NHS
North West

NORTH WEST GUIDELINE for the Detection and Management of FETAL GROWTH RESTRICTION

- **Document Control:**

Ownership

Role		Contact
Document authors Designation:	**Emma Ingram** **Edward Johnstone** **Andy Sharp** **Alexander Heazell** **Suzanne Thomas**	emma.ingram@lthtr.nhs.uk edward.johnstone@mft.nhs.uk a.sharp@liverpool.ac.uk alexander.heazell@manchester.ac.uk SuzanneL.Thomas@mft.nhs.uk

Version control:

Title	
V3	Ratified at Regional Guideline Steering Group January 2025

Compliant with:

1.	RCOG green top guideline n. 31
2.	SBLv3
3.	

Authors

Please list all authors here:

Emma Ingram **Edward Johnstone** **Andy Sharp** **Alexander Heazell** **Suzanne Thomas**	emma.ingram@lthtr.nhs.uk edward.johnstone@mft.nhs.uk a.sharp@liverpool.ac.uk alexander.heazell@manchester.ac.uk SuzanneL.Thomas@mft.nhs.uk

Acknowledgements
We would like to thank the members of the NW FGR Group for their commitment and contribution to the development of this NW FGR Guideline.

Ed Johnstone
Professor of Obstetrics & Fetal Medicine,
Consultant Obstetrician / FGR Lead
Chair of the North West FGR Group

Suzanne Thomas
Matron for Fetal Surveillance
Co-chair of the North West FGR Group

Conflict of Interest:

None	

Contents

1 Introduction

1.1 Purpose and Scope

The purpose of this guideline is to provide advice, based on the best evidence available, to guide clinicians regarding the investigation and care of the small-for-gestational-age (SGA) fetus and growth restricted fetus. The guideline reviews the risk factors for these conditions and provides recommendations regarding surveillance, diagnosis, and management, including recommendations for fetal monitoring and birth.

This guideline is for healthcare professionals who care for women, non-binary and trans people with a SGA fetus or with fetal growth restriction (FGR). Within this document we use the terms woman and women's health. However, it is import-ant to acknowledge that it is not only women for whom it is necessary to access women's health and reproductive services to maintain their gynaecological health and reproductive wellbeing. Gynaecological and obstetric services and birth of care must therefore be appropriate, inclusive and sensitive to the needs of those individuals whose gender identity does not align with the sex they were assigned at birth.

1.2 Definitions

For the purposes of the guideline;

Definition of FGR in a previous pregnancy as a risk factor is defined as any of the following:
• Birthweight <3rd centile.
• Early onset pre-eclampsia or FGR necessitating birth before 34+0 weeks.
• Birthweight below 10th centile with evidence of placental dysfunction (defined below).

Definition of FGR in a current pregnancy is defined as either of the following:
• EFW or AC <3rd centile.
• EFW or AC <10th centile with evidence of placental dysfunction (defined below).

For the purposes of this guideline placental dysfunction is defined as either:
• An abnormal uterine artery Doppler (UtAD) resistance defined as mean pulsatility index [PI] >95th centile in second trimester (Appendix 5 - Gomez et al. 2008)
• An abnormal umbilical artery Doppler (UAD) resistance defined as absent or reversed end diastolic flow or PI >95th centile (Appendix 6 - Acharya G et al 2005).

1.3 Background

The single largest risk factor for stillbirth is unrecognised fetal growth restriction, and preventive strategies need to focus on improving antenatal detection. (Gardosi et al, 2013. In addition, these infants are at increased risk of perinatal hypoxia and acidaemia, operative delivery, neonatal encephalopathy, and cerebral palsy (Ribbert et al. 2005, Jacobsson et al 2008).

Not all babies who are SGA (<10th centile birth weight) will have FGR, but the lower the centile the higher the chance that FGR will be present. The management strategies within this guideline reflect those recommended in Saving Babies Lives Care Bundle version 3 (SBLCBv3) and Green-Top Guideline No. 31 (2024). This approach aims to increase identification of fetal growth restriction whilst at the same time reducing unnecessary investigations and iatrogenic deliveries.

2. Detail of the Guideline

2.1 Monitor and review the risk of FGR throughout pregnancy

2.1.1 A risk assessment for FGR should be performed by 14 weeks' gestation using the agreed pathway (Appendix 2) in all singleton pregnancies. In multiparous women, risk assessment should include the calculation of birthweight centiles for previous infants. A risk assessment for Aspirin requirement should be performed in all women. Vitamin D should be offered to all women for the duration of their pregnancies as per trust guidance (Vitamin D in Pregnancy PGD). These should be recorded in the woman's obstetric history.

2.4.1 As part of the risk assessment for FGR, blood pressure should be recorded, at each contact, using a digital blood pressure monitor that has been validated for use in pregnancy.

2.1.3 The risk of FGR should be reviewed throughout pregnancy and maternity providers should ensure that processes are in place to enable the movement of women between risk pathways dependent on current risk.

2.1.4 Women who are at increased risk of FGR should have ultrasound surveillance of fetal growth at 3-weekly intervals until birth, the gestation at which serial scanning starts will depend on the risk categorisation (Appendix 3).

2.2 Women who are at <u>low risk</u> of FGR following initial risk assessment

2.2.1 Women who are at low risk of FGR following risk assessment should have surveillance using antenatal fundal height (FH) measurement, which should be started routinely from 26^{+0} - 28^{+6} weeks' gestation, and performed no more frequently than every 2 weeks. If there are any concerns about fetal wellbeing, FH measurements can be taken from 24^{+0} weeks. Measurements should be plotted to the nearest 0.5cm and/or recorded on charts by clinicians trained in their use, or as measured if using GROW 2.0. Staff who perform FH measurement should be competent in measuring, plotting (or recording), interpreting appropriately and referring when indicated. Only Staff who perform FH measurements need to undergo annual practical training in FH measurement and pass the competency assessment.

2.2.2 Where the FH plots less than the 10th centile on fetal growth charts or there is no change (<1cm difference) in FH measurement over 2 weeks on the fetal growth

chart, and where fetal movements are normal, the woman must be seen within 72 hours for ultrasound scan assessment of fetal growth, liquor volume (LV) and umbilical artery Doppler (UAD) (See Appendix 1). Where movements are reduced the woman must be seen in **INSERT NAME OF LOCAL SERVICE** on the same day where they should have a computerised CTG performed prior to the ultrasound scan assessment of fetal growth, LV and UAD which should be arranged for the next working day (See Appendix1).

2.2.3 Women who are undergoing planned serial scan surveillance should cease FH measurement after serial ultrasound surveillance begins. FH measurement should also cease if women are moved onto a scan surveillance pathway in later pregnancy for a developing pregnancy risk (e.g., development of gestational diabetes).

2.2.4 FH should be measured from the highest fetal pole to the top of the symphysis pubis, following the longitudinal lie of the fetus. FH measurement can only be used for longitudinal fetal lie and fetuses in the transverse position should undergo ultrasound scan assessment of fetal growth.

2.3 Women at moderate risk of FGR

2.3.1 Women at moderate risk of FGR may have a one-off FH measurement to assess fetal growth before 28^{+6} weeks of pregnancy (see section 2.2.1). If this measurement plots above the 10th centile on a growth chart no further action is required until the commencement of ultrasound assessment of fetal growth at 32 weeks' gestation. If the FH measurement plots below the 10th centile and fetal movements are normal, a scan assessment of fetal growth, LV and UAD should be arranged (See Appendix 1). Where movements are reduced the woman must be seen in **INSERT NAME OF LOCAL SERVICE** on the same day where they should have a computerised CTG performed prior to ultrasound scan assessment of fetal growth, LV and UAD arranged for the next working day (See Appendix1).

2.3.2 Ultrasound assessment of fetal growth, UAD assessment and LV should start from 32 weeks' gestation and be repeated every 3 weeks until birth. An appropriately trained person (Sonographer / Midwife / Midwife Ultrasound Practitioner / Clinician) should review the scan. See Appendix 1, 3 and Appendix 4 for the management of abnormal findings.

2.3.3 Women who smoke tobacco cigarettes at any gestation in pregnancy, regardless of if they have quit since conception should have serial scan surveillance throughout pregnancy from 32 weeks gestation until birth.

2.4 Women at high risk of FGR

2.4.2 Women at high risk of FGR should have Uterine Artery Doppler (UtAD), UAD and assessment of fetal growth by abdominal ultrasound at 18^{+0} - 23^{+6} weeks' gestation. Women who are classified as high risk should be considered for Aspirin 150mg ON from 8-12 weeks until 36 weeks' gestation. Aspirin can be commenced up to 16

weeks if this window is missed. Vitamin D should be offered to all women for the duration of their pregnancies as per trust guidance (Vitamin D in Pregnancy PGD).

2.4.3 Women will be assigned a "positive" screen if they have the following: EFW <10th centile, mean UtAD PI>95th centile for gestation (use Gomez chart; Appendix 5) or uterine artery notching. If only one uterine artery measurement is obtained, then the PI from this will be used. If neither is obtained, then this should be considered a positive finding (i.e., high risk).

Follow up should be arranged depending on the findings, as follows:

- Normal UtAD PI & EFW <10th centile requires serial ultrasound scans from 26 weeks' until delivery.
- Abnormal UtAD (as described above) & EFW >10th centile requires serial ultrasound scans from 28 weeks every 3 weeks until delivery.
- Abnormal UtAD and AC or EFW<10th centile - discuss with **INSERT NAME OF LOCAL GROWTH SERVICE**

2.4.4 Women with none of these features (i.e. a normal screen) should be seen for ultrasound assessment of fetal growth at 32 weeks' gestation unless initial referral for high risk assessment was because of abnormal serum markers (low PAPPA, raised inhibin, raised aFP) in isolation. If the only indication for serial scans is abnormal serum markers scans should start from 35 weeks, if they have another high-risk indication e.g. high BMI or previous FGR, serial scans should start at 32 weeks as per the other indication. Ultrasound scans should continue every 3 weeks until birth. Fundal height measurements should be conducted, where suitable, until the commencement of these fetal growth scans.

2.5 Women who are unsuitable for assessment of fetal growth by fundal height measurement or with special circumstances

2.5.1 Women with booking BMI ≥ 35 should have serial scans from 32 weeks' gestation 3 weekly until birth.

2.5.2 Women who have multiple large fibroids identified on ultrasound (defined as ≥2 fibroids > 5cm diameter) should undergo serial scans from 32 weeks' gestation 3 weekly until birth.

2.5.3 Women with pre-existing diabetes should be risk assessed using the trust diabetes in pregnancy guideline. **REFERENCE LOCAL GUIDELINE**. Women who develop diabetes in pregnancy should be monitored with ultrasound scans 3-weekly from 28 weeks. If women with diabetes develop FGR then management decisions should be made in partnership with the Consultant leads.

2.5.4 Women with significant part or complete uteri didelphys do not require UtAD but should receive serial ultrasound assessment from 28 weeks gestation until delivery. This category does not include women with minor septal abnormalities, bicornuate or arcuate uteri.

2.5.5 At the mid-trimester anomaly scan additional risk factors for FGR may be identified, such as a single umbilical artery (two-vessel cord) or echogenic bowel. Identification of an additional risk factor should prompt assessment of the UtAD to assess the ongoing risk of FGR. The Fetal Anomaly Screening Programme (FASP) provides guidance as to how these findings should be classified and whether referral for further assessment as for other suspected fetal anomalies should also occur.

2.5.6 When low pregnancy associated plasma protein A (PAPPA) levels or raised alpha fetoprotein (AFP) levels and/or raised inhibin A are incidentally detected following first or second trimester screening for aneuploidy, it is recommended women should be offered additional ultrasound surveillance for SGA/FGR. In pregnancies with abnormal serum markers (PAPP-A, inhibin A, AFP), UtAD assessment should be performed at 18-23^{+6} weeks gestation, and if UtAD is normal scan surveillance should be 3-weekly at from 35 weeks' gestation.

2.6 How can the risk of FGR be reduced?

2.6.1 Smoking increases the risk of SGA and women who stop smoking reduce their risk of SGA. Reduce smoking in pregnancy by identifying women who smoke with the assistance of carbon monoxide (CO) testing and ensuring in-house treatment from a trained tobacco dependence advisor is offered to all pregnant women who smoke, using an opt-out referral process. Refer to local smokefree pregnancy guidance.

2.6.2 Women at risk of pre-eclampsia and/or placental dysfunction should take aspirin 150mg once daily at night from 8-12 weeks until 36 weeks gestation to reduce their chance of SGA and FGR. Aspirin can still be commenced up to 16 weeks if this window is missed.

2.6.3 LMWH should not be prescribed to reduce the risk of SGA or FGR in at-risk women, even in the presence of heritable thrombophilia, and should only be used in women at risk of thromboembolic disease.

2.6.4 As per RCOG Green-top Guideline No. 31, hydroxychloroquine is not recommended outside of research settings in the prevention or treatment of FGR. Progesterone has also not shown any effect on the reduction of preeclampsia or FGR and therefore is not recommended outside of its use in preterm birth prevention.

2.7 Provide the correct surveillance when FGR is suspected and birth at the right time.

2.7.1 When a fetal growth disorder is suspected or diagnosed an assessment of fetal wellbeing should be made including a discussion regarding fetal movements and if required, a computerised CTG. A maternal assessment should be performed at each contact, this should include blood pressure measurement, using a digital monitor that has been validated for use in pregnancy, a urine dipstick assessment for proteinuria and a CO measurement. In the presence of hypertension, NICE guidance on the use of PlGF/sFlt1 testing should be followed.

2.7.2 Early onset-FGR (before 32 weeks' gestation)
Early onset fetal growth restriction is defined as occurring before 32 weeks' gestation in the absence of congenital anomalies.

2.7.3 Pregnancies with early onset FGR should be monitored and managed with input from tertiary level units with Level 3 neonatal care. Care should be multidisciplinary by neonatologists and obstetricians with fetal medicine expertise, particularly when extremely preterm (before 28 weeks). Therefore, woman should be referred to **INSERT NAME OF LOCAL SERVICE** or fetal medicine services (see Appendix 3) and seen/reviewed within 5 working days. If unable to obtain a review within this timeframe at the local unit, regional centres should be contacted to see if there is capacity to review there.

2.7.4 The specialist review should include a discussion around different causes of early onset FGR, the potential offer of additional investigations to exclude genetic or chromosomal causes (amniocentesis), or viral causes (TORCH/CMV, Zika and Malaria, Syphilis), and appropriate counselling on pregnancy management options depending on the fetal EFW and gestation (thresholds of viability). This may include termination of pregnancy, conservative management with anticipated intrauterine death, and active management.

2.7.5 Antenatal steroids should not be administered before a specialist review in **INSERT NAME OF LOCAL SERVICE** has occurred. If assessment is not available within 24 hours, then a computerised CTG should be performed. If computerised CTG criteria are met, then birth can be postponed until a specialist opinion is obtained at the next possible opportunity. If computerised CTG criteria are not met, then a review of which component this is dependent on should take place by a senior obstetrician. Short Term Variation (STV) is the key parameter, see Appendix 4 for birth indicators in FGR including STV safety net criteria values. If the cCTG does not meet the criteria on another component, then the decision regarding whether to proceed to birth or repeat the cCTG is the responsibility of the consultant obstetrician caring for the patient.

2.7.6 Women with early onset FGR require fetal wellbeing assessment at least weekly via ultrasound assessment of UAD and LV, and computerised CTG where appropriate. Fetal biometry should be performed every 2 weeks. The frequency of fetal wellbeing assessment will be based on the severity of UAD abnormalities and may be required more often (see Appendix 3). In cases of FGR with stable growth trajectories and no other risk factors it is not necessary to perform weekly UAD if the clinician and woman are comfortable with a longer scan interval.

2.7.7 If UAD PI is >95th centile in both vessels repeat Doppler twice per week until UAD returns to ≤95th centile or until birth is indicated.

2.7.8 Conservative Management **-** The decision to proceed with conservative management should be based on gestational age and estimated fetal weight using the BAPM framework for practice – Perinatal management of extreme preterm birth before 27 weeks' gestation (BAPM 2019). Where the chances of healthy survival of the infant is remote, conservative management can be considered, except where after detailed

counselling of the parents (including neonatal counselling) the parents wish for active management. Conservative management should be individualised to the patient and is at the discretion of the lead consultant. Maternal assessment for the early diagnosis of conditions related to early onset-FGR such as pre-eclampsia (blood pressure and urine) should be performed. There should also be clear documentation that delivery should not be based on fetal reasons, therefore CTG would not be recommended.

Scan surveillance should be individualised, but may include additional scans for fetal viability, fetal biometry or Dopplers for counselling purposes.

2.7.9 Active Management **-** Ultrasound surveillance should be arranged with oversight by a named consultant or fetal growth service. Active management requires the ability to perform DV, cCTG and provide tertiary (level 3) NICU facilities. Transfer of care should be considered if these services are not available locally.

2.7.10 If the UAD demonstrates absent EDF, ultrasound surveillance should be a minimum of 3 times per week to assess UAD, DV and LV. An assessment of EFW should occur every 2 weeks. More frequent maternal surveillance may be required to assess/monitor for pre-eclampsia. Computerised CTG should be considered in combination to fetal wellbeing ultrasound assessment, particularly with any episodes of further deterioration in fetal wellbeing or maternal concern, such as reduced fetal movements, new oligohydramnios, or Doppler changes. With high frequency surveillance inpatient stay should be offered.

2.7.11 All cCTGs should be considered in relation to the gestation and clinical situation. If computerised CTG criteria are not met but the calculated STV value is above the specified safety net criteria for that gestation CTG monitoring can be discontinued (see Appendix 4). A cCTG STV below the gestation specified safety net is a trigger to deliver following appropriate fetal optimisation.

2.7.12 Late onset FGR

Late onset fetal growth restriction is defined as occurring after 32 weeks' gestation, in the absence of congenital anomalies, with;

- AC/EFW <3rd centile
- AC/EFW <10th centile with abnormal UAD
- AC/EFW crossing 50 centiles *

* Particular attention should be paid to a downward trend in AC growth velocity

2.7.13 Women diagnosed with late onset FGR should be managed in accordance with the flow chart in Appendix 3.

2.7.14 Abnormal middle cerebral artery (MCA), cerebroplacental ratio (CPR) or umbilico-cerebral ratio (UCR) can inform monitoring strategy and frequency but should not be used to determine birth decisions prior to 37 weeks. After 37^{+0} weeks, an abnormal MCA, CPR or UCR can be used to guide timing of birth. Caution should be given to the interpretation of a normal MCA, CPR or UCR as this does not provide

reassurance that the fetus is not compromised. In all cases of FGR, birth is recommended prior to 37^{+6} weeks' gestation.

2.7.15 In late-onset FGR a woman's subjective assessment of reduced fetal movements or absent movements on ultrasound should prompt an assessment with cCTG.

2.8 Birth planning

2.8.1 Timing of Birth - All management decisions regarding the timing of birth of FGR infants and the relative risks and benefits of iatrogenic birth should be discussed and agreed with the mother.

2.8.2 If birth is planned when EFW <1.8kg or gestation <35 weeks' gestation, then the availability of neonatal care should be identified prior to induction of labour or caesarean delivery. If no suitable facilities are available, arrangements should be made for transfer but only if there is a normal cCTG and/or a normal DV a-wave (if <32 weeks') prior to this occurring. Where this is not the case women must give birth locally with ex-utero neonatal transfer as needed.

If there are concerns regarding maternal condition (such as pre-eclampsia) which indicate a consistent deterioration justifying preterm birth this should ALWAYS override the fetal wellbeing assessment.

2.8.3 FGR with abnormal UAD
If UAD is raised (PI > 95th centile) birth is recommended at 36^{+0} to 36^{+6} weeks.

If UAD shows absent EDF, birth should be considered at 32^{+0} weeks and is recommended at 34^{+0} weeks.

If UAD shows reversed EDF birth should be considered at 30^{+0} weeks and is recommended at 32^{+0} weeks.

If UAD has demonstrated absent or intermittently absent EDF, but this has returned to normal and has persisted beyond the initial improvement seen after antenatal corticosteroid administration, the pregnancy should be managed as if no AREDF.

2.8.4 Birth may be indicated earlier than the UAD gestational age criteria above if there is absent DV a-wave, cCTG STV below gestational safety net criteria (Appendix 4), or the presence of spontaneous persistent unprovoked fetal heart rate decelerations.

2.8.5 In the presence of UAD absent/reversed EDF after 32^{+0} weeks birth should occur as soon as is safely possible following fetal optimisation.

2.8.6 FGR with normal Dopplers and LV

EFW <3rd centile
When the EFW is <3rd centile and there are no other risk factors, initiation of labour and/or birth should occur at 37^{+0} weeks and no later than 37^{+6} weeks gestation.

SGA Fetus (EFW 3rd - 9th centile)
In fetuses with an EFW between the 3rd and 9th centile, with normal growth velocity, birth should be considered at 39^{+0} weeks and achieved by 39^{+6} weeks.

2.8.7 In the SGA pregnancies, other risk factors (maternal medical conditions or concerns regarding fetal movements) or fetal compromise (static growth or oligohydramnios) should be present for birth to be recommended prior to 39 weeks.

2.8.8 For women who are recommended for planned birth at 39^{+0} weeks for SGA but who wish to continue the pregnancy, counselling must include a discussion with a senior obstetrician (ST6+) regarding evidence that there is no additional risk for the baby or for the woman from planned birth/ induction at this gestation when compared with expectant care. An individualised surveillance plan for the continuation of the pregnancy must be made.

2.8.9 After 37^{+0} weeks, an abnormal MCA, CPR or UCR can be used to guide timing of birth. A normal MCA, CPR or UCR does not provide reassurance that the fetus is not compromised and in all SGA cases, birth is recommended prior to 39^{+6} weeks.

2.8.10 EFW > 10th
When static growth is suspected in babies whose EFW is >10th centile, assessment of all fetal biometry measurements should be performed since the anomaly scan to identify potentially erroneous single measurements and the presence or absence of other risk factors for FGR. Particular attention should be paid to a completely static or downward trend in abdominal circumference growth velocity. FGR is rare if EFW >20th centile, so early birth (before 39 weeks) should only be considered following senior review, ideally by a dedicated FGR service. Trusts may use reduced growth velocity calculators (e.g. GROW-2) or the Delphi consensus (50 centiles change) to determine reduced fetal growth, but how these are to be used should be defined at a local Trust level. Trusts should be aware that there are currently no prospectively evaluated growth velocity calculators that have been shown to reduce stillbirth.

2.8.11 The decision to deliver prior to 37 weeks must be made by a Consultant. If there are no concerning features, then attempts should be made to prolong pregnancy until 37^{+0} weeks gestation with additional cCTG monitoring in place if there are either medical or maternal concerns.

2.9 Mode of birth

2.9.1 In the FGR fetus with an abnormal cCTG STV, DV alteration, UAD with absent or reversed end diastolic flow velocities birth should usually be by planned Caesarean section.

2.9.2 Antenatal corticosteroids should be offered to all women between 24^{+0} and 34^{+6} weeks, ideally 48-hours before an anticipated birth. In women 35^{+0} – 36^{+6} steroids can be considered after counselling. At least 4 hours prior to caesarean section magnesium sulphate loading dose and infusion should be offered to all women between 24^{+0} and 29^{+6} weeks of pregnancy and considered for women between 30^{+0} and 33^{+6} weeks of pregnancy. This has been shown to reduce the incidence of cerebral palsy in high-risk pre-term infants (RCOG, 2011).

2.9.3 In the SGA fetus or late FGR fetus with normal UAD or with UAD PI > 95th centile but end–diastolic velocities present, induction of labour in a consultant led unit can be offered but rates of unplanned (emergency) caesarean birth are increased, and continuous fetal heart rate monitoring is recommended from the onset of uterine contractions.

2.10 Postnatal management

2.10.1 An individual birth weight centile must be calculated for every baby (live born/stillborn/multiples) at birth, this must be documented on the neonatal record and in the child's personal health record (red book).

2.10.2 If a baby is born with a birthweight less than 3rd centile, or there has been a static growth (reduction in growth velocity of 50 centiles) in the absence of known genetic or chromosomal causes, histopathological examination of the placenta should be requested in accordance with the Royal College of Pathologists guidelines, particularly if the birth is preterm.

2.10.3 All low-risk woman who deliver a baby with a birth weight less than the 3rd centile and less than 32^{+6} weeks must be offered a follow up postnatal appointment.
At this time, any potentially identifiable risk factor for FGR in future pregnancies should be discussed. Scientific data supporting a causal association between either methylenetetrahydrofolate reductase (MTHFR) polymorphisms or other common inherited thrombophilias and adverse pregnancy outcomes, such as recurrent pregnancy loss, severe preeclampsia and FGR, are lacking. Specific testing for antiphospholipid antibodies, when clinically indicated, should be limited to lupus anticoagulant, anticardiolipin antibodies and beta 2 glycoprotein antibodies.

A plan for future pregnancies and preventative strategies (smoking cessation, aspirin treatment) should be recorded in the notes and discussed with the woman.

3. Communication and Documentation

All women with learning disabilities, visual or hearing impairments or those whose first language is not English must be offered assistance with interpretation where applicable, and where appropriate a telephone interpreter must be used. It is paramount that clear channels of communication are maintained at all times between all staff, the women and their families. Once any decisions have been made/agreed, comprehensive and clear details must be given to the woman thereby confirming the wishes of the women and their families. The contents of any leaflet issued must be explained in full at the time it is issued. All communication difficulties (including learning difficulties) and language barriers must be addressed as outlined in the previous paragraph at the time the leaflet is issued.

Ensure the provision and discussion of information of the risks and benefits with women during the antenatal, intrapartum and postnatal periods.

Staff should aim to foster a culturally sensitive care approach in accordance with the religious and cultural beliefs of the parents and families in our care. All women with learning disabilities, visual or hearing impairments or those whose first language is not English must be offered assistance with interpretation where applicable, and where appropriate a telephone interpreter must be used. It is paramount that clear channels of communication are maintained at all times between all staff, the women and their families. Once any decisions have been made/agreed, comprehensive and clear details must be given to the woman thereby confirming the wishes of the women and their families. The contents of any leaflet issued must be explained in full at the time it is issued. All communication difficulties (including learning difficulties) and language barriers must be addressed as outlined in the previous paragraph at the time the leaflet is issued.

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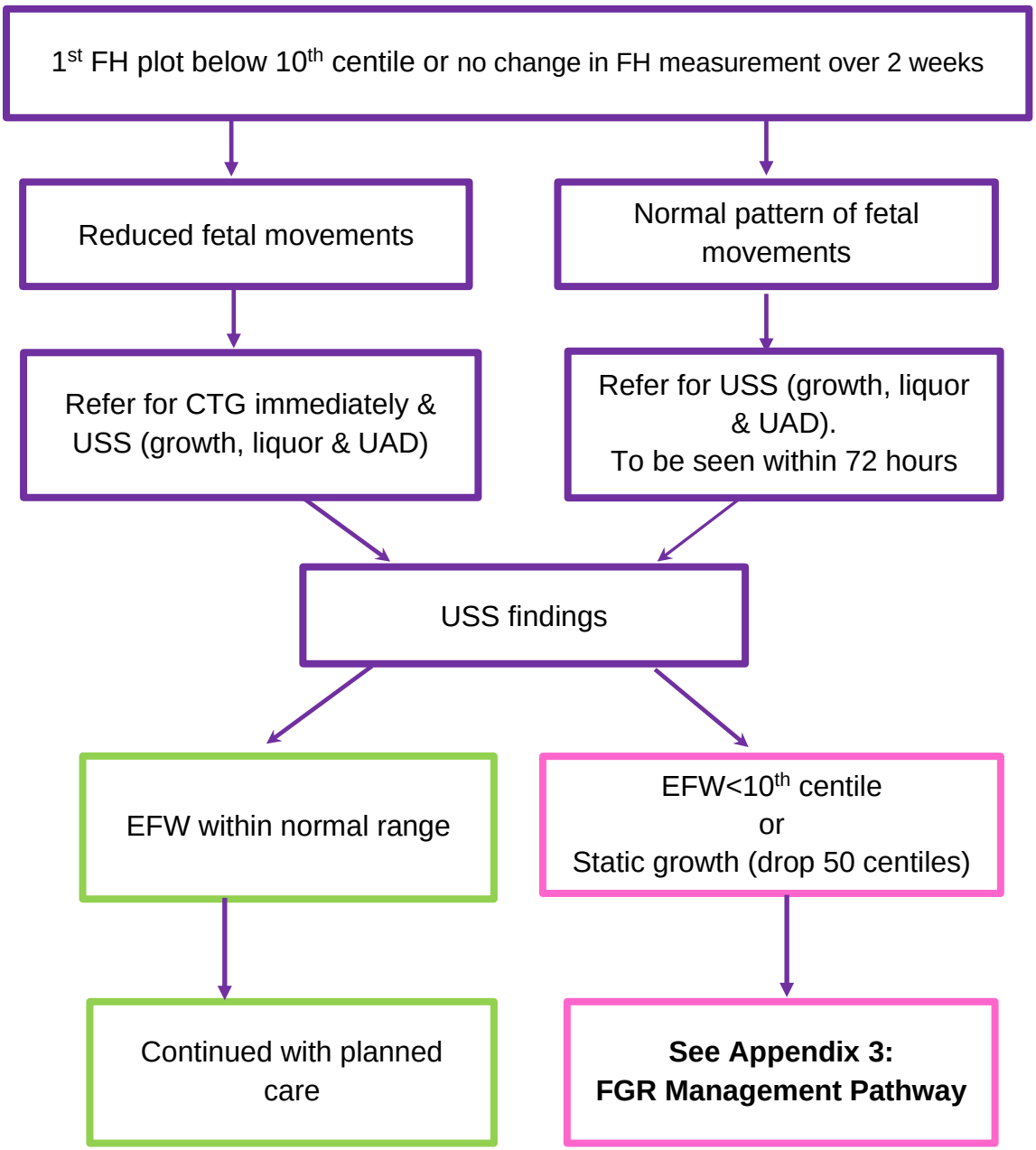
4. Equality, Diversity and Human Rights Impact Assessment

The EqIA score fell into low priority; no significant issues in relation to equality, diversity, gender, colour, race or religion are identified as raising a concern.

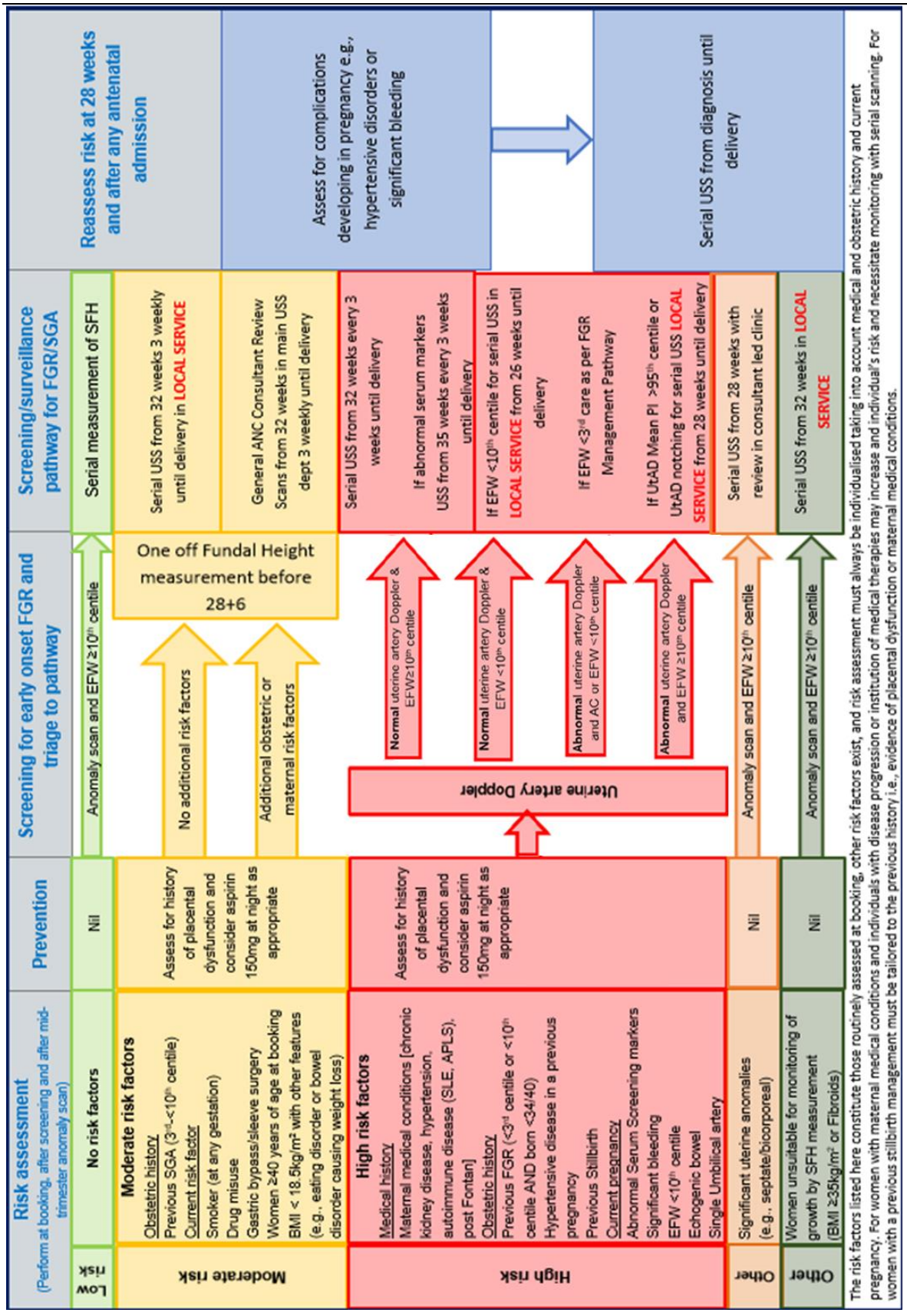
5. Consultation, Approval and Ratification Process

This guideline has been approved and ratified in accordance with the agreed process. Refer to Guideline for the Introduction or *Re-approval of a Clinical Guideline for Obstetric Practice.*

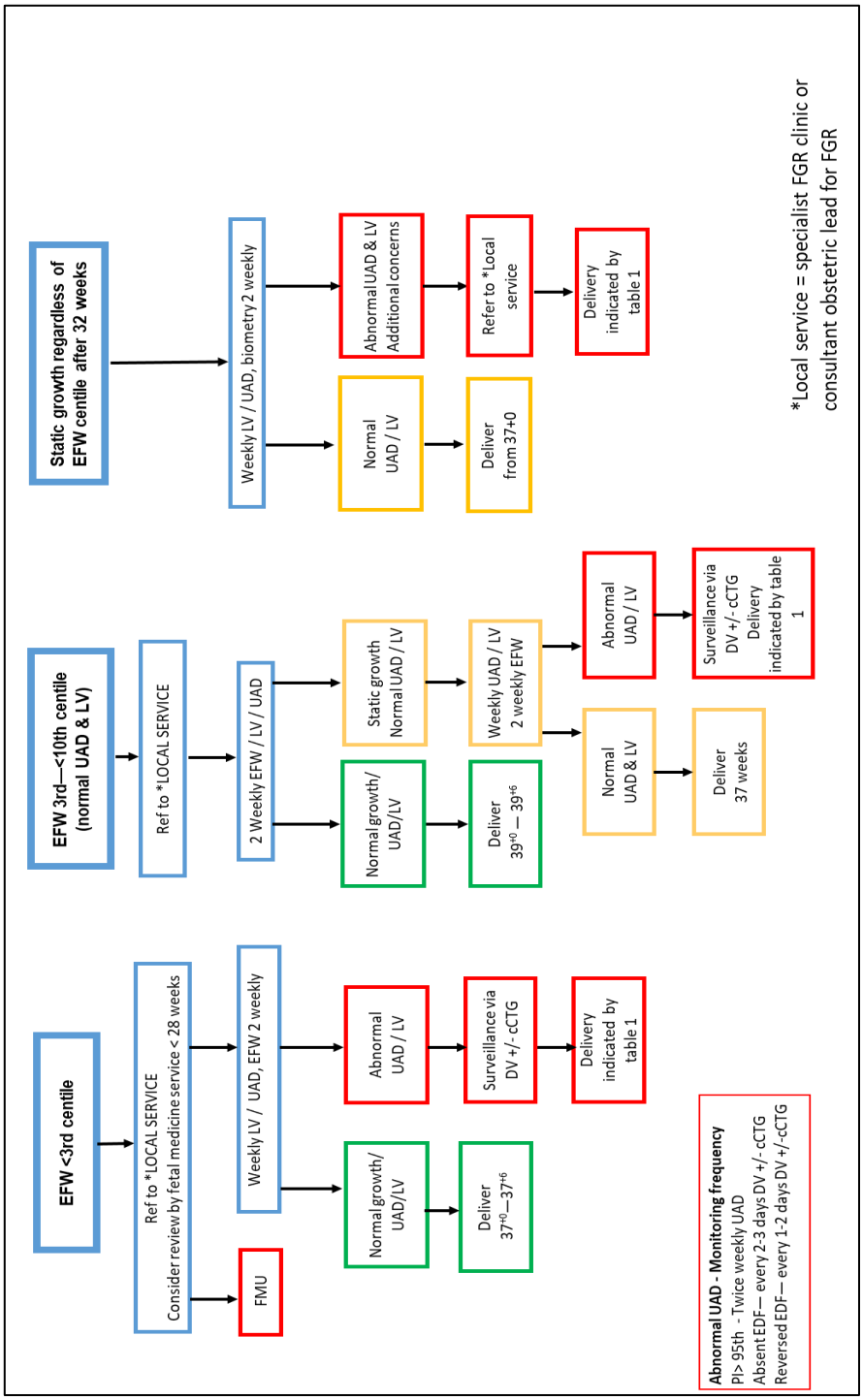
6. Appendix 1 - Abnormal Fundal Height (FH) Measurement pathway



7. Appendix 2 – Risk assessment, surveillance pathway and management of FGR



8. Appendix 3 - FGR Management Pathway



<table>
<tr><th>Gestation</th><th>EFW/AC</th><th>UAD</th><th>DV</th><th>cCTG STV</th><th>CTG</th><th>Maternal Disease</th></tr>
<tr><td>< 26 weeks</td><td colspan="5">Individualised care</td><td rowspan="11">Evolving maternal disease

E.g. preeclampsia</td></tr>
<tr><td>26—28+6</td><td rowspan="7"></td><td></td><td rowspan="4">Absent or reversed a-wave</td><td>< 2.6ms</td><td rowspan="8">Persistent spontaneous repeated decelerations</td></tr>
<tr><td>29—31+6</td><td>Reversed EDF
Deliver by 32 weeks, consider from 30 weeks</td><td><3.0ms</td></tr>
<tr><td>32—33+6</td><td>Absent EDF
Deliver by 34 weeks, consider from 32 weeks</td><td><3.5ms</td></tr>
<tr><td>34—35+6</td><td></td><td rowspan="6"><4.5ms</td></tr>
<tr><td>36 –36+6</td><td>PI > 95th centile</td><td rowspan="4"></td></tr>
<tr><td>37-37+6</td><td><3rd centile</td><td rowspan="3">PI > 95th centile
or
Cerebral redistribution</td></tr>
<tr><td>38 - 38+6</td><td></td></tr>
<tr><td>39-39+6</td><td>3—<10th centile</td></tr>
</table>

FGR delivery indication table – to determine if birth should be considered select the current gestation from the first column. From that row move across in a straight line to review whether the woman/fetus has met any of the birth indicators. If **any** of the birth indicators have been met, then birth should be planned following appropriate optimisation. If no indicators have been met, then surveillance can continue.

10. Appendix 5 - Reference ranges for uterine artery mean pulsatility index at 11 – 41 weeks of gestation

Table 2 Reference intervals for mean uterine artery pulsatility index

GA (weeks)	*5th centile*	*50th centile*	*95th centile*
11	1.18	1.79	2.70
12	1.11	1.68	2.53
13	1.05	1.58	2.38
14	0.99	1.49	2.24
15	0.94	1.41	2.11
16	0.89	1.33	1.99
17	0.85	1.27	1.88
18	0.81	1.20	1.79
19	0.78	1.15	1.70
20	0.74	1.10	1.61
21	0.71	1.05	1.54
22	0.69	1.00	1.47
23	0.66	0.96	1.41
24	0.64	0.93	1.35
25	0.62	0.89	1.30
26	0.60	0.86	1.25
27	0.58	0.84	1.21
28	0.56	0.81	1.17
29	0.55	0.79	1.13
30	0.54	0.77	1.10
31	0.52	0.75	1.06
32	0.51	0.73	1.04
33	0.50	0.71	1.01
34	0.50	0.70	0.99
35	0.49	0.69	0.97
36	0.48	0.68	0.95
37	0.48	0.67	0.94
38	0.47	0.66	0.92
39	0.47	0.65	0.91
40	0.47	0.65	0.90
41	0.47	0.65	0.89

Transvaginal and transabdominal ultrasound examinations were performed on pregnancies at 11–14 weeks and 15–41 weeks, respectively. GA, gestational age.

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11. Appendix 6 - Reference range for serial measurements of umbilical artery Doppler indices in the second half of pregnancy

	Percentile								
Gestation (wk)	2.5th	5th	10th	25th	50th	75th	90th	95th	97.5th
19	0.97	1.02	1.08	1.18	1.30	1.44	1.57	1.66	1.74
20	0.94	0.99	1.04	1.14	1.27	1.40	1.54	1.62	1.70
21	0.90	0.95	1.00	1.10	1.22	1.36	1.49	1.58	1.65
22	0.87	0.92	0.97	1.07	1.19	1.32	1.46	1.54	1.62
23	0.84	0.89	0.94	1.04	1.15	1.29	1.42	1.50	1.58
24	0.81	0.86	0.91	1.00	1.12	1.25	1.38	1.47	1.55
25	0.78	0.83	0.88	0.97	1.09	1.22	1.35	1.44	1.51
26	0.76	0.80	0.85	0.94	1.06	1.19	1.32	1.41	1.48
27	0.73	0.77	0.82	0.92	1.03	1.16	1.29	1.38	1.45
28	0.71	0.75	0.80	0.89	1.00	1.13	1.26	1.35	1.43
29	0.68	0.72	0.77	0.86	0.98	1.10	1.23	1.32	1.40
30	0.66	0.70	0.75	0.84	0.95	1.08	1.21	1.29	1.37
31	0.64	0.68	0.73	0.82	0.93	1.05	1.18	1.27	1.35
32	0.62	0.66	0.70	0.79	0.90	1.03	1.16	1.25	1.32
33	0.60	0.64	0.68	0.77	0.88	1.01	1.14	1.22	1.30
34	0.58	0.62	0.66	0.75	0.86	0.99	1.12	1.20	1.28
35	0.56	0.60	0.64	0.73	0.84	0.97	1.09	1.18	1.26
36	0.54	0.58	0.63	0.71	0.82	0.95	1.07	1.16	1.24
37	0.53	0.56	0.61	0.69	0.80	0.93	1.05	1.14	1.22
38	0.51	0.55	0.59	0.68	0.78	0.91	1.04	1.12	1.20
39	0.49	0.53	0.57	0.66	0.76	0.89	1.02	1.10	1.18
40	0.48	0.51	0.56	0.64	0.75	0.87	1.00	1.09	1.17
41	0.47	0.50	0.54	0.63	0.73	0.85	0.98	1.07	1.15

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