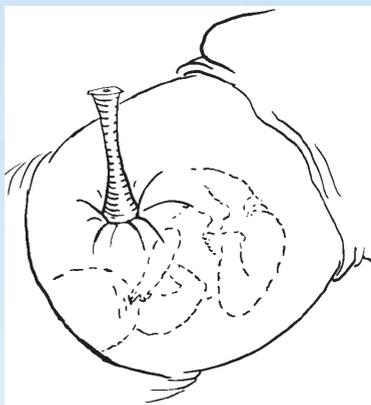
2) Find the fetal presentation and position by feeling for the baby through the mother's belly.

3) Place the Doppler over the area where you expect to hear the baby's heart best, usually where the baby's back is.

4) Place your finger on the mother's pulse to differentiate the mother's heartbeat from the baby's.

5) To determine the baseline, listen for a full minute between contractions. The baseline rate is written down as a number, not a range.

When you are monitoring a twin pregnancy, it is important to assure that you are not listening twice to the same baby. If possible, monitor with two midwives and two devices at the same time. Both midwives can tap the fetal heart rate they hear to assure that they are listening to the different babies.



## Abnormal fetal heart patterns

Abnormal fetal heart patterns occur when there is a decrease in oxygen, increase in PCO<sub>2</sub> and possibly fetal acidosis. A lack of oxygen, results in a slowing of the fetal heart rate. Unlike early decelerations, when the fetal heart rate slows during head compression, hypoxia causes the fetal heart rate to slow towards the end of the most intense part of a contraction. The slow fetal heart rate only speeds up again after the contraction has ended. This is known as a late deceleration. Therefore, late decelerations are abnormal and commonly related to fetal hypoxia. They suggest fetal distress.

During a late deceleration, the fetal heart rate is slowest at the end of, and immediately after, the contraction, because this is when there is the least amount of oxygen in the placenta. The baby responds to hypoxia with bradycardia to conserve oxygen and protect the myocardium. In addition, blood is shunted away from less important organs, such as the gut and kidney, to essential organs, such as the brain and the heart. This shunting may cause ischaemic damage to the gut and kidneys. The increased cerebral blood flow may result in intraventricular haemorrhage in the brain of preterm infants. Severe hypoxia will eventually cause a decreased cardiac output and hypotension leading to myocardial and cerebral ischaemia (not enough blood and oxygen supply to the heart and brain).

Late decelerations occur towards the end of a contraction and are caused by hypoxia.

## Module 3: What is an abnormal fetal heart rate?

### Objectives

After studying this module, you will be able to answer the following questions

- Which features of the fetal heart rate should always be observed?
- What is baseline tachycardia and what causes it?
- What is baseline bradycardia and what causes it?
- Describe the different kinds of deceleration and their causes.
- Describe when the fetal condition is reassuring, non reassuring and abnormal.
- Why is monitoring during the second stage of labour important?

### Group Discussion

Discuss your experiences with a small group of learners.

1. How do you know that a fetal heart rate is not normal?
2. What do you do when you discover a deceleration?
3. Discuss how you look after the baby when the mother is pushing at the place where you work.

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### Features of the fetal heart rate which should always be assessed

There are two features of the fetal heart rate that should always be assessed:

*The baseline fetal heart rate:* This is the heart rate before the start of a contraction when the uterus is relaxed.

*The presence or absence of decelerations:* If present, the relation of the deceleration to the contraction must be determined. It is very important to compare the timing of the contraction to the timing of the deceleration.

### Understanding the fetal heart rate

#### Baseline

The baseline of the fetal heart rate is the fetal heart rate just before the start of a contraction. A normal baseline fetal heart rate is between 120 and 160 bpm.

A *baseline tachycardia* is a baseline fetal heart rate (between contractions) of more

than 160 beats per minute. This can be caused by maternal pyrexia, maternal exhaustion, chorioamnionitis (infection of the placenta and membranes), fetal haemorrhage, anaemia or mild hypoxia.

A baseline bradycardia is a baseline fetal heart rate (between contractions) of less than 100 bpm.

A baseline bradycardia usually indicates severe fetal hypoxia and acidosis. If decelerations are also present, a baseline bradycardia indicates that the baby is at great risk of dying.

## Decelerations

A deceleration is a temporary slowing down of the fetal heart rate.

There are different kinds of decelerations. Their classification and their level of danger depend on when they occur in relation to the contractions.

An **early deceleration** is a deceleration that occurs only during a contraction.

A **late deceleration** is a deceleration that occurs during and after every contraction.

A **variable deceleration** is a deceleration that has no fixed relation to contractions.

Early decelerations are characterised by a slowing of the fetal heart rate starting at the beginning of the contraction, and returning to normal by the end of the contraction. Early decelerations are usually due to compression of the fetal head during contractions. This causes the heart rate to slow during the contraction only.

Early decelerations do not indicate the presence of fetal distress. However, they may indicate cephalopelvic disproportion (CPD). Therefore, these babies must be carefully monitored as they are at an increased risk of fetal distress. When early decelerations occur, normal variability is reassuring that the baby is not hypoxic.

A late deceleration is a slowing of the fetal heart rate during a contraction, with the rate only returning to the baseline 30 seconds or more after the contraction has ended. A late deceleration is present with several consecutive contractions, if it is just a single event it is most likely a variable deceleration. Late decelerations are a sign of fetal distress and are caused by fetal hypoxia. The degree to which the heart rate slows is not important. The timing of the deceleration is what must be carefully observed.

Variable decelerations have no fixed time relationship to uterine contractions. Therefore, the pattern of decelerations changes from one contraction to another. They often do not occur after every contraction. Variable decelerations are usually caused by compression of the umbilical cord and do not indicate the presence of fetal distress. However, these babies must be carefully monitored as they are at an increased risk of fetal distress.

Variable decelerations are not easy to identify when a fetal stethoscope or fetal heart rate monitor is used. Variable decelerations can be easily recognised on a CTG trace. When accompanied by loss of variability they may indicate fetal distress.

## Acceleration

An acceleration is an increase in the heart rate. Accelerations are almost always normal and do not indicate fetal distress. During pregnancy they usually occur with fetal movements.

## Variability

A healthy baby should respond to an external stimulus like fever or medication. This can be observed in the fetal heart rate pattern. The better the baby does this, the better his reactivity is. The presence of at least two accelerations, which are each peaking at 15 or more bpm above the baseline and each lasting 15 seconds or more is the proof of a reactive baby. This can be observed best when the mother is not in labour.

The variability of the fetal heart rate indicates the difference between the highest and the lowest bpm in the baseline fetal heart rate over a one minute period without decelerations or accelerations. It is difficult to determine this without a CTG trace. The variability tells a lot about the wellbeing of the baby. The ideal variability is between 5 and 25 bpm. A variability of less than 5bpm can indicate that the baby is sleeping but it should restore to higher values within 40 minutes.

## Fetal heart rate patterns

There are five different fetal heart rate patterns that can be easily recognised with a fetal heart rate monitor.

- Normal
- Baseline tachycardia
- Baseline bradycardia
- Early deceleration
- Late deceleration

Usually these fetal heart rate patterns can be easily recognised with a fetal heart rate monitor. However, variable decelerations are more difficult to recognise. It is common to get a combination of patterns, e.g. a baseline bradycardia with late decelerations. It is also common to get one pattern changing to another pattern with time, e.g. early decelerations becoming late decelerations.

The fetal condition is good if a normal fetal heart rate pattern is present (reassuring).

The fetal condition is suspicious if the fetal heart rate pattern indicates that there is an increased risk of fetal hypoxia (non-reassuring).

The fetal condition is poor (abnormal) if the fetal heart rate pattern is abnormal as this indicates fetal distress.

A baseline tachycardia and early decelerations indicate that the baby has an increased risk of distress during labour. These fetal heart rate patterns do not indicate fetal distress but warn that the patient must be closely observed as there is an increased risk that fetal distress may develop.

Late decelerations and a baseline bradycardia indicate fetal hypoxia (distress) during labour.

**The fetal heart rate must be assessed before, during and after a contraction. The following questions must be answered and recorded on the partograph:**

- What is the baseline fetal heart rate?
- Are there any decelerations?
- If decelerations are observed, what is their relation to the uterine contractions?
- If the fetal heart rate pattern is abnormal, how must the patient be managed?

Monitoring the fetal heart rate remains important during the second stage of labour. Even then abnormal fetal heart rate patterns that require special attention may occur. Decelerations occurring while the mother is pushing are common and do not necessarily indicate fetal hypoxia (distress). However, the baseline rate should be normal. A baseline bradycardia before the mother pushes suggests fetal distress and is an indication for urgent delivery. The fetal heart rate should be normal before each bout of pushing.

	<i>Baseline</i>	<i>Decelerations</i>	<i>Reactivity</i>	<i>Action</i>
<b>Reassuring fetal heart rate pattern</b>	✓ 120-160 bpm	✓ No decelerations	✓ 5-25 bpm variability (CTG) ✓ Accelerations	Continue to monitor according to guidelines
<b>Non reassuring fetal heart rate patterns</b>	✓ 100-120 bpm ✓ 160-170 bpm ✓ Mild baseline tachycardia or bradycardia	✓ Early decelerations ✓ Variable decelerations	✓ Uncomplicated variable decel. Less than 60 seconds and a loss of more than 60 bpm ✓ 5-25 bpm variability	If any other features (Meconium stained liquor, prolonged labour, etc) prepare to deliver, otherwise monitor closely.
<b>Abnormal fetal heart rate pattern</b>	✓ A persistent severe baseline bradycardia (less than 100 bpm) ✓ Above 170 bpm	✓ Late decelerations	✓ Less than 5 bpm variability	<b>ACT NOW!</b> <i>Deliver as soon as possible</i>
A combination of more uncertain fetal heart rate patterns result in an abnormal fetal heart rate pattern.				

## Module 4: What do I do if the fetal heart rate is abnormal?

### Objectives

After studying this module, you will be able to answer the following questions:

- What is a partograph?
- Why do you use a partograph?
- How do you record fetal observations on a partograph?
- How do you respond to fetal bradycardia?
- How do you respond to fetal decelerations?
- How do you respond to fetal tachycardia?
- How do you perform fetal resuscitation?

## Group Discussion

Discuss your experiences with a small group of learners.

1. Discuss the way you use the partograph at the place where you work.
2. How can a partograph help you to look after the baby during labour?

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## The partograph

A partograph is a simple tool which has proven to reduce prolonged labour, the need for augmentation, emergency caesarean sections and intrapartum stillbirth rates. It is a graphic representation of the course of dilatation of the cervix and descent of the baby which helps the healthcare worker to assess the progress of labour. It also has space to mark most other observations concerning the maternal and fetal condition during labour. The correct use of a partograph is one of the most important steps in the safe management of labour. The partograph helps to identify problems and plan further management. It should be used in all labour wards and centers for maternity care.

A health professional should start a partograph for all women in active labour, provided that they do not have a complication that requires immediate action. However, a partograph should only be started in the active phase when there is 4 or more centimeter dilatation of the cervix. Starting it earlier is of no use and will create false alarms.

The first recorded dilatation is marked with a 4 at the start line and the observations after that are marked at the corresponding time line. When the partograph is started at 4 centimeters cervical dilatation, the starting point will be the bottom of the 'alert line'. A mother in labour should be referred from a health centre to a hospital when the plotted line, which illustrates the cervical dilatation, moves to the right of the alert line. If this mother's membranes are still intact, amniotomy may be performed and the mother may be observed for a short period before considering a transfer.

**MINISTRY OF HEALTH**  
**LABOUR PROGRESS CHART (PARTOGRAM)**



Hospital or Health Centre: \_\_\_\_\_ IP no: \_\_\_\_\_  
 Name: \_\_\_\_\_ Date of admission: \_\_\_\_\_ Time of admission: \_\_\_\_\_  
 Age: \_\_\_\_\_ Gravida: \_\_\_\_\_ Para: \_\_\_\_\_  
 LMP: \_\_\_\_\_ EDD: \_\_\_\_\_ Weeks of Gestation: \_\_\_\_\_  
 Risk Factors: \_\_\_\_\_ Members ruptured at: \_\_\_\_\_  
 PMTCT code: \_\_\_\_\_

FETAL HEART RATE		180		170		160		150		140		130		120		110		100
MEMBRANES LIQUOR MOULDING																		
CERVICAL DILATATION IN CM		10		9		8		7		6		5		4		3		2
DESCENT OF HEAD		10		9		8		7		6		5		4		3		2
HOURS TIME		1		2		3		4		5		6		7		8		9
CONTRACTIONS PER 10 MINUTES FREQUENCY DURATION		5		4		3		2		1		1		1		1		1
PULSE BP		5		4		3		2		1		1		1		1		1
TEMPERATURE URINE DRUGS GIVEN OR IV FLUIDS		5		4		3		2		1		1		1		1		1

URINE TEST: ALBUMIN SUGAR ACETONE  
 CONTRACTION KEY:   LESS THAN 20 SECONDS      BETWEEN 20-40 SECONDS      MORE THAN 40 SECONDS

If the plotted line crosses the 'action line', labour is taking too long and active intervention is needed to prevent negative outcomes for both mother and child. As long as there is no evidence of fetal hypoxia (distress) or obstructed labour, the active intervention includes rehydration, the start of an intravenous line, bladder catheterization or encouraging the mother to empty her bladder, providing analgesia and augmentation of contractions with oxytocin.

The observations of the baby must be recorded on the partograph.

The fetal heart rate, presence or absence of decelerations, and type of decelerations must be recorded. It must also be recorded whether the amniotic fluid is clear or meconium stained once the membranes have ruptured. The condition of the mother, progress of labour and any management decisions must also be recorded in the appropriate places on the partograph.

## Responding to a change in fetal heart pattern

The fetal heart rate measurement done during the contraction is marked with an X, the measurement that is taken right after the contraction is marked with an O. This way, it is very easy to observe whether there was a deceleration. In case of a deceleration it is important to mark if it was an early, a late or a variable deceleration.

### Fetal bradycardia

Recording your findings on a partograph will help you to recognise a baby in distress. When you observe fetal bradycardia, fetal distress due to severe hypoxia is present. Therefore, you should immediately do the following:

- ✓ Turn the mother onto her side to correct any supine hypotension (a low blood pressure which some pregnant women can develop in late pregnancy when they lie flat on their back).
- ✓ If the woman is receiving an oxytocin infusion, this must be stopped immediately to prevent any uterine overstimulation.
- ✓ Do a vaginal examination to investigate if the baby's head is already deeply engaged and ready to be delivered and to make sure there is no cord prolapsed.
- ✓ Correct maternal hypovolemia.
- ✓ If the fetal heart rate returns to normal, allow labour to proceed, but monitor the fetal heart rate very carefully and frequently.
- ✓ If the fetal bradycardia persists, the baby must be delivered as soon as possible. Attempt fetal resuscitation.

If the abnormal fetal heart rate pattern returns to normal after fetal resuscitation, it is still important to deliver the baby without delay. This may involve moving the mother to a hospital where a safe caesarean section can be performed. It is very important to continue with fetal resuscitation and monitoring of the fetal heart rate during transport.

## Fetal decelerations

The first thing you need to do when you observe fetal deceleration is observe the relation of the decelerations to the uterine contractions to determine the type of deceleration (early, late or variable). Then manage the patient as follows:

If the decelerations are early, the fetal heart rate pattern warns that there is an increased risk of fetal distress and, therefore, the fetal heart rate must be checked every 15 minutes. The condition of the mother and the progress of labour must also be regularly assessed.

If late decelerations are present, the management will be the same as that for fetal bradycardia:

If the mother is lying on her back, the weight of the uterus could be blocking the blood from coming to the placenta, turn the mother on her side. Exclude overstimulation of the uterus with oxytocin.

Resuscitate the baby and then deliver the baby as soon as possible.

## Fetal Tachycardia

Fetal tachycardia is observed when the baseline of fetal heart rate is higher than 160bpm. You must undertake the following steps:

- Reposition mother
- Assess the mother's heart rate and temperature. If her heart rate is not faster and she does not have a higher temperature, the fetal tachycardia should be considered to be a sign of fetal distress.
- Investigate what kind of medication the mother has taken and if this could influence the fetal heart rate
- Assess the risk of fetal infection (duration of membrane rupture, group B streptococcus status if possible) and meconium stained liquor.
- If it is impossible to confirm the fetal wellbeing, deliver the baby as soon as possible.

## Fetal resuscitation

It is important that you know how to give fetal resuscitation as it buys you time to prepare for an emergency assisted delivery or caesarean section.

- Place mother in a lateral position
- Give a fluid load
- Stop oxytocin if in use
- Perform vaginal examination to rule out cord prolapse and assess progress of labour

Once the fetus shows an abnormal fetal heart rate pattern, emergency response is needed. Baby could be dead in 30 minutes!

- Call for help
- May consider oxygen by mask but there is little evidence that this is helpful (*Consider that preparing for oxygen therapy takes time while it may not be the immediate life saver*)
- Deliver the baby by the quickest possible route. If the woman's cervix is 9 cm or more dilated and the head is on the pelvic floor, proceed with an assisted delivery (forceps or vacuum). Otherwise, perform a caesarean section.
- If the baby cannot be delivered immediately (for example when there is another patient in theatre) the dose of salbutamol or adelat can be given if contractions start again, but not if the maternal pulse is 120 or more beats per minute.

## Prepare for birth

Make sure that you are prepared when the baby is about to be born.

To prepare for a normal birth you need:

- ✓ Gloves
- ✓ A suction device
- ✓ Head covering for the baby
- ✓ Scissors
- ✓ Timer
- ✓ A working ventilation bag and mask (check before you need it that they are working)
- ✓ Stethoscope
- ✓ Ties to tie the cord

When you prepare for a high risk birth, you need in addition to this list:

- ✓ A second person to assist you with resuscitation
- ✓ A prepared resuscitation station, ready for use

For further information about managing the resuscitation process, we refer you to the 'Helping Babies Breathe' training material which includes the 'Essential Newborn Care Course' at The Ministry of Health Department of Community Health/Child Health Division, Ministry of Health; Plot 6 Lourdel Rd, Nakasero.

## Test

### Test yourself 'Module 1'

- 1. A mother is in labour when:**
  - a. *She tells you she is*
  - b. *When she feels pain every ten minutes and when the membranes have ruptured*
  - c. *When she has regular uterine contractions and cervical changes*
- 2. During labour, a fetus may show signs of stress, this is caused by:**
  - a. *The contractions*
  - b. *Contractions and a decrease in oxygen supply*
  - c. *Compression of the fetal head*
- 3. What is the commonest cause of reduced oxygen supply to the baby during labour?**
  - a. *Contractions of the uterus*
  - b. *Partial placental separation*
  - c. *Infection of the membranes*
- 4. How does the baby usually respond to a lack of oxygen during labour?**
  - a. *The baby moves more*
  - b. *There is a decrease in the fetal heart rate*
  - c. *There is an increase in the fetal heart rate*
- 5. What is fetal hypoxia?**
  - a. *When the baby does not get oxygen anymore*
  - b. *When there is a lack of oxygen in the cells of the baby*
  - c. *When the baby gets brain damage due to lack of oxygen*

### Test yourself 'Module 2'

- 1. Which device is easy to use, accurate and comfortable for the mother?**
  - a. *The Pinard or fetoscope*
  - b. *The Doppler fetal heart rate monitor*
  - c. *The cardiotocograph*
- 2. Meconium stained amniotic fluids means that**
  - a. *The baby is mature enough to be born*
  - b. *There is a high risk of fetal distress*
  - c. *The baby is distressed and needs to get out as soon as possible*
- 3. You need to check the fetal heart rate during a routine labour**
  - a. *All the time*

- b. *Before and after a contraction*
- c. *Before, during and after a contraction*
- 4. What are late decelerations?**
- a. *Decelerations that occur after 38 weeks of pregnancy*
- b. *Decelerations that start 30 seconds or more after the beginning of the contraction*
- c. *Decelerations that return to the baseline 30 seconds or more after the end of the contraction*
- 5. Late decelerations:**
- a. *Always indicate fetal distress*
- b. *Only suggest that fetal distress may be present*
- c. *Cannot be diagnosed with a fetoscope*

### **Test yourself 'Module 3'**

- 1. What is a reassuring baseline fetal heart rate?**
- a. *110-170 bpm*
- b. *100-170 bpm*
- c. *120-160 bpm*
- 2. When can you be confident that the fetal condition is good?**
- a. *When the baseline fetal heart rate is normal and there are no decelerations*
- b. *When the baseline fetal heart rate is normal and there are only early decelerations*
- c. *When fetal tachycardia is present and there are no decelerations*
- 3. Accelerations:**
- a. *Are almost always normal*
- b. *Show that the baby is scared or stressed*
- c. *Are a sign of fetal hypoxia (distress)*
- 4. Which question does not need to be answered about the fetal heart rate**
- a. *If decelerations are observed, what is their relation to the uterine contractions?*
- b. *If accelerations are observed, what is their relation to the uterine contractions?*
- c. *What is the baseline fetal heart rate?*
- 5. During the second stage of labour:**
- a. *You should listen to the fetal heart rate immediately after a contraction every 5 minutes to determine whether the heart rate remains the same as the baseline*
- b. *You should listen to the fetal heart rate immediately after each contraction to determine whether the heart rate remains the same as the baseline*
- c. *You should listen to the fetal heart rate between contractions only*

## The PET hand crank Fetal Heart Rate Monitor

The basic design specifications for the hand crank fetal heart rate monitor are:

- *Safe and effective.* The fetal heart rate monitor meets European regulatory standards already with the CE mark.
- Capable of functioning *independently of mains electricity and replaceable batteries*, and capable of being powered by a range of options including human-powered hand crank, solar panel, car battery and generic mains adaptors. The device is capable of accepting the widely fluctuating AC parameters often experienced in Africa.
- *Robust*, “ruggedized” and low on maintenance
- Capable of operating without the need for proprietary replacement *consumables*.
- *Simple* in operation.
- *Affordable.* The target price for devices in developing world markets is \$200 or less per device, without compromising on quality.
- Provided with specially written *self-help distance learning materials* for use by health staff.
- Have a minimum lifespan of 3-5 years with intensive daily use.
- Environmentally non-toxic and capable of safe and easy disposal.

### Answers ‘test yourself’

#### Module 1

1. C
2. B
3. A
4. B
5. B

#### Module 2

1. B
2. B
3. C
4. C
5. A

#### Module 3

1. C
2. A
3. A
4. B
5. A



# Care during labour

## Every labour, you need:



Partogram



Monitoring device



Access to assisted delivery

Monitor the fetal heart rate every 30 minutes and record your findings on the partogram



Reassuring fetal heart rate



Continue monitoring mother and baby



Proceed to normal vaginal delivery

## Prepare for low risk birth:



Gloves



Timer (Watch or clock)



Scissors



Cord ties



Suction device



Ventilation bag and mask



Head covering



Cloths



## Increased monitoring

FHR 160-170 beats per minute

FHR 100 to 120 beats per minute

Early deceleration

Meconium stain liquor

Pre or post term baby  
or prolonged pregnancy



Two or more danger signs



## Immediate assisted delivery

FHR less than 100 beats per minute

FHR greater than 170 beats per minute

Late deceleration

Slow progress or failure to progress  
(Crossing the Action line)

## Prepare for high risk birth:

Same as low risk birth, plus:



Second person to assist with resuscitation

- Prepare resuscitation station



Follow 'Helping Babies Breathe' action plan