WOMEN'S HEALTH AND PAEDIATRICS

MATERNITY UNIT

Preterm Labour and Birth: Prevention and Management

Amendments			
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1			
2			
3	01/10/2018	Magnesium sulfate regime	Women's Health Guidelines Group
4	01/03/2022	Whole document review with major changes	Perinatal Governance Group

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Contents

Preterm Labour and Birth

1.0 Introduction

The guideline applies to women at risk of preterm birth or in preterm labour between 22 weeks and 0 days, and 36 weeks and 6 days. It provides strategies to identify women at risk of spontaneous preterm birth (sPTB), screening/preventive options for these women, management of suspected preterm labour, and imminent preterm birth. The BAPM Perinatal Management of Extreme Preterm Birth before 27 weeks of Gestation framework for practice includes neonates from 22 weeks and 0 days gestation. Consideration should be given to applying this guidance at these earlier gestations.

Preterm birth (PTB), is defined as delivery before 37+0 week's gestation, is a common complication of pregnancy, affecting around 8% of births in England and Wales. It is the most important single factor contributing to adverse infant outcome with regards to survival and quality of life. Babies born preterm have high rates of early, late, and infant mortality and morbidity. PTB is estimated to cost health services in England and Wales £3.4bn per year.

The prevention of preterm birth is an additional element to the NHS England Saving Babies' Lives Care Bundle, updated in March 2019. It was developed in response to the Department of Health's 'Safer Maternity Care' report, which extended the 'Maternity Safety Ambition' to include reducing preterm births from 8% to 6%. The element focuses on three intervention areas to improve outcomes, which are prediction and prevention of preterm birth and better preparation when PTB is unavoidable.

2.0 Risk factors for preterm birth

The following conditions are associated with spontaneous PTB and therefore history and examination should be performed to identify any of these conditions.

2.1 Previous preterm birth

Previous PTB is the most significant risk factor for PTB. This association is modified by three risk factors:

- the number of prior PTBs
- the gestational age at which the previous birth(s) occurred, and
- the order in which the prior PTB(s) occurred.

For example, the risk of PTB in the current pregnancy, with one previous PTB, is 15-20%, after two PTBs it is 35-40% and with one preterm and a subsequent term birth the risk is reduced to 10-15%.

2.2 Abnormal vaginal flora

The imbalance of microbial subpopulations seen in bacterial vaginosis (BV); predominance of anaerobes and deficiency of lactobacilli is associated with an increased risk of PTB. Therefore, consider treatment of BV if identified whilst performing routine screening. Pathogenic organisms such as Neisseria gonorrhoeae and Chlamydia trachomatis may also trigger an inappropriate inflammatory response leading to labour. Group B streptococcal (GBS) colonisation is normally seen in up to 25% of inner-city populations and is not an indication for routine antepartum treatment unless accompanied by symptomatic discharge or bacteriuria or a previous preterm birth associated with GBS.

2.3 Cervical incompetence

Cervical incompetence may arise following cervical treatment including large loop excision of the transformation zone (LLETZ), excisions where the amount of tissue removed is >10mm in depth, multiple dilatations of the cervix, hysteroscopic procedures where the cervix has been dilated up to or beyond Hegar 10, caesarean section at advanced dilatation, or in conjunction with Mullerian variants (alterations in uterine size/shape such as unicornuate or uterine didelphys).

2.4 Urinary tract infection (UTI)

UTI including asymptomatic bacteriuria, cystitis, and pyelonephritis is associated with PTB.

2.5 Systemic bacteraemia

Both acute (e.g. pyelonephritis, appendicitis, pneumonia and dental abscesses) and chronic bacteraemias are associated with PTB. This is presumed to be either due to direct blood-borne spread of infection to the intrauterine cavity or indirectly due to chemical triggers such as accompanying endotoxins or cytokines.

2.6 Uterine capacity

Conditions that increase uterine distension or interfere with uterine capacity such as fibroids, polyhydramnios, multiple pregnancy, or as a consequence of Mullerian variants are risk factors for PTB.

2.7 Placentation

Antepartum haemorrhage and/or persisting extrachorionic haemorrhage due to abnormal placentation, with chronic and repeated bleeding, is also a recognised risk factor for PTB.

2.8 Social factors

Smoking doubles the risk of preterm birth; domestic violence and maternal age are also risk factors for PTB.

3.0 Identification and care of women at risk of preterm birth

Prevention of preterm labour involves the screening of **all** women to identify and initiate interventions tailored to specific risk factors.

The following risk factors should be identified at the booking visit:

- **Smoking**

This doubles the risk of PTB. All women should be asked about smoking, and cessation advice and referral should be provided. Women who have experienced a previous PTB, who stop smoking early in the pregnancy, modify their risk back to that of a non-smoker. If smoking cessation is delayed until the third trimester this modifiable benefit is lost. The importance of promoting smoking cessation is therefore one of the most important prevention strategies to implement.

- **Maternal age**

Young women (<18 years) have an increased risk of PTB. Appropriate referral to the Willows team should be offered to provide adequate support and advice throughout the pregnancy.

- **Domestic violence**

Women experiencing domestic violence and/or other social pressures should be directly counselled and referred for specific support through our local pathways.

- **Urinary tract infection** (UTI)

A midstream urine sample (MSU) should be taken and sent for culture and sensitivity in all pregnant women at booking. Culture-positive samples, even in symptom-free women (asymptomatic bacteriuria), should be promptly treated. Following any positive culture and treatment, a repeat MSU to confirm clearance is recommended. Those who have a recurrent episode require review in secondary care. Each antenatal attendance a urinalysis should be undertaken with a view to identifying UTIs in symptom free women to reduce the chance of preterm birth.

- **Vaginal infection**

Pathogens such as *Neisseria gonorrhoeae* and *Chlamydia trachomatis* are associated with PTB and screening should be offered to at-risk women. In particular, the booking midwife should inform each pregnant woman under the age of 25 years about the high prevalence of chlamydial infection in their age group and may offer screening depending on local policy. The role of organisms found in bacterial vaginosis (BV) remains controversial; the presence of BV is linked with PTB, but the varying methods used to ascertain its presence, and the timing and means of treatment in several studies have meant that no consensus currently exists as to its screening and treatment in at-risk women. The presence of Group B Streptococci in a vaginal swab is not an indication to treat until in labour unless also isolated from a midstream urine specimen.

3.1 Risk factors requiring referral to the preterm birth clinic including Tommy's App

At booking a risk assessment should occur to identify women at HIGH or INTERMEDIATE risk of preterm birth.

All women who are eligible should be registered on the Tommy's App (see Tommy's App Standard Operating Procedure) and the booking midwife must complete the preterm birth risk assessment. This should be documented within the Management Plan Box on Badgernet.

3.2 High Chance group

- Previous spontaneous pre-term birth or mid-trimester miscarriage (14 – 34 weeks gestation)
- Previous preterm rupture of the membranes (PPROM) before 34+0 weeks
- Cervical cerclage in a previous pregnancy.
- Radical trachelectomy for locally invasive carcinoma of the cervix.
- Known uterine variant (unicornuate uterus, uterine didelphys)
- Ashermann's syndrome
- Incidental finding of short cervix on ultrasound (US): ≤ 25mm before 24 weeks
- Follow-up of women who have a rescue cervical cerclage placed in pregnancy

The Tommy's App will not identify all of the above risk factors and therefore the midwife booking the woman should ask advice from the preterm birth lead or antenatal clinic sister if there is any doubt as to the need for a referral.

Women identified as **HIGH risk** should be referred to the Preterm Birth Clinic via the antenatal clinic sister or reception. The Preterm Birth clinic runs fortnightly on Thursday morning (0900 hrs to 1300 hrs) in the Antenatal clinic area.

These women will be seen in the preterm birth clinic where they will have an individualised plan based on their previous history. The first appointment should be between 14-16 weeks of gestation, after the first trimester screening scan.

After discussion of the implications and possible interventions, they will be offered a cervical length scan at this appointment and repeated every 2-4 weeks until 24 weeks. Women with a history of previous cerclage or trachelectomy will be seen after their dating scan and offered either repeat cerclage or cervical length surveillance. Additional investigations (e.g. swabs for infection) or interventions such as prophylactic progesterone will be considered on an individual basis.

3.3 At the first appointment:

• Give

- Information leaflet about clinic.

• Ask about

- a detailed history
- smoking
- genital tract infection and h/o bacterial vaginosis (BV)
- recurrent urinary tract infection
- record BMI

• Discuss

- role of cervical length ultrasound
- cervical cerclage and if indicated
- progesterone and other preventive methods
- role of fetal fibronectin
- risk of recurrence of preterm birth – it is inevitable
- modifying risk factors and refer to smoking cessation

• Explain

- signs of preterm labour

• Agree

- an individualised plan of care for this pregnancy.
- any other referrals that may be needed.

• Check

- BP and dip urine
- booking bloods

• Perform

- ➢ High vaginal swabs
- ➢ Gram stain
- ➢ transvaginal scan

• Document

- ➢ the visit on Badgernet using the preterm prevention notes for audit purposes

All women should be advised of the symptoms and signs of preterm labour and asked to contact the pregnancy advice line if she experiences any of them.

Women who have required an intervention will remain under the Preterm birth care for the duration of the pregnancy. Women who have had normal cervical length scans, who are otherwise low risk (other than the preterm loss/birth), can be discharged back to midwifery led care at 24 weeks gestation.

3.4 Intermediate group

- Large loop excision of the transformation zone (LLETZ)
- Cone biopsy to cervix
- Previous caesarean section at full dilatation

The Tommy's App will not identify all of the above risk factors and therefore the midwife booking the woman should ask advice from the preterm birth lead or antenatal clinic sister if there is any doubt as to the need for a referral.

Women identified as **INTERMEDIATE** risk should have a single cervical length scan at anomaly scan. This should be documented within the Management Plan on Badgernet so that it can be easily seen by the sonographer at the time of the anomaly scan.

- If the cervical length is greater than 25mm they will be discharged from the Preterm Prevention clinic back to routine care.
- If the cervical length is 20-24mm, they will be referred to the next preterm birth clinic.
- If the cervical length is less than 20mm, they should be referred immediately to Maternity Day assessment unit or triage for a discussion with the labour ward consultant or COW.

3.5 Scan protocol

Cervical length scans are performed transvaginally to obtain the most accurate measurement.

• Informed verbal consent is obtained prior to the scan.

• Exclude latex allergy, and use latex free probe cover if they are allergic to latex.

• The woman must be asked to empty her bladder just prior to the scan (within 30 minutes).

• Give the woman a clean sheet to cover herself and allow her to undress her lower body in privacy.

- Follow steps from Fetal Medicine Foundation to perform Cervical Length scan (https://fetalmedicine.org/education/cervical-assessment)

For women with a cervical cerclage, record the total closed length and the closed cervical length cranial to the stitch, as closed length above the stitch is the best predictor of outcome.

3.6 Cervical length measurement interpretation:

• > 25mm- reassure the patient

• ≤ 25mm

- In women with a history of preterm birth or late miscarriage, discuss a cervical suture and/or prophylactic vaginal progesterone (Cyclogest Vaginal Pessaries 400mg BD PV/PR until 34/40 gestation). Discuss the risk/benefits of both options with the women and make a shared decision based on which treatment option is most suitable

- Low risk women who have an incidental finding of a short cervical length should **not** automatically be offered a cervical suture as there is limited data to support the use of a cervical suture in this situation. Each case should be individualised and the options discussed with the woman. Screen for infection (MSU, cervical and vaginal swab) and refer to the labour ward consultant or COW for an individualised plan.

It is not known whether a cervical suture is beneficial for women who have had a Caesarean section at full dilatation (CSFD) with a short cervix in a subsequent pregnancy. The CRAFT study has been designed to prove the evidence regarding this. ASPH is one of these centres and will offer eligible women who have had a CSFD and are found to have a short cervix into this trial.

3.7 Cervical cerclage

This procedure involves a stitch being inserted into the cervix under an anaesthetic. It may be done at any time up to 23+6 weeks of pregnancy. Ideally, the stitch should remain in place until around 36 - 37 weeks, but should be removed if premature labour is diagnosed. Patients requiring elective cervical cerclage to be booked as third patient on an elective LSCS list or on labour ward.

• Offer cerclage to:

- women with a previous history of preterm birth or late miscarriage whose cervix measures ≤ 25mm/ >25 mm if suggested by history
- women with a previously successful cervical cerclage
- women with recurrent mid-trimester miscarriage or preterm birth
- women with a previous failed cervical cerclage (delivery or PPROM at <28 weeks) should be offered an transabdominal cerclage – Refer to St Thomas / St Georges / Chelsea & Westminster Hospital ideally pre-pregnancy

• The cerclage is to be inserted as soon as is feasible after the Combined Test Results.

• Swab results should be available prior to placement of cerclage to allow sufficient time for treatment of infection.

• If the membranes are exposed or if the cervix measures 0mm in length, admit on labour for careful counselling regarding rescue cerclage.

Types of Cervical Cerclage

- **Transvaginal cerclage (McDonald):**

A transvaginal purse-string suture placed at the cervicovaginal junction, without bladder mobilisation.

- **High transvaginal cerclage (Shirodkar):**

A transvaginal purse-string suture placed following bladder mobilisation, to allow insertion above the level of the cardinal ligaments.

The suture should be removed after discussion with a consultant if:

• There are signs of systemic infection (local infections without maternal or fetal concerns may be treated as appropriate).

• There is bleeding with or without contractions.

• There is unexplained pain, with or without bleeding (i.e. where there is a high probability of concealed abruption).

• 37 week gestation is attained.

- **Rescue cerclage**

Do not offer this if signs of infection, active bleeding or uterine contractions

Consider a rescue cervical cerclage in women from 14 weeks up until 24 weeks who have a dilated cervix, unruptured fetal membranes

- This needs to be a consultant decision only
- Risks of the procedure (rupture of membranes, infection, and delivery) along with the benefits (aims to delay the birth to increase the likelihood of survival and reduce the risk of serious neonatal morbidity) should be discussed with the woman and an informed choice made.

Cerclage is contra-indicated if there is PPROM/ Bleeding/ contractions/ advanced cervical dilatation and membranes bulging in vagina.

4.0 Spontaneous preterm labour

4.1 Definition of preterm labour

Preterm labour can be defined as regular painful contractions leading to cervical dilatation before 37 weeks gestation. However, preterm labour can be relatively asymptomatic and so clinicians need to have a high index of suspicion when women present with symptoms such as vaginal discharge, antepartum haemorrhage, urinary tract symptoms etc.

4.2 Tommy's App: Possible preterm labour assessment

The Tommy's App should be used for women who are registered on the App as a decision support tool to help guide appropriate management. The Tommy's App can be used from 23+0 weeks. The Tommy's App can use either a fFN or transvaginal cervical length measurement, dependent on the available tools.

For women who are not registered, the management should be based on clinical assessment (see section 4.3)

4.3 Initial assessment

When a woman presents and preterm labour is suspected, a history should be taken and the following examinations and investigations should be performed. The woman should be kept informed throughout the process and consent gained. The findings and plan of care should be documented clearly on Badgernet.

Clinical information should be obtained, including:

- Gestational age
- Possibility of ruptured membranes
- Onset, frequency and duration of contractions; with direct confirmation by palpation
- Past obstetric history including: Mid-trimester miscarriages, pre-term deliveries, vaginal bleeding/discharge
- Antepartum haemorrhage
- Symptoms suggestive of generalised infection or a urinary tract infection (UTI)
- History of cone biopsy/ LLETZ/ other cervical surgery
- Full review of the obstetric notes including relevant obstetric and social history

Other causes of abdominal pain should be excluded. Certain conditions e.g. urinary tract infection and appendicitis will cause pain other than contractions but can trigger preterm labour.

A clinical examination should be individualised but may include:

- Full set of observations including respirations, pulse, blood pressure and temperature.
- Urinalysis and MSU
- Abdominal palpation including fundal height, presentation, lie, level of presenting part
- CTG monitoring - in women who are less than 26 weeks gestation, CTG monitoring should not be used.

Ultrasound scan to confirm fetal presentation. It may also be necessary to confirm gestation and assess fetal growth.

Speculum/ vaginal examination

- Following exclusion of other causes of abdominal pain, a sterile speculum examination should be performed with consent, to examine the cervix and take HVS.
- Use water as a lubricant NOT Hibitane® or gel.
- If there is no evidence of preterm, prelabour rupture of membranes (PPROM) then perform a FFN test. **DO NOT** perform a FFN test if gestation is less than 22 weeks or >34 weeks; if there is PPROM, bleeding or a history of sexual intercourse in the last 24 hours, or significant cervical dilatation.
- FFN has a high negative predictive value, therefore, a negative test is a good indication that preterm delivery will not occur. 99.2% of women presenting with threatened preterm labour and cervical dilatation of less than 3cms, with a negative FFN will not deliver in the following 14 days.
- A positive FFN test, however, has a poor predictive value in relation to delivery and is therefore not informative. Only 16.7% of women with a positive FFN test deliver in the following 14 days.
- When a FFN test is performed the patient details and test result must be recorded on Badgernet.

4.4 Fibronectin Results

If the woman is registered on the Tommy's App, the fibronectin result should be used as part the 'possible preterm birth assessment', with the decision support tool recommending management.

If the woman is not registered on Tommy's, the numerical result should be put into the **QUiPP App** along with the other clinical details to give a risk of preterm birth over the next 7 days and be used as a decision tool for ongoing management. The positive predictive value increases with increasing fibronectin results

The QUiPP app is a decision support tool that combines the medical history, fetal fibronectin and/or cervical length to give an individualised score for the risk of a spontaneous preterm delivery. QUiPP is embedded within the Tommy's App.

All Obstetric doctors and midwives working at ASPH should be registered as a healthcare professional on the Tommy's App. The QUiPPapp is free to download on Apple or Android and it is advised that members of the Obstetric team download it when joining the department. It is also available to use online at www.quipp.org

4.5 Management should be dependent on Tommy's App (or QUiPP if not registered) risk:

- If the risk of birth within 1 week is <5% admission/in-utero transfer is not required. Consider alternative diagnoses and reassure of low chance of preterm birth should be given to the woman. If discharged, advise that the woman returns to hospital if symptoms persist or worsen and arrange any follow up as appropriate.

- If the risk is >5% admission - admit to the labour ward and when stable transfer to the antenatal bay on Joan Booker ward. Consider administration of corticosteroids and tocolysis following discussion with an obstetrician (Registrar or Consultant level). In some cases admission for observation only is appropriate.

If a FFN is contraindicated or not possible then a digital examination or a cervical length scan should be performed to exclude or confirm labour.

In utero transfers from other units

- It is expected that women transferred in-utero with threatened preterm labour will have had a FFN test performed before transfer.

- Management must be based on sound clinical judgement and discussion with the consultant on call.

- There may be a place for repeating the FFN test 48 hours after the last speculum examination, especially if a negative result would assist in making a decision to discharge.

- If the previous test has been positive, do not repeat it because the result will not help with the management decisions.

4.6 Multiple pregnancies

FFN seems to have similar characteristics when used in women with a multiple pregnancy presenting with threatened preterm labour and therefore it can be supported for these women, especially where the fFN is a low chance result (good negative predictive value).

Women with preterm prelabour ruptured membranes (PPROM) are usually managed conservatively; therefore digital examination should be avoided unless there are strong clinical indications for a vaginal examination.

The neonatal unit (NICU) and neonatal team must be informed of the woman's admission and plan of management. If the woman is admitted, a member of the neonatal team should meet the parents for a discussion. If a neonatal cot is not available the obstetric registrar is responsible for arranging transfer to an appropriate unit. Possible in-utero transfers out of this unit must be discussed with the Labour Ward or on call Consultant before they are arranged. Cot availability should be checked with the Emergency Bed Service (EBS) 0207 4074999 before ringing hospitals. The obstetric registrar **must** confirm with both the obstetric and neonatal registrar at the accepting hospital that the transfer can be accommodated.

5.0 Management of Infants at the threshold of viability

The survival of extremely preterm infants has significantly improved over the last 20 years due to developments in neonatal care, administration of antenatal steroids and Magnesium sulphate and a multidisciplinary approach to management. In the current era, the outcomes for babies actively managed at 22 weeks of gestation appear similar to those of babies at 23 weeks of gestation at the time of the 2008 BAPM Framework for Clinical Practice.

The updated British Association of Perinatal Medicine (BAPM) Framework for Practice suggests neonatal stabilisation may be considered for babies born from 22+0 weeks of gestation following assessment of risk, multiprofessional discussion with parents and agreeing a clear plan.

The risk of mortality or serious residual disability increases with decreasing gestational age and poses serious ethical dilemmas in respect of appropriate management. So this may not be appropriate for all infants and the decision for resuscitation needs to be made after careful counselling from the neonatal Consultant considering all risk factors. These multidisciplinary discussions between neonatologist, obstetricians, midwives and parents should be considered an urgent priority on presentation in view of the speed and unpredictability of preterm birth and clearly documented on Badgernet. Good communication between parents and all health care professionals is of paramount importance.

This decision should be reviewed regularly, and these women discussed at the daily safety hurdle. Unless documented otherwise active resuscitation should occur from 24 weeks (Please see network guideline).

6.0 Administration of Corticosteroids

Maternal antenatal corticosteroids reduce the risk of neonatal respiratory distress syndrome, intraventricular haemorrhage and death. Optimal benefit is observed if delivery is between 24 hours and 7 days of administration but benefits may occur before and after these times.

The decision to prescribe steroids should be made by an experienced obstetrician, preferably a consultant. It is a balance between its clear benefits and the potential to waste that benefit if given when likelihood of delivery is low (especially for the women who deliver >2 weeks later and still deliver preterm). Steroids will usually be given only after objective evidence of cervical change but in cases of a convincing past and present history this may not mandatory.

Steroids should be offered at 23+0-34+6 week's gestation to women at risk of preterm birth (RCOG 2010). The decision to prescribe them at earlier gestations should be made by the Obstetric Consultant with input from the neonatal team and should be discussed from 22 weeks if active management is considered.

Dexamethasone 12mg IM, two doses, 24 hours apart should be administered. Administer the first dose as soon as practical after admission; steroids should still be given even if delivery is expected within 24 hours of this time.

Caution should be given when administering steroids to women with suspected infections such as tuberculosis or severe sepsis. When delaying delivery for steroid prophylaxis in cases of overt chorioamnionitis the case must be discussed with the labour ward/on call consultant.

Diabetes is not a contraindication to antenatal corticosteroid treatment for fetal lung maturation, but steroid administration in a diabetic MUST be discussed with a consultant before it is given. If steroids are given there must be a documented plan of BM testing and a clear indication of expected response to raised BMs. Diabetic women who have antenatal steroids often need the variable rate intravenous insulin infusion to maintain blood sugar control (**please see diabetes in pregnancy guidelines**).

If preterm ruptured membranes have been confirmed and the woman is not contracting, steroids should be given but tocolysis is not required. If the gestation is less than 34 weeks and contractions start before 24 hours of steroid treatment is completed, then it may be appropriate to suppress contractions however it is important to exclude any infection or chorioamnionitis.

Key Points:

- Steroids are given between **23+0 and 34+6** and discussed from 22+0 if active management is considered
- 2 doses of Dexamethasone 12mg i.m is given 24 hours apart
- Diabetic women will need BM monitoring and often need insulin infusion to maintain blood sugar control.
- Caution is advised in giving steroids to those with severe sepsis and must be discussed with a consultant

7.0 Tocolysis

There is no evidence that tocolysis improves outcome and therefore it is reasonable not to use it. However, tocolysis should be considered to allow completion of a course of corticosteroids or in for utero transfer. All women in whom tocolysis is considered must be discussed with the Labour ward /on call consultant. Evidence of this discussion must be documented.

7.1 Contraindications to tocolysis:

- Known lethal congenital or chromosomal malformation
- Intrauterine infection
- Any maternal or fetal condition that warrants delivery i.e. Severe pre-eclampsia, Placental abruption
- Advanced cervical dilatation
- Evidence of fetal compromise or placental insufficiency
- Known hypersensitivity to Atosiban / Nifedipine

7.2 Relative contraindications (must be discussed with the consultant):

- IUGR
- Mild APH thought to be due to placenta praevia
- Multiple pregnancy

7.3 Prerequisites for Using Tocolysis

- Regular uterine contractions lasting 30 seconds at a rate of ≥ 4 in 30 minutes
- Cervical dilation of 0 to 3 cm
- Gestation from 24+0 to 33+6 weeks
- Normal fetal heart rate
- Risk of delivery >5% in the next 7 days (QUIPP app)
- Agreement from consultant on call (who may also consider use at >3cm, <24weeks or >33+6 weeks)

Atosiban and Nifedipine have comparable effectiveness in delaying birth for up to 7 days. Although only Atosiban is licensed for this indication, the RCOG also advocates the use of Nifedipine which is easier to administer and less expensive (RCOG 2011).

Nifedipine should be given as first line tocolysis, with a change to Atosiban instead if the contractions have not subsided within 2 hours or if the woman develops significant side effects from Nifedipine.

7.4 Nifedipine

Give 20mg oral Nifedipine.

Continue oral Nifedipine 20mg every 6 hours for a maximum of 8 doses depending on uterine activity.

Side effects include hypotension, dizziness, headache, nausea and vomiting, but they are rare at these doses.

Women should be observed on labour ward for at least 12 hours. If contractions have then subsided and the woman has minimal side effects she may be transferred to the antenatal ward to complete her course of Nifedipine, with continued 4 hourly temperatures, pulse, respirations and blood pressure.

7.5 Atosiban (Trade name Tractocile)

- Licensed for use in pregnancy to delay preterm delivery
- Oxytocin antagonist
- IV administration
- Initial bolus, then high dose infusion for 3 hours followed by low dose infusion for <45 hours
- Half-life is 13 minutes so there is no additional risk of Post-Partum Haemorrhage.
- If contractions re-commence after Atosiban has been stopped, it can be restarted if steroid course is incomplete

This is administered intravenously as a three-step procedure:

i. An initial bolus dose of 6.75 mg (0.9ml from Atosiban 7.5mg/ml solution) over one minute

ii. Followed by an infusion of 18 mg/hour (300micrograms/min)for three hours

- remove 10ml fluid from a 100ml bag of normal saline
- add 2 x 5ml phials of Atosiban 7.5mg/ml solution to the bag

- infuse at a rate of 24ml/hr

iii. After three hours reduce the rate to 6mg/hr for up to 45 hours. (Total treatment should never exceed 48 hours and the maximum dose of Atosiban should not exceed 330mg)

Atosiban Side Effects

Nausea is very common (decreased by giving bolus slowly). Hyperglycaemia headache and dizziness, tachycardia, hot flush, hypotension, vomiting and injection site reaction are common. Insomnia, pruritus, rash, pyrexia and allergic reaction are uncommon.

7.6 Observations during tocolysis:

- **Pulse and blood pressure**

Pulse and blood pressure should be recorded and documented on the MEOWS chart every 15 minutes for the first 2 hours

Then record pulse, respirations and blood pressure hourly until 12 hours unless there is clinical concern. Temperature should be recorded four hourly.

If the woman has only had Nifedipine, pulse and blood pressure can be recorded 4 hourly after 12 hours. If however she remains on Atosiban, hourly observations should continue.

- **FHR monitoring**

Continuous FHR monitoring is required while the woman is contracting or tightening.

If the contractions stop completely, and it is > 6hours since tocolysis started then continuous monitoring can be stopped and the FHR can be checked at the same time as the pulse and blood pressure (see above).

- **Fluid balance (Atosiban only)**

Fluid balance and BM monitoring needs to be considered if Atosiban is commenced.

- The woman can eat and drink freely
- If oral intake is inadequate, fluid replacement with saline and potassium may be required.
- Input and output must be accurately recorded on the fluid balance chart and reviewed at least every 12 hours by the SHO/registrar.
- Serum urea and electrolytes should be checked every 12 hours by SHO.

- The lung fields should be auscultated for pulmonary oedema every 4 hours by SHO.
- BM monitoring every 4 hours.

KEY POINTS

- All women requiring tocolysis should be discussed with the consultant on call
- Tocolysis should be considered when giving a course of steroids or for in utero transfer
- Oral Nifedipine 20mg every 6 hours for a maximum of 8 doses is first line
- Atosiban should be considered if contractions continue despite Nifedipine or the woman develops side effects
- Fluid balance and BM monitoring is necessary when administering Atosiban

8.0 Magnesium Sulphate to Prevent Cerebral Palsy

Magnesium Sulphate should be considered in women in established preterm labour (cervical dilatation of >4cm with regular contractions) or having a planned preterm delivery 24 and 33+6 weeks gestation.

Women 22+0-23+6 in established preterm labour who have requested active resuscitation.

Magnesium Sulphate given to mothers shortly before delivery reduces the risk of cerebral palsy and protects gross motor function in those infants born preterm, although the exact mechanism of neuroprotection is unknown. The effect may be greatest at early gestations (<30 weeks) and is not associated with adverse long-term fetal or maternal outcome.

8.1 Dose and Administration

Magnesium sulphate is to be commenced as soon as possible when preterm birth is expected.

Regime:

Initial treatment (loading dose)

- 4g in 20ml (20%) $MgSO_4$ infused IV over 20 minutes. (IV infusion rate 60mls per hour)

Followed by maintenance dose till delivery

- 5g in 50ml (10%) $MgSO_4$ infused IV at a rate of 10mls per hour (1g per hour)

If delivery is imminent it is appropriate to give only the loading dose

For a planned LSCS delivery start the regime 4 hours prior to expected delivery time

8.2 Monitoring

All women requiring magnesium sulphate should have one to one midwifery led care on labour ward, ideally in a delivery room.

Prior to giving the loading dose, baseline observations should be recorded of

- temperature
- pulse
- respiratory rate
- oxygen saturations

- blood pressure
- deep tendon reflexes (knee or elbow jerk, knee jerk only suitable if no epidural in situ)

These should be repeated 10 minutes after the loading dose has been commenced and at the end of the loading dose infusion.

The above observations then need to be recorded **HOURLY** whilst on the maintenance infusion.

Urine output should be recorded and should remain above 100ml over 4hrs

Oxygen saturations should remain above 95% on air

Respiratory rate should be more than 14 per minute

8.3 Side Effects and Adverse Effects including toxicity of Magnesium Sulphate:

The use of magnesium sulphate for prevention of eclampsia is well established and it is known that magnesium sulphate is not associated with adverse long-term fetal or maternal outcomes.

Immediate maternal side effects include

- Facial flushing
- Nausea and vomiting
- Sweating
- Localised problems to the injection site

Magnesium toxicity is very unlikely with a normal urine output as it is excreted in the urine.

Toxicity can be clinically assessed as it causes respiratory depression or loss of deep tendon reflexes.

8.4 Management of Magnesium Sulphate Toxicity:

Stop the magnesium infusion IMMEDIATELY and inform the obstetric registrar and take blood for magnesium levels if

- Magnesium serum levels should be checked every 6 hours
- Urine output is reduced below 100ml over 4 hours

- Tendon reflexes become absent (rarely occurs unless magnesium level > 5mmol/l)
- Fall in respiratory rate less than 14 per minute or saturations less than 95% on air (rarely occurs unless magnesium level >6mmol/l

If respiratory depression occurs:

- Give 10-15l/min oxygen by mask with reservoir bag and place in left lateral
- Stop magnesium infusion
- Obstetric Priority call (2222)
- Give 10ml of 10% calcium gluconate (the antidote to magnesium) intravenously over 5-10 minutes. It does not need to be diluted (one ampoule always available in the Magnesium Box).

If respiratory arrest occurs:

- Commence airway management and place in left lateral
- Adult Priority call (2222)
- Give 10ml of 10% calcium gluconate intravenously over 5-10 minutes (as above)

When to Stop the Magnesium Sulphate Infusion:

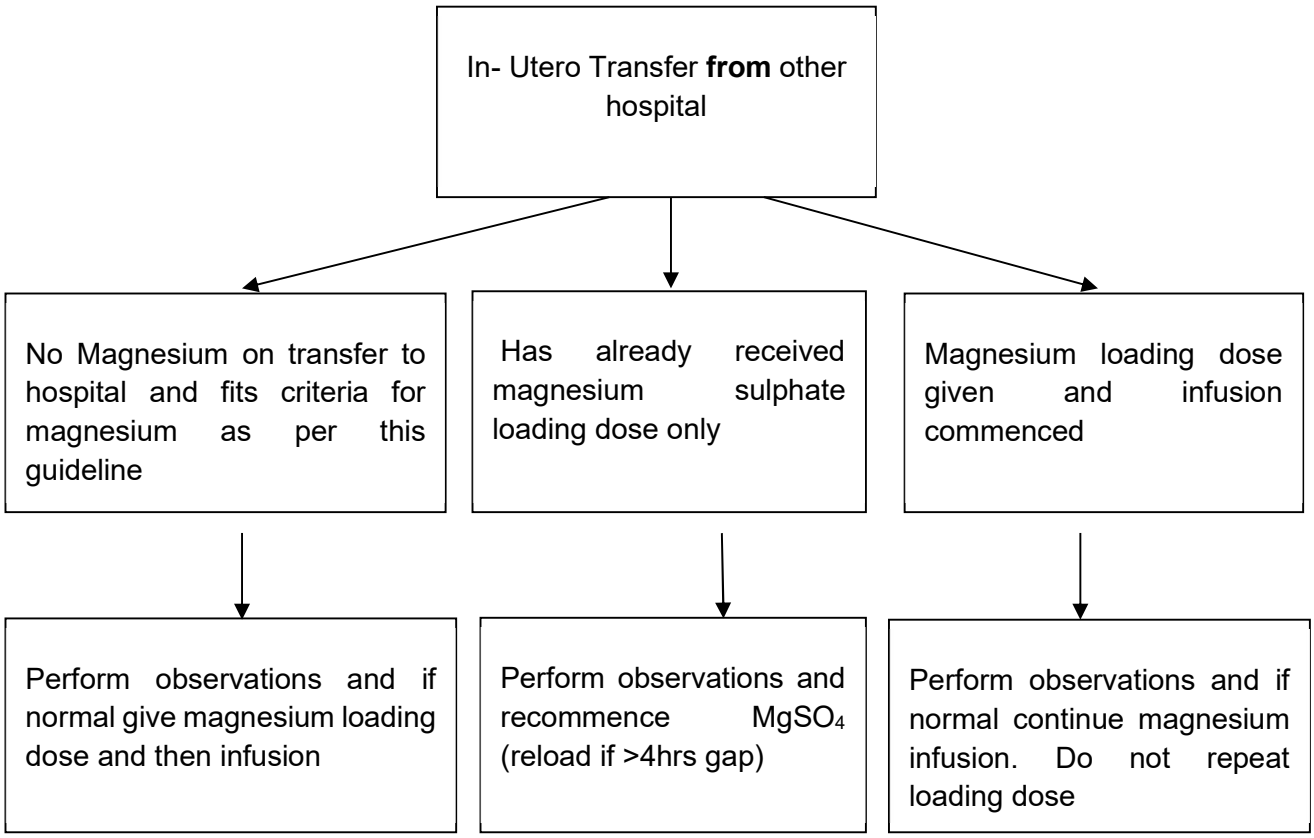
The Magnesium sulphate infusion should be stopped after birth. If birth does not occur then the magnesium sulphate infusion may need to be stopped, this decision MUST involve a consultant obstetrician. Similarly re-starting the magnesium infusion, because delivery again seems likely, should only occur after discussion with a consultant.

8.5 In-Utero Transfers and Magnesium Sulphate Dosage Regimens:

This unit often accepts women with threatened pre-term labour as in-utero transfers from other hospitals. These patients should be seen as soon as possible, after arrival, by the obstetric registrar so that decisions can be made in a timely manner. The Obstetric Registrar needs to determine if any Magnesium Sulphate has already been given and what Regime has been used. If the woman has received a loading dose of magnesium within the last 4 hours then the maintenance infusion only should be commenced on arrival. If she has received a loading dose only, and it was given more

than 4 hours before arrival then she should be given a second loading dose, followed by the maintenance infusion after arrival in this unit.

If a woman needs transfer out of this unit, and the above guidelines suggest that magnesium for fetal neuroprotection should be considered then the decision about the loading dose +/- maintenance infusion before or during transfer MUST be made by a consultant.



KEY POINTS:

- Magnesium sulphate should be commenced in women who are between **22+0 and 33+6** and at risk of delivery within the next 24 hours.
- A loading dose followed by maintenance infusion should be commenced as soon as possible but ideally at least 4 hours before delivery.
- This should be continued for 24 hours or until birth, whichever is soonest
- Women on magnesium sulphate require one to one midwifery care and regular monitoring particularly of urine output, respiratory rate and deep tendon reflexes.
- Magnesium toxicity is unlikely with normal urine output but can cause respiratory arrest. Emergency management including using calcium gluconate may be required.
- Magnesium sulphate should be commenced or continued for in utero transfers accepted into the unit who fit the criteria of this guideline.
- Magnesium infusion only (no repeat loading dose) to be commenced for in utero transfers who have had a recent loading dose already in the referring unit.

9.0 Diagnosing preterm prelabour rupture of membranes (P-PROM) NICE guideline (NG25, 2015 & 2019)

In a woman reporting symptoms suggestive of P-PROM, offer a speculum examination to look for pooling of amniotic fluid and:

- if pooling of amniotic fluid is observed, do not perform any diagnostic test but offer care consistent with the woman having P-PROM
- if pooling of amniotic fluid is not observed, perform an insulin-like growth factor binding protein-1 test of vaginal fluid (ActimProm test).

If the results of the insulin-like growth factor binding protein-1 test (ActimProm test) is positive, do not use the test results alone to decide what care to offer the woman, but also take into account her clinical condition, her medical and pregnancy history and gestational age, and either:

- offer care consistent with the woman having P-PROM **or**
- re-evaluate the woman's diagnostic status at a later time point.

If the results of the insulin-like growth factor binding protein-1 (ActimProm test) is negative and no amniotic fluid is observed:

- do not offer antenatal prophylactic antibiotics
- explain to the woman that it is unlikely that she has P-PROM, but that she should return if she has any further symptoms suggestive of P-PROM or preterm labour.

Do not perform diagnostic tests for P-PROM if labour becomes established in a woman reporting symptoms suggestive of P-PROM.

10.0 Antibiotics for Preterm Labour and Preterm Prelabour Rupture of Membranes (PPROM) (Including Group B Streptococcus Prophylaxis)

The ORACLE trial (2001) suggests that erythromycin reduces neonatal morbidity and mortality in women with preterm prelabour rupture of membranes when compared with placebo. (Co-amoxiclav was found to increase the incidence of necrotizing enterocolitis and is therefore not recommended in women likely to deliver preterm).

Give erythromycin 250mg qds for 10 days (or until delivery if earlier than 10 days) to any woman with confirmed rupture of membranes prior to 37 weeks gestation. If the woman is allergic to erythromycin use of antibiotic prophylaxis must be discussed with a consultant microbiologist during working hours, until this advice has been obtained the woman should be given intravenous clindamycin 900mg every 8 hours (as per the intrapartum GBS guidelines).

All women in preterm labour should be commenced on Intrapartum Antibiotic Prophylaxis, regardless of their GBS status, once in active labour. (IV Benzylpenicillin or Cefuroxine if penicillin allergic – see microguide).

This should be given even if already on oral Erythromycin.

If chorioamnionitis is suspected, broad-spectrum antibiotic therapy including an agent active against GBS should replace GBS-specific IV antibiotics and induction of labour should be considered (see sepsis guidelines).

Intrapartum Antibiotic Prophylaxis is not required for preterm caesarean section in the absence of membrane rupture.

KEY POINTS:

Those with confirmed PPROM prior to 37 weeks …

- Should be given erythromycin 250mg qds for 10/7 unless allergic.
- **All** women in preterm labour should be commenced on Intrapartum Antibiotic Prophylaxis, regardless of their GBS status and whether they have PPROM, once in active labour.
- If not in labour and GBS positive, erythromycin only is required until in labour when iv antibiotics against GBS will be required.
- If chorioamnionitis is suspected, broad spectrum antibiotics as per sepsis guideline should be commenced.

11.0 Prolonged Preterm Prelabour Rupture of Membranes

If a woman with preterm ruptured membranes has been reviewed on the labour ward by a registrar or consultant, and a clear management plan documented she may be transferred to Joan Booker ward provided she is not experiencing any tightening or contractions. Ongoing management plans will be made and documented by the consultant team responsible for her care on the daily antenatal ward round.

The admission HVS result should be checked 36 - 48 hours after admission to check GBS status. Management is generally expectant in a woman with prolonged rupture of membranes unless signs of infection occur.

Signs of infection include (see sepsis guideline):

Abdominal pain

Offensive, green or yellow liquor

Tachycardia

Raised temperature

Raised WBC (remember that the WBC will rise transiently after steroid administration)

Raised CRP

Abnormal CTG

12.0 Labour and Delivery

The neonatal team should always be informed of any woman in labour at less than 37 weeks gestation. It may be appropriate for the neonatal team to come to Labour Ward to discuss the neonatal plan of care prior to delivery.

Tocolysis with Nifedipine or Atosiban should be stopped if labour progresses such that the cervix is 4cm or more dilated.

Narcotic analgesia or epidural may be given if required but the neonatal team must be informed of this at delivery.

12.1 Fetal monitoring

The fetal heart rate in the preterm period has not been extensively studied. Whilst in the antenatal period there is good evidence to support the use of computerised CTG analysis (Dawes Redman criteria) to evaluate the risk of acidemia, there is no established classification for intrapartum management. It is known that at early gestations decelerations are more commonly seen as a normal phenomenon in the absence of hypoxia. Similarly, before approximately 30 weeks' gestation cycling is commonly absent and so is not an indication for intervention. This must be balanced against the background of infection or inflammatory response which often precipitates the premature onset of labour and leaves the fetus more vulnerable to hypoxia.

In general we would offer CTG at gestations of 26 weeks and above in pre-term labour. The decision to initiate CTG in preterm labour should be made at consultant level and include consideration of the appropriateness of intervention including a caesarean section based on CTG findings. Parents should be fully counselled, and although monitoring at less than 26 completed weeks gestation is not routinely recommended, management of such cases should be individualised. If Caesarean section is not thought appropriate, fetal heart rate auscultation only should be used to establish fetal viability during labour, at intervals to be decided on an individual basis. These plans require regular review with a view to modification as gestation increases.

Fetal scalp electrodes should not be routinely used prior to 34/40.

12.2 Mode of delivery

If cephalic presentation and no additional risk factors aim for a vaginal birth.

In preterm labour, unless the presentation is cephalic the mode of delivery MUST be discussed with the Labour Ward or on call consultant. The ideal mode of delivery for the preterm breech infant is unclear, as there are no suitably conducted trials on the optimum mode of delivery (Grant et al, 1996). Preterm breech delivery can lead to entrapment of the fetal head if pushing occurs before the cervix is fully dilated. Caesarean section for a preterm breech, especially with ruptured membranes,

can be very difficult and may involve trauma to the fetus therefore a consultant must be present for any caesarean section with a breech presentation at a gestation of 32 weeks or less. It may be appropriate to perform a classical or De Lee incision to avoid this. If the Caesarean is not a standard lower segment caesarean section this MUST be clearly recorded in the notes because of its implications for future pregnancies.

As far as possible preterm babies should be delivered with minimal handling. Delivery with intact membranes (either at Caesarean section, or vaginal delivery) is ideal if it can be achieved.

Ventouse should be avoided before 34 weeks gestation. Forceps may be used but are rarely indicated. There is no indication for an elective episiotomy.

Caesarean sections of very preterm babies often require a classical incision, which is associated with higher maternal morbidity (bleeding, paralytic ileus) and increased risk of scar rupture/subfertility in the future. There is no clear evidence that outcome is improved by Caesarean section (CS) over vaginal delivery in these extremely preterm infants (whether singleton or twin) although appropriate trials to address this issue are not available (Drife 2006). It is acknowledged that prognosis is partly determined by the immediate condition of the baby at birth. Unfortunately even CS can be associated with trauma during delivery of a very preterm baby e.g. with severe oligohydramnios and transverse lie. There is a significant risk of cord prolapse with transverse lies or footling breech presentation and CS should be discussed with the parents if they opt for active management.

With flexed or extended breeches, complications may arise from inappropriate pushing before full dilatation or an entrapped head by the cervix. These complications should be anticipated, epidural considered and a senior obstetrician should be present at delivery prepared to assist delivery of the after coming head. In rare circumstances cervical incision may be required to facilitate delivery of the head but unfortunately this may well be too late to change perinatal outcome.

Ensure neonatal team are present at delivery.

If mother and baby are stable, delay cord clamping for 3mins- ensure baby is positioned level or below the placenta prior to cord clamping.

If immediate cord clamping is required, DO NOT milk the cord (NEW 2020).

Keep cord long as it may be required for venous access.

Babies delivered at less than 32/40 gestation should be placed in a plastic bag without drying, a hat placed on baby's head (after drying) and nursed under a heat source.

Please see preterm delivery checklist for babies ≤ 34 weeks gestation (Appendix 1).

13.0 Neonatal care

Inform Neonatal Unit of threatened / established preterm labour.

An experienced neonatal practitioner should discuss anticipated neonatal management with the woman and her partner.

Management of infants at the threshold of viability should involve the Consultant Obstetrician and Neonatologist in discussion with the parents.

The anticipated prognosis for a baby should be evaluated by senior obstetric and neonatal staff taking into account not just gestational age but other factors such as fetal sex, fetal number, estimated fetal weight, whether steroids have been given and place of birth.

If gestational age is certain at 22+0–22+6 weeks an experienced Obstetrician should discuss the prognosis for babies born at this gestation. This will usually be a Consultant except in very acute situations when the Consultant is not immediately available. The BAPM Framework for Practice (2019) quotes a 30 % survival for those babies that are born alive and receive active stabilisation and a 1 in 3 chance of severe disability. Overall, for babies alive at the onset of labour, 6% will live without severe disability.

If the decision is for active neonatal care of the baby, senior neonatal staff should provide counselling prior to birth when possible and be present at delivery. The decision for active stabilisation should be individualised.

If there is no time for antenatal discussion of parental wishes, a neonatal Consultant should attend the birth.

If the gestational age is certain and less than 22+0 weeks it is considered in the best interests of the baby, and standard practice, for resuscitation not to be carried out. The obstetric team should discuss this with the parents and document the discussion. The parents should be informed that their baby may attempt to gasp and move when born, will be kept comfortable, treated with respect, dignity and love.

13.0 References

NICE guidance (2015) Preterm labour and birth.

The Management of Babies born Extremely Preterm at less than 26 weeks of gestation A Framework for Clinical Practice at the time of Birth (2008). British Association of Perinatal Medicine.

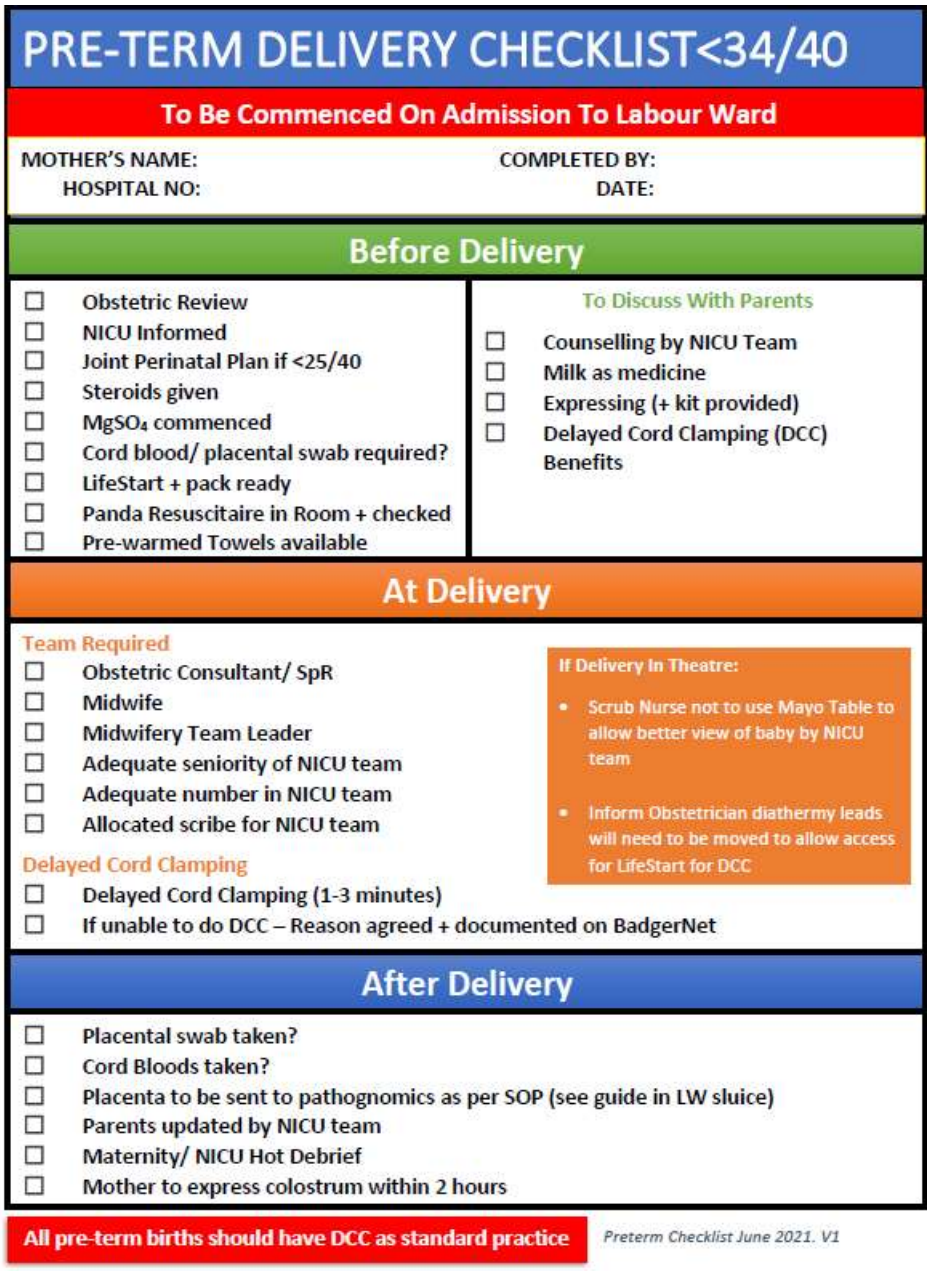
Berghella V, Hayes E, Visintine J, Baxter JK. Fetal fibronectin testing for reducing the risk of preterm birth. Cochrane Database of Systematic Reviews 2008, Issue 4. Art. No.: CD006843. DOI: 10.1002/14651858.CD006843.pub2.

ORACLE Trial. Report on RACLE Randomized Controlled Trial: Broad spectrum antibiotics for preterm, prelabour rupture of fetal membranes: Lancet 2001;357:979-88

Prevention of Early Onset Neonatal Group B Streptococcal Disease – Clinical Guideline (2003) RCOG.

Appendix 1

Preterm birth checklist



PRE-TERM DELIVERY CHECKLIST<34/40

To Be Commenced On Admission To Labour Ward

MOTHER'S NAME: COMPLETED BY:
HOSPITAL NO: DATE:

Before Delivery

- ☐ Obstetric Review
- ☐ NICU Informed
- ☐ Joint Perinatal Plan if <25/40
- ☐ Steroids given
- ☐ $MgSO_4$ commenced
- ☐ Cord blood/ placental swab required?
- ☐ LifeStart + pack ready
- ☐ Panda Resuscitaire in Room + checked
- ☐ Pre-warmed Towels available

To Discuss With Parents

- ☐ Counselling by NICU Team
- ☐ Milk as medicine
- ☐ Expressing (+ kit provided)
- ☐ Delayed Cord Clamping (DCC) Benefits

At Delivery

Team Required

- ☐ Obstetric Consultant/ SpR
- ☐ Midwife
- ☐ Midwifery Team Leader
- ☐ Adequate seniority of NICU team
- ☐ Adequate number in NICU team
- ☐ Allocated scribe for NICU team

If Delivery In Theatre:

- Scrub Nurse not to use Mayo Table to allow better view of baby by NICU team
- Inform Obstetrician diathermy leads will need to be moved to allow access for LifeStart for DCC

Delayed Cord Clamping

- ☐ Delayed Cord Clamping (1-3 minutes)
- ☐ If unable to do DCC – Reason agreed + documented on BadgerNet

After Delivery

- ☐ Placental swab taken?
- ☐ Cord Bloods taken?
- ☐ Placenta to be sent to pathognomics as per SOP (see guide in LW sluice)
- ☐ Parents updated by NICU team
- ☐ Maternity/ NICU Hot Debrief
- ☐ Mother to express colostrum within 2 hours

All pre-term births should have DCC as standard practice

Preterm Checklist June 2021. V1

Monitoring compliance with this Policy

Measurable Policy Objective	Monitoring/ Audit method	Frequency of monitoring	Responsibility for performing the monitoring	Monitoring reported to which groups/ committees, inc responsibility for reviewing action plans
• Women who receive antenatal corticosteroids as identified in the guideline • Are all women who present in established pre-term labour offered Magnesium Sulphate • Are all women in established pre-term labour offered intrapartum antibiotics • Is a MEOWS chart commenced for hourly maternal observations of temp, respiratory rate, pulse, blood pressure, tendon reflexes,	Badgernet Neonatal notes	Annually 1% of all health records of women with preterm labour / birth	Quality Improvement Lead	The completed reports will go to the quality and safety group and be presented at the departmental audit meetings. Action plans will be documented in minutes.

fluid intake and urine output				