

[Newborn Care Manual: Contents](#)

**20-1 HOW CAN INFANTS BE CLASSIFIED ON THE BASIS OF RISK?**

All infants can be classified into 1 of 3 groups:

1. Well infants.
2. High risk infants.
3. Sick infants.

To decide which group an infant falls into, the history must be reviewed and the infant examined.

**20-2 WHAT IS A WELL INFANT?**

A well (or low risk) infant has all of the following features:

1. Born at term
2. Weight appropriate for gestational age and not wasted.
3. The history of the pregnancy, labour, delivery and the post delivery period are normal.
4. The vital signs are normal and the infant appears normal on examination.

Infants that do not have all of the above features are either high risk infants or sick infants. Well infants only require routine care. This can be provided in a clinic or at home.

**20-3 WHAT IS A HIGH RISK INFANT?**

A HIGH RISK infant is an infant that APPEARS WELL but has a much greater chance than most infants of developing a clinical problem, such as hypothermia, hypoglycaemia, apnoea, infection, etc. in the newborn period.

High risk infants appear clinically well on examination.

**HIGH RISK INFANTS APPEAR WELL BUT HAVE AN INCREASED RISK OF COMPLICATIONS****20-4 WHICH INFANTS SHOULD BE REGARDED AS HIGH RISK?**

An infant that appears well but has any of the following features should be regarded as high risk and, therefore, likely to develop a problem during the newborn period:

1. Infants that are born preterm or post term.
2. All low birth weight infants.
3. Infants who are underweight or overweight for gestational age.
4. Wasted infants.
5. Infants who have a low 1 minute Apgar score or need resuscitation after birth.
6. Infants who are born to mothers with a complicated pregnancy, labour or delivery.
7. Infants who have had one or more clinical problems since delivery.
8. Infants who were sick but have now recovered.

A high risk infant often falls into more than one of the above categories.

**20-5 WHAT SHOULD YOU DO FOR A HIGH RISK INFANT?**

1. It is essential to IDENTIFY THE CLINICAL PROBLEM that the infant is at risk of developing, so that the problem can be anticipated.
2. Every effort should then be made to PREVENT THIS PROBLEM OCCURRING.
3. If this is not possible then the infant must be carefully MONITORED so that the problem can be identified as soon as it develops. This allows for early treatment.
4. Once the problem occurs, it must be TREATED as early as possible.

You should aim at ANTICIPATING and PREVENTING problems in high risk infants, so as to avoid having to treat them. High risk infants usually do not need immediate treatment.

**IT IS IMPORTANT TO ANTICIPATE PROBLEMS IN HIGH RISK INFANTS SO THAT STEPS CAN BE TAKEN TO PREVENT THESE PROBLEMS OCCURRING**

This stepwise process of identifying a possible problem, taking steps to prevent it, monitoring the infant for early signs of the problem, and finally having to treat the problem only if the earlier steps fail, forms the basis of good patient care.

### **20-6 WHAT IS A SICK INFANT?**

A sick infant does not appear well and has ABNORMAL CLINICAL SIGNS. The infant may previously have been well or may previously have been identified as a high risk infant.

Therefore, if a high risk infant develops one or more abnormal clinical signs, or the infant appears sick, then it is reclassified as a SICK infant.

The most important clinical signs that indicate that an infant is sick are:

1. HEART RATE. The infant may have a:
  - (i) Tachycardia (a heart rate more than 160 beats per minute).
  - (ii) Bradycardia (a heart rate less than 120 beats per minute).
2. RESPIRATION RATE and PATTERN. Abnormal signs are:
  - (i) Slow, shallow, irregular respiration.
  - (ii) Rapid respiration (tachypnoea ) more than 60 breaths per minute.
  - (iii) Grunting, recession or gasping.
  - (iv) Apnoea.
3. COLOUR. The infant may be:
  - (i) Pale.
  - (ii) Plethoric (very red).
  - (iii) Cyanosed. Centrally or peripherally.
  - (iv) Severely jaundiced.
4. TEMPERATURE. The infant may be hypothermic (cold) or pyrexial (hot).
5. ACTIVITY. The infant may be:
  - (i) Lethargic and respond poorly to stimulation.
  - (ii) Hypotonic and less active than before.
  - (iii) Feeding poorly.
  - (iv) Jittery with abnormal movements or fits.

You should recognise these most important or VITAL SIGNS that are usually monitored routinely in a sick or high risk infant. The sick infant may also be recognised by other, less common but abnormal signs on clinical examination, e.g. bleeding, oedema, abdominal distension, loose stools, etc.

**THE RECOGNITION OF A SICK INFANT IS ONE OF THE MOST IMPORTANT CLINICAL SKILLS THAT NURSES AND DOCTORS MUST LEARN**

Infants that have a congenital abnormality but are otherwise well are often grouped together with sick infants when management is planned.

**20-7 WHAT ARE THE CAUSES OF A SICK INFANT?**

Of the many causes of a sick infant, the most important are:

1. Infection.
2. Hypoxia.
3. Hypothermia
4. Hypoglycaemia.
5. Acute blood loss.
6. Anaemia.
7. Trauma.
8. Marked hyperbilirubinaemia.
9. Intraventricular haemorrhage.

**20-8 WHAT SHOULD YOU DO FOR A SICK INFANT?**

1. Resuscitate the infant if needed.
2. Immediately treat the abnormal signs, e.g. give oxygen for cyanosis.
3. Attempt to make a diagnosis of the cause of the clinical signs.
4. Treat the cause if possible.
5. Give the infant general supportive care.
6. Monitor the vital signs.
7. Discuss the problem with the parents.
8. Decide whether to transfer the infant to a level 2 or 3 nursery.

**20-9 HOW DO YOU RESUSCITATE A SICK INFANT?**

The method of resuscitating a sick infant is similar to that of resuscitating an infant with asphyxia at birth. The most important steps are:

1. Clear the airway by suction, especially if the infant has vomited.
2. Provide a source of oxygen if the infant is cyanosed.
3. Stimulate respiration if the infant is not breathing adequately. Ventilation by face mask or endotracheal tube may be needed.
4. Assess whether the infant is shocked. Treat if signs of shock are present.

**20-10 HOW DO YOU DIAGNOSE THE CAUSE OF THE PROBLEM?**

1. Review the history.
2. Examine the infant carefully.
3. Do any special investigations that are indicated, such as:
  - (i) Measure the blood glucose concentration.
  - (ii) Determine the packed cell volume or haemoglobin concentration.
  - (iii) Determine the acid base status by measuring the blood gases if possible.
  - (iv) Order a chest X-ray.

**20-11 WHAT GENERAL SUPPORTIVE CARE IS NEEDED BY A SICK INFANT?**

1. Maintain adequate respiration and circulation.
2. Maintain a normal body temperature.
3. Handle the infant as little as possible.
4. Provide extra oxygen ONLY if needed.
5. Observe the infant carefully, paying special attention to the vital signs.
6. Provide fluid and energy by giving intravenous fluid. Usually the stomach is emptied via a nasogastric tube.
7. Prevent infection by washing your hands or spraying them with a disinfectant before touching the infant.

**20-12 WHAT SHOULD YOU NOT DO IF THE INFANT IS SICK?**

1. Do not feed the infant by mouth as this may cause vomiting or apnoea. Most sick infants are fed by an intravenous infusion.
2. Do not handle the infant unless it is necessary.
3. Do not bath the infant.
4. Do not take the infant out of oxygen for a procedure, e.g. a chest X-ray.

**20-13 WHY IS EXCESSIVE HANDLING BAD FOR SICK INFANTS?**

Handling a sick infant, such as changing the nappy, may precipitate an apnoeic attack or bradycardia. The infant should not be suctioned unless this is indicated. The PaO<sub>2</sub> (concentration of oxygen in arterial blood) and SaO<sub>2</sub> (oxygen saturation) often fall when the infant is handled or suctioned. It is, therefore, important to handle a sick infant as little as possible. Only essential observations and procedures should be done.

**20-14 HOW SHOULD YOU MONITOR A HIGH RISK OR SICK INFANT?**

The infant's vital signs should be observed and recorded with as little interference as possible to the infant. Electronic monitors, e.g. a respiratory, heart rate and oxygen saturation monitor, should be used whenever possible. The infant should be handled and moved as little as possible when observations are made.

**20-15 WHAT OBSERVATIONS SHOULD YOU MAKE IN A HIGH RISK OR SICK INFANT?**

1. You should observe the vital signs:
  - (i) Heart rate.
  - (ii) Respiratory rate and pattern.
  - (iii) Colour.
  - (iv) Temperature of the infant and the incubator.
  - (v) Activity of the infant.
2. Look for any other abnormal signs that are present, such as vomiting, loose stools, etc.
3. The blood glucose concentration is usually also monitored.
4. The type and volume of the fluid intake (both oral feeds and intravenous fluids).
5. The frequency with which the infant passes urine. In severely ill infants the urine is collected in a urine bag or urethral catheter so that the volume of the urine passed can be measured.
6. The content of the urine (protein, blood and glucose) is determined with a reagent strip.
7. The blood pressure should be recorded in severely ill infants in level 2 or 3 nurseries.
8. If the infant is receiving oxygen, then the FiO<sub>2</sub> (fraction or percentage of inspired oxygen) must be noted. The SaO<sub>2</sub> should also be noted if the infant is being monitored with an oxygen saturation monitor.
9. The packed cell volume or haemoglobin concentration should be measured if the infant has lost blood.
10. The infant's weight should be recorded every day.

**20-16 WHAT IS THE IMPORTANCE OF WEIGHING A SICK INFANT DAILY?**

A weight loss of more than 10% of the birth weight or the previous day's weight suggests that the infant is dehydrated.

**20-17 HOW OFTEN SHOULD THE OBSERVATIONS BE MADE?**

Observations should be frequent enough to ensure that any change in the infant's condition will be detected as soon as possible. The sicker the infant, the more frequently observations will be needed. Very sick infants should be observed continuously. The use of monitoring equipment, such as apnoea alarms and heart rate monitors, is of great help in continuous monitoring. Routine observations in sick infants are usually made every 30 minutes. Three hourly observations are usually adequate in high risk infants.

**20-18 HOW SHOULD THE OBSERVATIONS BE DOCUMENTED?**

It is very important that the observations be carefully recorded on an observation chart together with the time of the observations. Not only is the observation record very helpful to monitor the infant's progress but it also provides an important hospital record.

**20-19 WHICH OBSERVATION CHART SHOULD BE USED?**

A chart that is specially designed for the recording of observations on newborn infants should be used. The observation chart must have columns for the recording of the vital signs and other important observations. A column must also be provided for the date and time, the observer's name and a space for comments.

The observation chart must be kept at the infant's cot or incubator so that it is easily accessible to both nurses and doctors.

The use of an observation chart is discussed in skills workshop 20 of this PEP manual.

**20-20 WHAT ADDITIONAL RECORDS ARE IMPORTANT?**

Progress notes must be written by the nursing and medical staff describing the infant's condition and the management given. The progress notes can be written on the observation chart or in a separate folder. Both nursing and medical staff should use the same records. The notes should be problem orientated.

**20-21 WHAT ARE PROBLEM ORIENTATED NOTES?**

Every time the infant is examined, you should ask yourself "what are the infant's problems?" Each problem must then be listed, together with the clinical observations, investigations and management of that problem. This system forces you to pay careful attention to each problem, and makes it very easy for another person to understand your notes. Each problem must be carried over in the notes from day to day until that problem has been resolved.

The keeping of problem orientated notes is discussed in skills workshop 20 of this PEP manual.

**THE MANAGEMENT OF SHOCK****20-22 HOW DO YOU DIAGNOSE SHOCK?**

Shock is the failure of the circulation to provide an adequate blood supply to the tissues. The signs of shock are:

1. Decreased capillary filling time.
2. Cold hands and feet in spite of a warm trunk.
3. Tachycardia or bradycardia.
4. Low blood pressure.
5. Pallor or cyanosis.

In clinical practice, a decreased capillary filling time is the easiest sign of shock to detect.

*\*\*\* The systolic blood pressure in an infant can be measured manually by inflating a cuff around the upper arm and noting the pressure at which pulsations are first felt in the brachial artery as the cuff is slowly deflated. The width of the cuff must be two thirds the length of the upper arm and the balloon must be long enough to extend completely around the arm. Preferably, both systolic and diastolic blood pressures should be recorded with an automatic machine that uses the principles of oscillometry (e.g. Dynamap) or doppler shift. The normal range of systolic blood pressure in term infants on day 1 is 50 to 70 mm Hg while that for diastolic blood pressure is 25 to 50 mm Hg. The normal range increases with the birth weight and gestational age of the infant. It also increases during the first week of life. The mean blood pressure is similar to the infant's gestational age, e.g. 38 mm Hg at 38 weeks gestation.*

**20-23 HOW CAN YOU MEASURE THE CAPILLARY FILLING TIME?**

Normally the capillaries in the skin fill immediately after they have been emptied. Due to the poor peripheral blood flow in shock, there is a delay in the time it takes to fill the capillaries.

The method of determining the capillary filling time is as follows:

1. Press firmly over the skin of the infant's heel or anterior chest with your thumb or finger for 3 seconds. The skin under your thumb will become pale.
2. Remove your thumb and immediately start counting. Stop counting when the blood has returned to the compressed area and the pallor has disappeared.
3. To ensure that you count at the correct speed of one number per second, it is helpful to count "1 potato, 2 potatoes, 3 potatoes", etc.

The normal capillary filling time is 3 seconds or less. If the capillary filling time is more than 3 seconds then the infant is shocked. A false reading may be obtained if the infant is cold, as this may also cause poor perfusion of the skin.

**20-24 WHAT ARE THE CAUSES OF SHOCK?**

1. Hypoxia is the commonest cause of shock in newborn infants.
2. Excessive vagal stimulation caused by suctioning the pharynx.
3. Haemorrhage.
4. Dehydration.
5. Septicaemia.
6. Heart failure.

**20-25 HOW DO YOU TREAT SHOCK?**

The treatment of shock is aimed at:

1. Correcting the cause of the shock, e.g. septicaemia or hypoxia.
2. Correcting the poor peripheral circulation by giving intravenous fluids, such as normal saline, fresh frozen plasma, stabilized human serum or Haemaccel. Ten ml/kg of fluid is given over 10 minutes. This should correct the blood pressure and capillary filling time.

*\*\*\* An intravenous infusion of dopamine at a rate of 5 µg/kg/minute may be used to increase cardiac output if fluid alone does not correct the shock.*

**THE MANAGEMENT OF FITS****20-26 HOW CAN YOU RECOGNISE A FIT IN A NEWBORN INFANT?**

A fit (i.e. a convulsion) is caused by excessive activity of a group of nerve cells in the brain. A fit may present as:

1. Twitching of part of the body (e.g. a hand), one side of the body, or the whole body (a generalized fit).
2. Extension (spasm) of part of the body (e.g. an arm) or the whole body.
3. Abnormal movements (e.g. mouthing movements, deviation of the eyes to one side or cycling movements of the legs).
4. Apnoea alone.

It is often very difficult to recognize a fit in a newborn infant as infants usually do not have a typical grand mal fit (generalized extension followed by jerking movements) as seen in older children and adults.

Jitteriness and the movements normal infants make while asleep must not be confused with fits. Unlike fits, jitteriness can be stimulated by handling the infant. In addition, jitteriness can be stopped by holding that limb.

## 22-27 WHAT ARE THE IMPORTANT CAUSES OF FITS?

The common causes of fits in the newborn infant are:

1. Hypoxia.
2. Hypoglycaemia.
3. Meningitis.
4. Congenital malformations of the brain.
5. Trauma or bleeding in the brain.

\*\*\* *Hypocalcaemia and hypomagnesaemia may also cause fits.*

## 22-28 HOW DO YOU TREAT A FIT?

1. MAKE SURE THAT THE INFANT IS GETTING ENOUGH OXYGEN.
  - (i) Clear the mouth and pharynx by suction and remove any vomited feed.
  - (ii) Give oxygen by face mask.
  - (iii) If the infant remains cyanosed or does not breathe, then ventilate the infant by mask or via an endotracheal tube.
  - (iv) Empty the stomach by a nasogastric tube to prevent vomiting.
2. STOP THE FIT.

The 2 drugs usually used are:

- (i) Phenobarbitone intravenously 20 mg/kg.
- (ii) Diazepam (Valium) 0,5 mg/kg by intravenous injection or rectally. Intravenous Valium may cause apnoea. Rectal Valium is given by a syringe and nasogastric tube. Valium is usually used if phenobarbitone fails to stop the fit.

\*\*\* *Paraldehyde 0,3 ml/kg by intramuscular injection is the safest drug to use. Do not keep paraldehyde in a plastic syringe for more than 2 minutes as it may react with the plastic.*

3. LOOK FOR AND TREAT THE CAUSE OF THE FIT.

Important steps in diagnosing the cause of the fit are:

- (i) Always check the blood glucose concentration as hypoglycaemia is a common cause of fits.
- (ii) A history of fetal distress or a low Apgar score will suggest hypoxia before delivery.
- (iii) A lumbar puncture should be done to exclude meningitis.

If a cause is found, it should be treated. Unfortunately there is no method of treating hypoxic brain damage once it has already occurred.

4. PREVENT FURTHER FITS.

If the cause of the fit (e.g. intraventricular haemorrhage) cannot be removed then further fits must be prevented by giving the infant phenobarbitone 20 mg/kg by intravenous or intramuscular injection, if this has not already been given. Usually a maintenance dose of 5 mg/kg oral phenobarbitone daily is not needed in newborn infants. All infants that have had a fit should be transferred to a level 2 or 3 nursery for further investigation and management. However, it is essential that hypoglycaemia is corrected and good respiration ensured BEFORE the infant is moved.

The following sections on acidosis need only be studied by those who work in hospitals with the facilities to measure blood gases.

## THE MANAGEMENT OF ACIDOSIS

### 20-29 WHAT IS ACIDOSIS?

Normally acid and alkali are present in equal amount in the body and are in balance. Acidosis is an excess of acid in the body. This is determined by measuring the pH (hydrogen ion concentration) of the arterial blood, using a blood gas analyser ("Astrup machine"). Normally the arterial blood pH in a newborn infant is 7,30 - 7,40. If the pH is below 7,30 then there is too much acid in the blood and the infant is said to be acidotic. In contrast, if the pH is above 7,40 there is too little acid in the body and the infant is said to be alkalotic. Alkalosis is less common than acidosis and is usually not as dangerous.

\*\*\* *Capillary blood from a warmed heel may also be used to measure the pH.*

### 20-30 WHAT TYPES OF ACIDOSIS ARE IMPORTANT?

There are 2 types of acidosis:

1. **METABOLIC ACIDOSIS.** This is the common and dangerous type of acidosis seen in sick infants. It is due to the accumulation of lactic acid which is formed during hypoxia, septicaemia, dehydration and shock when the cells of the body do not receive enough oxygen. If the cells receive too little oxygen, some energy can still be produced by converting a lot of glucose into lactic acid (anaerobic metabolism). The increased production of lactic acid lowers the pH, resulting in a metabolic acidosis.
2. **RESPIRATORY ACIDOSIS.** This type of acidosis is caused by the accumulation of carbon dioxide in the blood during respiratory distress and apnoea. Because the lungs are unable to get rid of carbon dioxide, the excess carbon dioxide dissolves in the plasma to form carbonic acid.

Therefore, acidosis may be caused by too much lactic acid or carbonic acid.

### 20-31 HOW DOES THE BODY TRY TO CORRECT A METABOLIC ACIDOSIS?

1. The body tries to correct the low pH by hyperventilating (excessive breathing). This lowers the  $\text{PaCO}_2$  (CARBON DIOXIDE CONCENTRATION in arterial blood) and, thereby, reduces the amount of carbonic acid.
2. The excess lactic acid can be bound to bicarbonate. This lowers the serum bicarbonate concentration, producing a BASE DEFICIT.

### 20-32 HOW IS ACIDOSIS DIAGNOSED?

Although there are clinical signs which may suggest acidosis in older children and adults, these are of little use in infants. Acidosis, therefore, is diagnosed by measuring the pH of a sample of arterial blood. It can further be decided whether the acidosis is metabolic or respiratory by determining the base deficit and measuring the carbon dioxide concentration ( $\text{PaCO}_2$ ) in the blood specimen.

1. With a **METABOLIC ACIDOSIS** the pH is below 7,30 and the base deficit is greater than 5 (normal = 0).
2. With a **RESPIRATORY ACIDOSIS** the pH is below 7,30 and the carbon dioxide concentration ( $\text{PaCO}_2$ ) is above 6,8 kPa (50 mm Hg).

The pH, the base deficit and carbon dioxide concentration are determined with a blood gas analyser which also calculates the base deficit.

**WITH A METABOLIC ACIDOSIS THE pH IS LOW AND THE BASE DEFICIT IS HIGH**

**20-33 HOW DO YOU TREAT METABOLIC ACIDOSIS?**

Always try to find and correct the cause, e.g. giving oxygen for hypoxia, treating septicaemia with antibiotics, and correcting shock with intravenous fluids.

If the pH is below 7,20 then 4% sodium bicarbonate must be given intravenously. Usually 2 ml/kg is given slowly over 10 minutes. The correct amount of 4% sodium bicarbonate that should be given can be calculated from the base deficit:

The volume of 4% sodium bicarbonate (in ml) = base deficit x the infant's weight in kg x 0,6.

For example: If the base deficit was 10 and the infant weighs 1,5 kg then the volume of 4% sodium bicarbonate needed would be 9 ml (10 x 1,5 x 0,6).

Never use 8% sodium bicarbonate in newborn infants as the high concentration is dangerous. If 4% sodium bicarbonate is not available, then 8% sodium bicarbonate must be diluted with an equal volume of sterile water to make up a 4% solution.

It is of little help to give sodium bicarbonate if the cause of the metabolic acidosis is not removed as the acidosis will simply recur. Always make sure that the infant's respiration is adequate before giving sodium bicarbonate.

**20-34 HOW DO YOU TREAT RESPIRATORY ACIDOSIS?**

The infant must be ventilated with a mask and bag or ventilator. When the high PaCO<sup>2</sup> (above 6,8 kPa or 50 mm Hg) is corrected, the pH will return to normal. Sodium bicarbonate will not correct a respiratory acidosis.

**CASE PROBLEMS****CASE 1**

A preterm infant of 1500 g has a normal Apgar score and appears healthy after delivery. The infant is transferred to the nursery for further care.

**1. Should this infant be classified as a well, high risk or sick infant?**

The infant should be classified as high risk as the infant, although appearing well, is preterm and low birth weight.

**2. List the 4 steps in the management of a high risk infant.**

- (i) Identify the clinical problems that are likely to occur.
- (ii) Take steps to prevent these problems occurring.
- (iii) Monitor the infant, specifically looking out for these problems.
- (iv) Treat any problems that do occur.

**3. Do high risk infants need immediate care?**

No. Unlike sick infants, high risk infants do not need immediate care. However, steps to prevent possible problems should be taken as soon as possible.

**4. Would you expect the vital signs of a high risk infant to be normal or abnormal?**

The vital signs of a high risk infant are normal. If any of the vital signs become abnormal then the infant must be reclassified as a sick infant.

**CASE 2**

A two day old term infant becomes lethargic and develops abdominal distension. A clinical diagnosis of septicaemia is made. The heart rate is 180 beats per minute, the respiration and temperature are normal and the infant is peripherally cyanosed. The capillary filling time of the skin over the anterior chest is 5 seconds.

**1. Is this a high risk infant or a sick infant?**

This is a sick infant as some of the vital signs are abnormal and the infant appears sick.

**2. Which vital signs are abnormal?**

- (i) The infant has a tachycardia (heart rate more than 160 beats per minute).
- (ii) The infant is peripherally cyanosed.
- (iii) The infant is lethargic.

**3. What other clinical signs are abnormal?**

- (i) Abdominal distension.
- (ii) The capillary filling time is prolonged.

**4. What is a normal capillary filling time?**

The normal capillary filling time is 3 seconds or less.

**5. What is the clinical significance of a prolonged capillary filling time?**

It indicates that the infant is shocked.

**6. How should the shock be treated?**

By giving 10 ml of normal saline (or fresh frozen plasma, stabilized human serum or Haemaccel) per kilogram by intravenous infusion over 10 minutes. The septicaemia, which has caused the shock, must also be treated with parenteral antibiotics.

**CASE 3**

A term infant is delivered by caesarean section after a diagnosis of fetal distress is made. The Apgar scores are 2 at 1 minute and 5 at 5 minutes. After resuscitation the infant appears lethargic and at 2 hours has a generalized fit. The blood glucose concentration is normal.

**1. What is the probable cause of the fit?**

Prenatal hypoxia which resulted in the fetal distress and low Apgar scores.

**2. What are the clinical presentations of fits in a newborn infant?**

- (i) Twitching of part or the whole body.
- (ii) Extension (spasm) of part or the whole body.
- (iii) Abnormal movements such as mouthing or deviation of the eyes to one side.
- (iv) Apnoea.

**3. What are the 4 important steps in treating fits?**

- (i) Make sure that the infant is getting enough oxygen.
- (ii) Stop the fit.
- (iii) Look for and treat the cause of the fits.
- (iv) Prevent further fits.

**4. How should the fits be stopped?**

Phenobarbitone 20 mg/kg is usually used to stop the fit. Intravenous (or rectal) diazepam (Valium) 0,5 mg/kg is also effective but may cause apnoea.

**5. What drug can be used to prevent further fits?**

Phenobarbitone 20 mg/kg by intravenous or intramuscular injection will not only stop most fits but should prevent further fits.

The next case need only be attempted by those students who have studied the management of acidosis.

**CASE 4**

A week old preterm infant of 1500 g develops loose stools and loses 50 g in weight overnight. Gastroenteritis with dehydration is diagnosed. A blood gas analysis on a sample of arterial blood gives the following result: pH 7,16 PaCO<sub>2</sub> 5,1 kPa (37 mm Hg) base deficit 15. Nasogastric feeds are stopped, an antibiotic is prescribed and an intravenous infusion is started.

**1. Is the infant acidotic?**

Yes, because the pH is below 7,3.

**2. Does the infant have a metabolic or respiratory acidosis?**

A metabolic acidosis because the base deficit is greater than 5. There is not a respiratory acidosis as the PaCO<sub>2</sub> is normal, i.e. not above 6,8 kPa (50 mm Hg)

**3. What is the cause of the metabolic acidosis?**

Dehydration due to the loose stools.

**4. How should the metabolic acidosis be treated?**

- (i) Remove the cause of the acidosis by correcting the dehydration with intravenous fluids.
- (ii) Give intravenous 4% sodium bicarbonate as the pH is below 7,2.

**5. How much sodium bicarbonate should be given to this infant?**

The infant has a base deficit of 15 and weighs 1450 g at the time that acidosis is diagnosed. Therefore, the infant should be given  $(15 \times 1,450 \times 0,6)$  13 ml of 4% sodium bicarbonate. Remember that 8% sodium bicarbonate is not used in newborn infants.