ANTENATAL MANAGEMENT OF MULTIPLE PREGNANCY GUIDELINE

Document Control	
Designation of guideline author	Consultant in fetal and maternal medicine
Ratifying committee	Maternity Risk Management Group
Date ratified	25.03.13
Version	5
Issue No	1
Date issued	28.03.13
Review date	March 2016

Content

1. Introduction

This recommended practice outlines the additional care that women with multiple pregnancies should receive. The general package of antenatal care outlined in the NICE guidelines on antenatal care is taken as being provided.

The summary of evidence can be read in Appendix 6.

2. Where women with multiple pregnancies be cared for

Twin and higher order pregnancies should be cared for within the Multiple Pregnancy Service

Clinical Team:
Consultant in Fetal and Maternal Medicine – Clinical Lead
Professor of Obstetrics and Gynaecology
Specialist Midwives
Midwife Sonographer

Fetal Medicine Unit, Liverpool Women's Hospital, Clinic on Wednesday mornings (in attendance = Professor Neilson, Dr Bricker, Multiple Pregnancy midwives, sonographer,, a Fetal Medicine midwife and a Fetal Medicine HCA). The midwives clinic continues into the afternoon.

3. Allocation of women to Multiple Pregnancy Clinic (MPC)

When twin pregnancy is already known before booking, women will be allocated to book as per normal booking routine and attend the Multiple Pregnancy Clinic (MPC) within 3 weeks of booking.

When twin pregnancy is diagnosed at booking or later at the dating scan, care will be transferred to the MPC and the Meditech maternity letter edited to reflect this. The consultant field on the Meditech booking summary should read as 'Multiple Pregnancy Team'. The woman should be seen in the clinic within 3 weeks of diagnosis.

4. What additional antenatal care should occur at the first visits?

Chorionicity, amnionicity, viability and assessment for any major congenital abnormalities should be determined at the first / dating scan.

Where chorionicity and amnionicity cannot be obtained with certainty women should have an appointment for the MPC within 2 weeks for a consultant scan.

Where monochorionic twins are suspected and no fetal heart beat is seen in one fetus, fetal medicine scanning should be considered to exclude TRAP syndrome.

Women should be offered screening for trisomy 21.
- For twins offer the combined nuchal translucency test (nuchal measurement and first trimester serum screening test). Ideally this should be performed between 11 and 12 completed weeks. The latest it can be performed is 13+6 weeks. If it is too late to offer first trimester combined screening, then second trimester quadruple screening should be offered.
- For triplets and higher order pregnancies offer nuchal translucency alone screening.

5. Information

All women should receive the following information in addition to routine booking information:

- Multiple Pregnancy booklet
- A flier with the dates and agenda for Parent Education Evenings held for multiple pregnancies.
- TAMBA details & membership form
- TAMBA helpline details
- Liverpool support group contact & useful e-mail addresses
- Multiple Births Foundation details & Publication list
- Breastfeeding workshop details
- Library information (in box in parent education room)
  The Parent Education Room at the Crown Street site is available to use during clinic times to look at books, TAMBA leaflets, view videos
- Information about preterm labour signs and symptoms and 'what to do'.

6. What additional care should be provided during the antenatal period?

The clinic schedule in appendix 1-4 (depending on chorionicity and multiplicity) should be used as a basis of care, following individual risk assessment and consultation with the woman.
A copy of the clinic schedule should be placed in the woman's handheld notes.

Women should not be offered iron and folic acid supplementation routinely but given the higher risk of maternal anaemia in multiple pregnancy, a FBC should be undertaken at 24 weeks gestation and supplementation offered if the haemoglobin is low (less than 10.6 g/dl)

Women with twin / triplet pregnancy should not be routinely admitted for rest.

Women with twin pregnancy should not have routine assessment of the cervix (clinical or ultrasound)

7. What steps should occur if screening for abnormality is abnormal?

If NT combined screening is high risk the women should be brought back to the next MPC in the Fetal Medicine Unit to see a consultant.

If any of the fetuses has an NT of >/= 3.5mm the women should be brought back to the next MPC in the Fetal Medicine Unit to see a consultant.

Clinical management where screening is abnormal should be coordinated by the MPC consultant team

8. What scans will be performed

Discuss and offer nuchal translucency combined screening (which must be undertaken before 13+6 weeks and ideally before 12 completed weeks) – if accepted book via Meditech.

Viability and chorionicity should be determined at the booking scan. See section 4 above.

The ultrasound scanning protocol will depend on the chorionicity, amnionicity and multiplicity

At all scans, the twins should be mapped as left and right OR upper and lower OR upper left or right and lower left or right.

8.1. Dichorionic twins

Dichorionic twin pregnancies should be scanned for growth at 24, 28, 32, 36 weeks' gestation.

Each scan report should include documentation of EFW.

Umbilical artery Doppler should only be undertaken if clinically indicated (eg.. baby is small or liquor volume abnormal).

If there are concerns about liquor volume in one or both twins a maximum pool depth (MPD) should be measured in each sac and recorded in the report. AFI (amniotic fluid index) should not be measured in multiple pregnancy.

Where there are concerns about fetal growth, wellbeing or liquor volume in DC twins, medical staff in the MPC (or Fetal Medicine consultant) should be informed.

8.2. Monochorionic twins

Monochorionic twin pregnancies should be scanned at 16-17, 19-20, and 21-22 weeks' gestation by or under the direct supervision of an appropriately trained consultant and have departmental growth scans thereafter at 24, 28, 32 and 34 weeks.

Doppler blood flow studies of the umbilical artery, middle cerebral artery and ductus venosus should be considered where there is suspicion of TTTS.

A five-chamber view of the heart should be carried out as part of the detailed anatomy scan at 18-19 weeks or at 21-22 weeks.

Where there is no evidence of TTTS or fetal size discordance departmental scans for growth should be carried out at 24, 28, 32 and 34 weeks gestation. Scan documentation should include full biometry, EFW, liquor and bladder size.

Where there is size or liquor discrepancy urgent consultation with the MPC medical team or consultants in fetal medicine should occur.

8.3. Mono-amniotic twins

Scans should be performed in the Fetal Medicine Unit by or under the direct supervision of an appropriately trained consultant at 15-16, 18, 20, 22, 24, 26 and 28, 32 and 34 weeks gestation.

At each scan the following should be documented – liquor volume, fetal bladders, biometry, EFW, assessment of intracranial anatomy, assessment of the cords with colour flow Doppler

Where there is evidence of cord entanglement, consideration should be given to carrying out scans weekly; where there is no evidence scans should be carried out 2-weekly.

8.4. Higher order pregnancies

For higher order pregnancies all scans will be undertaken in the Fetal Medicine Unit and the revisit schedule will be tailored to the particular pregnancy.

Transvaginal scanning of the cervix should be carried out at 15-16 weeks, 20-21 weeks and 24 weeks gestation.

9. How should multiple pregnancies be monitored?

Uncomplicated Dichorionic and Monochorionic Diamniotic twins should have serial weekly computerized CTGs undertaken from 36 weeks gestation.

To ensure that a record of each individual twin is obtained the clinician reviewing the CTG should

1. Observe the pattern of accelerations or changes in baseline to ensure that they are not the same in both traces
2. Observe that the baseline is not the same in both traces
3. The person should not use STV alone or any of the other quantitative computerized values to differentiate between fetuses
4. The individual criteria should be reviewed for each fetus separately

Where there are concerns about an individual fetal CTG or difficulties determining separate FHR traces, the CTG should be discussed with a Senior Registrar (SpR 4-5 or ST6-7) or consultant.

If the fetal monitoring of a multiple pregnancy is being undertaken as an in patient all CTG traces must be reviewed by a Senior Registrar (SpR 4-5 or ST 6) or a Consultant.

10. Where, when and how should birth occur?

Place, timing and mode of birth should be discussed and documented ideally around 32 weeks if it has not been discussed beforehand.

The Place, Timing and Mode of Birth Discussion checklist in Appendix 5 should be completed for all women with uncomplicated multiple pregnancy by 33 completed weeks gestation where appropriate.

Information should be provided on the risks and benefits of different modes of delivery to support women in planning for birth

Birth will be offered from 37 weeks gestation to all uncomplicated dichorionic twin pregnancies and from 36 weeks gestation to all uncomplicated monochorionic twin pregnancies. Birth on the consultant unit with continuous electronic fetal monitoring should be advised.

If the presenting twin is cephalic, induction of labour and vaginal delivery should be advised,

If the woman requests Caesarean section and there is no clinical indication, she should be seen by a consultant member of the MPC team or a junior doctor under the consultant's supervision. If she is seen by a junior doctor, there should be documentation that her request has been discussed with a consultant.

Women who do not wish elective delivery should be informed of risk as pregnancy progresses beyond 37 weeks and monitored accordingly.

A consultant review at the MPC should be offered at 39 weeks.

For triplet pregnancies, elective CS should be offered at from 35 weeks gestation.

For higher order pregnancies, elective CS should be offered from 32-34 weeks gestation.

11. Special circumstances

The Liverpool women's NHS Foundation Trust is a tertiary referral Trust.

11.1. Management of Twin to Twin Transfusion syndrome

Where TTTS is diagnosed care should be coordinated by a consultant member of the MPC team or by a consultant in fetal medicine.

The choice of treatment options should be determined by gestation of onset and severity

11.2. Management of Twin reversed arterial perfusion syndrome

Where TRAP syndrome is suspected women should be referred to the MPC medical team or a consultant in fetal medicine.

Treatment and monitoring should be considered on an individual basis

11.3. Management of twin pregnancy where one twin has died

Where co-twin death occurs in a DC twin pregnancy, women should be referred to a consultant member of the MPC team

Fetal monitoring should be carried out using conventional methods

Where co-twin death is diagnosed in MC twin pregnancy, the Fetal Medicine and MPC team should be immediately informed

Emergency referral should be arranged for the next fetal medicine clinic

Further monitoring and care should be coordinated by the MPC medical team

12. References:

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This guideline is based on and compliant with recommendations of NICE clinical guideline 129: Multiple pregnancy: the management of twin and triplet pregnancy in the antenatal period. RCOG press. Sept 2011

13. Key performance indicators

- Documentation of antenatal discussions re place, timing and mode of birth (completion of Place, Timing and Mode of Birth Discussion checklist)
- Offer of birth at from 37 weeks gestation to all uncomplicated dichorionic and from 36 weeks to all uncomplicated monochorionic twin pregnancies.
- Review by or discussion with Consultant member of the MPC team if the woman requests Caesarean section and there is no clinical indication
- Arrangements for offering women USS before 13+6 weeks to assess viability, chorionicity and nuchal translucency combined screening
- Antenatal clinic schedule as per guidance
- Management of twin to twin transfusion coordinated by a consultant member of the MPC team or by a consultant in fetal medicine.

14. Consultation and ratification process

The consultation and ratification process has been undertaken as detailed in the guideline for guideline development

15. Appendix 1: Antenatal care schedule for dichorionic diamniotic twin pregnancies

(A summary copy of this visit schedule will be placed in the woman's handheld notes)

Booking
Routine booking history and investigations
Discuss and offer nuchal translucency combined screening (which must be undertaken before 13+6 weeks and ideally before 12 completed weeks) – if accepted book via Meditech

After diagnosis of twins, the woman should attend the MPC for the first time within 3 weeks of diagnosis to meet the team and discuss how the pregnancy will be managed.
Midwife to:

- Review booking history and screening tests
- Discuss risks and care package for multiple pregnancies
- Discuss revisit policy and shared care with community midwife
- Place appropriate visit schedule in handheld notes
- Check information pack was given at booking and if not provide it
- Reassess risk of PET taking multiple pregnancy into account
- Discuss with consultant if any co-morbidities or other risk factors
- GP letter to be completed and sent

16 weeks
See community midwife if no concerns
If co-morbidities / any complications identified at booking -16 week review should occur at MPC

20 weeks
Routine anatomy scan in Ultrasound Department
Midwife consultation

- Review booking history and screening tests (if not completed before)
- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Give Mat B 1
- Health Visitor Liaison referral
- Flier for next parent education session
- Book parent education classes
- Discuss with consultant if there are any co-morbidities or other risk factors (which have not been addressed before) or if the women wishes to see consultant

24 weeks
Scan in Ultrasound Department
Midwife consultation

- Measure blood pressure and urinalysis

- Assess maternal wellbeing
- Check FBC
- Discuss risk of preterm labour and give leaflet about signs and symptoms of preterm labour and 'what to do'.
- Discuss any concerns with consultant if necessary

28 weeks
Scan in Ultrasound Department including umbilical artery Doppler
Midwife consultation
- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Blood tests – FBC and alloantibody screen
- Offer single dose of Anti D if Rhesus negative
- Complete infant feeding list
- Discuss any concerns with consultant if necessary

30 weeks
See Community Midwife

32 weeks
Scan in Ultrasound Department
Midwife consultation
- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Discuss place, timing and mode of delivery - complete checklist
- Discuss analgesia and / or anaesthesia
- Discuss with consultant if there are any co-morbidities or other risk factors or if the women wishes to see consultant
- If the first twin is not cephalic or the woman is requesting a Caesarean section arrange consultant review

34 weeks
See Community Midwife
Red book given

36 weeks
Scan in Ultrasound Department
CTG in Day Unit
Midwife consultation
- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Book IOL or CS (if previously discussed with consultant)
- If booked for CS before 38 completed weeks gestation arrange for corticosteroid injections to be given at least 24 hours prior to admission
- Discuss any concerns with consultant if necessary

37 weeks
CTG in Day Unit
Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Discuss any concerns with consultant if necessary

38 weeks
CTG in Day Unit
Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Discuss any concerns with consultant if necessary

39 weeks
CTG in Day Unit
Joint Consultant and Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Book IOL or CS as agreed when reaches 39+ weeks if not yet delivered
- Discuss any concerns with consultant if necessary and for consultant review if planning to continue beyond term

16. Appendix 2: Antenatal schedule for monochorionic diamniotic twin pregnancy

(A summary copy of this visit schedule will be placed in the woman's handheld notes)

Booking
Routine booking history and investigations
Discuss and offer nuchal translucency combined screening (which must be undertaken before 13+6 weeks and ideally before 12 completed weeks) – if accepted book via Meditech

After diagnosis of twins, the woman should attend the MPC for the first time within 3 weeks of diagnosis to meet the team and discuss how the pregnancy will be managed.
Midwife to:

- Review booking history and screening tests
- Discuss risks and care package for multiple pregnancies
- Discuss revisit policy and shared care with community midwife
- Place appropriate visit schedule in handheld notes
- Check information pack was given at booking and if not provide it
- Reassess risk of PET taking multiple pregnancy into account
- Discuss with consultant if any co-morbidities or other risk factors
- GP letter to be completed and sent

16-17 weeks
Fetal Medicine scan and consultation

- Review booking history
- Discuss risks and care package for monochorionic diamniotic twin pregnancy (if not done before)
- Discuss revisit policy (if not done before)

Midwife consultation

- Check information pack was given at booking (if not done before)
- Give leaflet entitled 'Twin to twin transfusion syndrome' (if not done before)

18-19 weeks
Fetal Medicine scan and consultation

21-22 weeks
Fetal Medicine detailed anatomy scan and consultation
Midwife consultation

- Review and discuss all screening tests
- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Give Mat B 1
- Health Visitor Liaison referral
- Flier for next parent education session
- Book parent education classes

24 weeks
Ultrasound department scan
Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Check FBC
- Discuss risk of preterm labour and give leaflet about signs and symptoms of preterm labour and 'what to do'.
- Discuss any concerns with consultant if necessary

28 weeks
Ultrasound department scan and Doppler
Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Blood tests – FBC and alloantibody screen
- Offer single dose of Anti D if Rhesus negative
- Complete infant feeding list
- Discuss any concerns with consultant if necessary

32 weeks
Ultrasound department scan and Doppler
Midwife consultation

- Discuss and review blood results from previous visit
- Discuss place, timing and mode of delivery – complete checklist
- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Discuss any concerns with consultant if necessary

34 weeks
Ultrasound department scan and Doppler
Midwife joint consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- If presenting twin is not cephalic or the women is requesting Caesarean section discuss with consultant
- Book IOL or CS if agreed
- If booked for CS before 38 completed weeks gestation arrange for corticosteroid injections to be given at least 24 hours prior to admission
- Discuss any concerns with consultant if necessary

36 weeks
CTG in Day Unit
Midwife consultation

- Measure blood pressure and urinalysis

- Assess maternal wellbeing
- Discuss any concerns with consultant if necessary

37 weeks
Ultrasound department scan and Doppler
CTG in Day Unit
Midwife consultation
- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Discuss any concerns with consultant if necessary

38+ weeks
Weekly CTG in Day Unit
Weekly Midwife consultation
- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Book IOL or CS as agreed when reaches 39+ weeks if not yet delivered
- Discuss any concerns with consultant if necessary and for consultant review if planning to continue beyond term

17. Appendix 3: Antenatal schedule for monochorionic monoamniotic twin pregnancy

(A summary copy of this visit schedule will be placed in the woman's handheld notes)

Booking
Routine booking history and investigations
Discuss and offer nuchal translucency combined screening (which must be undertaken before 13+6 weeks and ideally before 12 completed weeks and ideally before 12 completed weeks) – if accepted book via Meditech

After diagnosis of twins, the woman should attend the MPC for the first time within 3 weeks of diagnosis to meet the team and discuss how the pregnancy will be managed.

- Review booking history and screening tests
- Discuss risks and care package for multiple pregnancies
- Discuss revisit policy and shared care with community midwife
- Place appropriate visit schedule in handheld notes
- Check information pack was given at booking and if not provide it
- Reassess risk of PET taking multiple pregnancy into account
- Discuss with consultant if any co-morbidities or other risk factors
- GP letter to be completed and sent

16 weeks
Fetal Medicine scan and consultation

- Review booking history
- Discuss risks and care package for monochorionic monoamniotic twin pregnancy (if not done before)
- Discuss mode of delivery – i.e. recommended CS because risk of cord entanglement and locked twins
- Discuss revisit policy (if not done before)

Midwife consultation

- Check information pack was given at booking (if not done before)

18 weeks
Fetal Medicine scan and consultation

20 weeks
Fetal Medicine detailed anatomy scan and consultation
Midwife consultation

- Review and discuss all screening tests
- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Give Mat B 1
- Health Visitor Liaison referral
- Flier for next parent education session
- Book parent education classes

22 weeks
Fetal Medicine scan and consultation
Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing

24 weeks
Fetal Medicine scan and consultation
Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Check FBC
- Discuss risk of preterm labour and give leaflet about signs and symptoms of preterm labour and 'what to do'.

26 weeks
Fetal Medicine scan and consultation
Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Blood tests – FBC and alloantibody screen
- Offer single[t] dose of Anti D if Rhesus negative
- Complete infant feeding list

28 weeks
Fetal Medicine scan and consultation
If concerns about significant cord entanglement consider

- CTGs 3 x weekly (Monday, Wednesday and Friday)
- decide whether for Fetal Medicine consultation weekly
- plan delivery 32-34 weeks by CS (steroids 24 hours before) – complete checklist

If no concerns about cord entanglement

- weekly CTGs
- Fetal Medicine consultation alternate weeks
- plan delivery 34-36 weeks by CS (steroids 24 hours before)

Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Blood tests – FBC and alloantibody screen

18. Appendix 4: Antenatal schedule for triplet pregnancy

(A summary copy of this visit schedule will be placed in the woman's handheld notes)

Booking
Routine booking history and investigations
Discuss and offer nuchal translucency scan (which must be undertaken before 13+6 weeks) – if accepted book via Meditech

After diagnosis of triplets, the woman should attend the MPC for the first time within 3 weeks of diagnosis to meet the team and discuss how the pregnancy will be managed.

- Review booking history and screening tests
- Discuss risks and care package for multiple pregnancies
- Discuss revisit policy
- Place appropriate visit schedule in handheld notes
- Check information pack was given at booking and if not provide it
- Reasses risk of PET taking multiple pregnancy into account
- GP letter to be completed and sent

15-16 weeks
Fetal Medicine scan (including cervical assessment by TVS) and consultation

- Review booking history
- Discuss risks and care package for triplet pregnancy (if not done before)
- Discuss revisit policy (if not done before)

Midwife consultation

- Check information pack was given at booking (if not done before)
- Give leaflet entitled 'Twin to twin transfusion syndrome' if there is monochorionicity

18-19 weeks
Fetal Medicine scan and consultation

20-21 weeks
Fetal Medicine detailed anatomy scan (including cervical assessment by TVS) and consultation
Midwife consultation

- Review and discuss all screening tests
- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Give Mat B 1
- Health Visitor Liaison referral
- Flier for next parent education session
- Book parent education classes
- GP letter to be completed and sent

22 weeks
Fetal Medicine scan and consultation
Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing

24 weeks
Fetal Medicine scan (including cervical assessment by TVS) and consultation
Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Check FBC
- Discuss risk of preterm labour and give leaflet about signs and symptoms of preterm labour and 'what to do'.

26 weeks
Fetal Medicine scan and consultation
Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing
- Complete infant feeding list

28 weeks
Fetal Medicine scan and consultation
Midwife consultation

- Discuss and review blood results from previous visit
- Measure blood pressure and urinalysis
- Blood tests – FBC and alloantibody screen
- Assess maternal wellbeing
- Offer single dose of Anti D if Rhesus negative

30 weeks
Fetal Medicine scan and consultation
Consider admission for bed rest
Discuss place, timing and mode of delivery – complete checklist
Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing

32 weeks
Fetal Medicine scan and consultation and tailor further management according to clinicasituation
Midwife consultation

- Measure blood pressure and urinalysis
- Assess maternal wellbeing

19. Appendix 5

Multiple Pregnancy Place, Timing and Mode of Birth Discussion Checklist

Gravida…… Parity…… Gestation……..

	Tick box
Timing of Delivery	
• Advised multiples are more likely to be born early	
• Dichorionic/ Diamniotic aim for delivery after 37 weeks	
• Monochorionic/ Diamniotic aim for delivery after 36 weeks	
• Monochorionic/ Monoamniotic aim for CS delivery at 34-35 weeks	
Mode of delivery	
Vaginal birth	
• Vaginal birth is usual if twin 1 is cephalic (Di/Di & Mono/Di)	
• Twins are monitored continuously during labour. Twin 1 may have FSE fitted	
• Procedure following birth of twin 1	
• If twin 2 non-cephalic may need interventions to aid delivery i.e. may be complex	
• Risk of needing CS for twin 2 is small (<3%)	
Caesarean birth	
• Elective CS for twin 1 breech, placenta praevia, maternal choice	
• Pros / Cons of elective CS discussed	
• Con: Major surgery and risks thereof – bleeding, damage to organs most commonly bowel or bladder, wound infection, thrombosis	
• Con: May mean longer hospital stay	
• Con: Babies may have 'wet lung' and need special care	
• Con: Longer recovery and driving restrictions	
• Con: Affect of future birth options	
• Con: Can make BF more difficult	
• Pro: Avoid complex delivery of twin 2 if not cephalic	
• Pro: Avoids emergency CS which can still occur if aiming for vaginal delivery	
Analgesia	
• Pain relief in labour leaflet given	
• Epidural anaesthesia discussed	
General	
• Advised hospital birth on delivery suite is recommended	
• Advised about number of health professionals present at the birth of twins	
• Greater chance of admission to NNU	

Preferred mode of birth……

Contingency plan……

Signed…… Date…….....

20. Appendix 6: Summary of evidence

Multiple pregnancy is a high risk situation for both mother and fetus. As a general rule all risks are increased. Adverse perinatal outcomes occur more frequently in multiple births than in singletons. Prematurity is the main cause with important contributions from IUGR (growth restriction), malformation and twin-twin transfusion syndrome (1). The risk of cerebral palsy is increased 6 fold with twins and up to 24 fold with triplets, with aetiologies not just restricted to to prematurity (2). Maternal mortality is double that of singleton pregnancies mainly due to an increase in pre-eclampsia and haemorrhage (3). Up to 25% of multiple pregnancies are complicated by pregnancy-induced hypertension (4) and the incidence of gestational diabetes is 2-3 times that seen in singletons. The risk of pre-eclampsia increases 3 fold for twins and and is higher for higher order pregnancies (5). Antepartum and postpartum haemorrhage, urinary tract infection and operative delivery are all more common.

It is logical to suggest that women with high risk pregnancies should have care in specialised clinics run by appropriately skilled health care professionals. However the evidence for such clinics is very limited. Special management protocols for twin pregnancies may improve outcome (6,7) but attendance at dedicated clinics is yet to be proven beneficial. One small study of a dedicated clinic for monochorionic twins reported better adherence to protocol and a reduction in CS rate (from 70 to 50%) (8). The presumed advantages of a dedicated multiple pregnancy clinic are: promotion of evidence based practice; concentration of knowledge and skills; encourages a multidisciplinary approach; the provision of antenatal education which address the individual needs of women with multiple pregnancy; provision of continuity of care; offers good chance of delivery within the unit; seamless transition into postnatal care; well established links to independent support services, opportunities for clinical research. It is also advantageous if the obstetrician/s leading such a clinic have skills in level III obstetric ultrasound and interventional procedures such as amniocentesis, chorionic villus sampling, amnioreduction etc.

Model for Antenatal Care in Multiple Pregnancy

The Royal College of Obstetricians and Gynaecologists (RCOG) recommends routine early ultrasound (9). The policy reduces post-term inductions by up to 70% (10) presumably due to accurate. Coincidentally, it also reveals multiple pregnancies, which may benefit from more specialist care. In multiple pregnancies the dating scan also determines fetal number, amnionicity and chorionicity (11) and is ideally performed in the first trimester when accuracy for chorionicity approaches 100% (12). Many multiple pregnancies are induced prior to term therefore accurate dating is essential to prevent iatrogenic prematurity.

Chorionicity determination:
Early determination of chorionicity is important to enable risk stratification, counseling and plan management. Monochorionic (MC) twins have increased risks of late miscarriage, perinatal mortality and genetic and structural abnormalities. 10- 15 % will

develop TTTS, which results in up to 80% loss rates if left untreated. TTTS has also been reported in higher order pregnancies (13-15). Because of the risk of TTTS, MC pregnancies are managed more intensively than their dichorionic (DC) equivalents and are usually reviewed ultrasonographically from as early as 16 weeks to detect clinical disease, although discordant nuchal translucency at 11–14 weeks may be the earliest sign of this problem (16). 1% of MC pregnancies are also monoamniotic, which is associated with an extreme risk of perinatal mortality due to cord entanglement. Prenatal diagnosis, intensive surveillance and aggressive management of monoamniotic pregnancies has demonstrated an improved outcome (17, 18). Knowledge of chorionicity promotes a full and open discussion about the specific risks associated with MC placentations and guides prenatal diagnosis and subsequent pregnancy management. Knowledge of chorionicity is also important when considering multifetal pregnancy reduction in higher order pregnancies and selective termination in the presence of discordant fetal abnormalities.

Nutritional advice:
The literature on the importance of adequate nutrition in pregnancy is primarily focused on singleton gestations and data are not easily extrapolated to multiple pregnancies. It is, however, important to remember that pre-existing nutritional deficiencies are more likely to be exacerbated by multiple gestations and these may contribute to any complications that may develop (19,20). Routine iron supplementation is not recommended in normal pregnancy as this practice is unproven and associated with unpleasant adverse effects (21). Routine oral iron supplementation for pregnant women in the industrialised world thus remains a controversial issue (22) and the situation in multiple pregnancies is even less clear. Some units offer supplements only on the basis of documented deficiencies while others advocate routine oral iron from the second trimester onwards. Some supplement folic acid in addition to iron as the utilization of folate increases towards the end of pregnancy and it improves utilization of iron (23).

Prenatal screening and diagnosis:
It is assumed that structural malformations are more common in multiple pregnancies and in general twins have a two- to three-fold greater risk than singletons, mainly because of the higher incidence of abnormalities (about 50%) in monozygotic twins compared with dizygotic twins (24, 25). Monozygotic pregnancies are associated with an increased risk of malformation owing to the unusual nature of the cleavage of the conceptus that generates monozygotic twins. There is however, little evidence for increased risks in dizygotic twins. Defects may be concordant or discordant but 80–90% are discordant regardless of zygosity.

Second trimester serum screening for Down’s syndrome in multiple pregnancies has a poor detection rate. It also poses problems relating to the identification of which fetus is at higher risk. There is no strong evidence that multiple pregnancies are at increased risk of chromosomal aneuploidy. The complexities of screening in multiple gestations can be considerable and this is therefore best managed by experienced practitioners. Monochorionic (i.e. monozygotic) twins have identical karyotypes, which makes the risk of aneuploidy the same as the maternal age related risk. In dizygotic twins, each fetus

has its own independent risk of chromosomal abnormality and thus the risk is additive. Because of the limitations of second trimester serum screening, nuchal translucency (NT) is an accurate alternative. Its efficacy in singletons is well established, with detection rates of 75% for Down syndrome for a false positive rate of 5% (26). The sensitivity of NT for detecting Down syndrome in DC twins is similar to that in singleton pregnancies (27). However, false positive rates are higher in MC twins because approximately 8% of euploid MC fetuses have increased NT. It is now clear that nuchal translucency combined screening is the most accurate method to detect chromosomal abnormalities, however, it should be noted that false positive rates are higher than in singleton pregnancy. In some cases this increase may reflect early cardiovascular compromise related to TTTS. A discordant NT greater than the 95th centile in MC twins increases the risk of TTTS four-fold (28). Recent data suggest that in MC twins effective screening for trisomy 21 is best provided by using the average NT measured in the two fetuses (29).

Invasive techniques such as amniocentesis and chorionic villus sampling (CVS) are now commonly performed in multiple pregnancies. Because of the possibility of discordant anomalies, even in MC pregnancies, and the management difficulties that may follow, the RCOG recommends that such testing should only be performed in specialist centres (30). Each fetus should ideally be tested individually, as even genetically identical MC twins can have post-zygotic mutations (31). Documentation is extremely important in the context of invasive testing. In the estimation of procedural loss rates for amniocentesis and CVS, consideration of the higher background loss rates of multiple pregnancies is required. When this is taken into account the outcomes appear to be similar to that of singletons for amniocentesis (32,33) although the data for CVS are less robust.
Although serum screening for the detection of Down syndrome and other aneuploidies is less sensitive in multiple pregnancies, maternal AFP measurements can provide a reasonable screen for neural tube, abdominal wall and renal defects.. A correction factor needs to be applied to allow for the presence of more than one fetus and this is reflected in an MoM (multiples of the median) cut-off for normality in multiple pregnancies. Twins have twice the level of maternal AFP, triplets three times and quadruplets four times (34). A meta-analysis of published studies gave twin median MoM levels of 2.18 on 1638 unaffected twin pregnancies (35). As in singleton pregnancies, it can also be a potential marker of poor outcome (36). However, given that these pregnancies are scanned and monitored regularly, there seems little value in undertaking AFP as an additional test.

Scanning schedules
Estimates vary but approximately 25–33% of infants born of multiple pregnancies are small for gestational age by standard definitions. This is more common in MC pregnancies and is associated with increased perinatal mortality and morbidity (37, 38). There are currently no data to guide the optimal frequency of ultrasound assessment of fetal growth in multiple pregnancies, however the addition of umbilical artery Doppler to serial growth scans is of proven benefit (39, 40). MC pregnancies also have the unique risk of TTTS where ultrasonographic signs of TTTS can present as early as 16 weeks

gestation but the median gestational age of presentation is 21 weeks, and rarely after 23-24 weeks. Scanning schedules should be adjusted accordingly. Due to the reportedly higher risk of congenital cardiac disease in MC pregnancies (41) fetal echocardiography should be offered at 22-23 weeks gestation.

The role of uterine artery Doppler in twin pregnancies has been established (42,43). It provides a useful screen for pre-eclampsia or growth restriction but at lower sensitivities than for singleton pregnancies. As multiple pregnancies are already subjected to close fetal and maternal surveillance, and in the absence of proven interventions for either condition, it is difficult to argue for the routine inclusion of uterine artery Doppler assessments at 22–24 weeks in all patients.

Prediction and prevention of preterm labour

The optimal method of predicting and preventing preterm labour in multiple pregnancy are subjects of ongoing debate. The aetiology is probably multifactorial and the most effective predictor being previous preterm labour is not helpful in primigravidae. A cervical length of less than 25mm (compared with 15mm in singletons) is a good predictor of pregnancies destined to deliver before 32 weeks gestation (44, 45), but recent evidence suggests that prophylactic cerclage may actually increase the risk of preterm delivery (46). Because of the current lack of effective interventions, routine cervical assessments in twin pregnancies is not advocated. Prophylactic cerclage, i.e. routine practice not based on cervical assessment, has not been shown to be helpful in triplet pregnancies (47) but there is no evidence about the value of routine cervical assessment and cerclage if cervical length short. Testing for fetal fibronectin in vaginal secretions in multiple pregnancies is less predictive of preterm delivery than in singletons (48, 49) and is currently not recommended as a routine, i.e. should only be undertaken when clinically indicated. Routine admission for bed rest increases the risk of preterm delivery in twin pregnancies (50) and is not recommended. However for higher order pregnancies one small RCT (19 pregnancies) suggested a non-significant trend towards prolonged gestation and improved neonatal outcomes (51). In general the use of home uterine activity monitoring (HUAM) is not recommended as studies have shown conflicting results (52, 53). A systematic review and meta-analysis of prophylactic tocolysis failed to show a significant reduction if preterm delivery and improved outcome and it is therefore not routinely recommended (54). Screening for infection and use of antibiotics to prevent preterm labour have not been addressed in the context of multiple pregnancy and are therefore difficult to recommend in practice. There are ongoing trials in Scotland and Denmark evaluating the use of progesterone preparations to prevent preterm delivery in multiple pregnancy, but at present the question remains unanswered. Currently the effect of stress and depression on risk of preterm delivery is being studies at Liverpool Women's Hospital but no recommendations can be made at this stage with regard to effective interventions.

Fetal monitoring in the third trimester

There is very little evidence with regard to the value of routine cardiotocography (CTG) or biophysical assessment in multiple pregnancy. However, it is presumed that both these methods are as reliable as in singleton pregnancies in identifying those fetuses at

risk. A single retrospective study involving 665 twins, compared a policy of third trimester non-stress testing (NST) with no NST and found no statistically significant differences although there was only one stillbirth in the monitored group compared to 9 in those not monitored (55). If multiple pregnancies are monitored with CTGs it is critically important that the traces are visually inspected to ensure that they come from different babies. Quantitative indices on computerized CTG read outs do not necessarily provide this reassurance.

Timing and mode of delivery

Perinatal mortality rates in multiple pregnancies begin to rise at 39 weeks of gestation, with the intrauterine death rate surpassing that of singletons at 42 weeks (56). A single randomised trial from Japan comparing expectant management with induction of labour at 37 weeks in twin pregnancies failed to demonstrate any differences between the two groups but was underpowered to detect differences in neonatal outcome (57). In a study of 8150 twin pregnancies (2) the optimal timing of delivery was found to be 37–38 weeks, with the recommendation that twin pregnancies should not be allowed to go beyond 39 weeks. This view is opposed by a recent Cochrane review, which found no strong evidence to support this practice (58). A large multicentre RCT, coordinated by the Maternal and Perinatal Clinical Trials Unit at the University of Adelaide, may clarify this important issue.

The optimal mode of delivery of twins is a controversial issue (59). Of those pregnancies where an attempt at vaginal delivery is made, 30–40% result in caesarean section and there is also a 7% risk of having to deliver the second twin by caesarean section (60). A large retrospective study found an increased perinatal mortality in vaginally delivered second twins (3). Further information is required and a large multicentre randomised trial (the Twin Birth Study) coordinated by the Maternal, Infant and Reproductive Health Research Unit in Toronto is currently addressing this issue. Liverpool Women's Hospital NHS Foundation Trust is collaborating in this research.

Delivery of higher order multiple is more complex than delivery of twins, and the vast majority of larger centres prefer the caesarean route. Cord prolapse, abruption, problems with achieving adequate monitoring, lower Apgar scores and higher perinatal death rates are all issues which make caesarean a more attractive option. Despite this, some studies have reported good outcomes for vaginally born triplets (61, 62).

Special circumstances

Monoamniotic twin pregnancies

Approximately 1–2% of MC pregnancies are monoamniotic and they are associated with high perinatal mortality owing to the complications of cord entanglement (63). Historical studies quote stillbirth rates of 30–70% (64, 65) but newer series are more optimistic with mortality rates of 10–15% (18,66). Because of the rarity of the condition, optimal management has yet to be established and the current literature provides limited guidance regarding appropriate antepartum fetal surveillance and timing and mode of delivery. Two recent publications advocate intensive in-patient monitoring and

elective preterm delivery, suggesting that this lowers perinatal losses (67, 68) although caution should be exercised in interpreting this retrospectively collected data. Such intensive monitoring may reveal signs of cord compression but will not always prevent sudden death (18). Medical amnioreduction has been used to reduce the risk of cord complications (69, 70) but owing to the potential complications of sulindac, the most commonly used nonsteroidal anti-inflammatory drug (NSAID), it is recommended that this only be used in the context of clinical trials. Most monoamniotic pregnancies are delivered by caesarean section but successful vaginal deliveries have been reported (71, 72). Timing of delivery remains controversial with some studies supporting elective preterm birth (17,67,68,70,73) but others holding out until term (71). Currently, there is no prospective evidence to guide the management of these high-risk pregnancies but a combination of routine intensive fetal monitoring using computerised fetal heart rate analysis, ultrasound and colour flow/power Doppler from 25 to 26 weeks of gestation with planned elective delivery at 32–33 weeks, following administration of steroids, seems a reasonable approach.

Twin reversed arterial perfusion (TRAP)

TRAP sequence occurs in approximately 1% of MC twins. Because of the rarity of this condition, clinical management is based on case series (rather than RCTs) that recommend increased fetal surveillance with intervention being triggered by hydrops or polyhydramnios (74, 75). The perfused twin cannot survive, while mortality for the donor ranges from 50% to 70% (76, 77). There is an option of selective cord occlusion for the acardiac twin but the risk of pregnancy loss, i.e. losing the normal (pump) twin is 15-20% as a result of the procedure.

Death of a co-twin

Single fetal death occurs in 2–7% of spontaneous pregnancies and in up to 25% of pregnancies from assisted reproduction techniques (ART) most commonly in the first trimester (78). The greater loss rates seen in latter group is attributed to the inherent fragility of pregnancies resulting from ART and the increased frequency of higher order multiples. The consequences of fetal loss after the first trimester are more severe in MC pregnancies, with stillbirth and neurological abnormality rates of 10% and 20%, respectively (79). Neurological injuries probably result from either profound hypotension or thrombosis that occurs at the time of demise of the co-twin and is unlikely to be altered by immediate delivery, regardless of gestation. For both MC and DC pregnancies, death of a co-twin increases the risks of growth restriction, preterm delivery and perinatal mortality (80). Management depends on chorionicity, gestation and time since death. A conservative policy of increased surveillance with delivery at 37 weeks is recommended in DC pregnancies (81), but optimal care in MC pregnancies has not been determined. Patients should be appropriately counselled about the risks of long-term sequelae and follow-up with ultrasound of the fetal brain should be offered, with magnetic resonance imaging (MRI) in the event of abnormality. Concerns surrounding maternal coagulopathy seem to have been grossly exaggerated and need play no role in the decision-making process.

Twin-to-twin transfusion syndrome (TTTS)
The pathophysiology of TTTS relates to unbalanced vascular connections within the placenta and a paucity of protective superficial AA anastomoses. Until recently, optimal therapy for TTTS was controversial. The traditional treatment was amnioreduction, which reduces the risk of preterm delivery but does not address the underlying disease processes. Endoscopic laser ablation is now the treatment of choice for severe TTTS, with similar success rates to amnioreduction but significantly better neurological outcomes (82).

Note: This evidence summary has not been updated as the NICE guideline number 129 for Antenatal Management of Twin and Triplet Pregnancies has superseded it.

21. Appendix 7: Version Control Sheet

Version	Date	Author	Status	Comment
1	2007	Dr L. Bricker Consultant in fetal and maternal medicine in consultation with: Mrs Lorna Wood: Specialist midwife and Dr Andrew Carlin: SPR	Archived on Intranet	
2	Jan 2010	Dr L. Bricker Consultant in fetal and maternal medicine	Archived on Intranet on 30.03.11	
3	March 2011	Dr L. Bricker Consultant in fetal and maternal medicine	Archived on Intranet	Updated antenatal schedule care plan
4	July 2012	Dr L. Bricker Consultant in fetal and maternal medicine	Archived on Intranet	Updated on basis of NICE clinical guideline number 129
5	March 2013	Dr L. Bricker Consultant in fetal and maternal medicine	Current version	Updated to add Place, Time and Mode of Birth Checklist; update MP team information, update clinic place and time information, update schedules

22. Appendix 8: Monitoring Compliance with the Guideline

Audit outcomes	Target	How will the audit outcomes be Monitored?	Responsible committee for monitoring audit outcomes and action plans	Frequency of guideline monitoring	Frequency of action plan monitoring	Lead
Completion of Place, Timing and Mode of Birth Discussion Checklist fully and if appropriate by 33 completed weeks gestation.	75%	Audit of 1% or 10 sets of health records of women who have had multiple births	Maternity risk management	3 yearly	Quarterly	Consultant in fetal and maternal medicine
Review by or discussion with Consultant member of the MPC team if the woman requests Caesarean section and there is no clinical indication	75%	Audit of 1% or 10 sets of health records of women who have had multiple births	Maternity risk management	3 yearly	Quarterly	Consultant in fetal and maternal medicine
Arrangements for offering women USS before 13+6 weeks to assess viability, chorionicity and nuchal translucency combined screening	75%	Audit of 1% or 10 sets of health records of women who have had multiple births	Maternity risk management	3 yearly	Quarterly	Consultant in fetal and maternal medicine
Antenatal clinic schedule as per guidance	75%	Audit of 1% or 10 sets of health records of women who have had multiple births	Maternity risk management	3 yearly	Quarterly	Consultant in fetal and maternal medicine
Management of twin to twin transfusion coordinated by a consultant member of the MPC team or by a consultant in fetal medicine	75%	Audit of 1% or 10 sets of health records of women who have had multiple births	Maternity risk management	3 yearly	Quarterly	Consultant in fetal and maternal medicine