به نام خدا

# Electronic Fetal Heart Monitoring (CTG)

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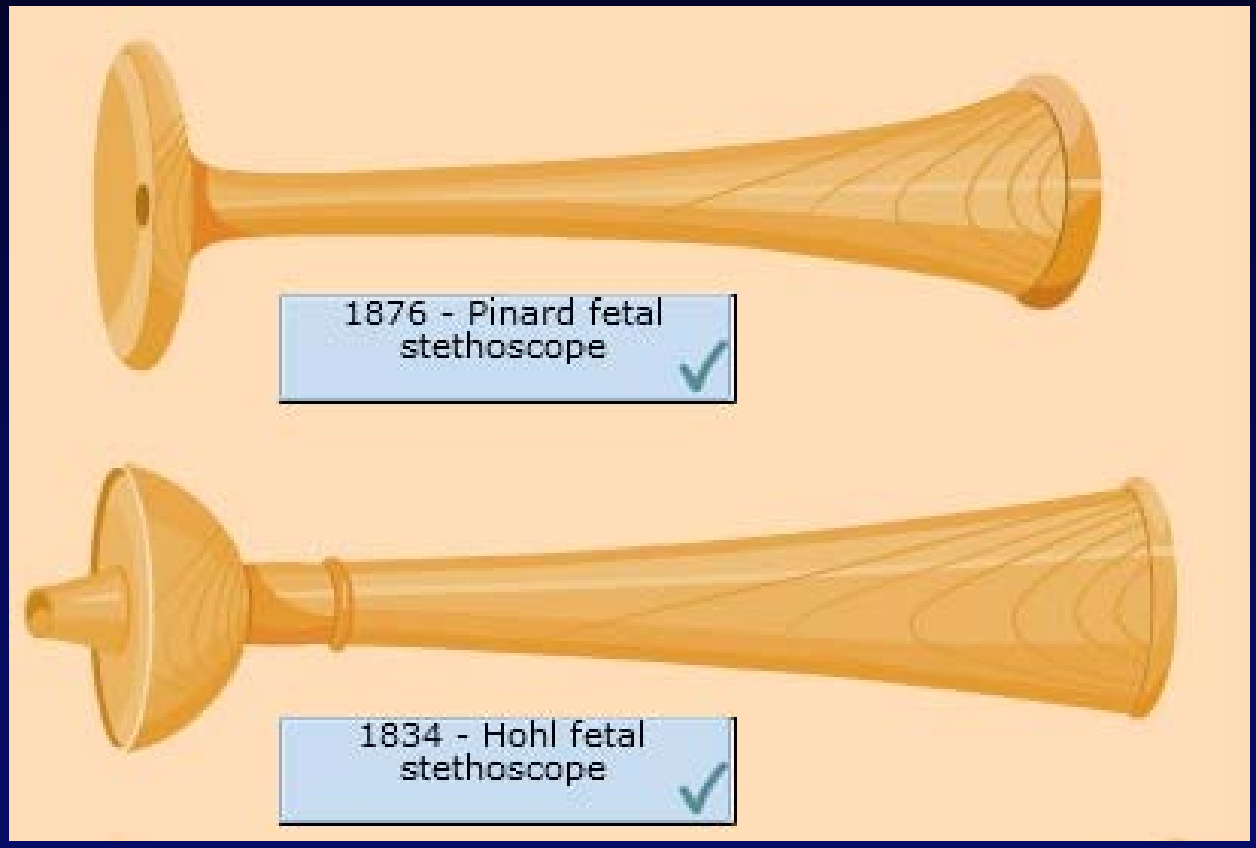
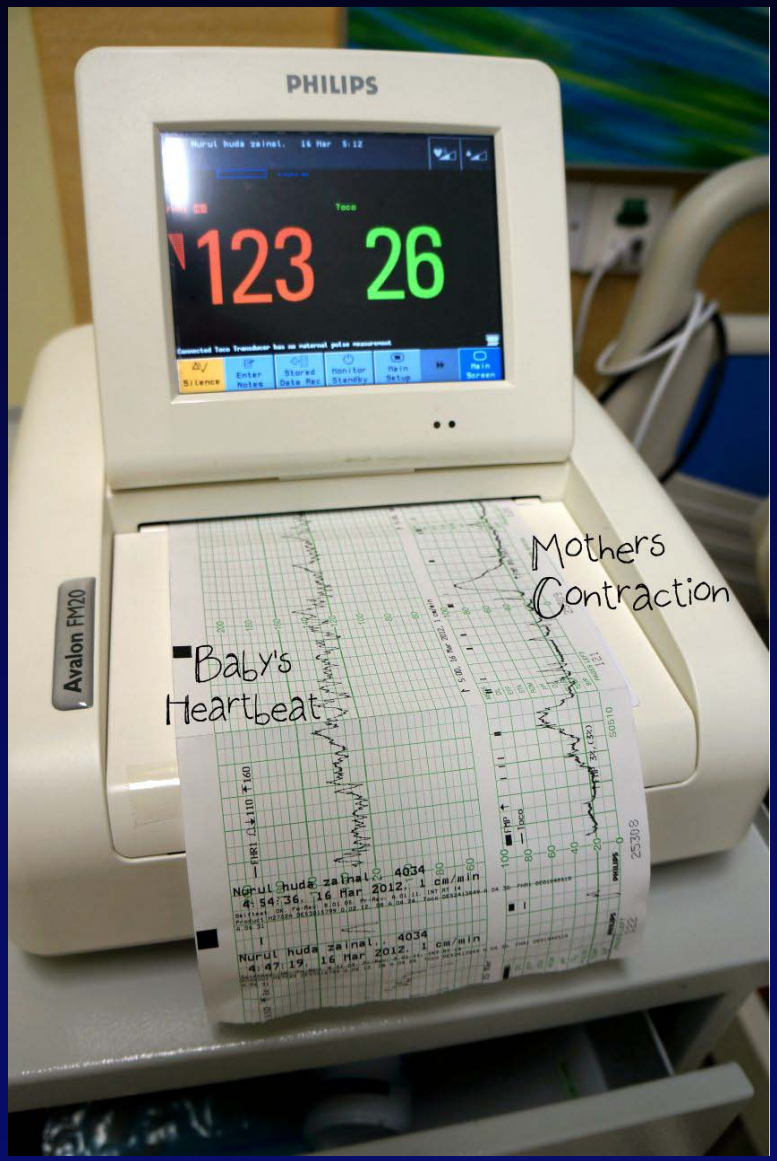
# First Fetal Heart Monitoring



# Today's fetal heart monitoring



# Why is it called *CTG*?

**Cardiotocography**

recording (*-graphy*) the fetal heartbeat (*cardio-*) and the uterine contractions (*-toco-*)

- e.g. **Electrocardiography** (**ECG** or **EKG** from German: *Elektrokardiogramm*) electric (electro) recording (graphy) of the heartbeat (cardio/kardio)

# Litigation Cost of CTG Misinterpretation

- In the ten years (2000-2010) covered by the study, 300 claims involving alleged CTG misinterpretation were reported to the NHSLA. The total value of these claims is estimated to be in the region of £466million.

- 2,330,000,000,000 Toman, 2.3 trillion T or 2300 Billion T ( assuming 1£=5000 T)

Source: NHSLA

# Figure 1 – Total number of reported CNST claims by specialty 01/04/95 to 31/03/11

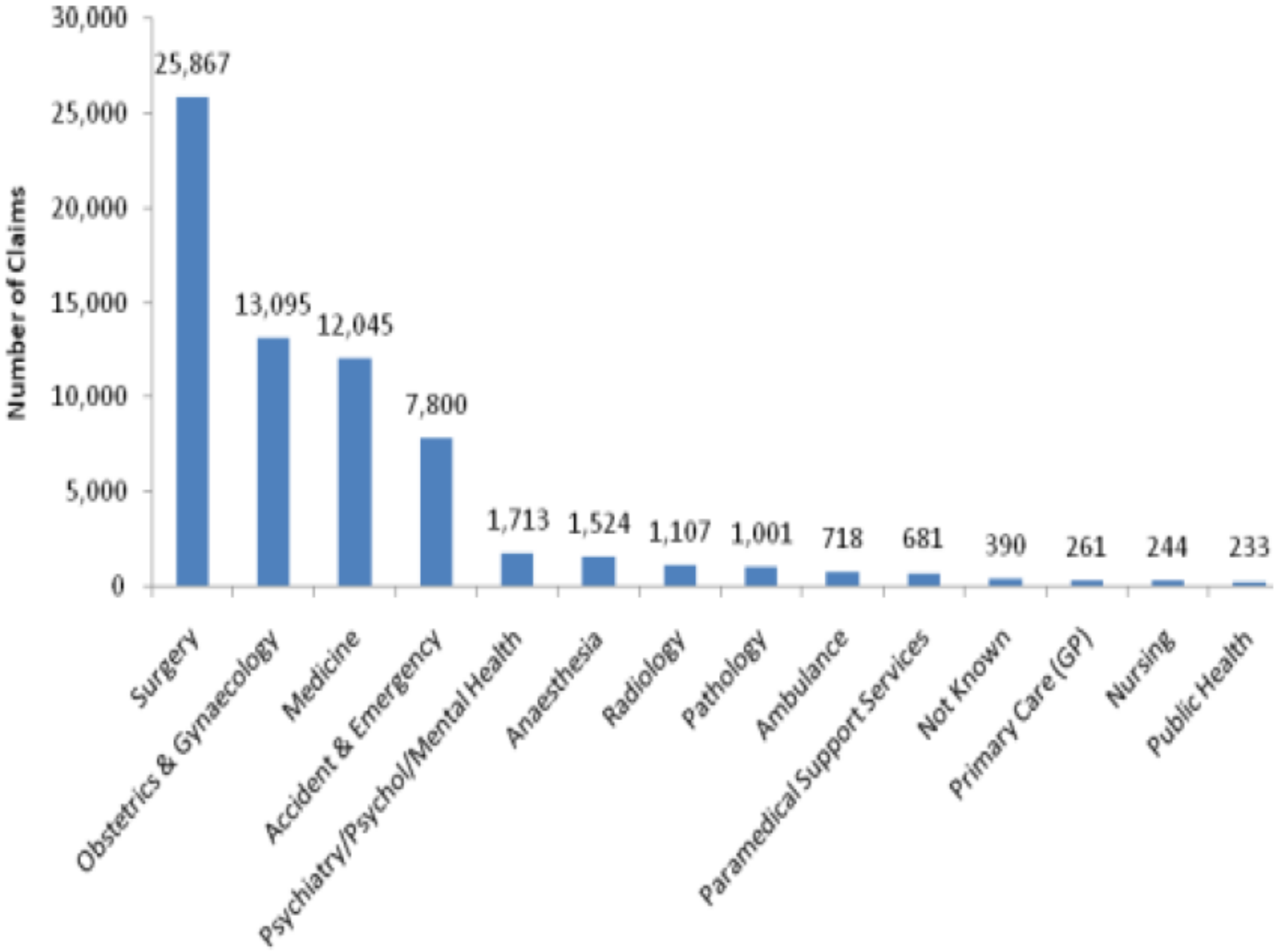
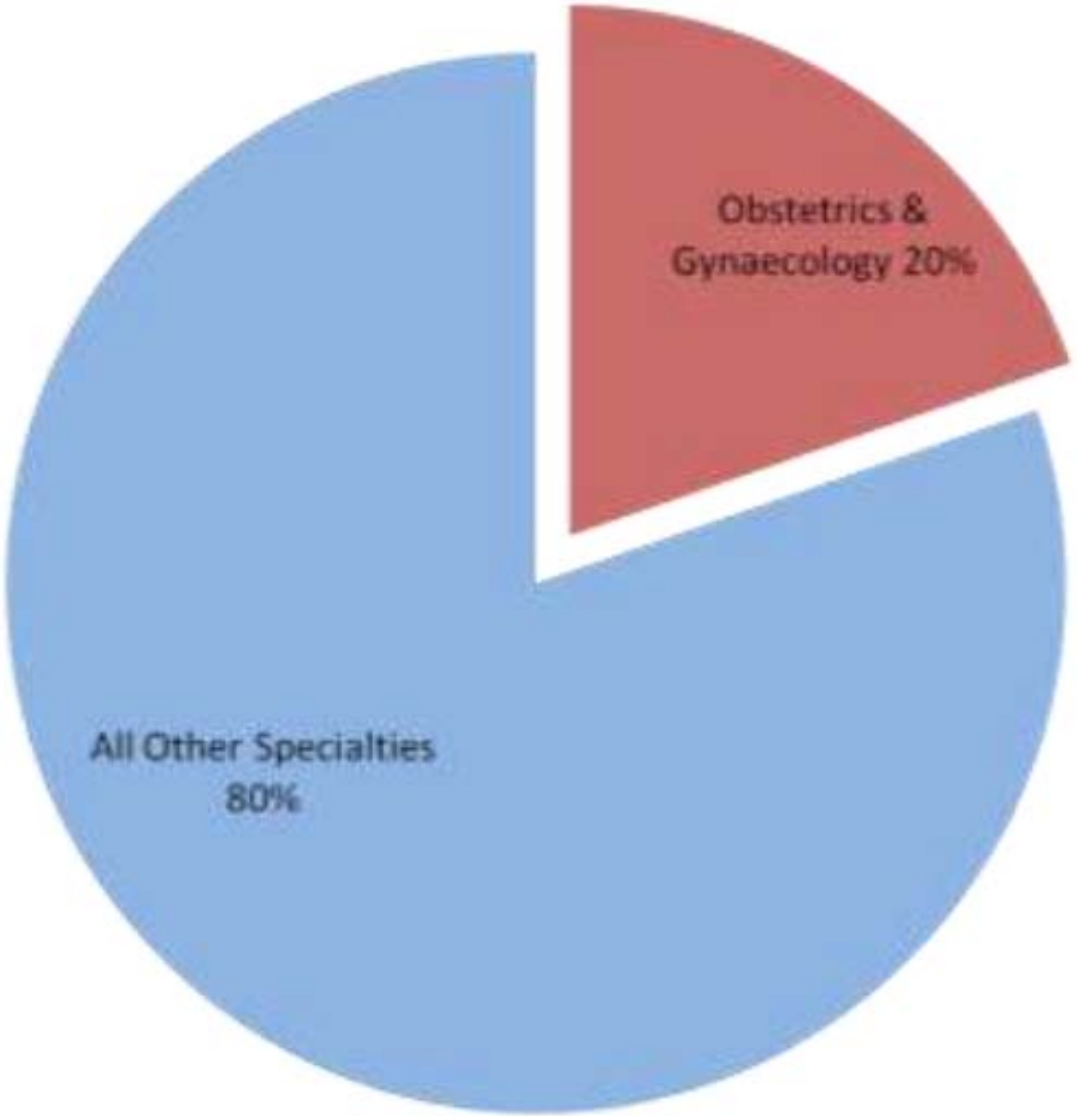


**Figure 3 – Total number (%) of reported CNST claims by specialty 01/04/95 to 31/03/11**



## Figure 2 – Total value of reported CNST claims by specialty 01/04/95 to 31/03/11

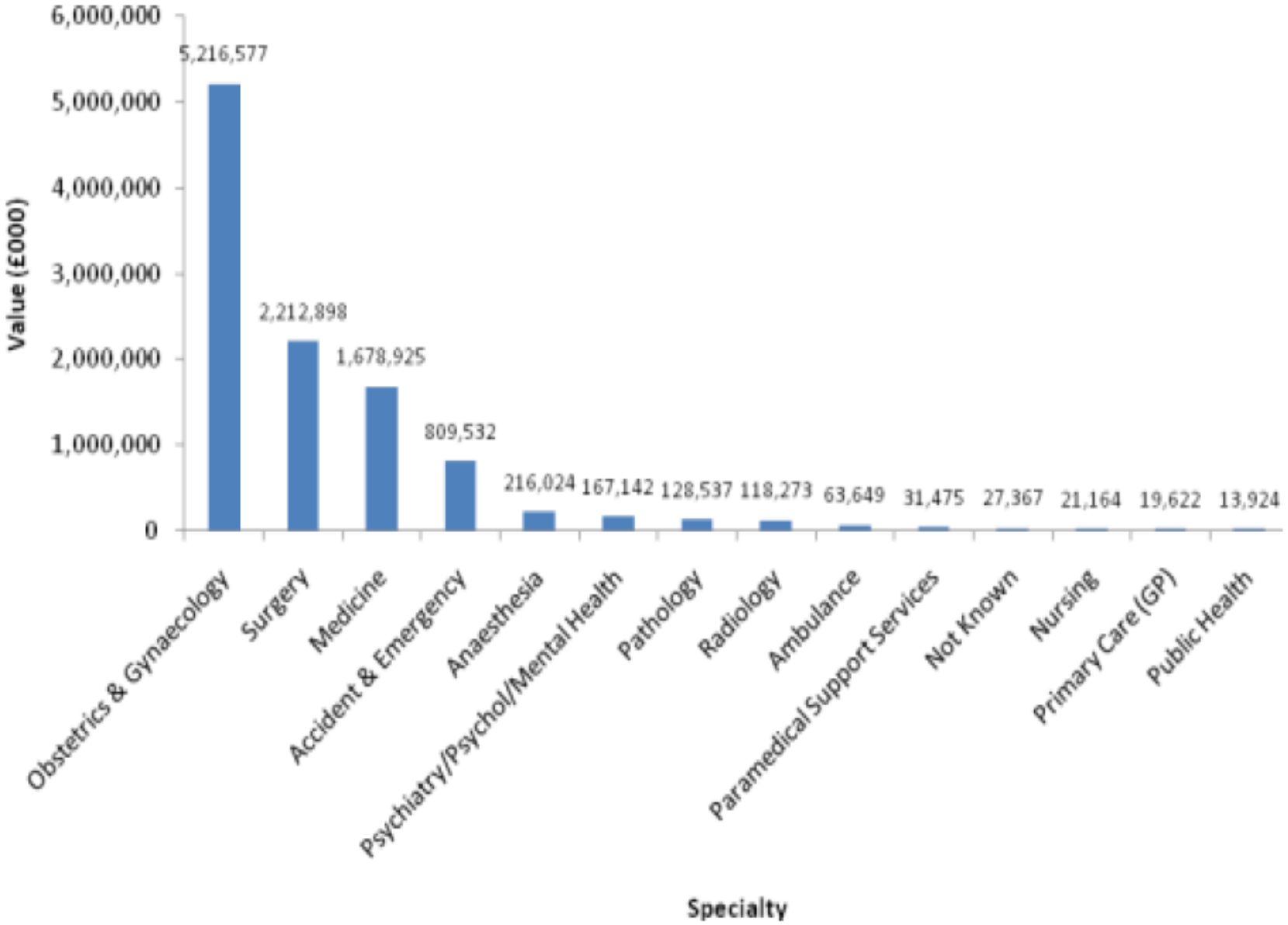


**Figure 4 –Total value (%) of reported CNST claims by specialty 01/04/95 to 31/03/11**

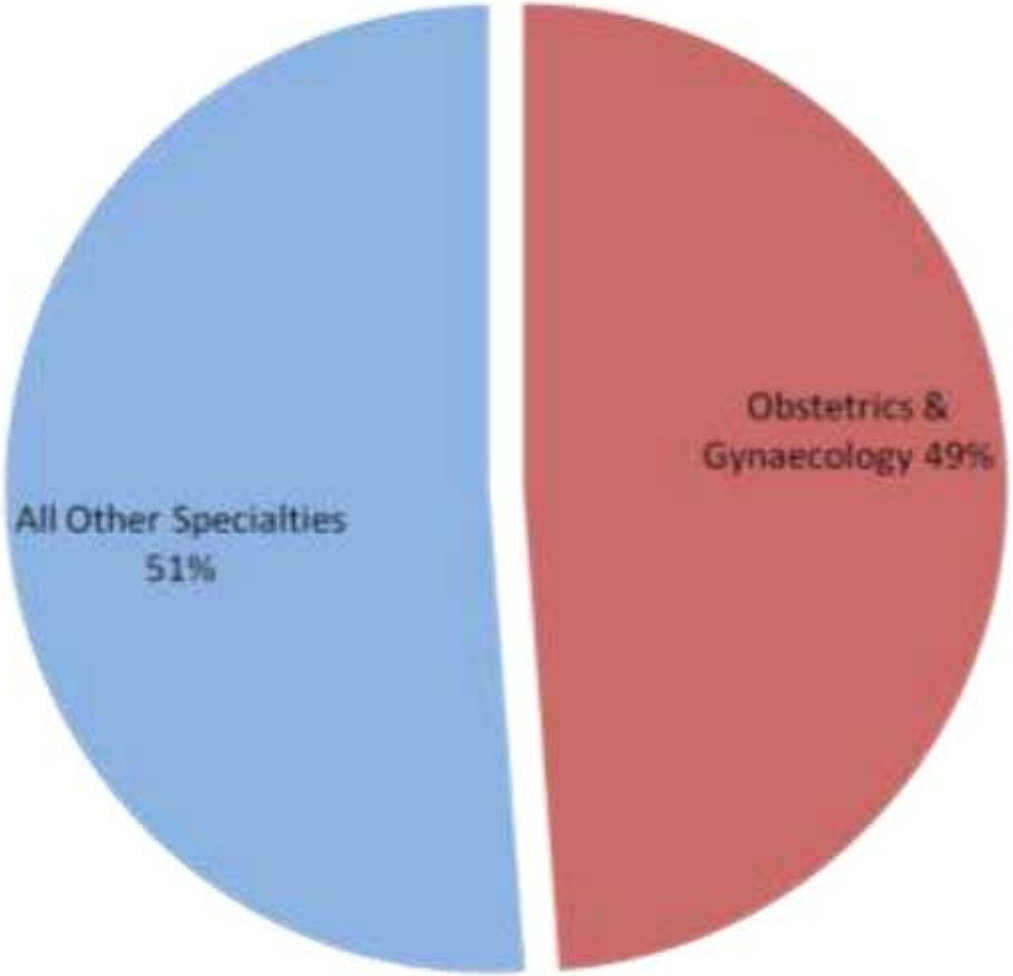


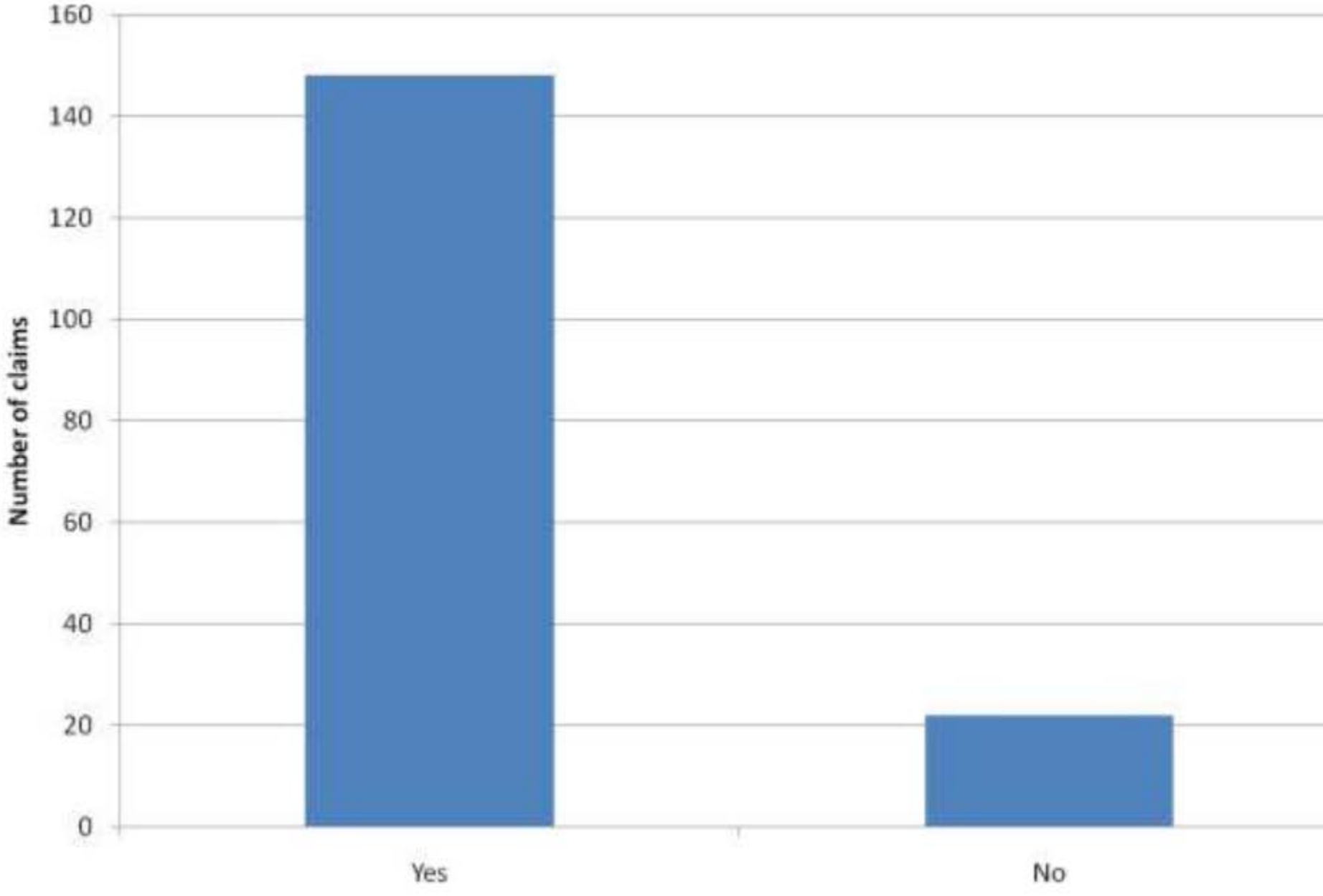
**Figure 5: Total number and value of maternity claims by financial year as at 31st March 2010**

| Financial Year | Number of claims | Total value |
|---|---|---|
| 2000/2001 | 692 | £315,077,262 |
| 2001/2002 | 643 | £297,746,799 |
| 2002/2003 | 690 | £439,990,329 |
| 2003/2004 | 683 | £368,912,614 |
| 2004/2005 | 649 | £459,091,400 |
| 2005/2006 | 588 | £455,233,188 |
| 2006/2007 | 517 | £371,968,190 |
| 2007/2008 | 362 | £226,580,089 |
| 2008/2009 | 222 | £148,455,956 |
| 2009/2010 | 41 | £34,594,061 |
| **Total** | **5,087** | **£3,117,649,888** |

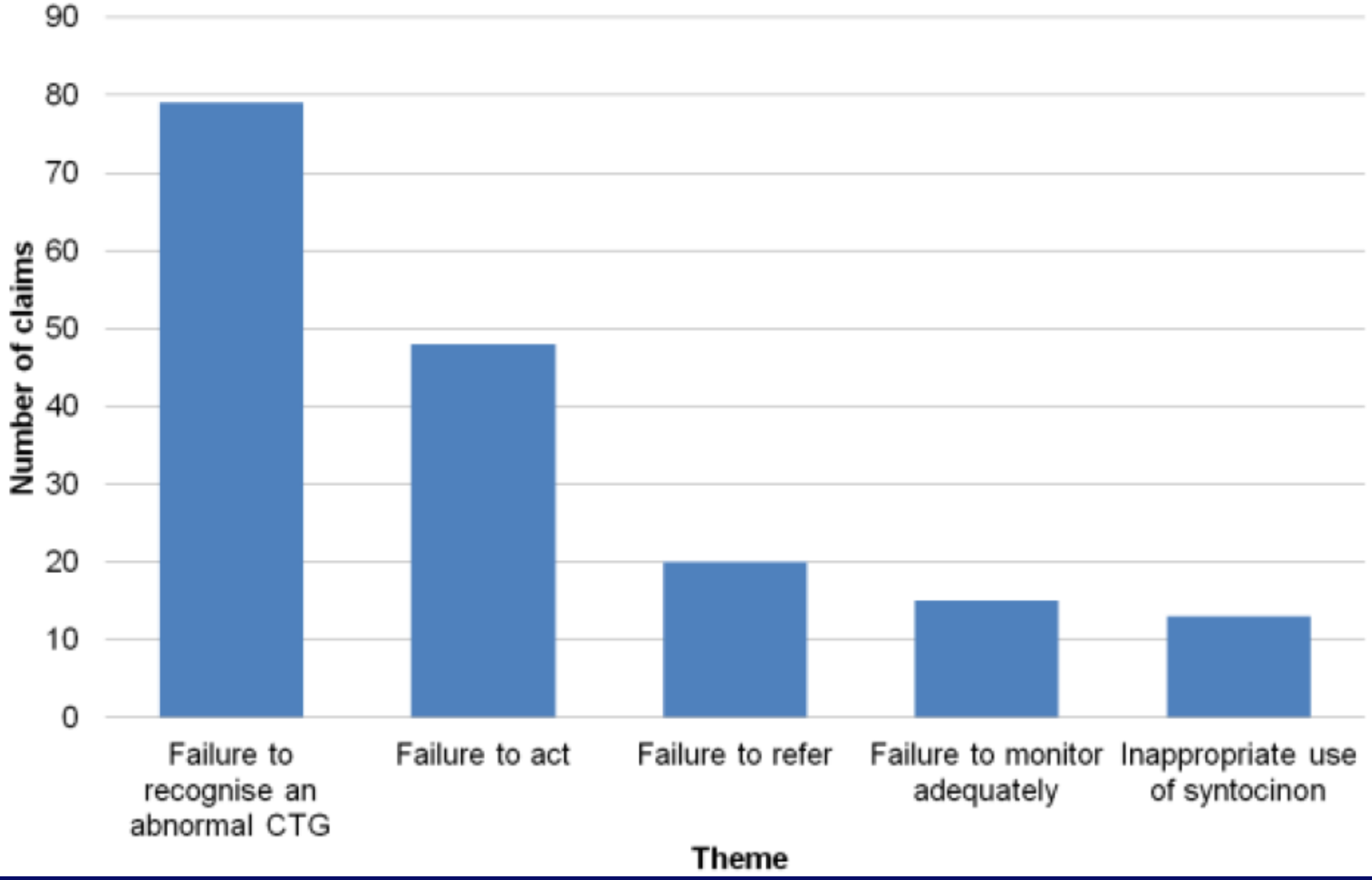
**Figure 6: Total number and value of claims by category between 1st April 2000 and 31st March 2010 as at 31st March 2010**

| Category | Number of Claims | (%) | Total value | (%) |
|---|---|---|---|---|
| Accident | 58 | 1.14 | £728,796 | 0.02 |
| Anaesthetic | 172 | 3.38 | £19,249,853 | 0.61 |
| Antenatal care | 391 | 7.68 | £144,811,665 | 4.64 |
| Antenatal investigations | 230 | 4.52 | £149,986,770 | 4.81 |
| Bladder | 72 | 1.41 | £8,824,269 | 0.28 |
| Caesarean section | 674 | 13.24 | £216,167,223 | 6.93 |
| Cerebral palsy | 542 | 10.65 | £1,263,581,324 | 40.52 |
| CTG interpretation | 300 | 5.89 | £466,393,771 | 14.95 |
| Drug error | 83 | 1.63 | £8,759,430 | 0.28 |
| Management of labour | 715 | 14.05 | £424,039,651 | 13.60 |
| Maternal death | 38 | 0.74 | £20,253,906 | 0.64 |
| Nursing care | 35 | 0.68 | £511,700 | 0.01 |
| Operative vaginal delivery | 160 | 3.14 | £93,659,223 | 3.00 |
| Other | 265 | 5.20 | £40,252,783 | 1.29 |
| Perineal trauma | 441 | 8.66 | £31,202,836 | 1.00 |
| Postpartum haemorrhage | 111 | 2.18 | £3,024,833 | 0.1 |
| Psychological | 28 | 0.55 | £681,791 | 0.02 |
| Retained swabs | 186 | 3.65 | £3,021,910 | 0.1 |
| Shoulder dystocia | 250 | 4.91 | £103,520,832 | 3.32 |
| Stillbirth | 251 | 4.93 | £15,712,695 | 0.50 |
| Uterine rupture | 85 | 1.67 | £103,264,627 | 3.31 |
| **Total** | **5,087** | | **£3,117,649,888** | |

**Figure 12 – Was there a misinterpretation of the CTG?**



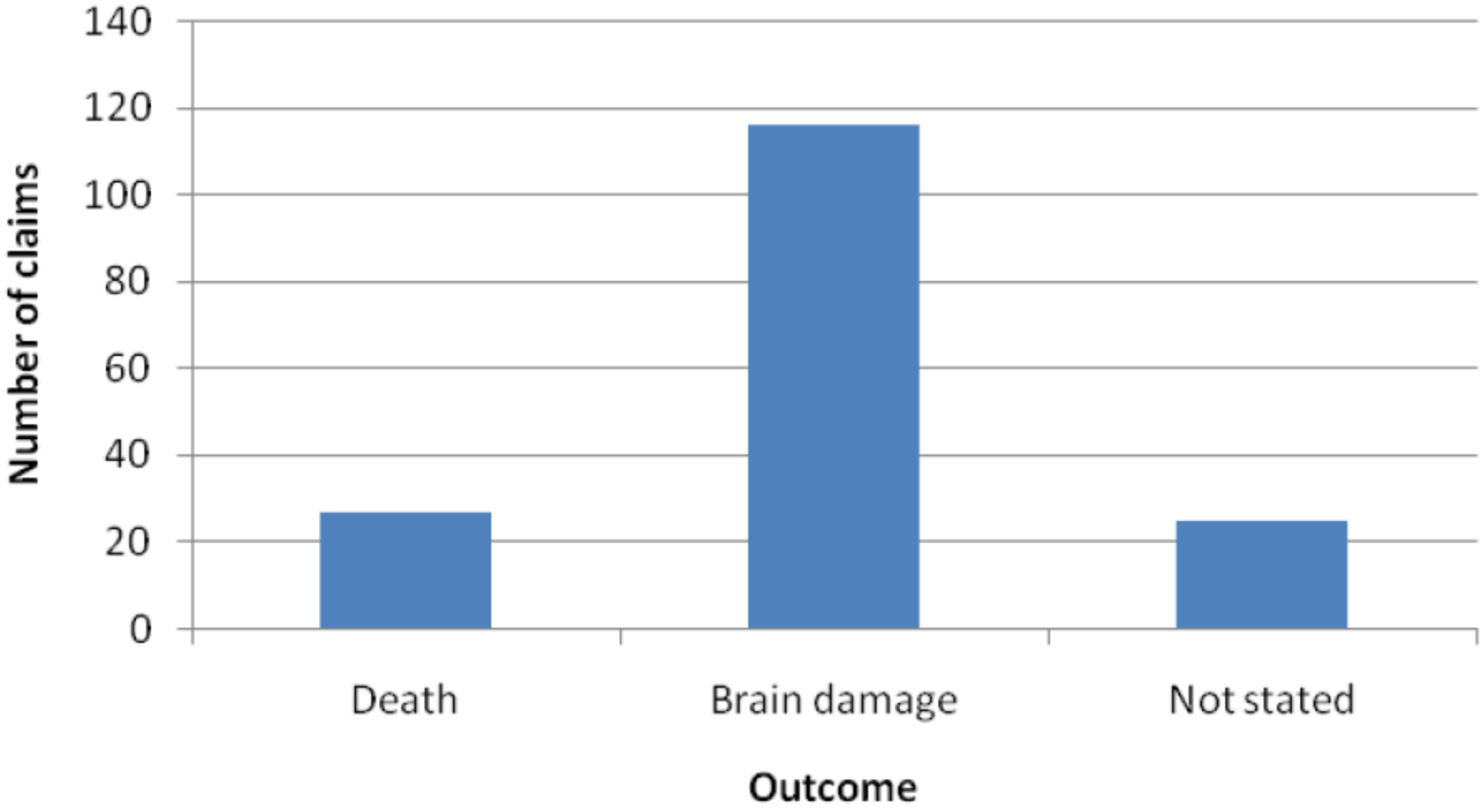
## Figure 13 – Themes of misinterpretation of CTG



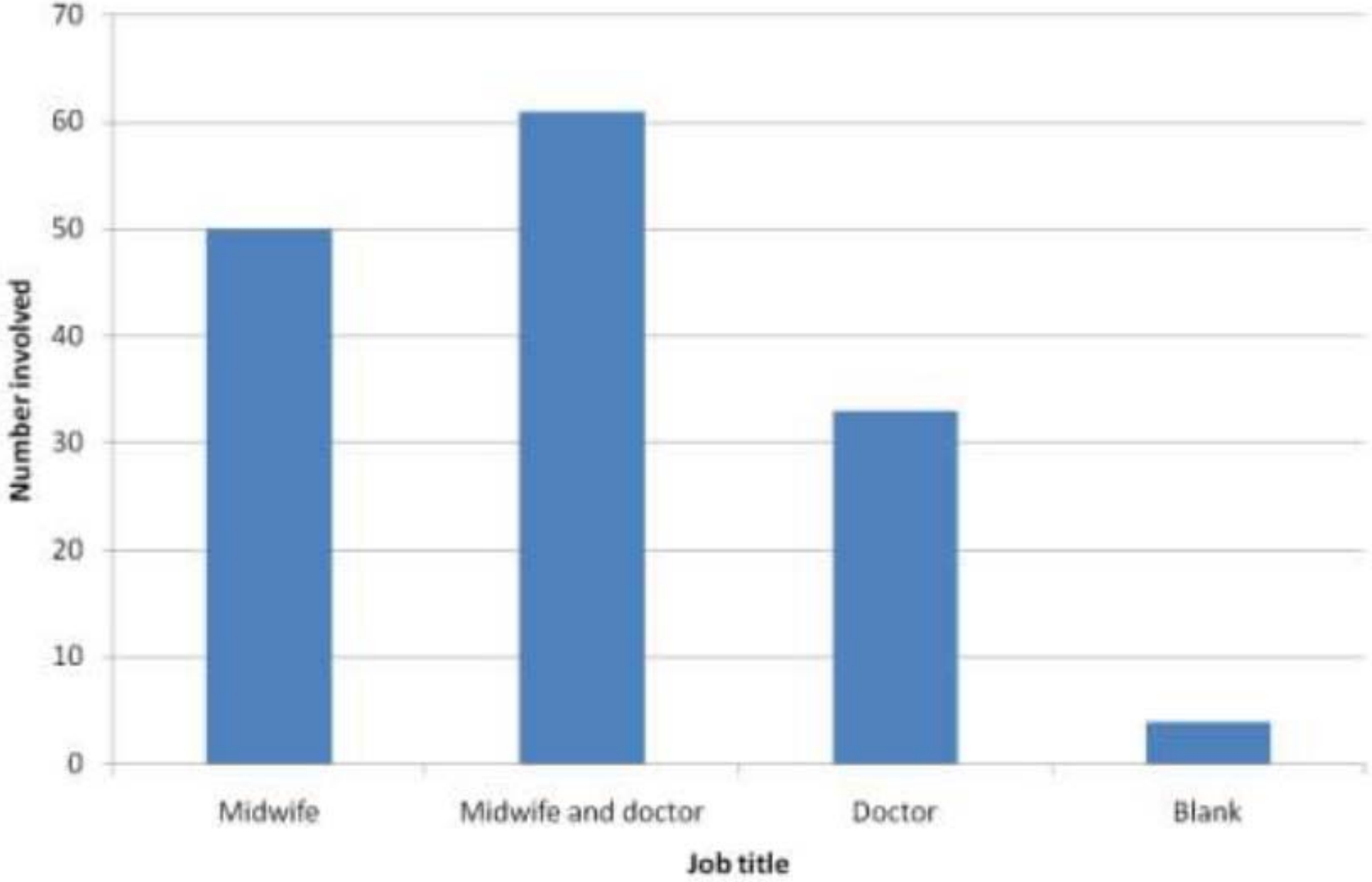
# Themes of Misinterpretation of CTG

- failure to recognise an abnormal CTG
- failure to act on an abnormal CTG
- failure to refer appropriately
- continuing to prescribe or administer Syntocinon in the presence of an abnormal CTG
- failure to monitor the fetal heart adequately (mistaking maternal pulse for the fetal heart, failing to recognise „doubling“ on the CTG)
- inadequate documentation

**Figure 14 – Outcomes in relation to misinterpretation of a CTG or auscultation of the fetal heart**



## Figure 18 – Job title of those involved in the misinterpretation of CTGs



# Hypoxia (lack of oxygen)

- Intrapartum (IP) hypoxia is a significant cause of fetal death and disability.

- In theory, the worst consequences and the majority of the adverse outcomes of IP hypoxia can be avoided.

# HIE ( Hypoxic Ischemic Encephalopathy)

| Grade I HIE (mild) | Grade II HIE (moderate) | Grade III HIE (severe) |
|---|---|---|
| Irritable hyperalert | Lethargic | Comatose |
| Normal or mild hypotonia | Markedly abnormal tone | Severely hypotonic |
| Poor sucking | Requires tube feeding | Needs assisted ventilation |
| No seizures | Seizures | Prolonged seizures |

# Cerebral Palsy

- Cerebral palsy is a group of permanent disorders of the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain.

Source: cerebralpalsy.org

# Cerebral Palsy

- Severity
  - Mild
  - Moderate
  - Severe

- **Motor Function**
  - **Spastic (Pyramidal)80% can affect any limb(s)**
    - **Monoplegia, paraplegia, hemiplegia, tetraplegia**
  - **Non-Spastic (Extrapyramidal) 20%**
    - **Ataxia & Dskinesia**
  - **Mixed**

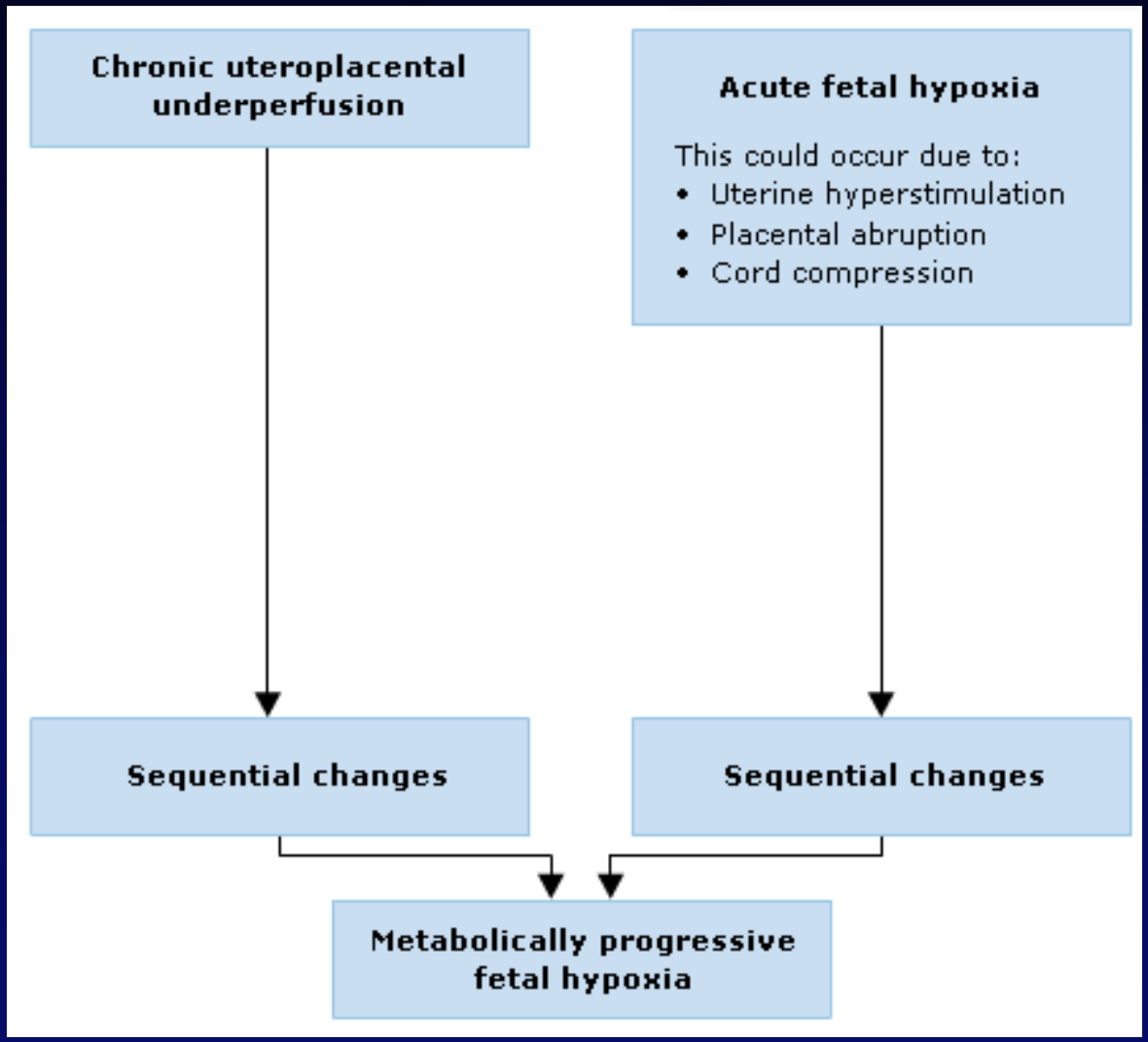
- In addition to the motor impairment, individuals with cerebral palsy may have sensory impairments, cognitive impairment, and epilepsy. Ambulation status, intelligence quotient, quality of speech, and hand function together are predictive of employment status

- Current strategies to decrease the risk of cerebral palsy due to IP hypoxia include induced hypothermia for neonates with hypoxic-ischemic encephalopathy.

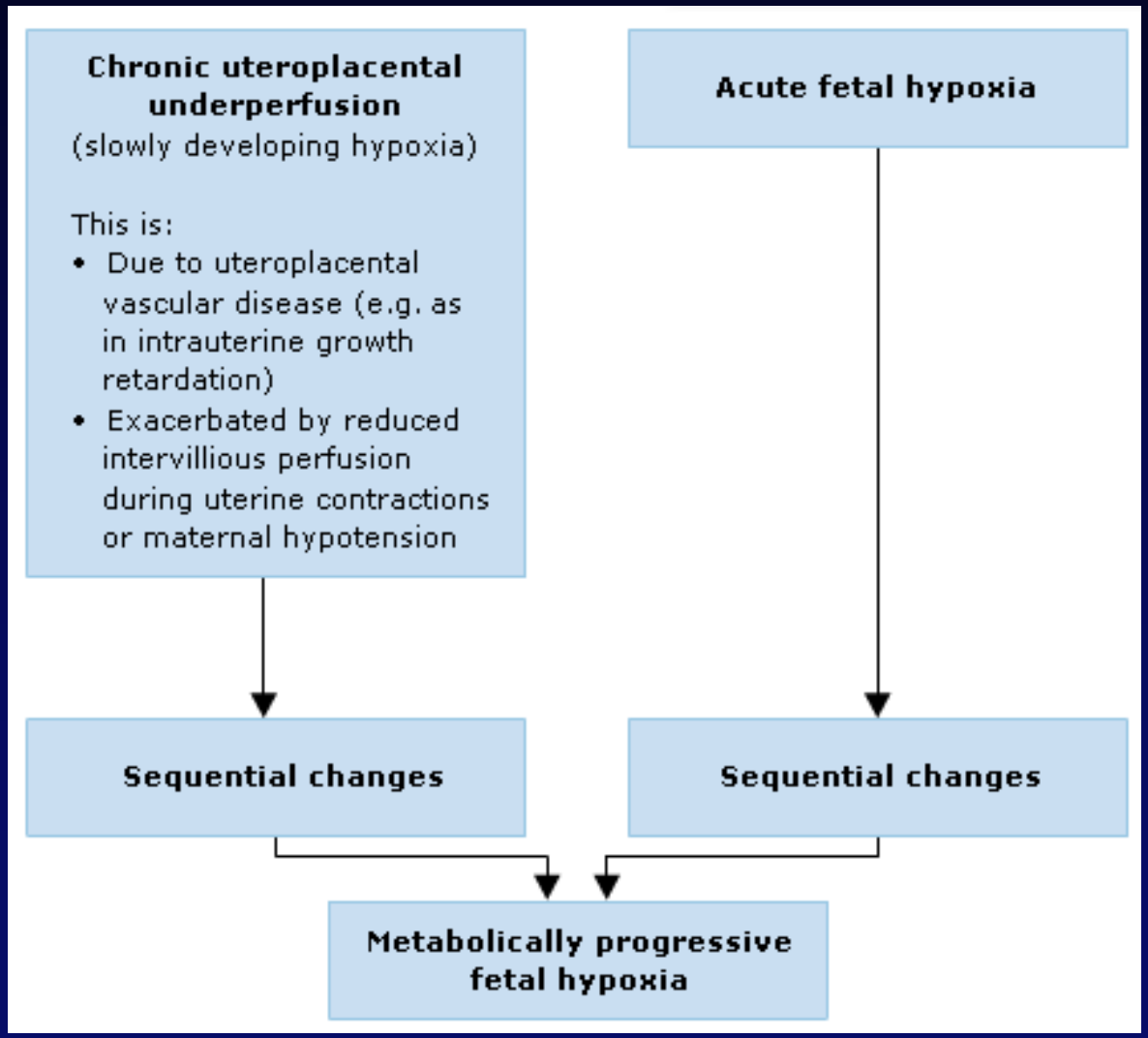
# Hypoxia may present

- chronically or
- acutely

# Development of fetal hypoxia (Acute)



# Development of fetal hypoxia (Chronic)



# Fetal Reserve

- Some episodes of hypoxaemia are common in labour and are tolerated well by the healthy fetus, unless the episodes are profound (e.g. abruption, shoulder dystocia) or protracted or repetitive for a long time (prolonged labour or hyperstimulation).

# Risk Factors for IP Fetal Hypoxia

- Maternal
- Fetal

- Pre-eclampsia : materno-fetal oxygen transfer (uteroplacental vascular disease).
- Maternal Diabetes: uteroplacental vascular disease esp Type I, relative intrauterine growth restriction in diabetic women ( size of baby in relation to placenta)
- **Antepartum Haemorrhage: placenta seperating**
- Maternal cardiac disease may cause reduced uterine perfusion
- Intrauterine growth restriction and therefore fetal hypoxia is more common in autoimmune disorders such as:
  - Systemic lupus erythematosus (SLE) (Fig 1)
  - Antiphospholipid syndrome

# Fetal Factors

- Small fetus esp. IUGR Even in the absence of utero-placental vascular disease causing intrauterine growth restriction, the constitutionally small fetus will be predisposed to hypoxia due to reduced fetal nutritional reserves
- The severity of placental dysfunction can be assessed by features including:
  - Degree and gestation at onset of growth restriction
  - Degree of oligohydramnios
  - Doppler ultrasonography of the umbilical artery

# Prematurity

- Associated pathology that may have triggered preterm labour, in particular
  - intrauterine growth restriction
  - Intrauterine infection (which may not be apparent clinically)
- The reduced nutritional reserves (especially cardiac glycogen) of a preterm fetus to cope with the normal intermittent hypoxic insult with each contraction in labour

# Oligohydramnios

- Intrauterine growth restriction and PPROM
- Increased risk of cord compression resulting in fetal hypoxia in labour

# Isoimmunization

- Fetuses with alloimmunisation are at risk of severe anaemia and therefore hypoxia

# Multiple Pregnancy

- Preterm labour
- Pre-eclampsia
- Intrauterine growth restriction
- acute intrapartum hypoxia in twin 2 after delivery of twin 1 due to :
  - Decompression of the uterus (can cause abruption)
  - Sustained contraction of the uterus
  - Possible cord compression

# Breech Presentation

- The mechanism is not known, but breech presentation may be more common amongst fetuses with growth restriction, and may predispose to cord compression or cord prolapse.

# Intrauterine Infection

- Intrauterine infection leads to a rise in perinatal morbidity and mortality
- Making the CTG less sensitive at detecting hypoxia
- **Sensitising the fetus so that perinatal injury occurs at a lesser degree of hypoxia**

# Previous Caesarean Section

- If VBAC , ruptures in labour (1:250)
- Absolute risk : same as having the first baby vaginally

# Prolonged Membrane Rupture

- Infection, which can alter the fetal response to hypoxia by making the CTG less sensitive at detecting hypoxia
- sensitising the fetus so that perinatal injury occurs at a lesser degree of hypoxia
- Cord compression, which can cause hypoxia directly
- Abruption, which can cause hypoxia directly

# Uterine Hyperstimulation

- No time to breathe
- Can cause abruption

# Meconium

- Old meconium, especially in mature fetuses, is less significant than fresh meconium. The incidence of meconium passage rises from less than 4% before 34 weeks to over 30% at 42 weeks.

- Meconium aspiration can occur with normal cord PH
- Is there a place for c/section for grade III mec?

# Acute Hypoxic Insults in labour

- Cord prolapse
- Uterine rupture (which can occur in an unscarred uterus)
  - Watch very carefully Parous ladies on Syntocinon
- Placental abruption
- Maternal hypotension
  - Usually transient and after Epidural
- Hyperstimulation
  - Uncommon in non-induction group

# Why labour is stressful to baby and the staff!?

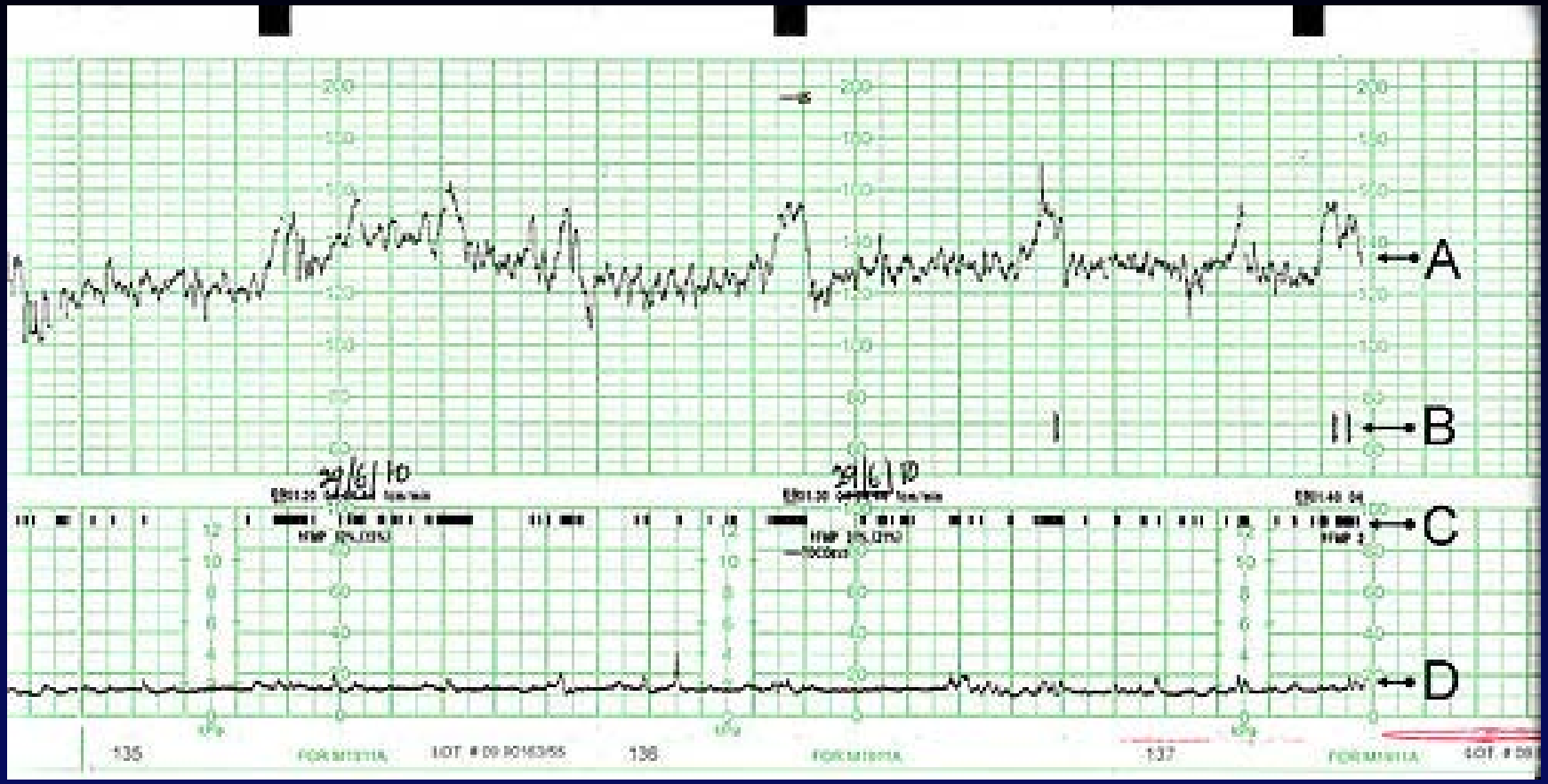
- Each uterine contraction is associated with a temporary reduction of placental blood flow and placental oxygen exchange. The healthy fetus has enough metabolic reserves to be able to cope with these periods of hypoxia for hours during labour. Between contractions, uterine perfusion normalises and placental oxygen exchange resumes.

- Resembling : swimming

# Control of FHR

- **Intrinsic**
  - Spontaneous dominant pacemaker activity of the sinoatrial node in the atrium

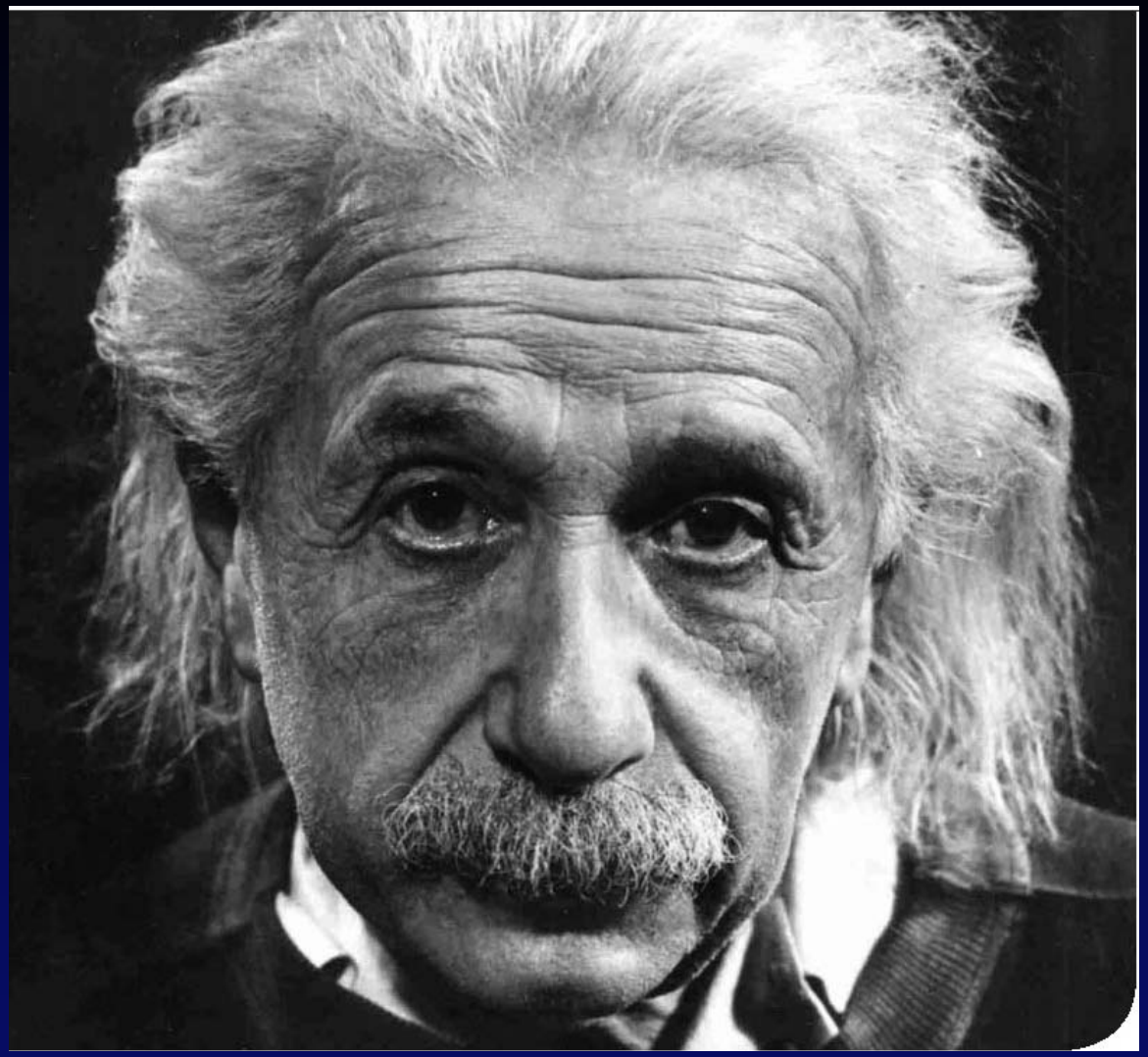
- **Extrinsic**
  - The cardio-regulatory/vasomotor centre in the brain stem
  - Baroreceptors
  - Chemoreceptors
  - Autonomic nervous system: Sympathetic causes increase in FHR and lowers baseline variability
  - Parasympathetic slows FHR and increases baseline variability
  - Circulating catecholamines
  - Aldosterone production and kidneys contribute to control of blood volume




- A typical CTG output for a woman not in labour. A: Fetal heartbeat; B: Indicator showing movements felt by mother (caused by pressing a button); C: Fetal movement; D: Uterine contractions

# Pattern Recognition

- Recognizing a pattern is a daily job
- How you recognise a car , face etc,



# Who is this guy!?

# Looking at the CTG paper systematically

- Check the name
- Check the speed
- Check the time and the date
- Check the maternal pulse
- Define risk and the indication of CTG monitoring

# Check your paper speed first

- 1cm/minute
- 3cm/minute

- In UK it is 1cm/minute
- What is yours?
- Does it need to be standardised in Iran?

# Baseline and Gestational Age

- From 14 weeks to term there is a progressive fall in the mean baseline FHR which is unaffected by whether the fetus is Active or Quiescent

# Variability and Gestational age

- The baseline variability of the FHR in early pregnancy is low and increases with gestation, but that is refined by the behavioural state of the fetus . Thus over the second half of pregnancy the baseline variability increases progressively during fetal activity; this increase is less marked during fetal quiescence and declines from 30 weeks onwards.

# FSE

- Fetal scalp electrode

Indication:

Any problem in getting a good trace eg. Patient moving due to pain or obese patients.

# Effect of medication on CTG

- Pethidine
- Methyldopa

# Classification of CTG

- Normal
- Suspicious
- Pathological

# What do you do with?

- Normal  CTG
- Suspicious CTG
- Pathological CTG

# Suspicious CTG

**Ensure adequate quality recording of both fetal heart rate and contraction pattern**

## Inadequate quality CTG?

Check maternal pulse

Poor contact from external transducer?

- check position of transducer
- consider applying fetal scalp electrode (FSE)

FSE not working?

- Check position of electrode
- Confirm fetal heart with Pinard stethoscope and/or ultrasound

## Uterine hypercontractility?

Is the mother receiving oxytocin?

- Reduce/stop infusion

Has the mother recently received vaginal prostaglandins?

- Consider tocolysis with subcutaneous terbutaline 0.25 mg

## Maternal tachycardia/pyrexia

Is there a maternal infection?

- Check temperature. If 37.5°C on two occasions, 2 hours apart or 38.0°C or higher, consider screening and treatment

Is mother dehydrated?

- Check blood pressure and give 500 ml crystalloid (IV) if appropriate

Is mother receiving tocolytic infusion?

- If maternal pulse > 140 bpm, reduce infusion

## Other maternal factors

What is the mother's position?

- Encourage mother to adopt left-lateral position

Consider:

- Is mother hypotensive?
- Has a vaginal examination just been performed?
- Has mother been vomiting or had a vasovagal episode?
- Has mother just had epidural sited?

Check blood pressure and give 500 ml crystalloid (IV) if appropriate

# Pathological CTG

**Fetal blood sampling (FBS) possible and/or appropriate?**

Encourage mother to adopt left lateral position. Check blood pressure and give 500 ml crystalloid (IV) if appropriate.

| FBS result (pH) | Recommended action |
|---|---|
| **Normal**<br>**7.25 or above** | – FBS should be repeated in 1 hour if FHR abnormality persists or sooner if there are further abnormalities<br>– If result remains stable after second test, a third/further sample may be deferred unless there are further abnormalities of the CTG |
| **Borderline**<br>**7.21 – 7.24** | – Repeat FBS within 30 minutes if the FHR remains pathological or sooner if there are further abnormalities. (consideration should be given to the time taken to perform FBS when planning repeat samples)<br>– If a third sample is indicated, a consultant obstetric opinion should be sought |
| **Abnormal**<br>**7.20 or less** | – Consultant obstetric advice should be sought<br>– Urgent delivery within 30 minutes |

**All FBS results should be interpreted taking into account the previous pH measurement, the rate of progress in labour and the clinical features of mother and fetus.**

**Fetal blood sampling not possible/inappropriate?**

– Encourage mother to adopt left lateral position. Check blood pressure and give 500 ml crystalloid (IV) if appropriate.

**EXPEDITE DELIVERY:**

– The urgency and mode of delivery should take into account the severity of the fetal heart rate and the clinical circumstances.

– The accepted standard is that delivery should be accomplished within 30 minutes.

**Figure 5.9.** Suggested actions if CTG pathological

Pathological CTG

Sample or Deliver

# 4 Features of CTG

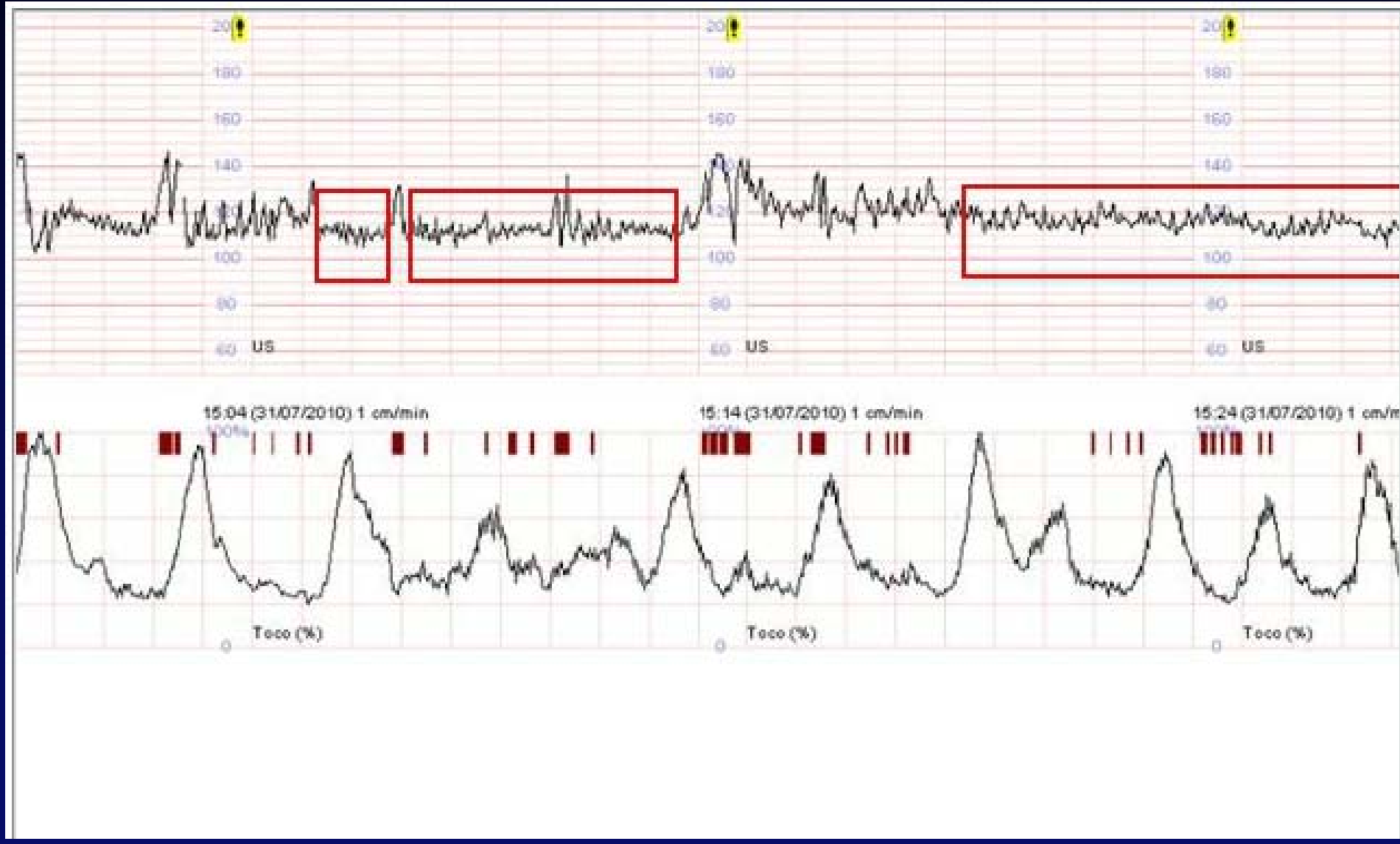
- **Baseline**
  - **Reassuring, Non Reassuring , Abnormal**
- **Variability**
  - **Reassuring, Non Reassuring , Abnormal**
- **Deceleration**
  - **Reassuring, Non Reassuring , Abnormal**
- **Accelerations**
  - **Lack : unknown significance in Labour**

# Baseline FHR – Definition

- The FHR in between periodic changes is called the baseline FHR

- The normal baseline FHR varies between 110-160 bpm (slightly quicker for preterm).
- A baseline FHR of 100-109 bpm or 161-180 bpm is non-reassuring.
- A baseline FHR of <100 or >180 bpm is classified as an abnormal feature.

# Example of baseline rate



# How to define baseline rate?

- Look at the paper from the side
- Watch for creeping baseline (Look at the side of folded papers)

# Baseline variability

- This is the difference between the upper and lower limits of the baseline heart rate over a short period of time, for example, over one minute.

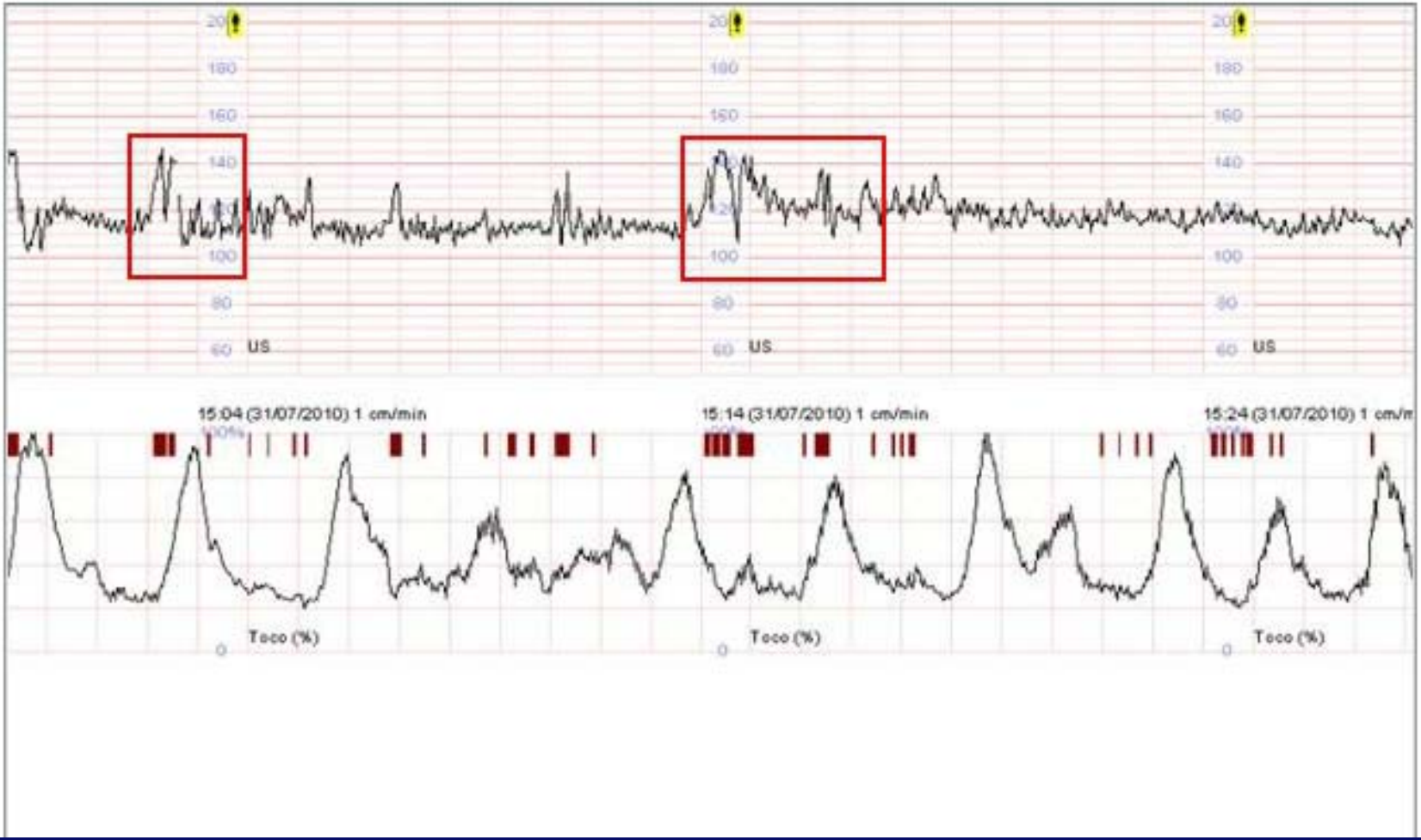
- Variability between 5 and 25 bpm is considered 'reassuring'. Reduced variability of <5 bpm can be physiological during periods of fetal sleep.
- Variability of <5 bpm is considered a non-reassuring feature if it lasts between 40 to 90 minutes.
- A variability of <5 bpm for more than 90 minutes is an abnormal feature.

# Accelerations

- An acceleration is a transient increase in FHR of at least 15 bpm above the baseline which lasts for at least 15 seconds .

- Accelerations are an essential feature of a non-labouring CTG, however, in labour the fetus may preserve energy by reducing its movements. Therefore, the absence of accelerations in labour is common and is of no known clinical significance.

# Example of acceleration



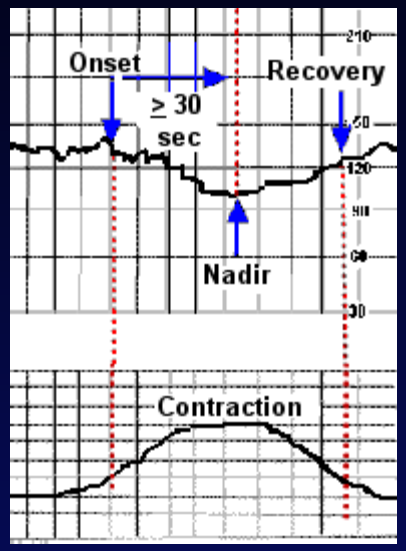
# Decelerations

- A deceleration is a transient decrease in FHR of at least 15 bpm below the baseline which lasts for at least 15 seconds.

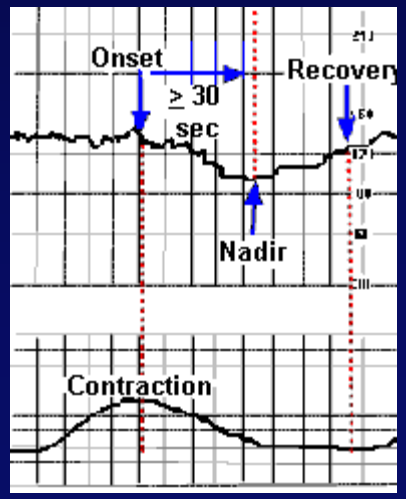
- The presence of decelerations is a non-reassuring or abnormal feature in a CTG and is classified according to the type, duration and frequency of the decelerations.

# Early Vs Late Decels

- Early Decel

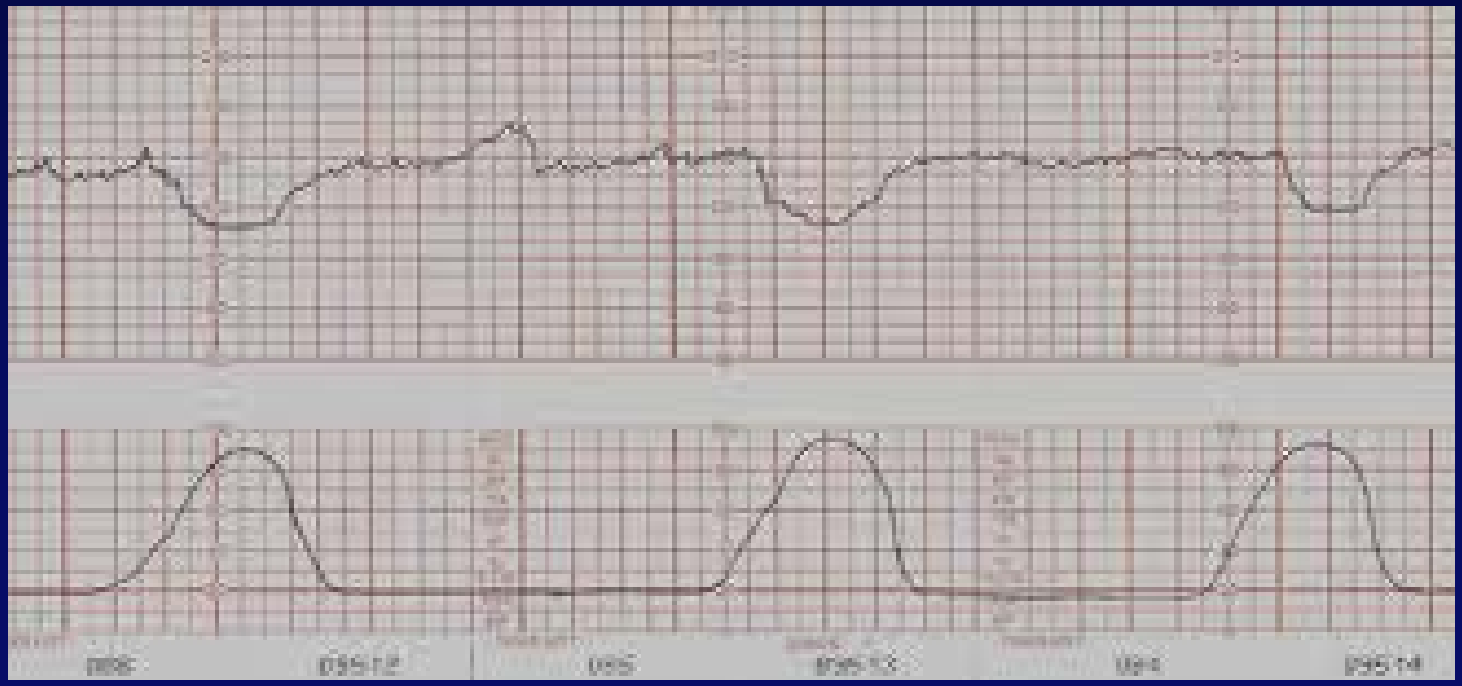



- Late Decel

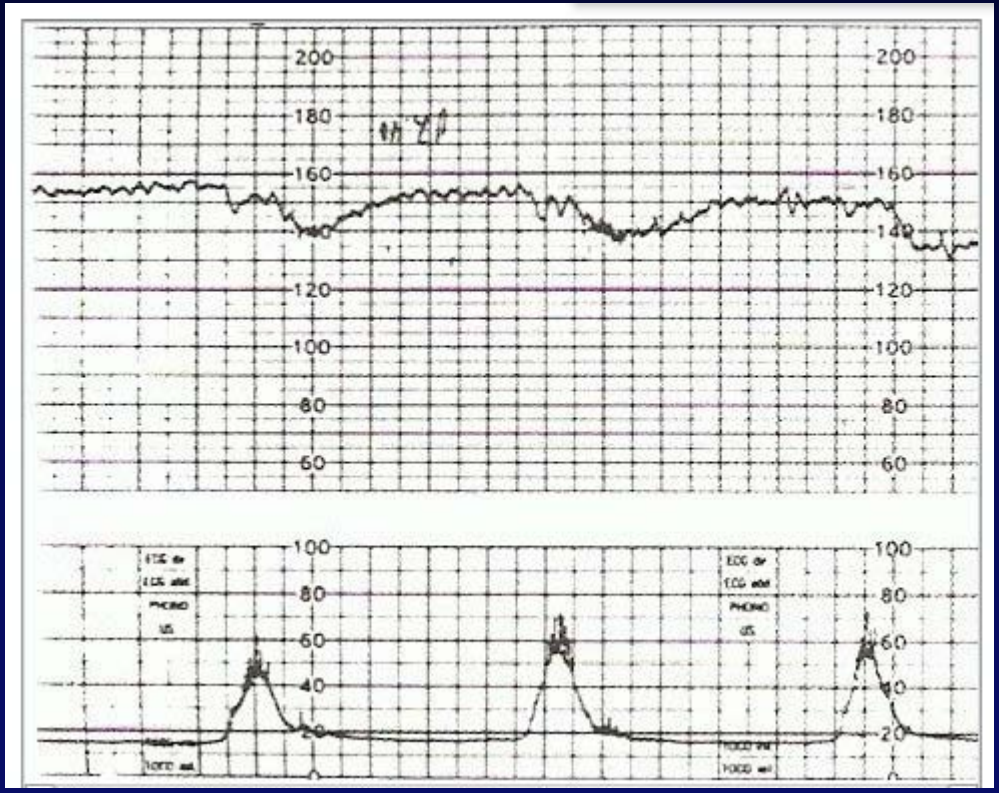


# Early deceleration

- Caused by head ompression



# Late deceleration



# Late Decels

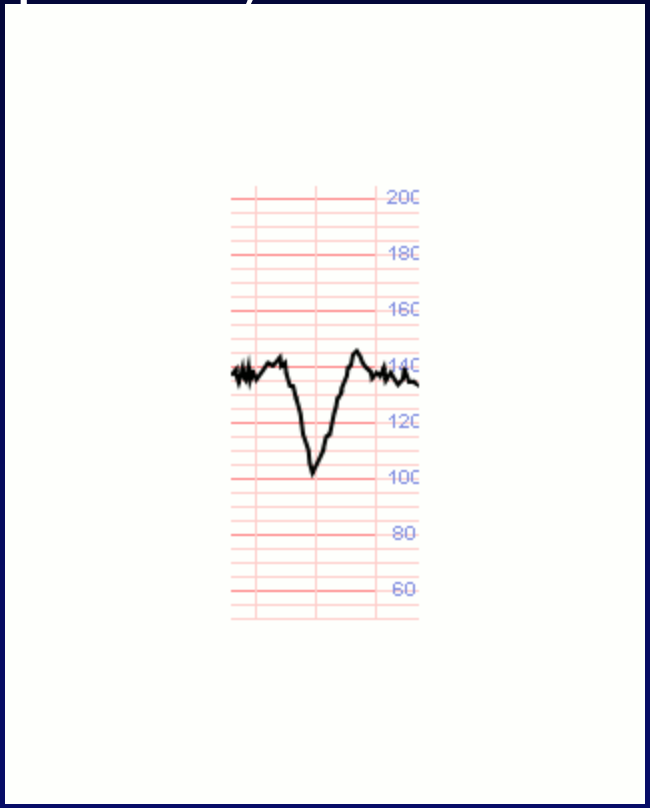
- Must be **uniform** in both length and depth; for this reason true late decelerations are uncommon (more commonly they are atypical variable decelerations that have been wrongly classified)
- Late decelerations are one feature of uteroplacental insufficiency.

# Variable deceleration

- vary in length and amplitude and are not uniform (unlike early and late decelerations).
  - Typical
    - 'Shoulders' (primary and secondary acceleratory phases)
  - Atypical
    - Overshoots
    - Loss of primary shoulder/acceleratory phase
    - Smooth deceleration
    - Slow return to baseline (late component)
    - Baseline returns to a lower level (after deceleration)
    - Biphasic (W shape)

# Typical variable deceleration

- 'Shoulders' (primary and secondary acceleratory phases)



# Atypical deceleration

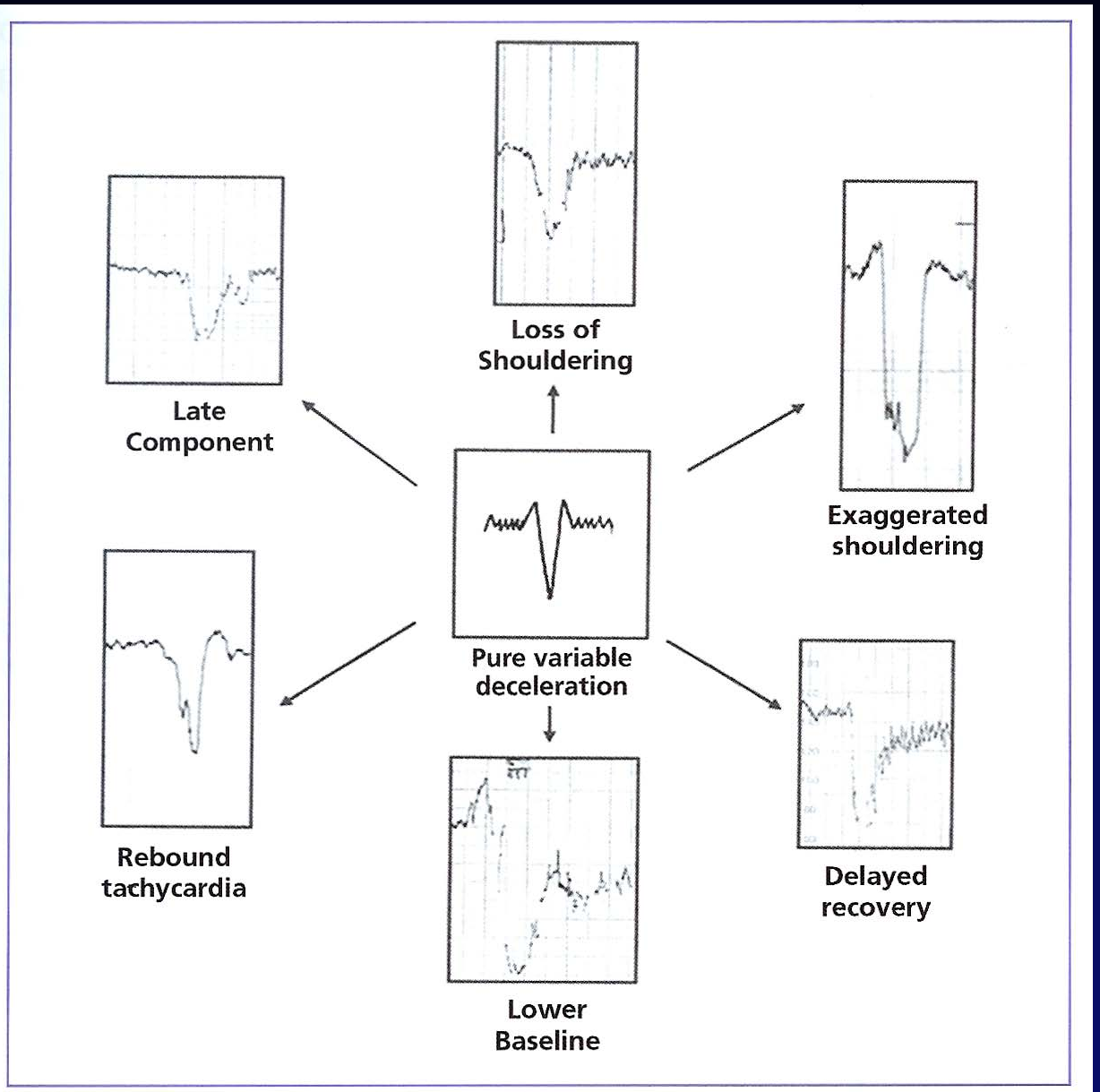



Figure 5.5. Atypical variable decelerations

## Classification of FHR trace features

| Feature | Baseline (bpm) | Variability (bpm) | Decelerations | Accelerations |
|---|---|---|---|---|
| Reassuring | 110–160 | ≥ 5 | None | Present |
| Non-reassuring | 100–109<br>161–180 | < 5 for 40–90 min | Typical variable decelerations with over 50% of contractions, for over 90 min<br>Single prolonged deceleration for up to 3 min | The absence of accelerations with otherwise normal trace is of uncertain significance |
| Abnormal | < 100<br>> 180<br>Sinusoidal pattern<br>≥ 10 min | < 5 for 90 min | Either atypical variable decelerations with over 50% of contractions or late decelerations, both for over 30 min<br>Single prolonged deceleration for more than 3 min | |

## Definition of normal, suspicious and pathological FHR traces

| Category | Definition |
|---|---|
| Normal | All four features are classified as reassuring |
| Suspicious | One feature classified as non-reassuring and the remaining features classified as reassuring |
| Pathological | Two or more features classified as non-reassuring or one or more classified as abnormal |

| Feature | Baseline (bpm) | Variability (bpm) | Decelerations | Accelerations |
|---|---|---|---|---|
| **Reassuring** | 110–160 | ≥5 | None | Present |
| **Non-reassuring** | 100-109<br>161-180 | <5 for 40-90 minutes | Typical variable decelerations with over 50% of contractions, occurring for over 90 minutes<br>Single prolonged deceleration for up to 3 minutes | The absence of accelerations with otherwise normal trace is of uncertain significance |
| **Abnormal** | <100<br>>180<br>Sinusoidal pattern ≥10 minutes | <5 for 90 minutes | Either atypical variable decelerations with over 50% of contractions or late decelerations, both for over 30 minutes<br>Single prolonged deceleration for more than 3 minutes | |

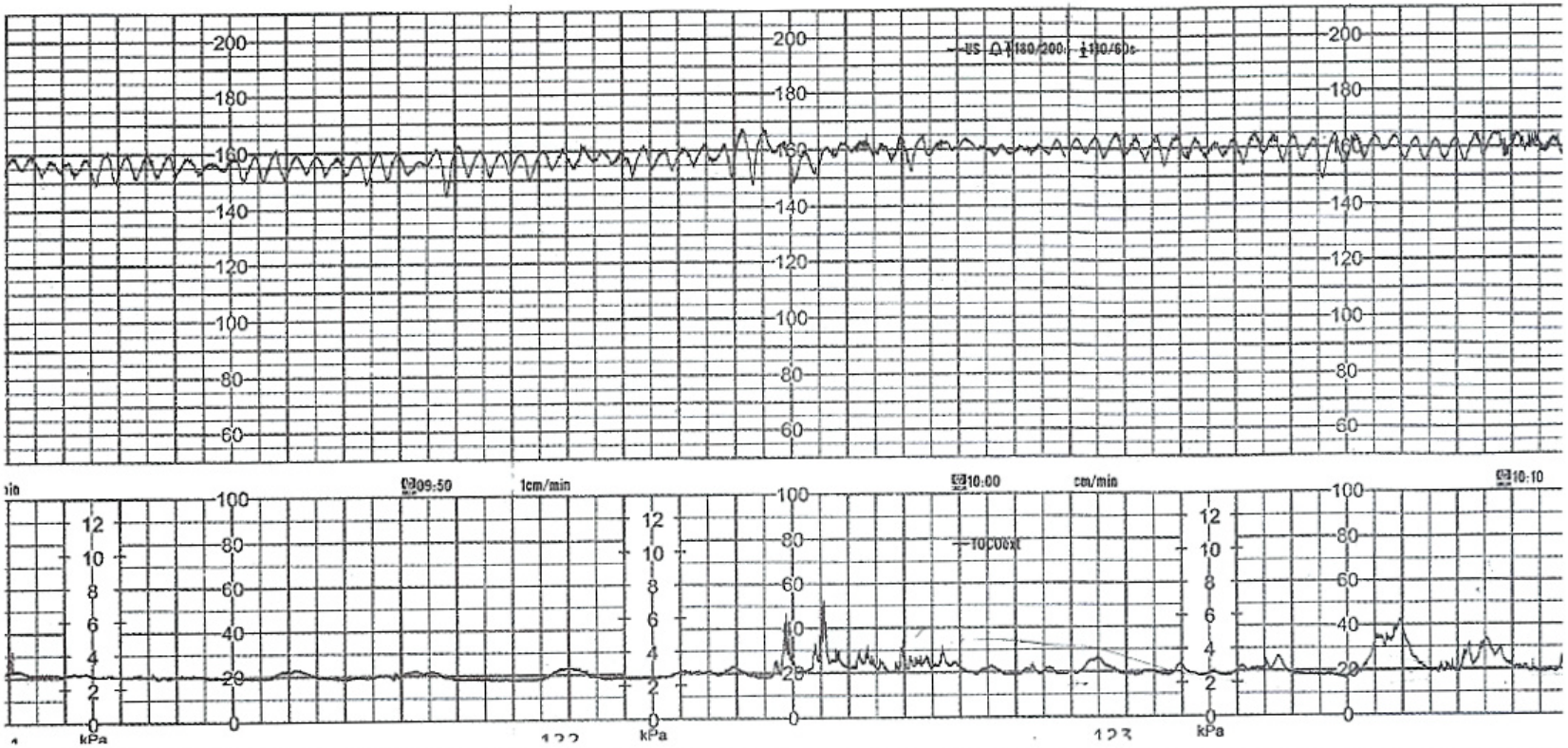
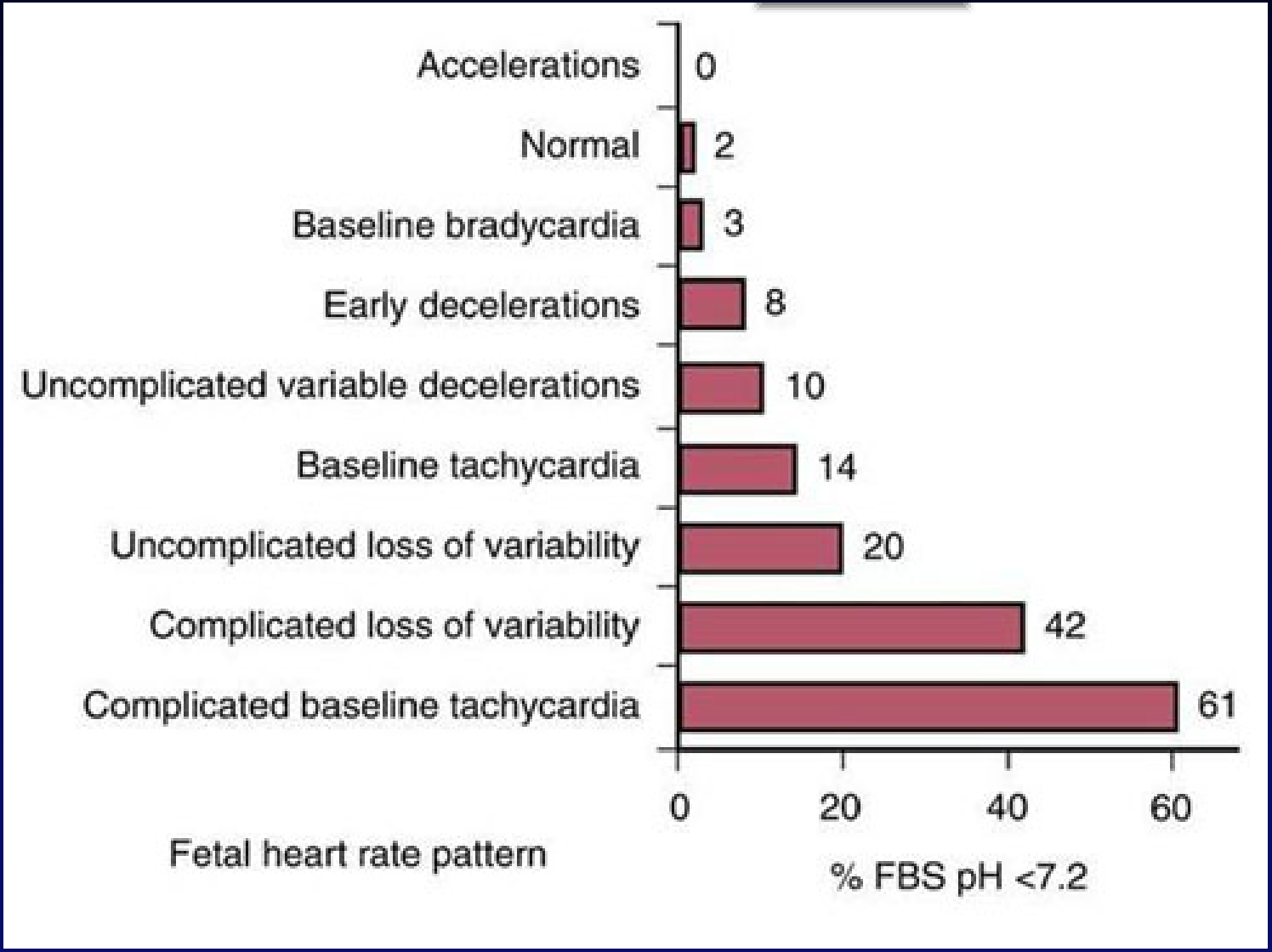



**Figure 5.6.** Sinusoidal pattern

# Red Flags

- Loss of variability
- Complicated tachycaardia

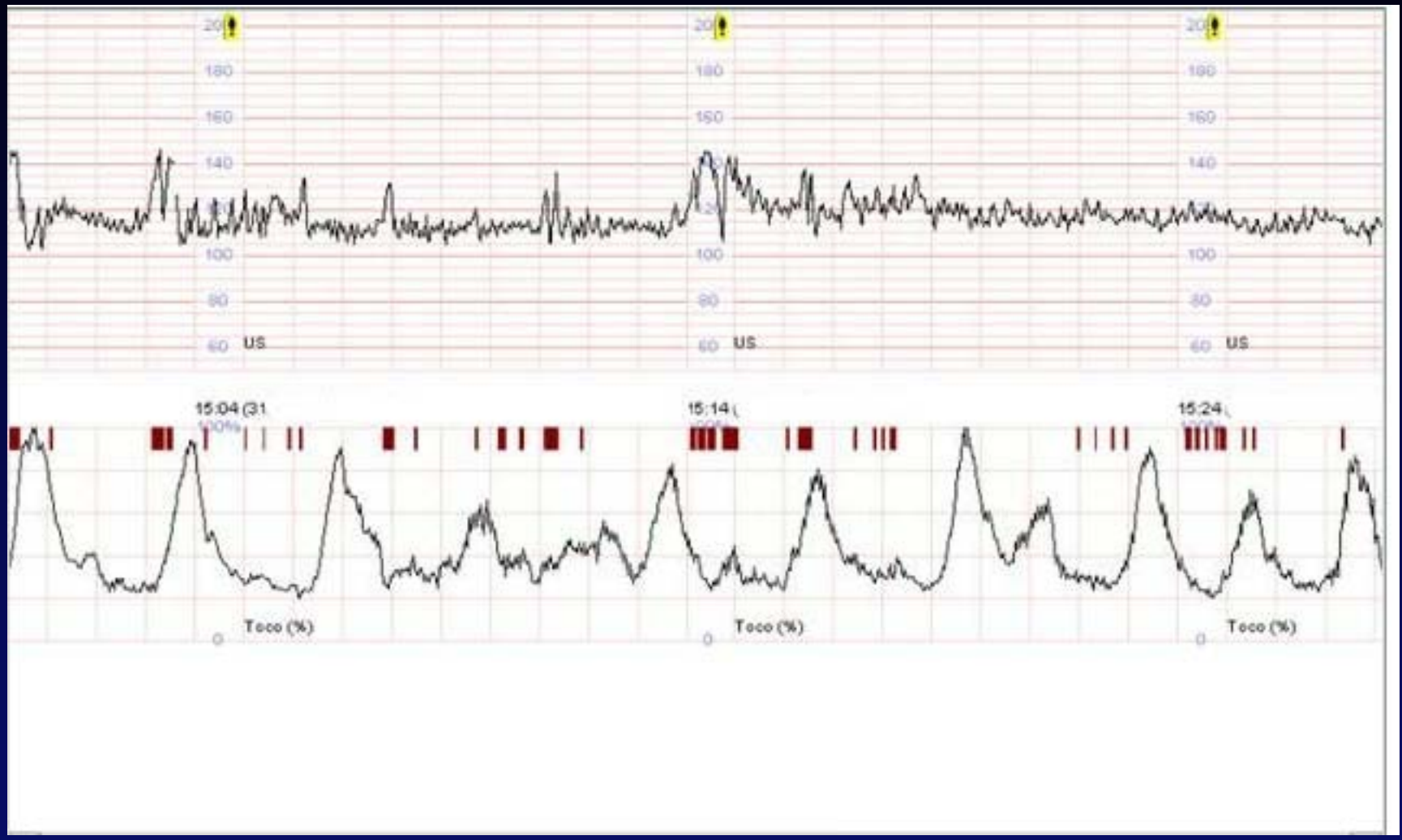
# Chronic hypoxic insults



## Record-keeping

- Check date/time clock on EFM machine.
- Label FHR traces with mother's name, date and hospital number.
- Sign trace and record date, time and mode of birth.
- Note events, e.g. vaginal exam, FBS, epidural siting on trace.
- Store traces securely.

How reliable is the clock in the labour  ward and the hospital?


US
US
US
15:04 (31
15:14
15:24
Toco (%)
Toco (%)
Toco (%)

# Contraction Assessment

- The external transducer detects the frequency of uterine contractions, but not their strength or duration.
- The optimum frequency of contractions is 4 to 5 in 10 minutes.
- t is important to note the contraction frequency to detect hypercontractility (>5 contractions in 10 minutes) and also to characterise the decelerations.

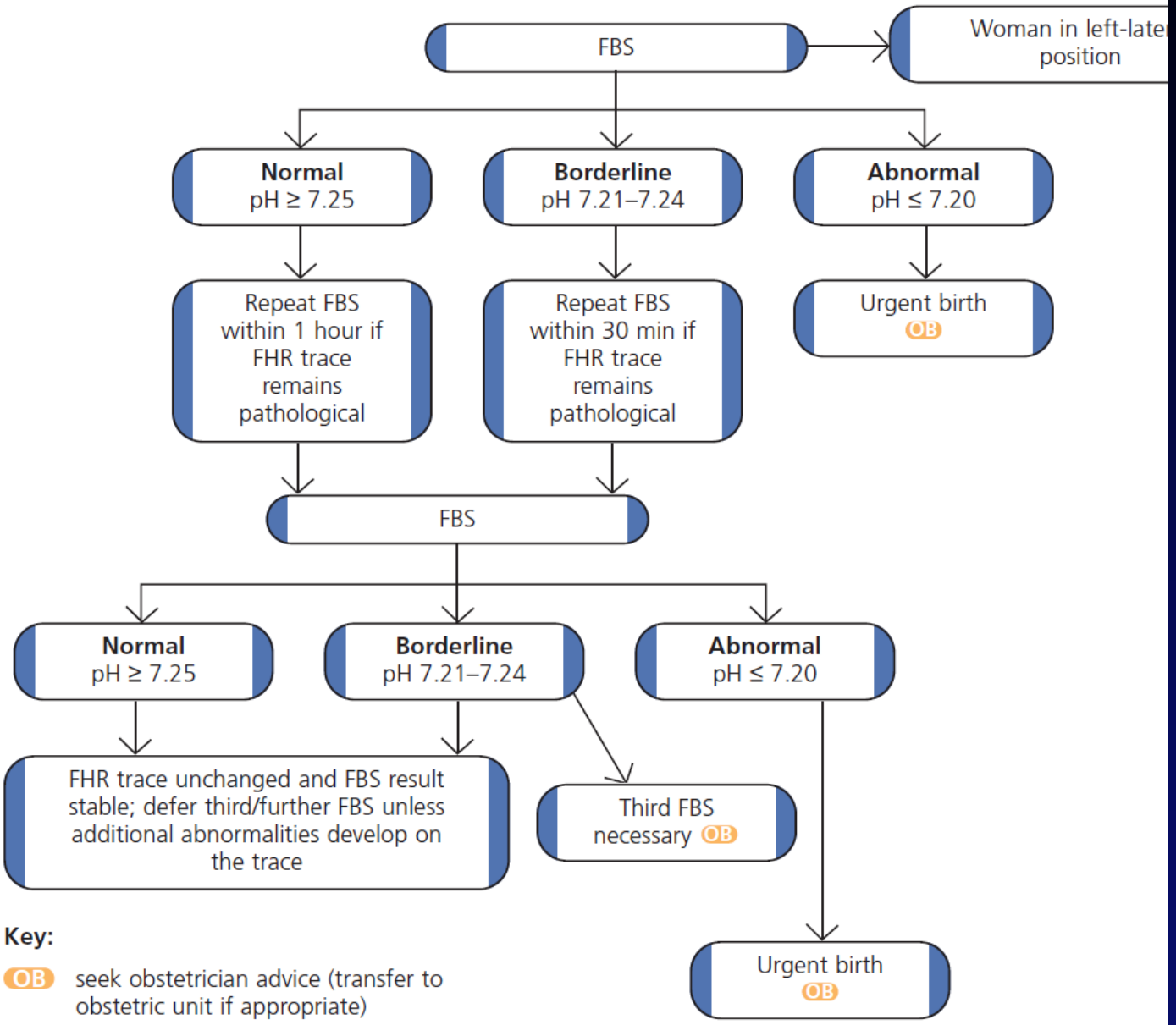
## Risk management

- Consider the time taken for instrumental vaginal birth and CS when making decisions about fetal wellbeing.
- Keep FHR traces for 25 years; where possible store electronically.
- If the baby may suffer developmental delay, photocopy and store FHR traces indefinitely.
- Use tracer systems if FHR traces stored separately from women's records.
- Take paired cord blood gases only when concerned about the baby either in labour or immediately following birth.
- Ensure an additional clamp for double-clamping is available at all birth settings.

# CTG Interpretation

**DR C BRAVADO**
**D**etermine Risk
**C**ontractions
**B**aseline **RA**te
**V**ariability
**A**ccelerations
**D**ecelerations
**O**verall **A**ssessment

# Fetal blood sampling (FBS)

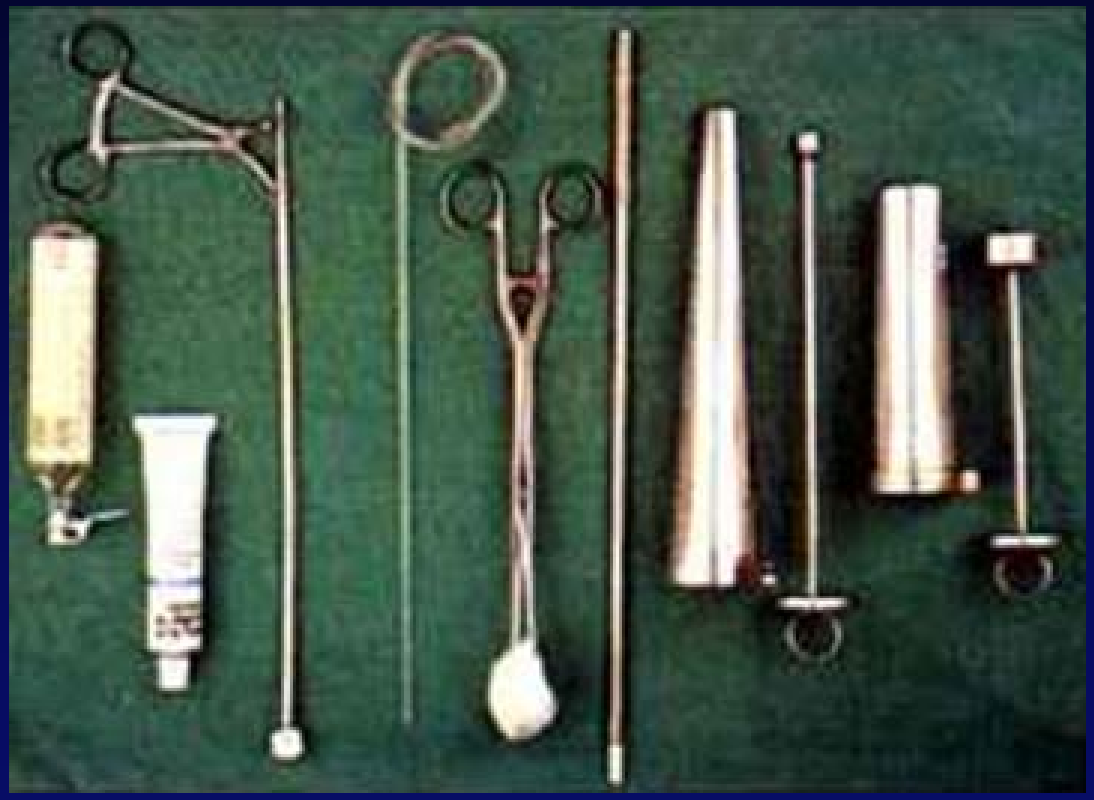



NICE Guideline

# FBS Kit( Disposable)

# FBS Kit (Reusable)

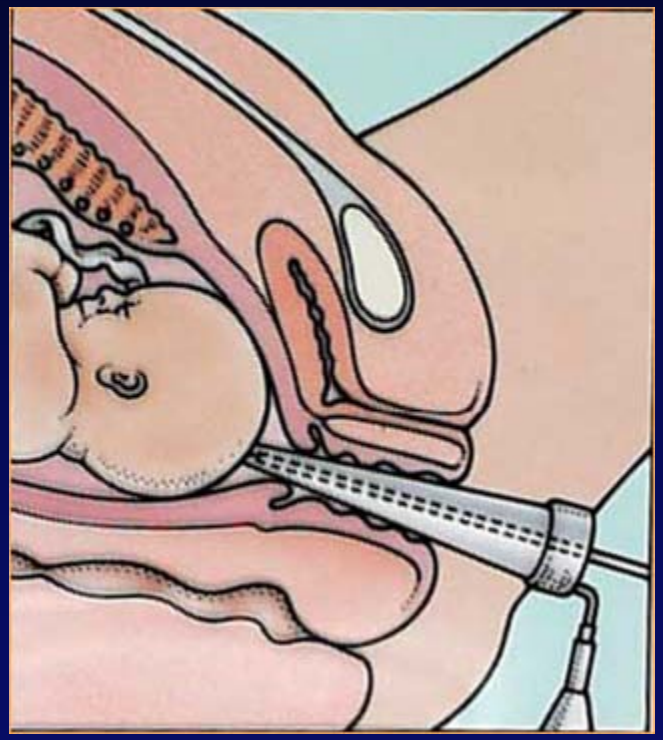
# FBS reusable instruments



# Positions for FBS

- Left Lateral
- Lithotomy

# FBS



# Fetal Blood Sampling

# How to perform FBS

- Taking the sample
- Clean the scalp
- Spray the scalp with ethyl chloride to encourage a reactive hyperaemia in the skin
- Use petroleum jelly to lightly cover the scalp and smooth the hair in a single direction
- Use the blade in line with the hair and use a single firm stab.
- Wait for a minute and blood will come into a bubble
- Use a glass tube to take up blood by capillary action
- Put the sample into machine - use clean end to avoid contamination

# Contraindication to FBS

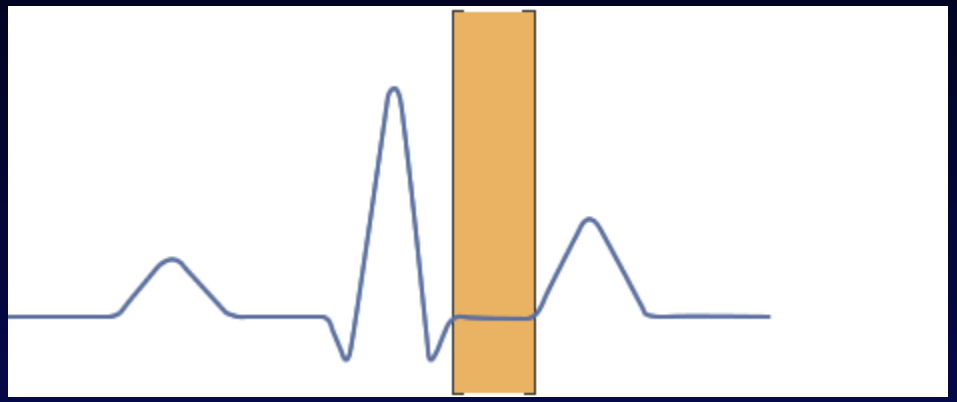
- acute compromise : Bradycardia , average time to get an FBS is 18 minutes
- vertical transmission of virus or bacteria possible, e.g. HIV, hepatitis C, suspected chorioamnionitis

- fetal bleeding disorders suspected, e.g. haemophilia, low platelets
- Be careful in preterm infants - avoid below 34 weeks

# Best Candidate for FBC

- Parous patient whom needs one or two FBS before delivery

# Fetal ECG

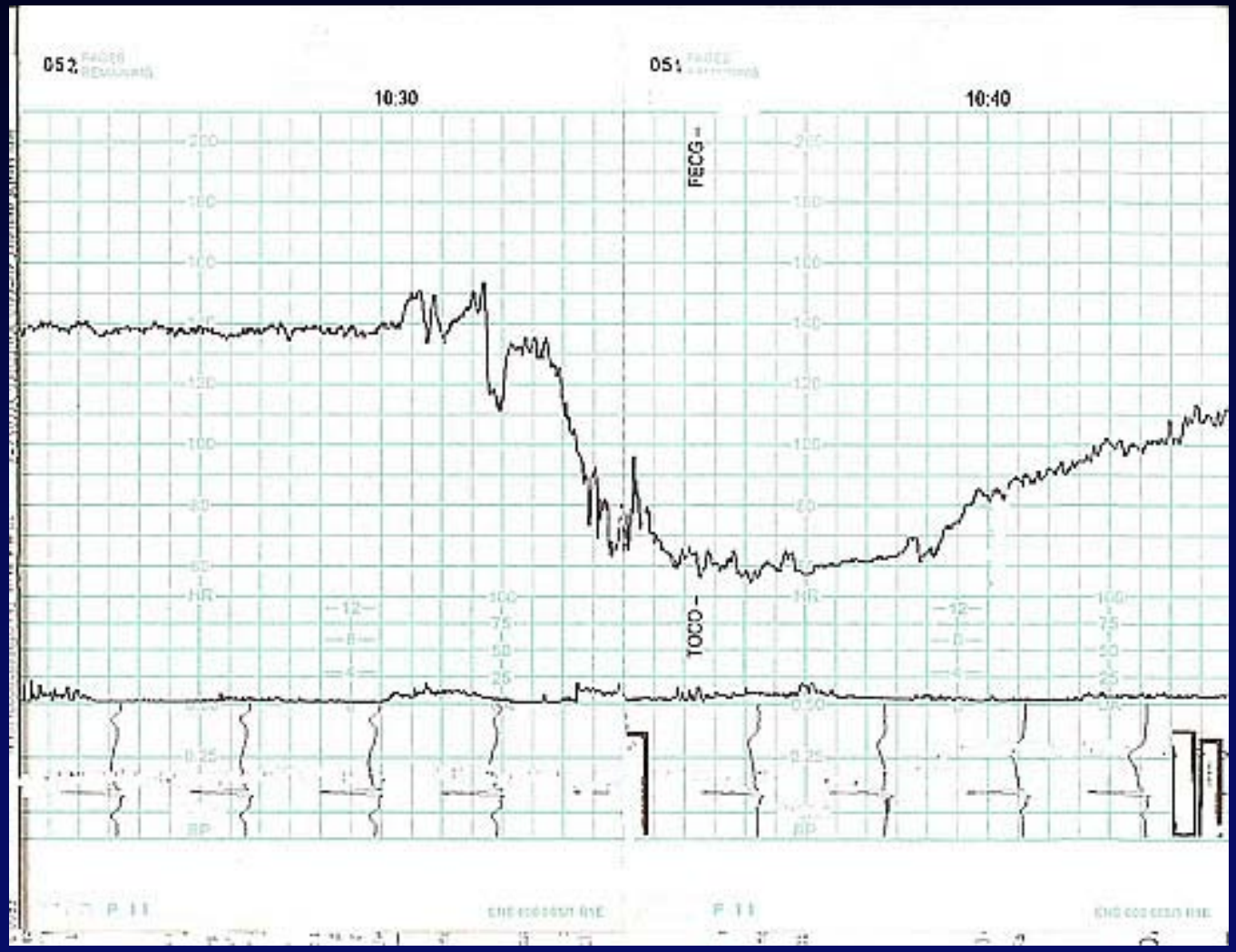


NICE: ST analysis seems to add value to the use of EFM and reduce intervention. While associated with a lower neonatal encephalopathy rate in surviving infants, when combined with perinatal deaths, there is no significant difference in outcome. It comes at added cost and also requires the use of fetal scalp electrodes and extra staff training. If used when fetal heart rate abnormalities are present, it may be necessary to perform an FBS before using ST analysis.

# Interventions to Improve the CTG

- Maternal Oxyge:
  - NICE recommends that using maternal facial oxygen therapy for more than 10 minutes may be harmful to the baby and should be avoided.
- Maternal position:
  - A significant degree of compression of the inferior vena cava is demonstrable with up to 15˚ of lateral tilt . The use of a lateral tilt (>15˚) at delivery, both by caesarean section and during labour, reduces the cardiovascular compromise considerably by reducing this compression
- Drugs

# Just after an Epidural



# What do you do now?

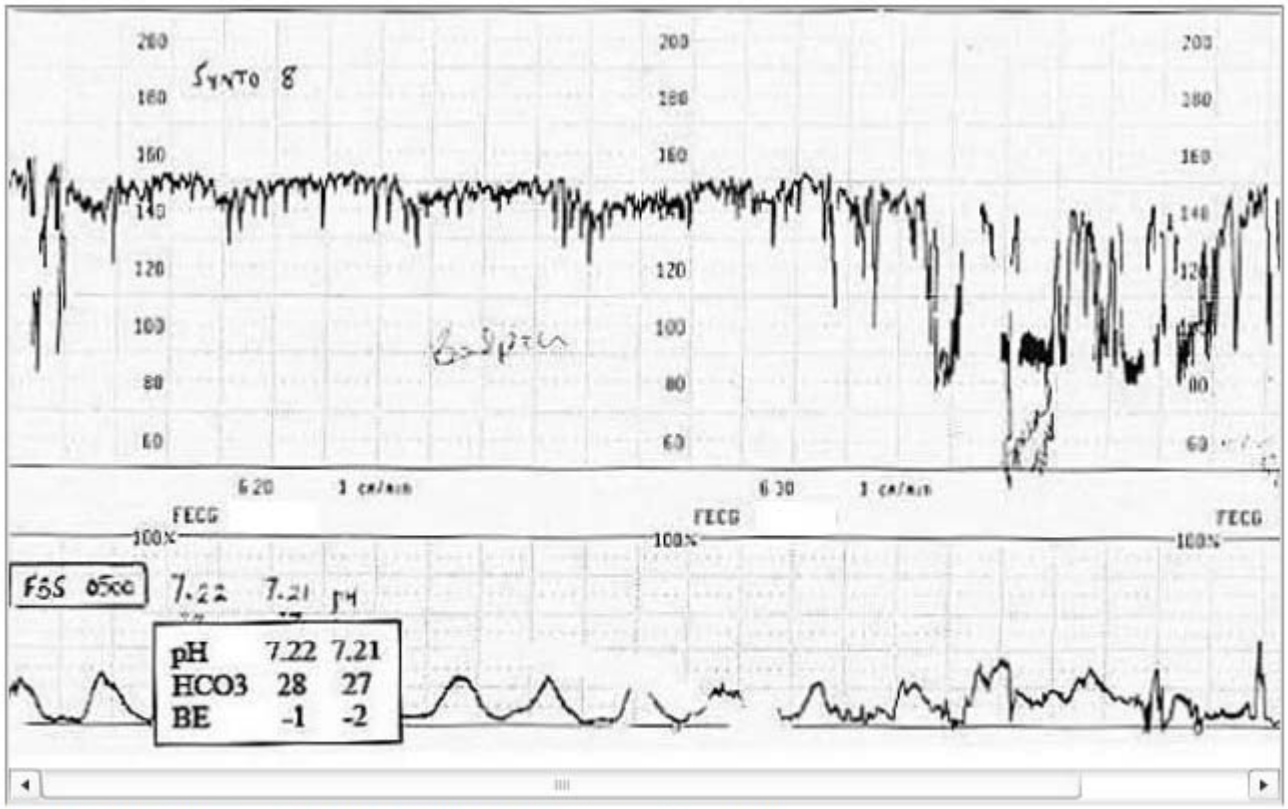


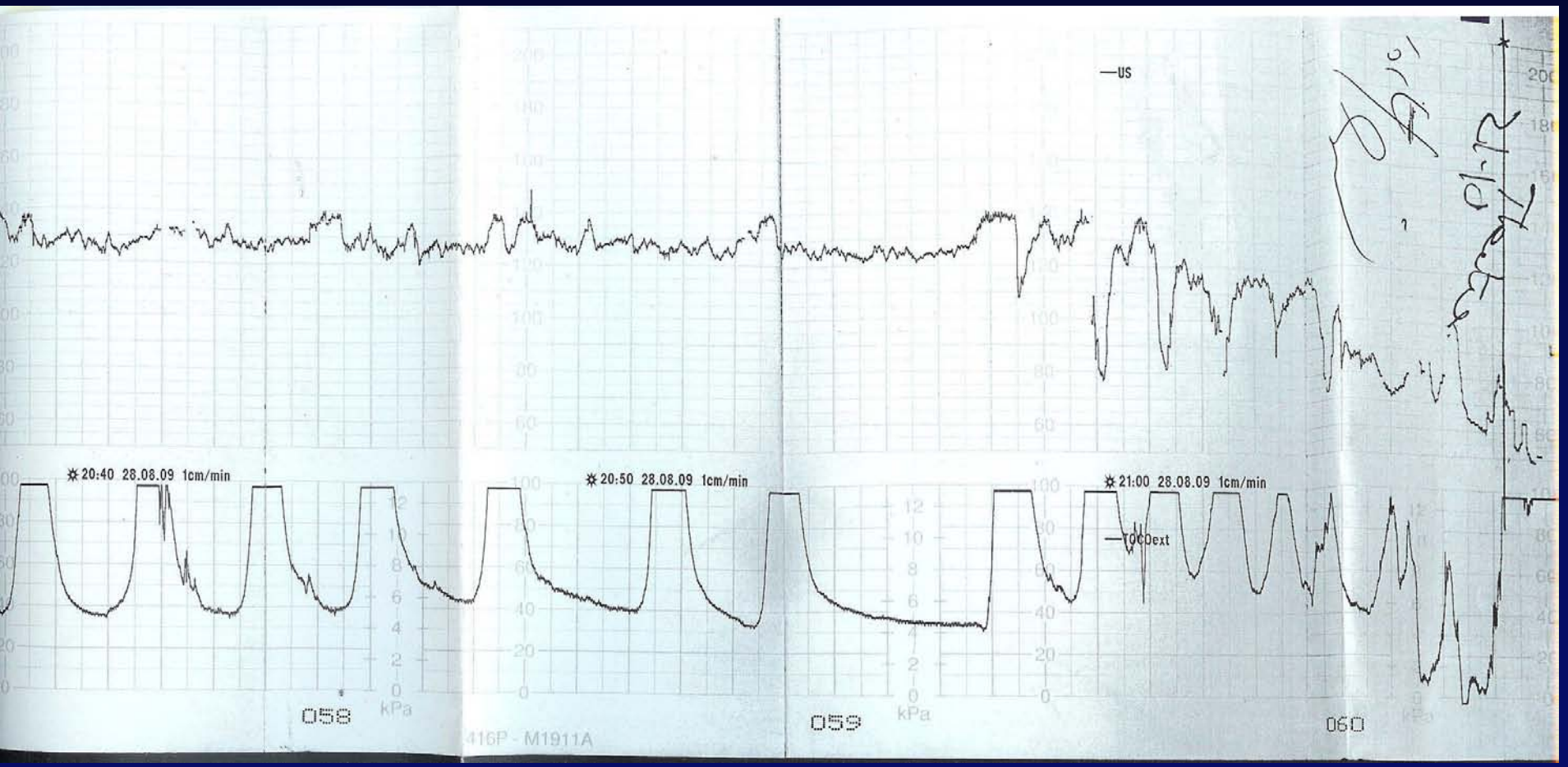

**Fig 1** CTG of effect of uterine overstimulation on the fetal heart rate

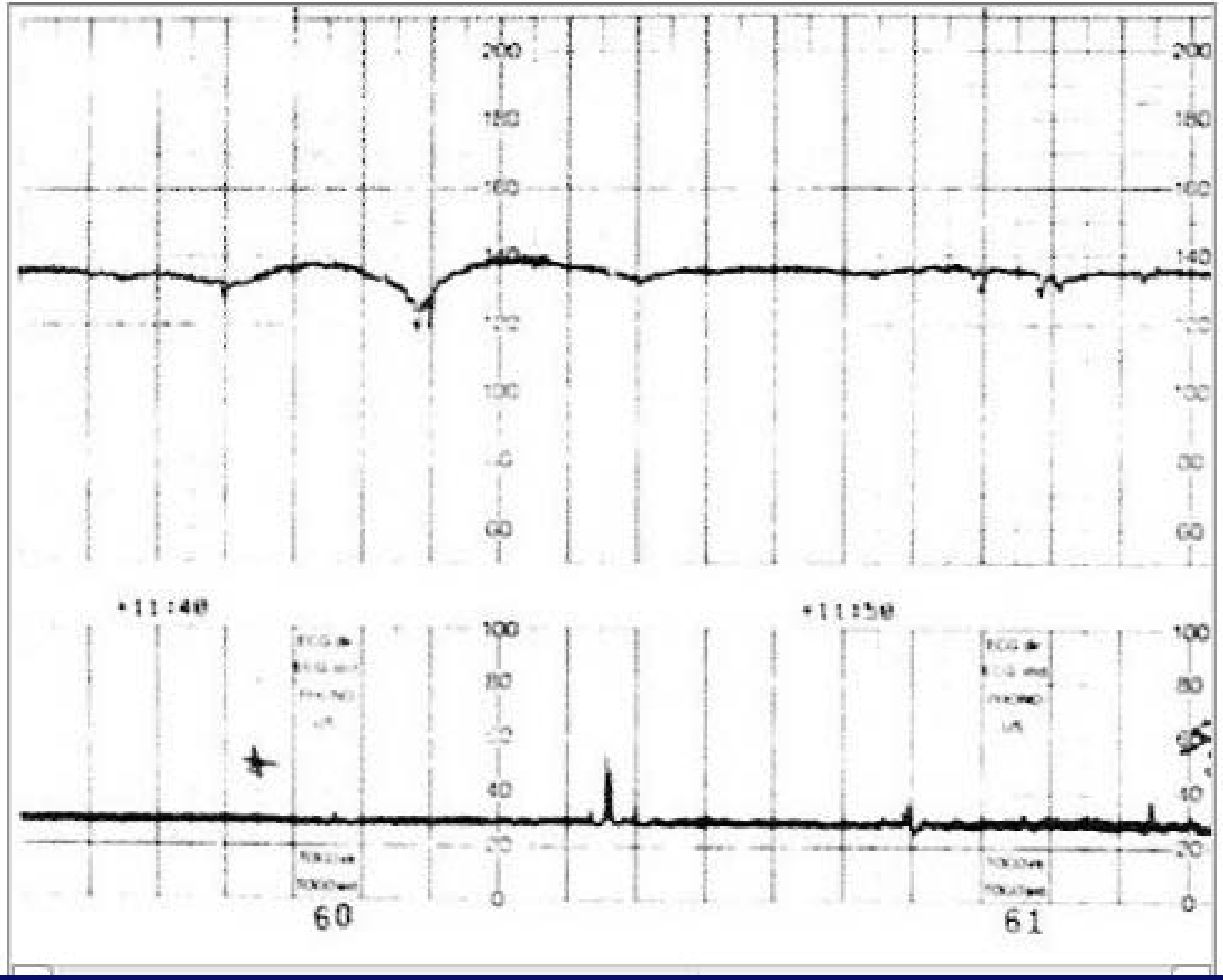
# Drugs

- **Reducing or discontinuing an oxytocin infusion**
- Removing vaginal prostaglandin agents
- Administration of a fluid bolus
- Administering tocolytics

- Terbutaline 0.25 mg , Subcut
  - rapid onset of action with a reduction in uterine activity of up to 87.3% in 15 minutes

# case 1: Clinically abruption ,PV bleeding and abdominal pain




200
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+11:40
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40
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80
10
20
0
60
61

# Placental abruption

- If decelerating , perform c/section/vaginal delivery immediately
- Don’t delay delivery for abrution
- Continue with labour if CTG Normal

# Not to forget two conditions

- Meconium ( Fresh meconium or thick meconium)
- Infection ( Pyrexia, prolonged ROM, Maternal and fetal tachycardia, Offensive discharge)
- Don’t get falsely re-assured by Normal FBS

# Suggestions to improve

- CTG training courses
- Annual mandatory CTG training preferably online
- CTG weekly meeting to discuss interesting cases
- Make the definition of the CTG findings as standard
- Make the speed of the machine standard
- When in doubt ask for a second opinion
- Practise , Practise and Practise
- Good documentation
- Legal cases to be judged by an expert in interpretation and labour management
- Any other suggestions??


Thank You