Maternal Care Manual: Contents

PERINATAL EDUCATION PROGRAMME

THE FIRST STAGE OF LABOUR: THE CONDITION OF THE FETUS

UNIT 7

OBJECTIVES

When you have completed this unit you should be able to:

1. Monitor the condition of the fetus during labour.
2. Record the findings on the partogram.
3. Understand the significance of the findings.
4. Understand the causes and signs of fetal distress.
5. Interpret the significance of different fetal heart rate patterns and meconium stained liquor.
6. Manage any abnormalities which are detected.

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7-1 WHY SHOULD YOU MONITOR THE FETUS DURING LABOUR?

It is essential to monitor the fetus during labour in order to assess how it responds to the stresses of labour. The stress of a normal labour usually has no effect on a healthy fetus.

7-2 WHAT MAY STRESS THE FETUS DURING LABOUR?

1. Compression of the fetal head during contractions.
2. A decrease in the supply of oxygen to the fetus.

7-3 HOW DOES HEAD COMPRESSION STRESS THE FETUS?

During uterine contractions compression of the fetal skull causes vagal stimulation which slows the fetal heart rate. Head compression usually does not harm the fetus. However, with a long labour due to cephalopelvic disproportion, the fetal head may be severely compressed. This may result in fetal distress.

7-4 WHAT MAY REDUCE THE SUPPLY OF OXYGEN TO THE FETUS?

1. UTERINE CONTRACTIONS: Uterine contractions are the commonest cause of a decrease in the oxygen supply to the fetus during labour.
2. REDUCED BLOOD FLOW THROUGH THE PLACENTA: The placenta may fail to provide the fetus with enough oxygen and nutrition due to a decrease in the blood flow through the placenta, i.e. placental insufficiency. Patients with pre-eclampsia have poor formed spiral arteries that provide maternal blood to the placenta. This can also be caused by narrowing of the uterine blood vessels due to maternal smoking.
3. ABRUPTIO PLACENTAE: Part or all of the placenta stops functioning because it is separated from the uterine wall by a retroplacental haemorrhage. As a result the fetus does not receive enough oxygen.
4. CORD PROLAPSE OR COMPRESSION: This stops the transport of oxygen from the placenta to the fetus.

UTERINE CONTRACTIONS ARE THE COMMONEST CAUSE OF A DECREASED OXYGEN SUPPLY TO THE FETUS DURING LABOUR

7-5 HOW DO CONTRACTIONS REDUCE THE SUPPLY OF OXYGEN TO THE FETUS?

Uterine contractions may:

1. Reduce the maternal blood flow to the placenta due to the increase in intra-uterine pressure.
2. Compress the umbilical cord.

7-6 WHEN DO UTERINE CONTRACTIONS REDUCE THE SUPPLY OF OXYGEN TO THE FETUS?

Usually uterine contractions do not reduce the supply of oxygen to the fetus, as there is an adequate store of oxygen in the placental blood to meet the fetal needs during the contraction. Normal contractions in labour do not affect the healthy fetus with a normally functioning placenta and, therefore, are not dangerous.

However, contractions may reduce the oxygen supply to the fetus when:

1. There is placental insufficiency.
2. The contractions are prolonged or very frequent.
3. There is compression of the umbilical cord.

7-7 HOW DOES THE FETUS RESPOND TO A LACK OF OXYGEN?

A reduction in the normal supply of oxygen to the fetus causes FETAL HYPOXIA. This is a lack of oxygen in the cells of the fetus. If the hypoxia is mild the fetus will be able to compensate and, therefore, show no response. However, severe fetal hypoxia will result in FETAL DISTRESS. Severe, prolonged hypoxia will eventually result in fetal death.

7-8 HOW IS FETAL DISTRESS RECOGNIZED DURING LABOUR?

Fetal distress caused by a lack of oxygen results in a decrease in the fetal heart rate.

*** *The fetus responds to hypoxia with a bradycardia to conserve oxygen. 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 may cause ischaemic damage to the gut and kidneys, and intraventricular haemorrhage in the brain. Severe hypoxia will eventually cause a decreased cardiac output leading to myocardial and cerebral ischaemia. Hypoxia also results in anaerobic metabolism which causes fetal acidosis (a low blood pH).*

7-9 HOW DO YOU ASSESS THE CONDITION OF THE FETUS DURING LABOUR?

Two observations are used:

1. The fetal heart rate pattern.
2. The presence or absence of meconium in the liquor.

*** *Measuring the pH of the fetal blood is a very valuable additional method of assessing the condition of the fetus, if the facilities are available.*

FETAL HEART RATE PATTERNS

7-10 WHAT CAN BE USED TO MONITOR THE FETAL HEART RATE?

Any one of the following 3 pieces of equipment:

1. A fetal stethoscope.
2. A doptone.
3. A cardiotocograph (CTG machine).

In most low risk labours the fetal heart rate can be determined adequately using a fetal stethoscope. However, a doptone is helpful if there is difficulty hearing the fetal heart, especially if intra-uterine death is suspected. If available, a doptone is the preferred method in primary care clinics and hospitals. Cardiotocograph is not needed in most labours but is an important and accurate method of monitoring the fetal heart in high risk pregnancies.

A DOPTONE IS THE PREFERRED METHOD IN PRIMARY CARE CLINICS AND HOSPITALS

7-11 HOW SHOULD YOU MONITOR THE FETAL HEART RATE?

Because uterine contractions may decrease the maternal blood flow to the placenta, and thereby cause a reduced supply of oxygen to the fetus, it is essential that the fetal heart rate should be monitored during a contraction. In practice, this means that the fetal heart pattern must be checked before, during and after the contraction. A comment on the fetal heart rate, without knowing what happens DURING and AFTER a contraction, is almost valueless.

THE FETAL HEART RATE MUST BE ASSESSED BEFORE, DURING, AND AFTER A CONTRACTION

7-12 HOW OFTEN SHOULD YOU MONITOR THE FETAL HEART RATE?

Low risk patients who have had normal observations on admission;

1. Two hourly during the latent phase of labour
2. Hourly during the active phase of labour

Patients with a high risk of fetal distress should have their observations done more frequently. The following patients would be regarded as at higher risk:

1. Intermediate risk patients.
2. High risk patients.
3. Patients with abnormal observations on admission.
4. Patients with meconium stained liquor.

These patients need more frequent recording of the fetal heart rate:

1. Hourly during the latent phase of labour.
2. Half hourly during the active phase of labour.
3. At least every 15 minutes if fetal distress is suspected.

7-13 WHAT FEATURES OF THE FETAL HEART RATE PATTERN SHOULD YOU ALWAYS ASSESS DURING LABOUR?

There are 2 features that should always be assessed:

1. THE BASELINE FETAL HEART RATE: This is the heart rate between contractions.
2. THE PRESENCE OR ABSENCE OF DECELERATIONS: If present, the RELATION OF THE DECELERATION TO THE CONTRACTION must be determined:

(i) Decelerations that occur only DURING a contraction (i.e. early decelerations).
(ii) Decelerations that occur DURING AND AFTER a deceleration (i.e. late decelerations)
(iii) Decelerations that have NO FIXED RELATION to contractions (i.e. variable decelerations).

*** *In addition, the short trem beat-to-beat variation should also be evaluated if a cardiotocograph is available.*

7-14 WHAT FETAL HEART RATE PATTERNS CAN BE RECOGNISED WITH A FETAL STETHOSCOPE?

1. Normal.
2. Early deceleration.
3. Late deceleration.
4. Variable deceleration.
5. Baseline tachycardia.
6. Baseline bradycardia.

These fetal heart rate patterns (with the exception of variable decelerations) can be easily recognised with a stethoscope. However, cardiotocograph recordings (figures 7-1, 7-2 and 7-3) are used to help demonstrate the differences between the 3 types of deceleration.

*** *If a cardiotocograph is used, loss of short term beat-to-beat variation may also be recognised.*

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.

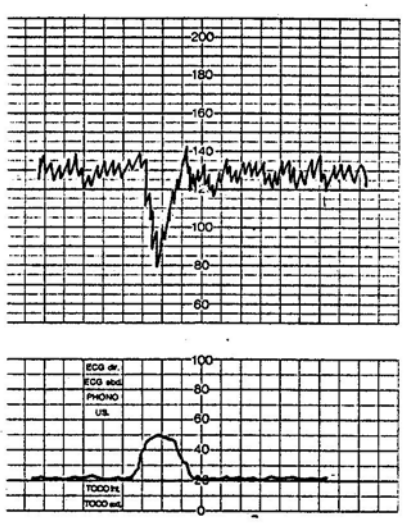
7-15 WHAT IS A NORMAL FETAL HEART RATE PATTERN?

1. No decelerations during or after contractions.
2. A baseline rate of 100 - 160 beats per minute.

7-16 WHAT ARE EARLY DECELERATIONS?

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 with a resultant increase in vagal stimulation which causes the heart rate to slow during the contraction.

Figure 7-1. An early deceleration.



7-17 WHAT IS THE SIGNIFICANCE OF EARLY DECELERATIONS?

Early decelerations do not indicate the presence of fetal distress. However, these fetuses must be carefully monitored as they are at an increased risk of fetal distress.

*** *When early decelerations occur, normal beat-to-beat variation is reassuring that the fetus is not hypoxic.*

7-18 WHAT ARE LATE DECELERATIONS?

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.

WITH A LATE DECELERATION THE FETAL HEART RATE ONLY RETURNS TO THE BASELINE 30 SECONDS OR MORE AFTER THE CONTRACTION HAS ENDED

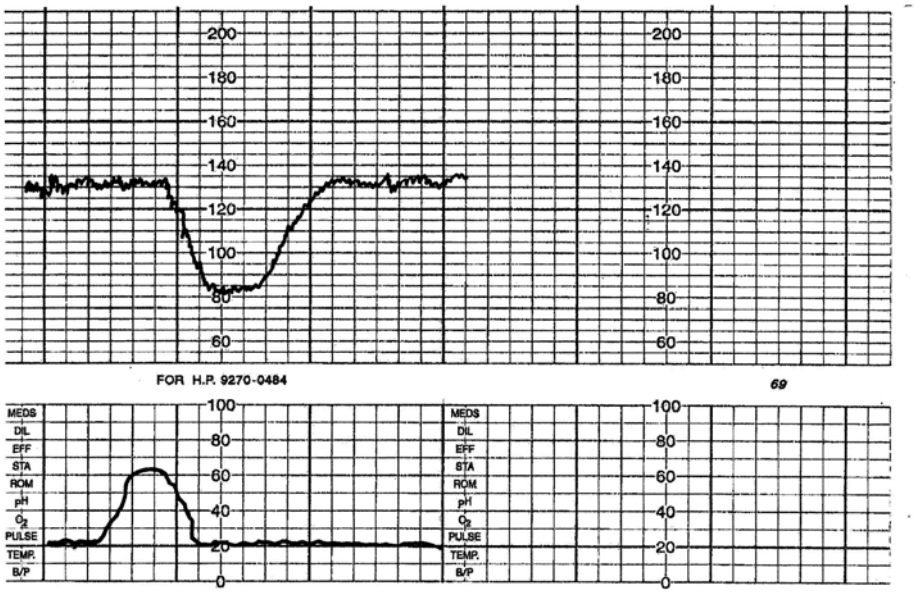
*** *When using a cardiotocograph, a late deceleration is diagnosed when the lowest point of the deceleration occurs 30 seconds or more after the peak of the contraction.*

7-19 WHAT IS THE SIGNIFICANCE OF LATE DECELERATIONS?

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.

LATE DECELERATIONS INDICATE FETAL DISTRESS

Figure 7-2. A late deceleration.



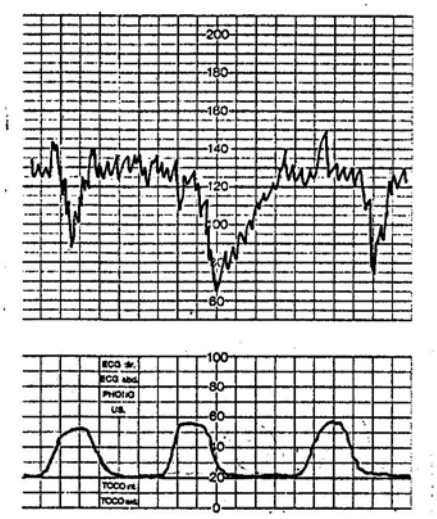
7-20 WHAT ARE VARIABLE DECELERATIONS?

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

*** *Variable decelerations accompanied by loss of beat-to-beat variation may indicate fetal distress.*

*** *Beat-to-beat variation (or variability) is assessed with a CTG. It is the alteration in the baseline heart rate, measured over a period of 1 minute. The variation in rate is normally exceed 5 beats or more per minute, giving the baseline a spiky appearance. A loss or reduction in beat-to-beat variation to below 5 beats per minute gives a flat baseline and may indicate fetal distress. However it may also occur if the fetus is asleep or as the result of the administration of analgesics (pethidine, morphine) or sedatives (phenobarbitone).*

Figure 7-3. Variable decelerations.



7-21 WHAT IS A BASELINE TACHYCARDIA?

A baseline fetal heart rate of more than 160 beats per minute.

7-22 WHAT ARE THE CAUSES OF A BASELINE TACHYCARDIA?

1. Maternal pyrexia.
2. Maternal exhaustion.
3. Hexoprenaline (Ipradol) administration.
4. Chorioamnionitis (infection of the placenta and membranes).
5. Fetal haemorrhage or anaemia.

7-23 WHAT IS A BASELINE BRADYCARDIA?

A baseline fetal heart rate of less than 100 beats per minute.

7-24 WHAT IS THE CAUSE OF A BASELINE BRADYCARDIA?

A baseline bradycardia of less than 100 beats per minute usually indicates fetal distress which is caused by severe fetal hypoxia. If decelerations are also present, a baseline bradycardia indicates that the fetus is at great risk of dying.

7-25 HOW SHOULD YOU ASSESS THE CONDITION OF THE FETUS ON THE BASIS OF THE FETAL HEART RATE PATTERN?

1. The fetal condition is NORMAL if a normal fetal heart rate pattern is present.
2. The fetal condition is UNCERTAIN if the fetal heart rate pattern indicates that there is an increased risk of fetal distress.
3. The fetal condition is ABNORMAL if the fetal heart rate pattern indicates fetal distress.

7-26 WHAT IS A NORMAL FETAL HEART RATE PATTERN DURING LABOUR?

A normal baseline fetal heart rate without any decelerations.

7-27 WHICH FETAL HEART RATE PATTERNS INDICATE AN INCREASED RISK OF FETAL DISTRESS DURING LABOUR?

1. Early decelerations.
2. Variable decelerations.
3. A baseline tachycardia.

These fetal heart rate patterns do not indicate fetal distress but warn that the patient must be closely observed as fetal distress may develop.

*** *If electronic monitoring is available, the fetal heart rate pattern must be monitored.*

7-28 WHAT FETAL HEART RATE PATTERNS INDICATE FETAL DISTRESS DURING LABOUR?

1. Late decelerations.
2. A baseline bradycardia.

*** *On cardiotocography loss of beat-to-beat variation lasting more than 60 minutes also suggests fetal distress.*

7-29 HOW SHOULD THE FETAL HEART RATE PATTERN BE OBSERVED DURING LABOUR?

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

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

7-30 WHICH FETAL HEART RATE PATTERN INDICATES THAT THE FETAL CONDITION IS GOOD?

1. The baseline fetal heart rate is normal.
2. There are NO decelerations.

The frequency of monitoring the fetal heart rate is given in section 7-12 of this PEP manual.

7-31 WHAT MUST BE DONE IF A FETAL BRADYCARDIA IS OBSERVED?

Fetal distress due to severe hypoxia is present!

Therefore, you should immediately do the following:

1. Exclude other possible causes of bradycardia, e.g. turn the patient onto her side to correct supine hypotension, and stop the oxytocin infusion to prevent uterine overstimulation.
2. If the fetal bradycardia persists the fetus must be resuscitated and delivered (as discussed in unit 2).

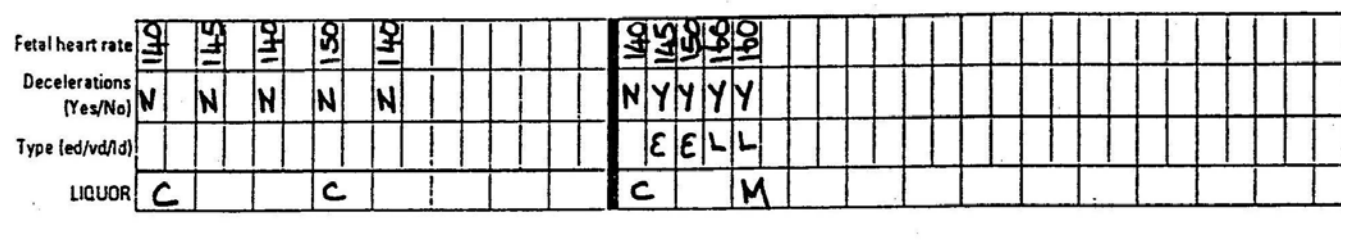
7-32 WHAT MUST BE DONE IF DECELERATIONS ARE OBSERVED?

First the relation of the decelerations to the uterine contractions must be observed to determine the type of deceleration. Then manage the patient as follows:

1. If the decelerations are early or variable, 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.
2. If late decelerations are present, the management will be the same as that discussed in 7-31.

The observations of the fetal heart rate must be recorded on the partogram as shown in figure 7-4. A note of the management decided upon must also be made under the heading "Management" at the bottom of the partogram.

Figure 7-4. Recording fetal observations on the partogram.



THE LIQUOR

7-33 IS THE LIQUOR COMMONLY MECONIUM STAINED?

Yes, in 10-20% of patients the liquor is yellow or green due to meconium staining. The incidence of meconium stained liquor is increased in the group of patients that go into labour after 42 weeks gestation.

7-34 IS IT IMPORTANT TO DISTINGUISH BETWEEN THICK AND THIN, OR YELLOW AND GREEN MECONIUM?

Although fetal and neonatal complications are more common which thick meconium, all cases of meconium stained liquor should be managed the same during the first stage of labour. The presence of meconium is important and the management does not depend on the consistency of the meconium.

7-35 WHAT IS THE IMPORTANCE OF MECONIUM IN THE LIQUOR?

1. Meconium stained liquor usually indicates the presence of fetal hypoxia or an episode of fetal hypoxia in the past. Therefore, fetal distress may be present. If not, the fetus is at high risk of distress.
2. There is a danger of meconium aspiration at delivery.

MECONIUM STAINED LIQUOR WARNS THAT EITHER FETAL DISTRESS IS PRESENT OR THAT THERE IS A HIGH RISK OF FETAL DISTRESS

7-36 HOW SHOULD YOU MONITOR THE FETUS DURING THE FIRST STAGE OF LABOUR IF THE LIQUOR IS MECONIUM STAINED?

1. Listen carefully for late decelerations. If present, then fetal distress must be diagnosed.
2. If late decelerations are absent, then observe the fetus carefully during labour for fetal distress as about a third of fetuses with meconium stained liquor will develop fetal distress.

*** *If electronic monitoring is available, the fetal heart rate pattern must be monitored.*

7-37 HOW MUST THE DELIVERY BE MANAGED IF THERE IS MECONIUM IN THE LIQUOR?

1. The infant's mouth and pharynx must be thoroughly suctioned after delivery of the head but before the shoulders and chest are delivered, i.e. before the infant breathes. This must be done irrespective of whether a vaginal delivery or caesarean section is done.
2. Anticipate that the infant may need to be resuscitated at delivery. If the infant has asphyxia and needs intubation, suction the airways via the endotracheal tube before starting ventilation.

<u>The prevention of meconium aspiration at delivery is discussed in unit 16 of the Newborn Care manual of the Perinatal Education Programme.</u>

7-38 HOW AND WHEN ARE THE LIQUOR FINDINGS RECORDED?

Three symbols are used to record the liquor findings on the partogram:

I = Intact membranes (i.e. no liquor draining).
C = Clear liquor draining.
M = Meconium stained liquor draining.

The findings are recorded in the appropriate space on the partogram as shown in figure 7-4.

The liquor findings should be recorded when:

1. The membranes rupture.
2. A vaginal examination is done.
3. A change in the liquor findings is noticed, e.g. if the liquor becomes meconium stained.

CASE PROBLEMS

CASE 1

A primigravida with inadequate uterine contractions during labour is being treated with an oxytocin infusion. She now has frequent contractions, each lasting more than 40 seconds. With the patient in the lateral position, listening to the fetal heart rate reveals late decelerations.

1. What worries you most about this patient?

The late decelerations indicate that fetal distress is present.

2. Should the fetus be delivered immediately?

No. Correctable causes of poor oxygenation of the fetus must first be ruled out, e.g. postural hypotension and overstimulation of the uterus with oxytocin. The oxytocin infusion must be stopped and oxygen administered to the patient. Then the fetal heart rate should be checked again.

3. After stopping the oxytocin the uterine contractions are less frequent. No further decelerations of the fetal heart rate are observed. What further management does this patient need?

As overstimulation of the uterus with oxytocin was the most likely cause of the late decelerations, labour may be allowed to continue. However, very careful observation of the fetal heart rate pattern is essential, especially if oxytocin is to be restarted. The fetal heart should be listened to every 15 minutes or fetal heart rate monitoring with a cardiotocograph should be started.

CASE 2

A patient who is 38 weeks pregnant presents with an antepartum haemorrhage in labour. On examination, her temperature is 36,8§C, her pulse rate 116 beats per minute, her blood pressure 120/80 mm Hg, and there is tenderness over the uterus. The baseline fetal heart rate is 166 beats per minute. The fetal heart rate drops to 130 beats per minute during contractions and then returns to the baseline 35 seconds after the contraction has ended.

1. Which of the maternal observations are abnormal and what is the probable cause of these abnormal findings?

A maternal tachycardia is present and there is uterine tenderness. These findings suggest an abruptio placentae.

2. Which fetal observations are abnormal?

Both the baseline tachycardia and the late decelerations.

3. How can you be certain that these are late decelerations?

Because the deceleration continues for more than 30 seconds after the end of the contraction. This observation indicates fetal distress. The number of beats by which the fetal heart slows during a deceleration is not important.

4. Why should an abruptio placentae cause fetal distress?

Part of the placenta has been separated from the wall of the uterus by a retroplacental clot. As a result, the fetus has become hypoxic.

CASE 3

During the first stage of labour a patient's liquor is noticed to have become stained with thin green meconium. The fetal heart rate pattern is normal and labour is progressing well.

1. What is the importance of the change in the colour of the liquor?

Meconium in the liquor indicates an episode of fetal hypoxia and suggests that there may be fetal distress or that the fetus is at high risk of fetal distress.

2. Can thin meconium be a sign of fetal distress?

Yes. All meconium in the liquor indicates either fetal distress or that the fetus is at high risk of fetal distress. The management does not depend on whether the meconium is thick or thin.

3. How would you decide whether this fetus is distressed?

By listening to the fetal heart rate. Late decelerations or a baseline bradycardia will indicate fetal distress.

4. How should the fetus be monitored during the remainder of the labour?

The fetal heart rate pattern must be determined carefully every 15 minutes in order to diagnose fetal distress should this occur.

5. What preparations should be made for the infant at delivery?

The infant's mouth and pharynx must be well suctioned immediately after the head has been delivered. If the infant does not breathe well directly after delivery, intubation and further suctioning of the larger airways may be required before ventilation is started.