GS32 - Growth Scan Guideline

Category:	Guideline
Guideline Number:	GS32
Summary:	This document provides guidance for all maternity staff involved in performing and interpreting growth ultrasound scans for women and birthing people during the antenatal period
Equality impact assessed:	05/08/2025
Valid from:	05/08/2025
Date of next review:	04/08/2028
Approval date/ via:	05/08/2025 by Document Review Group (DRG) Chair's action
Related documents:	Anomaly Scan Guideline Ultrasound Department SOP for Growth Scans Antenatal Care Guideline Placenta Praevia Guideline
Author(s):	Consultant Obstetrician, High Risk Lead Consultant Obstetrician Maternity Network Manager/Lead Midwife
Clinical lead:	Consultant Obstetrician FMU Lead
Further information:	N/A
This document replaces:	Growth Scan Guideline v2.3

This document is uncontrolled once printed

It is the responsibility of all users to this document to ensure that the correct and most current version is being used.
This document contains many hyperlinks to other related documents.
All users must check these documents are in date and have been ratified appropriately prior to use.

Contents

1. Who should read this document?

1.1.1.1. This guideline should be read by all staff providing care to women and birthing people

2. Key Standards/Messages

2.1.1.1. **(Updated in v2.3)** All women and birthing people are now allocated to one of 5 Growth Scan Care Pathways at the time of their 20-week ultrasound scan (Pathway A, C, D0, D1 or D2). The allocated pathway reflects the chance of their pregnancy being affected by problems with fetal growth.

2.1.1.2. Adjustments to the allocated pathway are made based on the emergence of new symptoms and the findings of each growth ultrasound scan

3. Background

3.1.1.1. Small for gestational age (SGA) babies, and those whose growth slows from what is expected, are at a significantly increased risk of stillbirth, neonatal death and perinatal morbidity.

3.1.1.2. In the UK, fewer than 30% of babies who are small for their gestational age are identified during pregnancy. This percentage is increased by universal third trimester scanning, particularly if the criteria for fetal growth restriction (FGR) are included.

3.1.1.3. Nevertheless, most stillborn babies (particularly near term) are not SGA and do not have clear evidence of FGR.

3.1.1.4. The Growth Scan Care Pathways described in this guideline are designed to monitor the wellbeing of pregnancies in a structured, planned, equitable and clinically effective manner. Refinements have been driven by the analysis of our own data of >45 000 pregnancies since 2016, and the latest UK national guidelines

4. Key Updates

4.1.1.1. **(Updated in v2.3)** Expansion of Growth Scan Pathways from 3 to 5

4.1.1.2. Women and birthing people allocated to Pathway D2 will be cared for by a fetal medicine consultant within a new antenatal clinic (Tuesday afternoon, Level 1, JR).

4.1.1.3. **(New in v2.3)** Growth Scan Care Pathway screening questions added to provide

easy risk stratification

4.1.1.4. **(New in v2.3)** Pregnancies where the estimated fetal weight (EFW) is ≥ 10th centile and <20th centile should be re scanned 2-3 weeks later if birth has not occurred.

4.1.1.5. **(New in v2.3)** Growth Scan Care Pathway screening questions added to provide easy risk stratification

4.1.1.6. **(New in v2.3)** If the fetus is SGA at 35+0-36+6 weeks, FMU will review the pregnancy details and either arrange for ANC follow up (usually with advice), or will review in a FMU growth clinic.

4.1.1.7. Other updates appear as **(Updated in v2.3)** throughout the document

5. Aim(s)

5.1.1.1. The aim of this guidance is to aid the identification, investigation and appropriate management of the SGA, and particularly the growth restricted, fetus.

6. Full Guideline

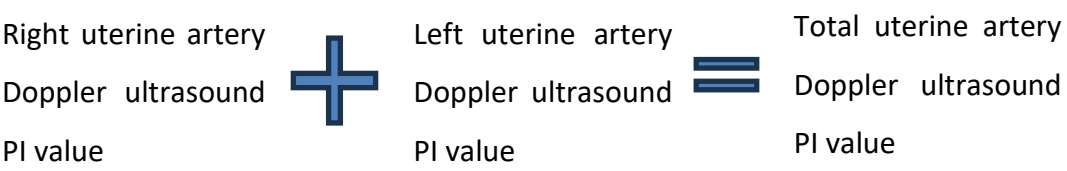
6.1. Growth Scan Care Pathways

6.1.1. Allocation to the Growth Scan Care Pathway

6.1.1.1. All women and birthing people are allocated to one of 5 Growth Scan Care Pathways at the time of their 20-week ultrasound scan (Pathway A, C, D0, D1 or D2).

6.1.1.2. Allocation is based on the woman or birth person's answers to the Growth Scan Care Pathway Screening Questions and the results of the uterine artery Doppler ultrasound measurements.

6.1.1.3. The Total uterine artery Doppler ultrasound pulsatility index (PI) value is calculated as follows:



6.1.1.4. If one of the uterine artery Doppler ultrasound measurements is not obtained then the 'Total' uterine artery Doppler ultrasound PI value is calculated as follows:

uterine artery Doppler ultrasound PI value (obtained) × 2 = Total uterine artery Doppler ultrasound PI value

	Left Uterine Artery Doppler PI value	Right Uterine Artery Doppler PI value	Total uterine artery Doppler PI value
Example A	1.1	Not obtained	2.2
Example B	Not obtained	1.6	3.2

6.1.1.5. The sonographer undertaking the 20-week ultrasound scan is responsible for:

- asking the woman or birthing person the Growth Scan Care Pathway Screening Questions
- calculating the Total uterine artery Doppler ultrasound PI value
- assigning the woman or birthing person to the correct pathway
- documenting the allocated pathway on the ultrasound scan report
- ensuring the follow-up growth ultrasound scans are booked (these can be booked +/- 5 days of the advised gestation)
- requesting the appropriate onward referrals
- directing the woman or birthing person to the Patient Information Leaflet 'Understanding your Care Pathway' (this will already be available to the woman or birthing person within their BadgerNotes Personal Timeline)

6.1.1.6. If the estimated fetal weight (EFW) is < 10th centile at the anomaly scan (see anomaly scan guideline) the woman or birthing person should be referred to FMU irrespective of the uterine artery Doppler ultrasound measurements. Advice on repeat scanning will be given, or an FMU appointment arranged.

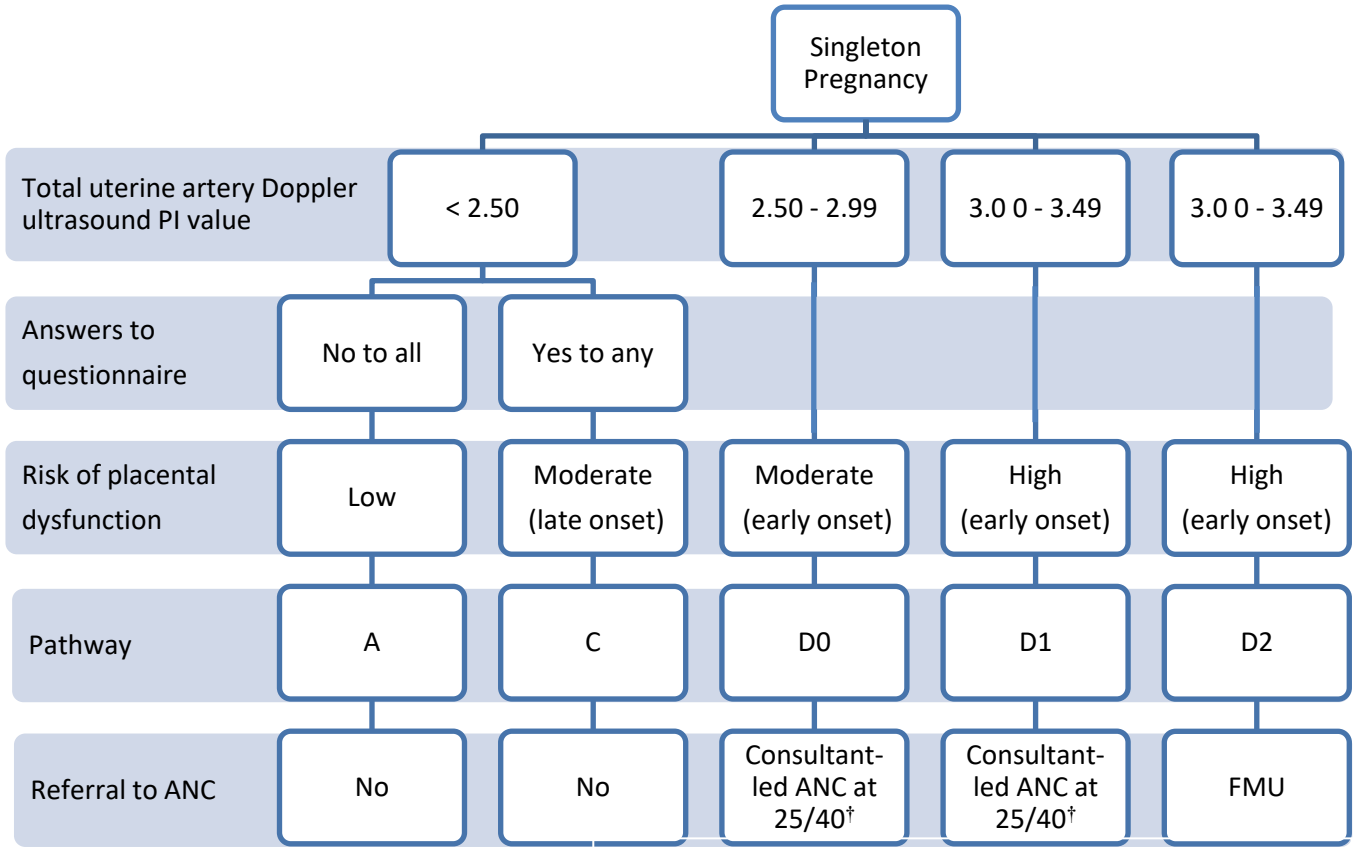
6.1.1.7. Multiple pregnancies are allocated to the appropriate multiple pregnancy ultrasound scan pathway (see Multiple Pregnancy and Birth Guideline) and not to one of the 5 Growth Scan Care Pathways

6.1.2. Growth Scan Care Pathway Screening Questions (New in v2.3)

6.1.3. *Table 1. Growth Scan Pathway Screening Questionnaire for Risk Factors*

Questions to ask the woman / birthing person	Yes	No
Have you had a baby (not a twin) that weighed fewer than 2.5kg (5lb 9oz)?		
Are you 40 years old or over?		
Do you smoke? (Tick yes if the CO level ≥ 4ppm)		
Was your booking BMI ≥ 35?		
Would you describe yourself as being of Black or South Asian ethnic origin?		
Do you have a womb shape that is different from the 'norm'?		
Do you have high blood pressure (≥140/90) and / or are you taking medication to control your blood pressure?		
Was your pre-eclampsia screening result 'high risk' and / or are you taking aspirin?		
Information to be obtained from Viewpoint or the ultrasound scan	Yes	No
Is the PAPP-A result <0.3 MoMs? (This will be flagged on Viewpoint.)		
Is there a 2-vessel umbilical cord?		

6.1.4. Flowchart A: Allocation to Growth Scan Care Pathway



† If under maternal medicine, schedule appointment for 25/40

6.1.5. Table 1. to show additional ultrasound growth scans and BP checks needed for each of the 5 pathways

	Pathway				
	A	C	D0	D1	D2
25 weeks			*	*	Plan of ultrasound growth scans and blood pressure checks determined by a Fetal Medicine Consultant
28 weeks					
31 weeks					
32 weeks					
36 weeks			*	*	
39 weeks				*	
40 weeks					
* Appointments in Consultant-led Antenatal Clinic					

6.1.5.1. The doctor in the Consultant – led Antenatal Clinic at 25/40 (24/40 if a Maternal Medicine Clinic) is responsible for:

- explaining the rationale behind the woman or birthing person's allocated pathway
- explaining the sequelae of a baby not growing as expected and the sequelae of pre-eclampsia
- providing safety netting information to the woman or birthing person
- checking the correct growth ultrasound scans have been booked for the allocated pathway (see Table 1.)
- contacting the Community Midwife Team by EPR Millenium PowerChart Communicate to ensure the community team is aware of any additional blood pressure checks (with accompanying urine dip checks) (see Table 1.)
- arranging follow-up in the Consultant-led Antenatal Clinic to ensure an appropriate plan is made regarding the timing of birth (see Table 1.)
- directing the woman or birthing person to the Patient Information Leaflet 'Understanding your Care Pathway' (this will already be available to the woman or birthing person within their BadgerNotes Personal Timeline)

6.2. Scans outside of the Growth Scan Care Pathway

6.2.1. Indications for additional scans that will be accepted

6.2.1.1. Additional scans may be required to reflect the woman or birthing person's

individual pre-existing risk factors (eg previous stillbirth) or new pregnancy complications (eg new hypertension).

Pre-existing risk factors	New Pregnancy Complications
• a previous SGA baby • a previous pregnancy loss after 16/40 • antiphospholipid syndrome • sickle cell disease	• PV bleeding • symphysis fundal height reduction compared to previous measurements • new hypertension • follow up of ongoing hypertension (see Hypertension Guideline) • second or more episode of reduced fetal movements (see Reduced Fetal Movements Guideline) • gestational diabetes (see Diabetes Guideline) • suspected polyhydramnios

6.2.1.2. If a woman or birthing person books late, and a growth ultrasound scan after 20 weeks is used to determine gestational age (eg dating based on head circumference), a second dating scan is not required. If there are any concerns with the Doppler ultrasound measurements a referral to FMU is indicated.

6.2.2. Reasons for additional scans that will be rejected

6.2.2.1. The following requests for additional scans will be rejected

- Placental site location and no PV bleeding - unless the placental site was not recorded at the 20-week ultrasound or was unclear at subsequent ultrasound scans
- Presentation – as this will be reported at the 36-week ultrasound scan (see Guideline on Breech and other Non-Cephalic presentations)
- Large for Dates or accelerated SFH before 36 weeks – as fetal growth will be assessed at the 36-week ultrasound scan
- Serial growth scans before 36 weeks for 'low risk' indications eg IVF
- 'New to Trust well-being check' - if the routine scans already performed at a different Trust were normal
- Requests for growth ultrasound scans within 14 days of a previous growth ultrasound scan - unless requested by FMU or a referral accepted by FMU

6.3. Requesting a non-pathway growth scan

6.3.1.1. The following steps should be taken to ensure an efficient and effective process:

- Requests should be made via EPR BadgerNet Referrals to the relevant sonography team / FMU
- Check existing appointments to avoid duplication
- Ensure additional scan requests meet the stated criteria (see above)
- Clearly document the indication for the ultrasound scan

6.3.1.2. The requests will be reviewed and triaged every working day by a dedicated vetting sonographer. If a request is rejected the referrer will be informed of this outcome, and the reason for the outcome, via EPR Millenium PowerChart Communicate.

6.3.1.3. The FMU team can be contacted for advice, or to answer queries, via EPR BadgerNet - Referral to Fetal Medicine – using the drop-down box 'Fetal Growth Advice'. The query will be reviewed within 1 working day and a response documented on EPR BadgerNet and EPR Millenium PowerChart.

GUIDELINE CONTINUES ON NEXT PAGE

6.4. Action(s) to be taken by sonographers at every ultrasound growth scan

6.4.1. Measurements to be taken at each ultrasound growth scan

6.4.1.1. At each ultrasound growth scan the following should be measured and / or reported:

- presentation (if not cephalic, see Guideline on the Management of Breech and other Non-Cephalic Presentations)
- placental site (if low-lying or covering the cervical os, see Guideline on the Diagnosis and Management of Placenta Praevia and Placenta Accreta Spectrum)
- biparietal diameter (BPD), head circumference (HC), femur length (FL) and abdominal circumference (AC) (use an average of 3 measurements of the best AC images)
- liquor volume – the deepest vertical pool (DVP) that is cord and limb-free
- umbilical artery (umbA) Doppler ultrasound PI

6.4.1.2. At each ultrasound growth scan the EFW should be calculated

6.4.1.3. From 32+0 only, the middle cerebral artery (MCA) Doppler ultrasound PI should be measured

6.4.1.4. If the umbA Doppler ultrasound PI and MCA Doppler ultrasound PI have been measured the cerebroplacental ratio (CPR) will calculate automatically (do not display or print the CPR chart in Viewpoint)

6.4.1.5. At each ultrasound growth scan the following must be stored:

- views of the head, AC, FL and DVP from which the final measurements were taken
- waveforms of the umbilical artery Doppler ultrasound and MCA Doppler ultrasound from which the final measurements were taken.

6.4.2. Umbilical Artery Doppler ultrasound measurement technique

6.4.2.1. The umbilical artery Doppler ultrasound measurement should be taken in a section of a free loop of the umbilical cord (N.B. in a twin pregnancy it should be taken at the fetal cord insertion.)

6.4.2.2. If the initial umbilical artery Doppler ultrasound measurement appears high, repeat the measurement on a newly acquired image with careful attention to ensure optimal quality (see Doppler guideline).

6.4.2.3. Once an optimal quality image is acquired, the lowest, not highest, PI should be reported.

6.4.3. Use of graphs to assess and report ultrasound growth scan findings

6.4.3.1. The graphs function of Viewpoint should be used to visually inspect the AC trajectory. If the growth trajectory appears to be crossing centiles, calculate the centile difference in AC between the latest ultrasound growth scan and the anomaly ultrasound scan. If the AC has decreased by ≥ 40 centiles compared to the anomaly ultrasound scan, this is a significant alteration in growth velocity and the fetus is automatically SGA risk.

6.4.3.2. The printed Viewpoint report should include charts of the HC, AC, EFW and umbA PI, with 2 charts printed per page

6.4.4. Coding of indication in Viewpoint

6.4.4.1. The 'Indication' field within Viewpoint should be completed using the following 4 codes:

- G2-SGA pathway - for pre-booked pathways scans
- Non-pathway scan – for an existing pregnancy risk
- New complication
- Follow up - SGA risk fetus

6.4.5. Coding of diagnoses in Viewpoint

6.4.5.1. Ultrasound measurements and findings are assessed according to the following criteria and used as diagnosis codes on the Viewpoint reports

Ultrasound Finding	Diagnosis Code
AC decreased by ≥ 40 centiles from anomaly to current ultrasound scan	SGA Risk
EFW < 10th centile	
Umbilical artery Doppler ultrasound PI > 95th centile	Abnormal Doppler
CPR < 1.1	

The code 'In utero Growth Restriction' (IUGR) should only be used by FMU

6.4.5.2. The following tables (Tables 2. and 3.) and flowchart (Flowchart B.) summarise how these ultrasound findings are combined to generate a diagnosis, and the action(s) that must then be taken by the sonographer

6.4.6. Table 2. Sonographer action(s) following ultrasound growth scans at 26+0 → 34+6

Ultrasound Findings:					Diagnosis in Viewpoint	Action(s) to be taken
Growth		**Umbilical Artery Doppler**		**CPR** (will only be calculated ≥ 32+0)		
Normal	+	Normal	+	Normal	Normal fetal growth	36/40 scan as planned (NB: No ANC referral)
Normal	+	Abnormal	or	Abnormal	Normal fetal growth but abnormal Dopplers	Refer to FMU* If AEDF/REDF/CPR < 1.1 for immediate review (Refer to MAU if FMU staff not available)
EFW > 95th c					Large for dates / fetal macrosomia	Only arrange OGTT if a woman / birthing person has other risk factors for GDM and has not previously been screened
SGA risk (EFW ≥ 3rd c)	+	Normal	+	Normal	SGA risk with normal dopplers	Repeat ultrasound scan in 2-3 weeks and arrange follow up in ANC on the same day
SGA risk (EFW < 3rd c)	+	Normal	+	Normal	SGA risk with normal Dopplers	Refer to FMU* **(New in v2.3)**
SGA risk	+	Normal	+	Not obtained as MCA could not be obtained	Abnormal growth with unobtainable MCA	Refer to FMU*
SGA risk	+	Abnormal	+/or	Abnormal	SGA risk with abnormal Dopplers	Refer to FMU* If AEDF/REDF/CPR < 1.1 for immediate review in FMU (Refer to MAU if FMU staff nor available)
		MCA Doppler VMAX > 100 cm / s No other MCA measurement (excluding CPR < 1.1) should prompt referral				Refer to FMU*
Other growth concerns						Do not arrange repeat ultrasound scans to recheck one measurement Refer to FMU* / Request FMU review of images*
					Fetal Abnormality	Refer to FMU*

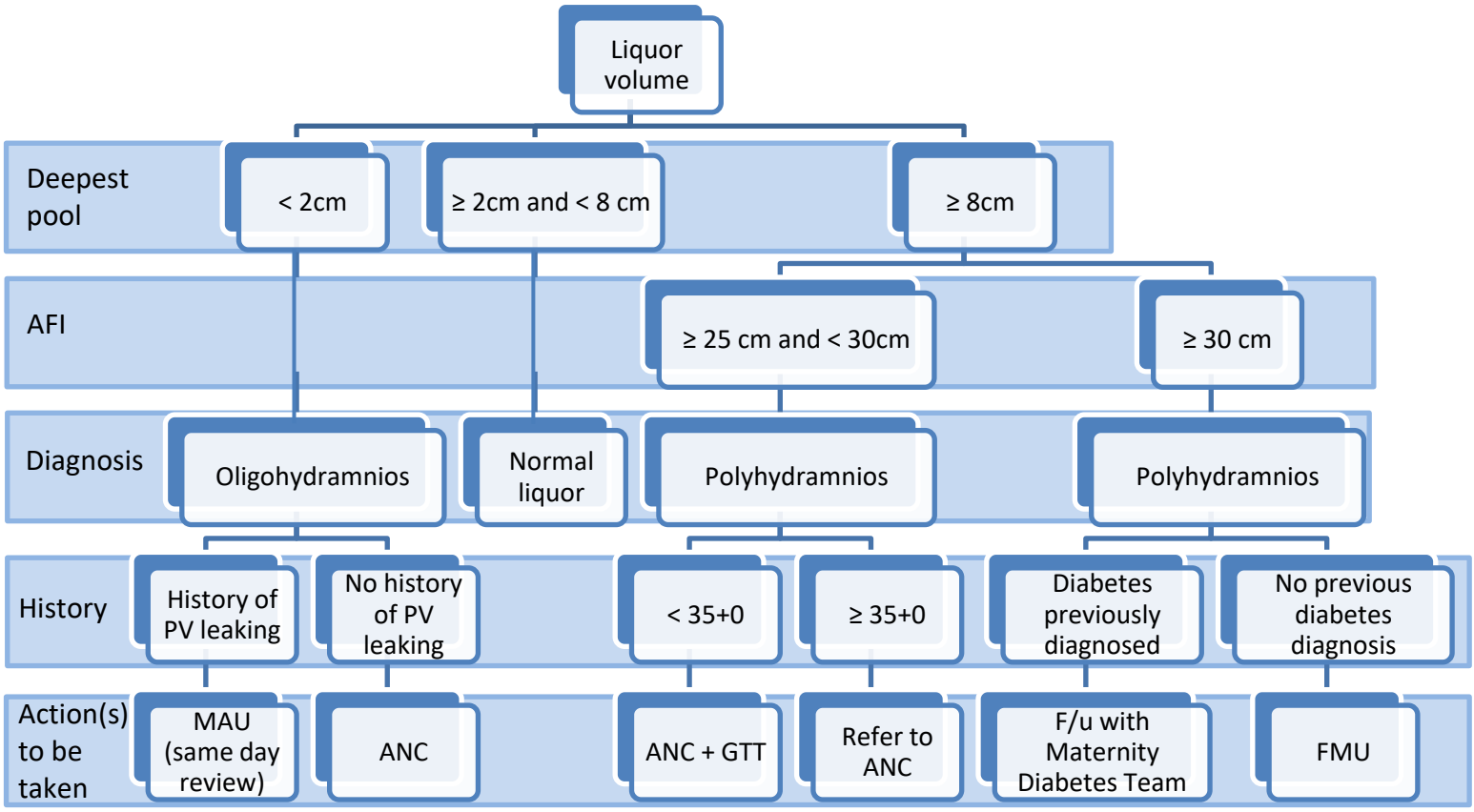
*referral to FMU (or requests for image reviews) should be via EPR BadgerNet – Referral – Fetal Medicine unless otherwise stated

6.4.7. Table 3. Sonographer action(s) following ultrasound growth scans at ≥ 35+0

Ultrasound Finding:					Diagnosis in Viewpoint	Action(s) to be taken
Growth		**Umbilical Artery Doppler**		**CPR**		
Normal **EFW ≥ 20th c**	+	Normal	+	Normal	Normal fetal growth	No further ultrasound scans, no additional ANC appointments
Normal **EFW ≥ 10th c and < 20th c (New in v2.3)**	+	Normal	+	Normal	Normal fetal growth – EFW ≥ 10th centile and < 20th centile	Re-scan in 2-3 weeks (this should already be booked if allocated to Pathway D1) No ANC referral is required
Normal	+	Normal	+	Not obtained as MCA could not be obtained		No action
Normal	+	Abnormal	or	Abnormal	Normal fetal growth but abnormal Dopplers	Refer to FMU* If AEDF/REDF/CPR < 1.1 for immediate review in FMU (Refer to MAU if FMU staff nor available)
EFW > 95th c						Referred to a Consultant-led ANC for shared decision making and individualised birth planning
SGA risk	+	Normal	+	Normal	SGA risk with normal dopplers	Refer to FMU* FMU clinic will then either arrange follow up in FMU, or will refer on (with accompanying advice) to another clinic **(New in v2.3)**
SGA risk	+	Normal	+	Not obtained as MCA could not be obtained	Abnormal growth with unobtainable MCA	Refer to FMU*
SGA risk	+	Abnormal	+/ or	Abnormal	SGA risk with abnormal Dopplers	Refer to FMU* If AEDF/REDF/CPR < 1.1 for immediate review in FMU (Refer to MAU if FMU staff nor available)
		MCA Doppler VMAX > 100 cm / s No other MCA measurement (excluding CPR < 1.1) should prompt referral				Refer to FMU*
Other growth concerns						Do not arrange repeat ultrasound scans to recheck one measurement Refer to FMU / Request FMU review of images
					Fetal Abnormality	Refer to FMU*

*referral to FMU (or requests for image reviews) should be via EPR BadgerNet – Referral – Fetal Medicine unless otherwise stated

6.4.8. Flowchart B. Sonographer action(s) following ultrasound assessment of liquor volume



N.B. If the deepest pool is 'normal', use the 'normal with AFI' function and enter the measurement under Deepest Pool

6.5. Action(s) to be taken by the medical team following an ultrasound growth scan diagnosis (singleton pregnancies only)

6.5.1.1. At every and any antenatal review the Viewpoint ultrasound report should be examined by the clinician

6.5.2. Timing of birth following a diagnosis of SGA

6.5.2.1. **(Updated in v2.3)** Before 37+0 any decision for birth driven by SGA risk, or abnormal Doppler ultrasound measurements, must be made by the FMU team. These babies are at risk of hypoglycaemia and should be monitored as per the guideline for SGA neonates.

6.5.2.2. At, or after, 37+0 the decision for birth does not need a FMU review. Advice can be

sought from FMU via EPR BadgerNet – Referral – Fetal Medicine using the drop-down option 'fetal growth advice'. Any previous advice from FMU relating to the ultrasound growth scans will be documented on EPR BadgerNet under 'Fetal Medicine Specialist Review'.

6.5.3. Uncomplex SGA

6.5.3.1. Uncomplex SGA is characterised by the following:

- low prior risk
- Total uterine artery Doppler ultrasound PI value < 3.0
- normal growth velocity
- normal umbilical artery Doppler ultrasound PI value
- CPR ≥ 1.1
- EFW > 3rd c
- no other pregnancy complications

6.5.3.2. In general, women or birthing people with 'uncomplex SGA' pregnancies, should be advised to give birth at 39+0 – 39+6. A planned caesarean birth is not indicated for sthis reason alone. These babies are at risk of hypoglycaemia and should be monitored as per the guideline for SGA neonates.

6.5.3.3. If an uncomplex SGA baby remains undelivered for > 2 weeks after the 36-week ultrasound growth scan, a further non-FMU growth scan should be offered

6.5.4. Complex SGA

6.5.4.1. Complex SGA is characterised by the following:

- high prior risk
- Total uterine artery Doppler ultrasound PI value ≥ 3.0
- evidence of growth velocity reduction
- abnormal umbilical artery Doppler ultrasound PI value eg > 95th c
- CPR < 1.1
- EFW < 3rd c

6.5.4.2. Women or birthing people with 'complex SGA' pregnancies, will usually be reviewed by FMU and care individualised. Birth will usually be expedited around 37 weeks. Caesarean birth is not indicated for this reason alone. These babies are at risk of hypoglycaemia and should be monitored as per the guideline for SGA neonates.

7. Review

7.1.1.1. This policy will be reviewed every 3 years

7.1.1.2. This policy may need to be revised before this date, particularly if national guidance or local arrangements change, where implementation is unsuccessful or where audits necessitate a policy review.

8. EPR Millenium PowerChart & EPR BadgerNet considerations

8.1.1.1. As detailed in the Full Guideline

9. Document History

Version valid from	Version number	Reason for review/update
TBC	v3.0	• 3 yearly review
28/08/2024	v2.3	• Growth Scan Pathway for Singletons updated • Growth scan pathway Screening questions added • Other updates appear as (Updated in v2.3) throughout the document
24/01/2023	v2.2	• Reference list on page 16 updated to include the Fetal Medicine Unit Induction of Labour Protocol
21/12/2022	v2.1	• To begin February 2023: • In line with SBLCBv2, a growth scan for DCDA twins should be offered at 24 weeks gestation in addition to the 28, 32 and 36 week growth scans (please see the Growth Scan Pathway for Twins Table on page 8). • (New in v2.0) Growth Scan Referral Pathways added (Appendix 2) on pages 18/19
26/09/2022	v2.0	• Changes to guidance re: • EFW >95th centile replacing AC >95th centile as a predictor of fetal Macrosomia • Action for management of predicted fetal macrosomia <35+0 weeks gestation • Action for management of fetal macrosomia predicted ≥ 35+0 weeks gestation • Action for management of polyhydramnios <35+0 weeks gestation • Action for management of polyhydramnios ≥ 35+0 weeks gestation
09/03/2020	v1.3	3 yearly review
28/04/2016	v1.2	3 Yearly review

10. Consultation Schedule

Who? Individuals or Committees	Rationale and/or Method of Involvement
Consultant Obstetrician FMU Lead	Author and Review
SST Fetal Medicine	Review
Screening Coordinator	Review
Ultrasound Manager	Author and review
Ultrasound Interim Manager	Author and review
Quality Assurance and Improvement Midwife	Review
Document Review Group (DRG)	Review and pre-approval for MCGC

11. References

Moraitis, AA, Wood, AM, Fleming, M, and Smith, GC. (2014) Birth weight percentile and the risk of term perinatal death. Obstet Gynecol.124: 274–283

Pilliod, RA, Cheng, YW, Snowden, JM, Doss, AE, and Caughey, AB (2012); The risk of intrauterine fetal death in the small-for-gestational-age fetus. Am J Obstet Gynecol. 207: 318–416

RCOG (2013), Green-top guideline no. 31: the investigation and management of the small-for-gestational-age fetus. Royal College of Obstetricians and Gynaecologists Press, London

Sovio, U, White, I, ,Dacey, A, Pasupathy, D, Smith, GCS, (2015); Screening for fetal growth restriction with universal third trimester ultrasonography in nulliparous women in the Pregnancy Outcome Prediction (POP) study: a prospective cohort study, Lancet 2015; 386: 2089–97

12. Appendices

12.1. Appendix 1: Supporting information about Doppler Ultrasound

12.1.1. Umbilical artery (umbA) Doppler ultrasound

12.1.1.1. This is a useful test before 35 weeks of gestation to help distinguish the normal small fetus from the small, compromised, fetus and helps determine monitoring frequency and iatrogenic preterm delivery. Chronic placental dysfunction may lead to increased resistance (RI) and pulsatility (PI) in the arteries. The waveform is considered abnormal if the pulsatility index is > 95th centile or if there is absent or reversed end-diastolic flow. These latter two describe increasing degrees of placental dysfunction. Umbilical artery Doppler ultrasound is not useful after 35 weeks of gestation except as part of the cerebroplacental ratio.

12.1.2. Middle cerebral artery (MCA) Doppler ultrasound

12.1.2.1. This has 2 principal uses.

- Firstly, it can be used to exclude fetal anaemia in at risk fetuses e.g. Rhesus disease. The peak systolic velocity (PSV, or Vmax) is assessed.
- Secondly the waveform (PI is normally used) may demonstrate head sparing: more blood is sent to the brain in fetal diastole as a 'survival' mechanism. The pulsatility (PI) reduces in adverse circumstances. Its principal usage is therefore as part of the cerebroplacental ratio (see below).

12.1.3. Cerebroplacental ratio (CPR)

12.1.3.1. This is thought to be useful from 35 weeks to help distinguish between the normal, small fetus from the small, compromised fetus, and is considered abnormal if reduced. It may also help identify chronic fetal compromise babies that are not obviously small for gestational age. It is calculated by dividing the MCA PI by the umbA PI.

12.1.4. Uterine artery (utA) Doppler Ultrasound (Updated in v2.3)

12.1.4.1. This is a screening test. It is most effective for growth restriction and pre-eclampsia that occurs before 34 weeks. The uterine artery Doppler ultrasound can be measured at any gestation but is routinely used at the 20-weeks anomaly scan. A high pulsatility or resistance waveform (PI or RI) suggests less effective placental

implantation. A normal result implies a low risk of early growth restriction or pre-eclampsia. The higher the PI the higher the risk of pregnancy complications.

12.1.5. Obtaining and Measuring the Doppler Signal

12.1.5.1. Once 4-6 cycles are obtained and frozen, press the vessel option (eg umbA) and then Autotrace. Limit the section autotraced to the best 3 consecutive similar waveforms. In case of excessive background noise and poor signal, a manual trace can be used. Store the best image of each vessel. Check the values using the 'report' function. The lowest umbA PI measurement should be kept and the others deleted. For the MCA PI measurement, the highest MCA PI measurement should be kept and the others deleted. This is best done prior to transfer. Use the 'send report' function to ensure measurements are stored in Viewpoint; in the event of a lost connection, manually enter both PI and RI for each vessel.

12.1.5.2. The following 6 criteria must be satisfied for any of the Doppler ultrasound measurements obtained:

Magnification	50% of the screen (zoom box) and sample gate in centre of vessel
Angle	< 30%
Sweep speed	4 - 6 waves insonated with constant signal
Clearance of the IMAGE	Velocity and colour gain correction (no veins signal)
Anatomic site of the Sample	UmbA: free loop (twins at fetal cord insertion) MCA: at the emergence of the MCA from the Circle of Willis
Velocity Scale	75% of the peak systolic velocity

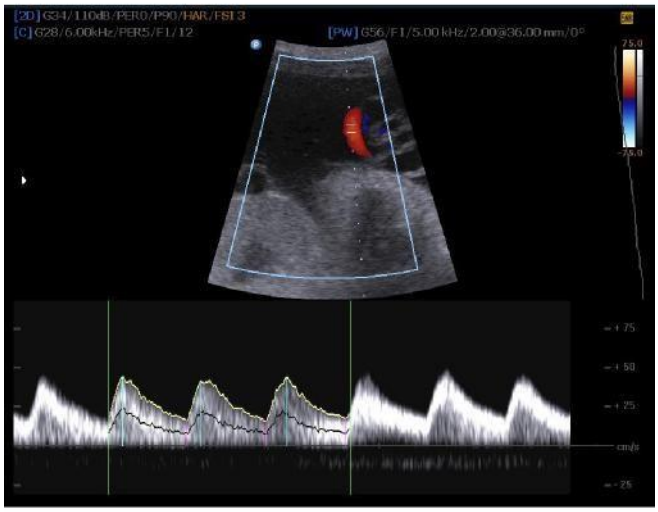
12.1.5.3. The UmbA Doppler signal should be obtained from the sampling of a free loop of the umbilical cord, during fetal quiescence in absence of significant limbs/breathing movements (Fig 1). The PI and RI should be reported.

12.1.5.4. The end diastolic flow (EDF) should be considered as present if no discontinuation

between the end of the diastolic signal and the beginning of the following systolic signal is seen. Absent or reversed EDF should then be reported.

12.1.5.5. The MCA Doppler signal should be obtained at the axial section of the brain, including the thalami and the sphenoid bone wings, Colour should be used to identify the circle of Willis and the proximal MCA. (Fig: 2) The pulsed-wave Doppler gate should then be placed at the proximal third of the MCA, close to its origin in the internal carotid artery. The angle between the ultrasound beam and the direction of blood flow should be kept as close as possible to 0 (or modified after acquisition to be reduced to 0.) Care should be taken to avoid any excessive pressure on the fetal head. The PI and PSV should be reported.

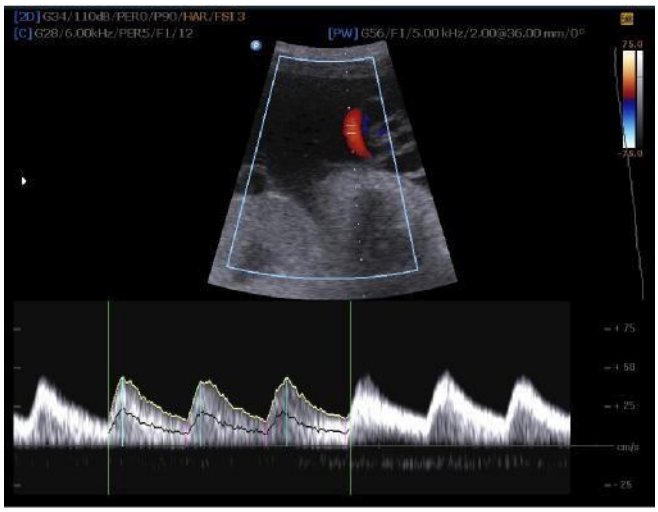
12.1.5.6. Fig 1: UmbA



12.1.5.7. Fig 2: MCA

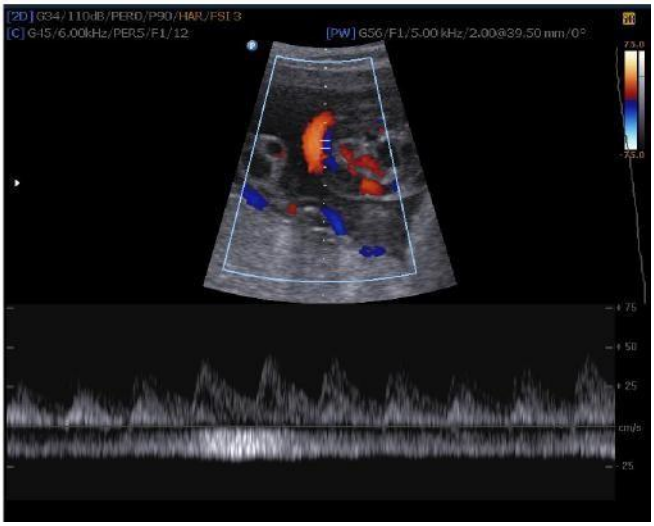
12.1.6. Common Errors

12.1.6.1. Small sweep and low scale/low pulsatility repetition frequency (PRF) scale



12.1.6.2. Scale less than 30% of the peak velocity, angle more than 30%

Gate placed not in the centre of the vessel, background noise of the umbilical vein



12.2. Appendix 2: Definitions

Term	Definition
AC	Abdominal Circumference
AEDF	Absent End Diastolic Flow
c	centile
CPR	Cerebroplacental Ratio (MCA PI/ UmbA PI)
EFW	Estimated Fetal Weight
EDF	End Diastolic Flow
FGR	Fetal Growth Restriction
FL	Femur Length
FMU	Fetal Medicine Unit
HC	Head circumference
IUGR	Intra Uterine Growth Restriction
MCA	Middle Cerebral Artery
PD	Pool Depth
PI	Pulsatility Index
PET	Pre-eclampsia
REDF	Reversed End Diastolic Flow
RI	Resistance Index
SGA	Small for Gestational Age
UmbA	Umbilical Artery

12.3. Appendix 3: Education and Training

12.3.1.1. There is no mandatory training associated with this guideline. Individuals' training needs will be identified through annual appraisal and supervision".

12.4. Appendix 4: Image and Doppler audit tool

12.4.1.1. Growth scan Audit Template .xlsx

Growth Scan Audit

Sonographer ID:
Review period:
Date of review:
Assessor:

		Case 1	Case 2	Case 3	Comments / Feedback
Date of scan					
MRN					
Restrictions					
Head Circumference	HC occupies more than 30% of ultrasound image				
	Rugby ball shape				
	Presence of cavum septum pellucidum				
	Measured at the transventricular plane				
	Midline less than 20° to horizontal				
	Midline centrally placed, with the two hemispheres symmetrical				
	HC ellipse adequate to the size of the head				
	Accurate caliper placement around the outer border of the skull				
	Total (8)				
Abdominal Circumference	AC occupies more than 30% of ultrasound image				
	As close as possible to circular in shape				
	Spine appears as three ossification centres				
	Single straight rib				
	Short length of the umbilical vein, in the middle one third of the abdomen				

	Stomach bubble present				
	Kidney asbent				
	Accurate caliper placement around the outer border of the skin				
	Total (8)				
Femur Length	FL occupies more than 30% of ultrasound image				
	Full length of femur clearly visible				
	Angle less than 45° to the ultrasound beam				
	Accurate caliper placement (outer to outer in the middle of the femur extremities)				
	Total (4)				
Placenta	Clear image of cervix and proximal distance to placenta				
	Total (1)				
Deepest vertical pool	Empty fluid pool (cord and limb free)				
	True maximum depth in section demonstrated				
	Accurate caliper placing perpendicular to floor				
	Accurate caliper placing taking into account any artefact present				
	Total (4)				
Dopplers	TIB within safety guidelines (<2.5)				
	Image (zoom box) is magnified to fill at least 50% of the screen				
	4-6 waveforms displayed				
	Waveforms fill at least 75% of the scale				
	Measured waveforms are similar in appearance				
	Angle of insonation less than 30° from the vertical				
	Sample is taken from a free loop of the umbilical cord				
	Sample is taken from the				

	emergence of the MCA from the Circle of Willis				
	Gate is placed centrally within the vessel				
	No aliasing/artefacts/movements				
	Total (10)				
	Total (35)	0	0	0	
	Percentage %	0%	0%	0%	

Further actions	✓ or x	Overall comments
No actions required and feedback given to practitioner		
A further 3 growth scans reviewed		
Observe scan technique		
1 to 1 image review		

12.5. Appendix 5: Equality Impact Assessment

12.5.1. Information about the guideline, service or function

What is being assessed?					
New Guideline/Procedure	[ ]	New Service/Function	[ ]		
Existing Guideline/Procedure	[X]	Existing Service/Function	[ ]		
Staff member completing assessment: Marie Barnard					
Name of guideline: Growth Scan Guideline					
Details about the guideline: This document provides guidance for all maternity staff involved in performing Ultrasound growth scans. It also applies to all midwifery and medical staff who provide care antenatal and intrapartum care and/or information to women and their families within the Oxford University Hospitals NHS Foundation Trust (OUHFT).					
Review Date: 09/09/2022		Date assessment completed:			
Signature of staff member completing assessment: Marie Barnard		Signature of staff member approving assessment:			

12.5.2. Screening Stage

Who benefits from this guideline, service or function? Who is the target audience? (*tick all that apply*)					
Patients	[x]	Family/Carers	[xx]	Not applicable	[ ]
Staff	[x]	Other (*specify*):			
Does the guideline, service or function involve direct engagement with the target audience?					
Yes	[x]	Continue with full equality impact assessment			
No	[ ]	Full equality impact assessment not required			

12.5.3. Research Summary

Summary Characteristic		Impact			Not Enough Information	Reasoning
		Positive	Negative	Neutral		
Sex and Gender Reassignment	Men (incl. trans men)			x		All genders of pregnant people will have equal access to the provision of growth scans.
	Women (incl. trans women)			x		
	Non-binary people			x		
Race[a]	Asian or Asian British			x		All pregnant people will benefit from this guideline. Consideration should be taken if not able to read written English – including for white British people. Pictoral explanations may need to be used. Where English is not spoken or not first language, then language line should be used for consultations, especially when giving information of medication uses and doses.
	Black or Black British			x		
	Mixed Race			x		
	White British			x		
	White Other			x		
	Other:			x		
Disability	Disabled people			x		If the woman has any learning difficulties an advocate should be in attendance. If they have a hearing loss– a British Sign Language Interpreter should be offered which can be done via language line.
	Carers			x		
Age[b]				x		This guideline is only applicable to adult pregnant people. Please consult the Children's BNF or gain advise from a

				x		paediatrician before if the pregnant person is less than 18 years old.
Sexual Orientation				x		This guideline does not discriminate with regards to sexual orientation, as all people will have equal access to the advice and treatments described above.
Religion or Belief[3c]				x		This guideline does not discriminate with regards to belief or religion, as all people will have equal access to the advice and treatments described above.
Pregnancy and Maternity		x				The advice in this guideline is for pregnant people therefore will have a positive impact on this group.
Marriage or Civil Partnership				x		This guideline does not discriminate with regards to marriage or civil partnership, as all people will have equal access to the guidance and care described above.
Other Groups / Characteristics	For example: homeless people, sex workers, rural isolation.			x		This guideline does not discriminate with regards to social situations, as all people will have equal access to the guidance and care described above.

aRace categories *follow those used in the National Census by the Office for National Statistics. Consideration should be given to the specific communities within broad categories such as Bangladeshi people*

b *Please select age groups which may be impacted by the guideline, service or function and complete as appropriate.*

c *Religion or Belief covers a wide range of groupings, the most common of which are Muslims, Buddhists, Jews, Christians, Sikhs and Hindus; it also covers people who do not have a faith. Consider these individually and collectively when determining impacts.*

List the sources of information used in the table below	
OUH Trust Equality impact assessment procedure guideline – available via trust intranet Annual Equality and Diversity Report, Workforce Race Equality Standard Data, or the Equality Delivery System 2 report	
Using the table below, list any protected groups you will target during the consultation process, and give a summary of those consultations.	
Group	Summary of consultation
List any other individuals/groups that have been or will be consulted on this guideline, service or function.	
This guideline will be reviewed prior to publication by relevant Midwives, Obstetricians, Obstetric Physicians and Pharmacist	

12.5.4. Summary Stage

Outcome Measures List the key benefits that are intended to be achieved through implementation of this guideline, service or function and state whether or not you are assured that these will be equitably and fairly achieved for all protected groups. If not, state actions that will be taken to ensure this.
The benefits of this guideline will be to improve the antenatal care women receive during pregnancy by offering growth scans to check fetal wellbeing where recommended. This guideline will help to ensure that women are risk assessed appropriately to ensure continued access to care provision by the most appropriate member(s) of the MDT in accordance with NICE and RCOG guidance risk assessment recommendations. Consideration should be taken in those pregnant women who may not be able to understand or read written English – including for white British women. Pictoral explanations may need to be used. Where English is not spoken or understood, then language line should be used for consultations, especially when giving information of medication uses and doses. If the pregnant women has any learning difficulties an advocate should be in attendance. If they are D/Deaf or d/Deaf or have a hearing impairment– a British Sign Language Interpreter should be offered and can be accessed via language line.
Positive Impact List any positive impacts that this guideline, service or function may have on protected groups as well as any actions to be taken that would increase positive impact.
This guideline has been written specifically to support the antenatal care provision for pregnant women, therefore this is a positive impact for this group.

Unjustifiable Adverse Effects List any identified unjustifiable adverse effects on protected groups along with actions that will be taken to rectify or mitigate them.
No adverse effects predicted on any group
Justifiable Adverse Effects List any identified unjustifiable adverse effects on protected groups along with justifications and any actions that will be taken to mitigate them.
No adverse effects predicted on any group

12.5.5. Equality Impact Assessment Action Plan

Identified Risk	Recommended Actions	Lead	Resource Implications	Review Date	Completion Date
Pregnant women with learning disabilities having an understanding the information	Consider if the use of an advocate is required				
Difficulty accessing follow up and appointments for pregnant women who are homeless or have limited means of transport for appointments	Consider whether hospital transport is appropriate.				