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TRUST CLINICAL GUIDELINE

Small for Gestational Age (SGA) and Fetal Growth Restriction (FGR)

OVERVIEW
To provide evidence based guidance for staff on the screening and diagnosis of small for gestational age fetuses and fetal growth restriction and the subsequent management of the pregnancy and birth with an aim to reduce perinatal mortality.

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STANDARDS	Saving Babies Lives version 3 (2023) RCOG Small-for-Gestational-Age Fetus, Investigation and Management (Green-top Guideline No. 31) (2024) Antenatal Care. NICE guideline [NG201] (2021) ISUOG Practice Guidelines: diagnosis and management of small-for-gestational-age fetus and fetal growth restriction (2020)
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Small for Gestational Age (SGA) and Fetal Growth Restriction (FGR)

1.0 Introduction

This guideline provides evidence based guidance for staff on the screening and diagnosis of small for gestational age fetuses and fetal growth restriction and the subsequent management of the pregnancy and birth with an aim to reduce perinatal mortality. It operationalizes the more comprehensive RCOG guidance which should be used as the definitive guidance.

2.0 Definitions and abbreviations used in this document

AREDF - Absent or reversed end diastolic flow	**CEFM -** Continuous Electronic Fetal Monitoring
CS - Caesarean Section	**EFW -** Estimated Fetal Weight
FBS - Fetal Blood Sampling	**FGR -** Fetal Growth Restriction
IA - Intermittent Auscultation	**MIS -** Maternity Information System eg Badgernet
PI - Pulsatility Index	**RCT -** Randomized Control Trials
SGA - Small for Gestation Age	**USS -** Ultrasound Scan

3.0 Duties and responsibilities

All staff working in the Trust	• To access, read, understand and follow this guideline. • To use their professional judgement in application of this guideline.
Managers	• To ensure the guideline is reviewed three yearly and aligns with national standards. • To ensure the guideline is accessible to all relevant staff.

4.0 Small for Gestational Age (SGA) & Fetal Growth Restriction (FGR)

Small fetuses are divided into:

i) Normal (constitutionally) small.
ii) Non–placenta mediated growth restriction, for example; structural or chromosomal anomaly, inborn errors of metabolism and fetal infection.
iii) Placenta mediated growth restriction.

Pragmatically fetuses with a placenta mediated growth problem are classified as being either:

i) Small for Gestational Age (SGA) defined as fetuses with an estimated fetal weight between the 3rd and 10th centile and normal Doppler indices of which an estimated 70% will be constitutionally small.
ii) Fetal Growth Restriction (FGR).

4.1 Defining FGR

FGR is difficult to diagnose representing those fetuses that have failed to reach their growth potential. A Delphi consensus-based definition has been used in research for both early (defined in the Delphi consensus as <32 weeks) and late onset FGR, but has not yet been shown to be useful in improving outcomes through intervention. Diagnosing FGR in a current pregnancy and risk assessing whether FGR existed in a previous pregnancy also present different challenge.

The following definitions are suggested to address these challenges whilst remaining practical. They highlight that absent or reversed end diastolic flow (AREDF) in the umbilical artery is a feature of early onset FGR. Importantly the absence of this feature (for example, a normal umbilical artery Doppler) after 32 weeks of gestation does not exclude growth restriction or fetal compromise.

4.2 Definition of FGR in a previous pregnancy as a risk factor:

Defined as any of the following:

- Birthweight <3rd centile.
- Early onset placental dysfunction necessitating birth <34 week.
- Birthweight <10th centile with evidence of placental dysfunction as defined below for current pregnancy.

4.3 Definition of FGR in a current pregnancy

Defined as either of the following:

- EFW or abdominal circumference (AC) <3rd centile.
- EFW or AC <10th centile with evidence of placental dysfunction (either):
  - Abnormal uterine artery Doppler (mean pulsatility index >95th centile) earlier in pregnancy (20 – 24 weeks)
    and/or
  - Abnormal umbilical artery Doppler (absent or reversed end diastolic flow or pulsatility index >95th centile).

5.0 Interventions

5.1 Reduce the risk FGR where possible

1. Assess all women at booking to determine if prescription of Aspirin is needed using Appendix 1.
2. Recommend Vitamin D supplementation to all pregnant women and birthing people using Appendix 1.
3. Assess smoking status and manage findings as per Saving Babies Lives version 3 Element 1.

5.2 Monitor and review the risk of FGR throughout pregnancy.

Perform a risk assessment for FGR by 14 weeks gestation using Appendix 2. In multiparous pregnant women and birthing people risk assessment should include the calculation of previous birthweight centiles. Record the classification of risk on the Maternity Information System (MIS).

Use the appropriate charts to record fundal height and ultrasound derived measurements:

- Fundal height should be measured and recorded on MIS using the Intergrowth-21 symphysis fundal height chart.
- Fetal Biometry should be recorded on Viewpoint using Chitty charts.
- Estimated fetal weight should be calculated using Hadlock 3.
- Estimated fetal weight should be plotted on Viewpoint using Hadlock 3 estimated fetal weight centile charts with reference curves for the 3rd and 10th centiles.
- Birth weight should be plotted on MIS using WHO birthweight centile charts with reference curves for the 3rd and 10th centiles birth weight charts. As an interim solution to charts being available across the whole Trust use Appendix 3 figure 2 and table 3 to establish whether an EFW is below the 3rd or 10th centile.

All these charts have been generated using the appropriate methodology for that specific type of chart which means they may not precisely correlate with each other. In practice that means all the biometry on the Chitty charts can appear normal but the Hadlock EFW is below the 10th centile. In these cases the chart should be interpreted as per the section on interpretation of scan reports below. The Hadlock EFW calculation and charts correlate with the WHO birth weight charts better than any other EFW charts.

As part of the risk assessment for FGR, blood pressure should be recorded using a digital monitor.

Pregnant women and birthing people who are designated as high risk for FGR using Appendix 2 should undergo uterine artery Doppler assessment between 18+0 to 23+6 weeks gestation.

The risk of FGR should be reviewed throughout pregnancy with movement of pregnant women and birthing people between risk pathways determined by the current risk (see Appendix 2 & Appendix 3).

When an ultrasound-based assessment of fetal growth is performed Trusts should ensure that robust processes are in place to review which risk pathway a pregnant woman or birthing person is on and agree a plan of on-going care (see Appendix 3 & Appendix 4).

Pregnant women and birthing people who are at low risk of FGR following risk assessment should have surveillance using antenatal fundal height measurement before 28+6 weeks gestation. Measurements should be plotted or recorded on charts by clinicians trained in their use.

Staff who perform fundal height measurement should be competent in measuring, plotting (or recording), interpreting appropriately and referring when indicated.

- Referral criteria are a single fundal height which plots below the 10th centile or serial measurements which demonstrate slow or static growth by crossing lower centiles.
- A fundal height measurement of ≥ 3cm MORE than gestation in weeks should NOT be referred for an USS providing there are no other risk factors (NICE, 2008). The midwife should check for glycosuria: If positive refer for a glucose tolerance test. If negative continue with normal A/N care pathway.

Only staff who perform fundal height measurement need to undergo training in fundal height measurement.

Pregnant women and birthing people who are undergoing planned serial scan surveillance should cease fundal height measurement after serial surveillance begins. Fundal height measurement should also cease if pregnant women or birthing people are moved onto a scan surveillance pathway in later pregnancy for a developing pregnancy risk.

Pregnant women and birthing people who are at increased risk of FGR should have ultrasound surveillance of fetal growth at 3-4 weekly intervals until birth (see RCOG guidance and Appendix 4).

When FGR is suspected an assessment of fetal wellbeing should be made as described in Appendix 4.

The surveillance for FGR identified prior to 34+0 weeks is provided in Appendix 4.

When FGR is suspected, the frequency of review of estimated fetal weight (EFW) should follow the guidance in Appendix 4.

Risk assessment and management of growth disorders in multiple pregnancy should comply with NICE guidance and is described in the Trust's multiple pregnancy guideline.

All management decisions regarding the timing of FGR infants and the relative risks and benefits of iatrogenic delivery should be discussed and agreed with the pregnant woman or birthing person. When the estimated fetal weight (EFW) is <3rd centile and there are no other risk factors (see 5.20), initiation of labour and/or delivery should occur at 37+0 weeks and no later than 37+6 weeks gestation (see Appendix 4) .

In fetuses with an EFW between the 3rd and <10th centile, birth should be considered at 39+0 weeks. Birth should be achieved by 39+6 weeks. Other risk factors should be present for birth to be recommended prior to 39 weeks (see Appendix 4).

Appendix 1: Medication to reduce the risk of pregnancy complications

Folic Acid:

All pregnant women and birthing people should take a daily supplement of 400 micrograms (400 µg) folic acid before conception and until the 12th week of pregnancy. If a pregnant woman or birthing person has a BMI of 30 or above, a daily dose of 5 mg of folic acid is recommended.

Vitamin D:

Pregnant women and birthing people (and all adults, including breastfeeding women and people) are also recommended to have 10 micrograms of vitamin D a day. The full guidance on Vitamins, supplements and nutrition in pregnancy can be found on nhs.uk.

Aspirin:

As a preventative medication appears to be safe in pregnancy and therefore there is a substantial net benefit of daily aspirin use to reduce the risk for preeclampsia and associated preterm birth.

At booking take a full history from pregnant women and birthing people who have had a previous baby with FGR and/or a preterm birth to determine whether placental dysfunction was a contributory factor. Use the table 1 below to determine if aspirin should be recommended from 12-36 weeks to increase placental blood flow.

The dose of aspirin should be 150mg and may be more effective if taken at night. Pregnant women and birthing people with hepatic or renal disease may require a lower dose of 75mg. This should be decided by the obstetric consultant on an individual basis.

Table 1: Clinical risk assessment for pre-eclampsia as indications for aspirin in pregnancy

(Based on the NICE NG133 Hypertension in Pregnancy (2023) guideline).

Risk level	Risk factors	Recommendation
High	• Hypertensive disease during a previous pregnancy • Chronic kidney disease • Autoimmune disease such as systemic lupus erythematosus or antiphospholipid syndrome • Type 1 or type 2 diabetes • Chronic hypertension • Placental histology confirming placental dysfunction in a previous pregnancy	Recommend low dosage aspirin if the pregnant woman or birthing person has at least one of these high-risk factors
Moderate	• First pregnancy • Are 40 years or older at booking. • Pregnancy interval of more than 10 years	Consider aspirin if the pregnant woman or birthing

	• Body mass index (BMI) of 35kg/m² or more at first visit • Family history of preeclampsia in a first degree relative • Multiple pregnancy	person has two or more moderate risk factors

Contraindications:

There are a few absolute contraindications to aspirin therapy. Pregnant women and birthing people with a history of aspirin allergy (for example, urticaria) or hypersensitivity to other salicylates are at risk of anaphylaxis and should not receive aspirin. There is significant cross-sensitivity between aspirin and other nonsteroidal (NSAIDS) drugs, thus aspirin is contraindicated in pregnant women and birthing people with known hypersensitivity to NSAIDs. Relative contraindications to aspirin include a history of gastrointestinal bleeding, active peptic ulcer disease, other sources of gastrointestinal or genitourinary bleeding, and severe hepatic dysfunction. The decision to continue aspirin in the presence of obstetric bleeding or risk factors for obstetric bleeding should be considered on a case-by-case basis.

Appendix 2: Risk assessment and surveillance of FGR

This appendix describes a risk assessment and surveillance pathway for pregnant women and birthing people at increased risk of FGR and a management pathway when a fetus has been found to be growth restricted, recognising that prior to 34 weeks this will require input from fetal medicine services. It has been designed to optimise effectiveness and minimise the scan burden on providers and recognise the potential harm caused by increased intervention in infants at only marginally increased risk of stillbirth.

Risk assessment and screening:

Figure 1 provides an algorithm for using uterine artery Doppler as a risk assessment tool for risk of early onset FGR.

Early onset FGR is rare (~0.5%). Most cases are associated with abnormal uterine artery Doppler indices or already present estimated fetal weight (EFW) <10th centile in the early third trimester. Thus, uterine artery Doppler can be used in the second trimester (18+0 – 24+0 weeks) to facilitate determining the risk of placental dysfunction and risk of hypertensive disorders or early onset FGR.

For pregnant women and birthing people with a normal uterine artery Doppler pulsatility index (mean measurement ≤95th centile) the risk of these disorders is low and thus serial scanning for fetal biometry can be routinely planned from 32 weeks gestation.

Pregnant women and people at moderate risk of FGR do not require uterine artery Doppler assessment but are still at risk of later onset FGR so require serial ultrasound assessment of fetal growth from 32 weeks.

Ongoing surveillance of fetal growth should be performed at intervals between 21 – 28 days whilst fetal growth remains >10th centile. For many pregnancies in the moderate risk category or in those unsuitable for fundal height measurements, an interval of four weeks is appropriate. For pregnant women and people in the high-risk category the scan interval should be confirmed following the first assessment for fetal growth, but routine growth assessment should not occur <14 days.

It should be noted that there are reference ranges available for uterine artery Doppler PI throughout pregnancy and thus while offering at the time of the fetal anomaly scan is appropriate (for resource use and convenience), the measurement may be performed at any time during pregnancy.

Measuring uterine artery mean PI:

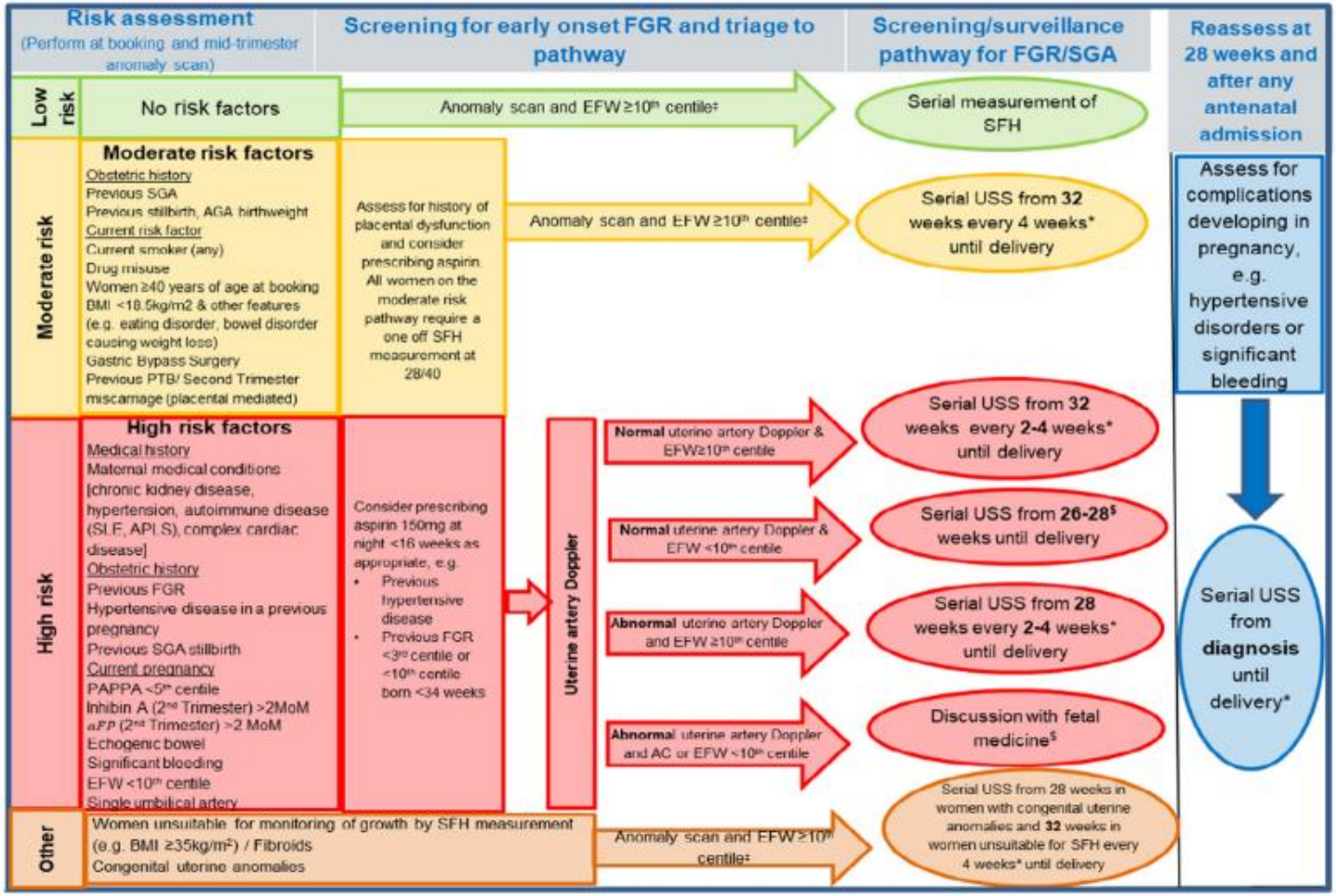
To calculate the mean PI, add left & right PIs then divide by 2. If this figure is less than 95th centile for correct gestation above, this is normal. If raised manage as per Figure 1 below.

Whether there are notches or not, is irrelevant.

Table 2: Reference intervals for mean uterine artery pulsatility index.

GA (weeks)	5th centile	50th centile	95th centile
11	1.18	1.79	2.7
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	1.2	1.79
19	0.78	1.15	1.7
20	0.74	1.1	1.61
21	0.71	1.05	1.54
22	0.69	1	1.47
23	0.66	0.96	1.41
24	0.64	0.93	1.35
25	0.62	0.89	1.3
26	0.6	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	1.1
31	0.52	0.75	1.06
32	0.51	0.73	1.04
33	0.5	0.71	1.01
34	0.5	0.7	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	0.9
41	0.47	0.65	0.89

Figure 1: Surveillance pathway following risk assessment for Fetal growth Fetal medicine refers to a clinician with fetal medicine expertise



The risk factors listed in Appendix I constitute those routinely assessed at booking and at mid trimester scan. Other risk factors exist and risk assessment must always be individualised taking into account previous medical and obstetric history andcurrent pregnancy history. For women with maternal medical conditions and individuals with disease progression, or institution of medical therapies, an individual's risk may increase and necessitate monitoring with serial scanning. For women witha previous stillbirth, management must be tailored to the previous history i.e. evidence of placental dysfunction or maternal medical conditions. Serial measurement of SFH should be performed as per NICE guideline [CG62].‡AC and/or EFW <10th centile at the anomaly scan is a high-risk factor.$ An individualised plan of care should be made.* Refer to risk assessment and screening section for advice on scan interval.

Which pregnancies complicated by fetal growth disorders should be referred to local fetal medicine for further investigations?

- Offer referral to fetal medicine if EFW is below the 3rd centile or below the10th centile with abnormal uterine artery Doppler at the mid trimester anomaly scan
- Invasive diagnostic testing should be offered in severely SGA fetuses with structural anomalies and considered in non-anomalous fetuses detected before 23 weeks of gestation, especially if uterine artery Doppler is normal. Analysis should include a microarray to detect microdeletions and microinsertions. Prenatal exome sequencing should only be considered in cases with multisystem abnormalities or isolated short long bones.
- Serological screening for congenital cytomegalovirus(CMV) and toxoplasmosis infection should be offered in severe SGA
- Testing for malaria and Zika should be considered in high risk populations.

Appendix 3: reporting and interpretation of fetal growth scans

The importance of reduced fetal growth velocity:

As a group, structurally normal SGA fetuses are at increased risk of perinatal mortality and morbidity, but adverse outcomes are more prevalent in the group with fetal growth restriction. Significantly, 70% of stillbirths occur at term occur in fetuses classified as AGA. These AGA infants are likely to have experienced late-onset FGR with a reduction in growth velocity but the size of the fetus is affected to a lesser extent than in early onset FGR.

Defining poor fetal growth velocity:

There is on-going expert clinical debate about the best way to define poor fetal growth velocity. SBLv3 defined suboptimal fetal growth as an increase in EFW <280g over 14 days (20g per day) from 34 weeks. This was too didactically interpreted and led to clinical management of the weight change alone rather than the full clinical picture.

The International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) diagnosis of FGR includes a fall between consecutive ultrasound scans of > 50 percentiles for AC or, more commonly, EFW but this definition may lack diagnostic sensitivity for[1].

There is limited evidence that falls in EFW or AC of > 30 centiles between 20 and 36 weeks are associated with two – threefold relative risks of placental insufficiency Kennedy, L.M., Tong, S., Robinson, A.J. et al. Reduced growth velocity from the mid-trimester is associated with placental insufficiency in fetuses born at a normal birthweight[2] (BMC Med 18, 395 2020). BMUS in 2022 BMUS Professional Guidance for Fetal Growth Scans Performed After 23 weeks of Gestation[3] (BMUS 2022) recommended using this definition based upon guidance from New Zealand (New Zealand Maternal Fetal Medicine Network. Guideline for the Management of Suspected Small for Gestational Age Singleton Pregnancies and Infants after 34 Weeks' Gestation[4] (NZMFM:2014) which does not state why that definition was chosen. Until National guidance is published, this guideline uses a fall of >30 percentiles for AC or EFW to define poor fetal growth velocity.

Reporting of scan results:

- The fetal growth scan should be reported as normal if the EFW is between the 90th and the 10th centile where any drop in the AC or EFW since the anomaly scan is by less than 30 percentiles.
- The umbilical artery Doppler should be measured at all growth scans. An abnormal umbilical artery Doppler PI greater than the 95th centile or AERDF should be reported as abnormal. Evidence on the use of MCA Doppler in the management of late onset FGR is awaited. The decision to measure the MCA Doppler PI to help identify and act upon potential fetal compromise in later pregnancy is at the sonographer's or requesting clinician's discretion.

- If the EFW is between the 90th and the 10th centile with a drop in the AC or EFW since the anomaly scan of greater than 30 percentiles then the scan should be reported as decreased growth velocity and advise senior clinical review.
- If the EFW is between the 3rd and 10th centile and the Dopplers are normal then the scan should be reported as a small for gestational age (SGA) fetus to assess if there is late onset growth restriction.
- If the EFW is below the 3rd centile or between the 3rd and 10th centile with abnormal Dopplers then the scan should be reported as fetal growth restriction.
- If the EFW is above the 90th / 97th centile then the scan should report that the EFW is above the 90th / 97th centile no comment on growth velocity should be made but clinical review with reference to the large for gestational age guideline is indicated.

Plotting scan results including suboptimal fetal growth:

Estimated fetal weight should be plotted on the Hadlock chart and work is underway to make these charts available on Viewpoint and Badgernet. Viewpoint currently shows the 5th centile. As an interim solution where there is doubt about the centile EFW Figure 2 below and Table 3 below can be used to determine if the EFW is less than the 3rd centile.

Figure 2: Hadlock chart showing EFW centiles

Table 3: Hadlock table showing EFW centiles

Menstrual Week	Percentiles (g)				
	3rd	10th	50th	90th	97th
10	26	29	35	41	44
11	34	37	45	53	56
12	43	48	58	68	73
13	55	61	73	85	91
14	70	77	93	109	116
15	88	97	117	137	146
16	110	121	146	171	183
17	136	150	181	212	226
18	167	185	223	261	279
19	205	227	273	319	341
20	248	275	331	387	414
21	299	331	399	467	499
22	359	398	478	559	598
23	426	471	568	665	710
24	503	556	670	784	838
25	589	652	785	918	981
26	685	758	913	1,068	1,141
27	791	876	1,055	1,234	1,319
28	908	1,004	1,210	1,416	1,513
29	1,034	1,145	1,379	1,613	1,724
30	1,169	1,294	1,559	1,824	1,649
31	1,313	1,453	1,751	2,049	2,189
32	1,465	1,621	1,953	2,285	2,441
33	1,622	1,794	2,162	2,530	2,703
34	1,783	1,973	2,377	2,781	2,971
35	1,946	2,154	2,595	3,036	3,244
36	2,110	2,335	2,813	3,291	3,516
37	2,271	2,513	3,028	3,543	3,785
38	2,427	2,686	3,236	3,786	4,045
39	2,576	2,851	3,435	4,019	4,294
40	2,714	3,004	3,619	4,234	4,524

Clinical interpretation of scan results including suboptimal fetal growth:

All scan reports require clinical interpretation by a midwife or an obstetrician which should include a risk assessment based upon the history and risk factors for fetal FGR. This review should include assessment of all fetal biometry measurements since the anomaly scan to identify potentially erroneous single measurements. **Particular attention should be paid to a downward trend in abdominal circumference growth velocity.** A fall in the AC or EFW by less than 30 percentiles although reported as normal may assume significance once interpreted within a clinical context. FGR is rare >20th centile, so early delivery (<39+0 weeks) should only be considered following senior review.

Arranging follow up scans:

If a scan result is interpreted as normal then the pregnant woman or birthing person should return to the previously agreed fetal growth surveillance pathway e.g. serial symphysis fundal height measurements or serial ultrasound scans (see figure 1). A switch to ultrasound scan growth surveillance should be based upon hospital guidelines. A switch to serial ultrasound scan surveillance not based upon a guideline should only be made by a consultant who should document in the notes the reason for the serial scans.

Appendix 4: Management of SGA and FGR

When FGR is suspected an assessment of fetal wellbeing should be made including a discussion regarding fetal movements (see SBLv3 Element 3) and if required computerised CTG (cCTG). Figure 4 shows STV cut offs for STV at different gestational ages for the management of pregnancies with fetal growth restriction. A maternal or birthing person assessment should be performed at each contact this should include blood pressure measurement using a digital monitor and a urine dipstick assessment for proteinuria. In the presence of hypertension NICE guidance on the use of PlGF/sflt1 testing should be followed once the test becomes available at University Hospital Sussex.

The role of Dopplers in assessing fetal growth

The role of Umbilical Artery Dopplers:

Absent or reversed end diastolic flow in the umbilical artery is a feature of FGR prior to 32 weeks. A normal umbilical artery Doppler after 32 weeks of gestation does not mean that the fetus is not growth restricted, nor that there is no evidence of fetal compromise.

The role of Middle Cerebral Artery Dopplers:

Abnormal MCA cerebroplacental ratio (CPR) can inform monitoring strategy and frequency but should not be used to determine birth decisions prior to 37 weeks. At present middle cerebral artery Dopplers should be measured only in fetuses after 34 weeks where there is decreased growth velocity (a fall of >30 percentiles for AC or EFW) or the fetus is SGA (EFW below the 10th centile).

The role of Ductus Venosus Dopplers:

Hospitals caring for pregnancies complicated by FGR should have access to personnel who can carry out DV Doppler assessment and computerised CTG. If hospitals do not have access to DV Doppler or access that is intermittent (i.e. not 365 days/year), then computerised CTG from 24 weeks gestation must be provided for monitoring and a pre-established referral pathway should be present to enable assessment of pregnant women by a specialist fetal medicine service within 72 hours. Ductus venosus (DV) Doppler is less predictive after 32 weeks in the management of the FGR fetus.

Recommended surveillance:

1. **Appropriate for Gestational Age fetuses with suboptimal fetal growth (A fall in the AC or EFW by more than 30 percentiles or senior clinical opinion) and normal umbilical artery Doppler.**

- Two weekly scans which should record fetal biometry, liquor volume*.
- Two weekly umbilical Doppler PI.
- Two weekly computerised CTG. More frequent computerised CTG surveillance may be appropriate when there are additional risk factors.

2. SGA fetuses with normal umbilical artery Doppler

- Two weekly scans which should record fetal biometry, liquor volume*.
- Two weekly umbilical Doppler PI. More frequent Doppler surveillance may be appropriate in a severely SGA fetus. The Middle Cerebral Artery PI should be measured after 34 week gestation.
- Two weekly computerised CTG. More frequent computerised CTG surveillance may be appropriate in a severely SGA fetus or when there are additional risk factors.

3. FGR fetuses

- Two weekly scans which should record fetal biometry, liquor volume*
- When umbilical artery Doppler flow indices are abnormal (pulsatility index >95th centile) and delivery is not indicated repeat surveillance twice weekly in fetuses with positive end–diastolic flow and daily in fetuses with absent/reversed end-diastolic flow.
- Twice weekly computerised CTG.

** Amniotic fluid volume is usually estimated by the maximum vertical pocket (MVP) or deepest vertical pool (DVP) with abnormal being defined as less than 2 cm. Although older studies in high-risk pregnancies have shown that a reduced MVP is associated with increased perinatal mortality, limited information is available about the accuracy of oligohydramnios to independently predict perinatal mortality and substantive perinatal morbidity in non–anomalous SGA fetuses monitored with umbilical artery Doppler. An AFI ≤ 5 cm is associated with an increased risk of caesarean birth for fetal distress and an Apgar score < 7 at 5 minutes.*

Timing of birth:

Fetuses who demonstrate declining growth velocity from 32 weeks' gestation are at increased risk of stillbirth from late onset FGR. Declining growth velocity can occur in fetuses with an EFW >10th centile. Evidence to guide practise is limited and guidance is currently based on consensus opinion.

1.0 FGR diagnosed before 34 weeks' gestation

Prior to 34+0 weeks, management of the FGR fetus requires regional network specialist fetal medicine input to determine the most appropriate monitoring for fetal wellbeing and timing of birth where fetal compromise is demonstrated.

Pregnant women and birthing people with early onset FGR should give birth in a unit with neonatal facilities able to deal with the increased risks of FGR preterm infants. Timing should be determined in collaboration with neonatal colleagues, sub-speciality fetal medicine input and findings from the Truffle 2 study which is summarised by ISUOG in figure 4.

Steroid administration and magnesium sulphate administration and be guided by current RCOG guidance. Steroids for fetal lung maturation should generally not be given until a decision has been made to deliver in the next seven days.

2.0 FGR diagnosed after 34 weeks' gestation

For fetuses with an EFW <3rd centile diagnosed later in pregnancy birth should be initiated at 37+0 weeks' gestation. If other risk factors are present, then involvement of a specialist fetal growth service or fetal medicine service is required to plan birth.

In fetuses with an EFW between the 3rd and <10th centile, other risk factors must be present for birth to be recommended prior to 39 weeks. These are reduced fetal movements, abnormal Dopplers as described in figure 4, cCTG that does not meet criteria, maternal hypertensive disease, abnormal sFlt1: PlGF ratio/free PlGF or reduced liquor volume. These additional factors indicate the need for senior review rather than mandating delivery. Timing of birth should then be determined in collaboration with the mother or birthing person and neonatal colleagues and local fetal medicine input informed by findings from the Truffle 2 study which is summarised by ISUOG in figure 4.

If FGR cannot be excluded, then birth after 37 weeks should be discussed with the pregnant woman and birthing person and an on-going management plan individualised.

3.0 Complicated SGA after 34 weeks' gestation

In fetuses with declining growth velocity and EFW >10th centile the risk of stillbirth from late onset FGR should be balanced against the risk of late preterm delivery. In fetuses where declining growth velocity meets criteria for FGR (a fall between consecutive ultrasound scans of > 50 percentiles for AC or, more commonly, EFW) birth should be planned from 37+0 weeks unless other risk factors are present.

Risk factors that should trigger review of timing of birth are: reduced fetal movements, cCTG that does not meet criteria, maternal or birthing person hypertensive disease, abnormal sFlt1: PlGF ratio/free PlGF or reduced liquor volume*.

A CPR can inform monitoring strategy and frequency. MCA CPR should not be used to determine birth decisions prior to 37+0 weeks however the guidance from RCOG in figure 4 may help inform decision making.

An opinion on timing of birth for these fetuses with poor growth velocity or concurrent pregnancy complications should be made in consultation with consultants with a specialist interest in fetal growth services or fetal medicine services depending on availability.

4.0 Uncomplicated SGA after 34 weeks' gestation

For all fetuses with an EFW or AC <10th centile, birth or the initiation of induction of labour should be offered at 39+0 weeks after discussion with the mother.

For pregnant women and birthing people who decline induction of labour or birth after 39+0 weeks, counselling must include a discussion regarding evidence that there is no increase in risk for the baby or for the mother from birth/induction at this gestation (Muglu et al 2019) and that there is no evidence to determine how fetuses with SGA/FGR should be monitored if pregnancy continues.

5.0 Abnormal Umbilical Artery Dopplers in a normal size fetus with normal growth velocity should be interpreted in conjunction with a full clinical review

Please note Figure 4 relates to fetuses with fetal growth restriction. If the MCA Doppler PI has been measured and the CPR calculated then clinicians should be aware of the high false positive rate associated with this parameter. MCA CPR can inform monitoring strategy and frequency. MCA CPR should not be used to determine birth decisions prior to 37+0 weeks.

Informed choice and personalised care:

Evidence shows that better outcomes and experiences, as well as reduced health inequalities, are possible when pregnant women and birthing people can actively shape their care and support. Personalised care means pregnant women and birthing people have choice and control over the way their care is planned and delivered, based on best available evidence, 'what matters' to them and their individual strengths, needs and preferences.

Pregnant women and birthing people receiving maternity care make informed decisions. They and their maternity professionals discuss evidence-based options together exploring preferences, benefits, risks, and consequences to enable a safe and positive experience.

For any given situation where a decision needs to be made, pregnant women and birthing people are supported by their maternity professionals to understand their options, the benefits, harms and consequences of each. They have all the information they need for shared decision making and give consent, in line with the Montgomery ruling.

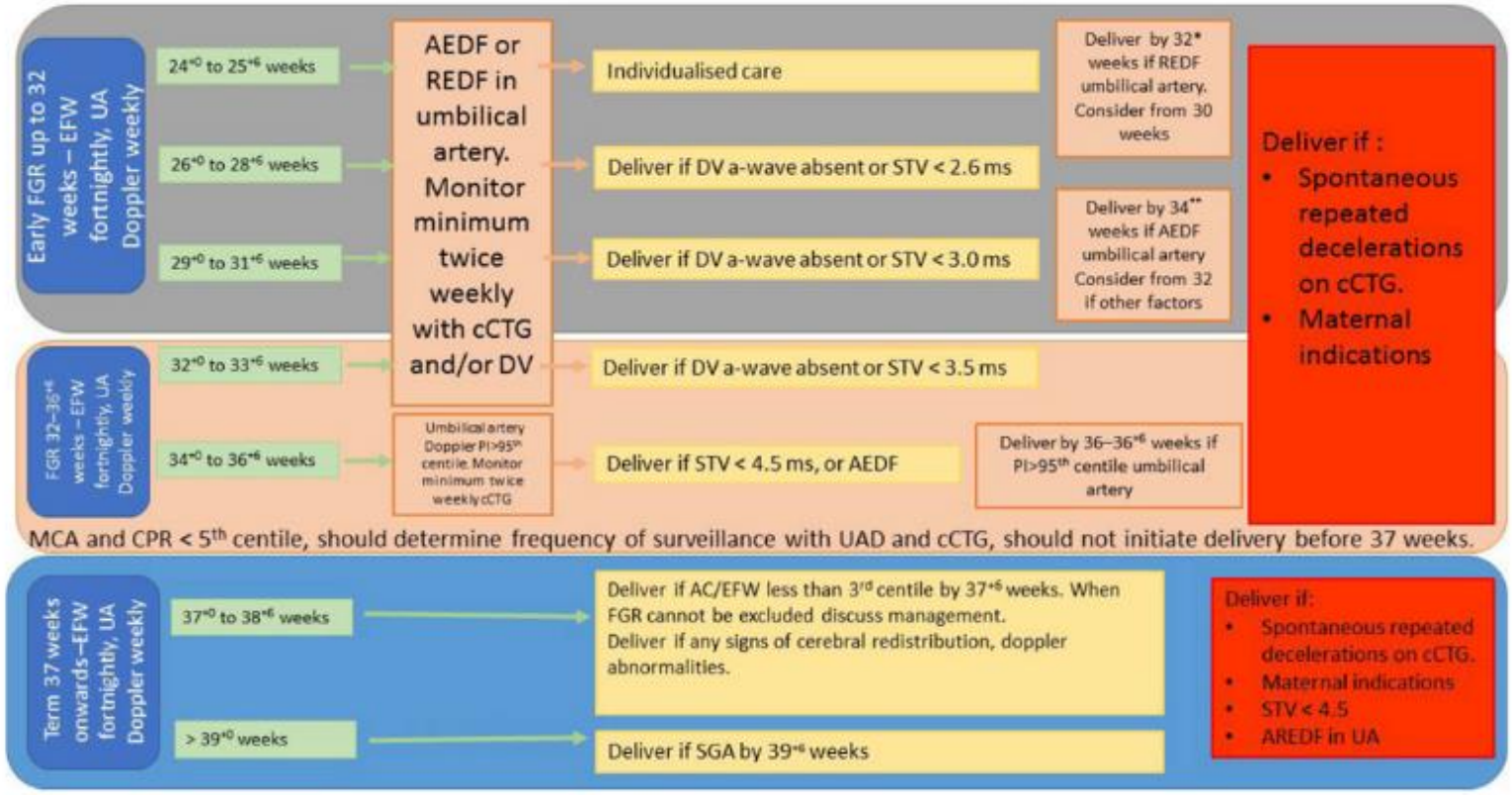
Informing pregnant women and birthing people of the long-term outcomes of early term birth:

When considering birth before 39 weeks please provide the Trust Leaflet on Early Term Birth. More information on the risks of early term birth can be found on pages 19-20 and 34-36 of Saving-babies-lives-version-three

For information on how fetuses with fetal growth disorders be born and prepared for birth and postnatal investigation and pre pregnancy counselling please see RCOG Small-for-Gestational-Age Fetus, Investigation and Management (Green-top Guideline No. 31) (2024)

Figure 4: Management of fetal growth restriction (FGR)

Consider after 30 +0 weeks; **Consider after 32+0 weeks; EFW, estimated fetal weight; UA, umbilical artery; DV, ductus veno-sus; cCTG, computerised cardiotocograph; STV, short-term variation; ms, milliseconds; AC, abdominal circumference; PI,pulsatility index; AREDF, absent reversed end-diastolic flow.



NB: If Dawes Redman criteria are not met then a full one hour CTG is required before the STV can be used for clinical decision making. If Dawes Redman criteria are met then it is very unlikely the STV will be below the thresholds described above – See Appendix 5.

Appendix 5: Interpretation of short term variation

Ox-DR CTG Dawes-Redman

UNIVERSITY OF OXFORD

STV
(Short Term Variation)

What is the STV?
Second-by-second trimming of the fetal heart rate is normal and causes a small 'jitter' on the baseline, in other words short term variation

How is it measured?
The STV is part of the Dawes-Redman analysis. It is calculated from 16 measurements of the fetal heart rate every minute. Decelerations are not included and signal loss must be low.
STV is measured in millisecs. In healthy fetuses, it increases with gestational age, typically from about 6ms at 26 weeks to 8ms at term (Serra et al 2009. Ultras Obst Gynecol. 2009 Jul;34(1):74-9).

The problem of low STV – is it normal or not?
STV is not constant during a normal CTG. It changes up and down, doubling or even tripling rapidly when there are many accelerations, while it may be very low during quiet sleep. After the first 10 minutes it may not be "typical". If the baby is deeply asleep it will be very low. If the baby is awake and moving it will be high. This is why low STV does **not** reflect fetal stress/distress until it has been sustained for 60 minutes.

What does a low STV mean?
If it is **transient**, this is expected as part of the sleep cycle of healthy fetuses. If it is **sustained** (60 mins), this may indicate chronic hypoxia or other rare causes of fetal brain dysfunction. If the STV is low before 60 minutes this is not necessarily abnormal.

STV (ms) After 60 minutes when Dawes-Redman criteria are not met	Interpretation***
>4.0:	The fetus is not hypoxic or acidotic but can still have another serious problem
3.0-3.9	The fetus may be stressed but is NOT distressed by acidosis
<3.0:	High probability of metabolic acidosis and asphyxia (terminal trace)

*** Other cause of fetal cerebral dysfunction (drugs, intoxication etc must be excluded.

Street et al. Am J Obstet Gynecol. 1991 Sep;165(3):515-23.
Key points for clinical practice:
1. **A short term STV** (less than 60 minutes) **cannot be interpreted**. It is not helpful and may even be misleading. For this reason it is not reported by the most up-to-date versions of the Dawes-Redman system
2. **A low STV at 60 minutes** may indicate chronic fetal hypoxia or even acidosis typical of a terminal trace.
3. **Other problems affecting the fetal brain** are rare causes of a low STV that is sustained. These must be borne in mind according to the clinical context.
4. A **normal STV does not exclude a serious fetal problem** when criteria are not met.

PLEASE NOTE:
There is no algorithm to follow when criteria are not met. A plan of care must be made taking into account the context and the full clinical picture. It can never be a 'one size fits all'

Prof Chris Redman
Nuffield Department of Reproductive and Women's Health, Oxford.

Prof Manu Vatish
Professor of Obstetrics

Beth Albert
Specialist Midwife for Dawes-Redman CTG monitoring

Appendix 6: Monitoring the effectiveness of this guideline

Each site should have a fetal medicine lead whose remit should include learning from excellence and error, or incidents.

1 The Trust's maternity patient safety team should involve the fetal medicine leads in any investigations related to FGR. The fetal medicine lead should act upon all themes related to FGR that are identified from investigation of incidents, perinatal reviews, and examples of excellence.

2 Trusts should provide data to their Boards and share this with their ICS in relation to the following:

a) Percentage of babies born <3rd birthweight centile >37+6 weeks' gestation.
b) Ongoing case-note audit of <3rd birthweight centile babies not detected antenatally and born after 38+0 weeks, to identify areas for future improvement (at least 20 cases per year, or all cases if less than 20 occur).
c) Percentage of babies born >39+6 and <10th birthweight centile to provide an indication of detection rates and management of SGA babies.
d) Percentage of babies >3rd birthweight centile born <39+0 weeks gestation.

3 Use the PMRT to calculate the percentage of perinatal mortality cases annually where the identification and management of FGR was a relevant issue. Trusts should review their annual MBRRACE perinatal mortality report and report to their ICS on actions taken to address any deficiencies identified.

4 Individual Trusts should examine their outcomes in relation to similar Trusts to understand variation and inform potential improvements.

5 Individual Trusts should provide data on the distribution of FGR outcomes with relation to maternal reported ethnicity.

6 Maternity providers are encouraged to focus improvement in the following areas:

a) Appropriate risk assessment for FGR and other conditions associated with placental dysfunction and robust referral processes to appropriate care pathways following this.

b) Appropriate prescribing of aspirin in line with this risk assessment in women at risk of placental dysfunction.

c) Review of ultrasound measurement quality control. Trusts are encouraged to comply with BMUS guidance on audit and continuous learning with relation third trimester assessment of fetal wellbeing.

d) Trusts will share evidence of these improvements with their Trust Board and ICS and demonstrate continuous improvement in relation to process and outcome measures.

Process indicators:

a) Percentage of pregnancies where a risk status for FGR is identified and recorded at booking. (This should be recorded on the provider's MIS and included in the MSDS submission to NHS Digital once the primary data standard is in place.)

b) Percentage of pregnancies where an SGA fetus is antenatally detected, and this is recorded on the provider's MIS and included in their MSDS submission to NHS Digital.
c) Percentage of perinatal mortality cases annually where the identification and management of FGR was a relevant issue (using the PMRT).

Outcome indicators:

a) Percentage of babies <3rd birthweight centile born >37+6 weeks (this is a measure of the effective detection and management of FGR).
b) Percentage of live births and stillbirths >3rd birthweight centile born <39+0 weeks gestation, where growth restriction was suspected.

Appendix 7: Guideline version control log

Change Log – SGA & FGR

Version	Date	Author(s)	Comment
1.0	Feb 2024	Matthew Jolly	New Trust-wide guideline replacing: • CG01191 Small for Gestational Age/Fetal Growth • MP080 SGA & FGR

Appendix 8: Due regard assessment tool

To be completed and attached to any guideline when submitted to the appropriate committee for consideration and approval.

		Yes/No	Comments
1.	**Does the document/guidance affect one group less or more favourably than another on the basis of:**		
	Age	*No*	
	· Disability	*No*	
	· Gender (Sex)	*No*	
	· Gender Identity	*No*	
	· Marriage and civil partnership	*No*	
	· Pregnancy and maternity	*No*	
	· Race (ethnicity, nationality, colour)	*No*	
	· Religion or Belief	*No*	
	· Sexual orientation, including lesbian, gay and bisexual people	*No*	
2.	**Is there any evidence that some groups are affected differently and what is/are the evidence source(s)?**	*No*	
3.	**If you have identified potential discrimination, are there any exceptions valid, legal and/or justifiable?**	*NA*	
4.	**Is the impact of the document likely to be negative?**	*No*	
5.	**If so, can the impact be avoided?**	*NA*	
6.	**What alternative is there to achieving the intent of the document without the impact?**	*NA*	
7.	**Can we reduce the impact by taking different action and, if not, what, if any, are the reasons why the guideline should continue in its current form?**	*NA*	
8.	**Has the document been assessed to ensure service users, staff and other stakeholders are treated in line with Human Rights FREDA principles (fairness, respect, equality, dignity and autonomy)?**	*Yes*	

If you have identified a potential discriminatory impact of this guideline, please refer it to [Insert Name], together with any suggestions as to the action required to avoid/reduce this impact. For advice in respect of answering the above questions, please contact uhsussex.equality@nhs.net 01273 664685).

Appendix 9: Template dissemination, implementation and access plan

To be completed and attached to any guideline when submitted to Corporate Governance for consideration and TMB approval.

	Dissemination Plan	Comments
1.	Identify:	
	Which members of staff or staff groups will be affected by this guideline?	Midwives and obstetricians
	How will you confirm that they have received the guideline and understood its implications?	Dissemination through the usual Communication channels and highlighted at Safety Huddles.
	How have you linked the dissemination of the guideline with induction training, continuous professional development and clinical supervision as appropriate?	All new members of staff shown where to access Clinical documents that are relevant to their area of practice.
2.	How and where will staff access the document (at operational level)?	Accessed by staff via Sharepoint

		Yes/No	Comments
3.	Have you made any plans to remove old versions of the guideline or related documents from circulation?	Yes	Previous versions will be archived.
4.	Have you ensured staff are aware the document is logged on the organisation's register?	Yes	Dissemination plan includes notifying staff via email, safety noticeboards, departmental newsletter and social media.

Additional guidance and information

1. Lees, C.C., Stampalija, T., Baschat, A.A., da Silva Costa, F., Ferrazzi, E., Figueras, F., Hecher, K., Kingdom, J., Poon, L.C., Salomon, L.J. and Unterscheider, J. (2020), ISUOG Practice Guidelines: diagnosis and management of small-for-gestational-age fetus and fetal growth restriction. Ultrasound Obstet Gynecol, 56: 298-312. https://doi.org/10.1002/uog.22134
2. Kennedy, L.M., Tong, S., Robinson, A.J. *et al.* Reduced growth velocity from the mid-trimester is associated with placental insufficiency in fetuses born at a normal birthweight. *BMC Med* **18**, 395 (2020). https://doi.org/10.1186/s12916-020-01869-3
3. Professional guidance for fetal growth scans performed after 23 weeks of gestation British Medical Ultrasound Society 3rd Trimester Special Interest Group. January 2022 BMUS 2022.
4. New Zealand Maternal Fetal Medicine Network. Guideline for the Management of Suspected Small for Gestational Age Singleton Pregnancies and Infants after 34 Weeks' Gestation. NZMFM:2014.
5. NICE (2023) NG133 Hypertension in Pregnancy