

GS32 - Growth Scan Guideline

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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.

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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)** At the 36 week scan, pregnancies where the estimated fetal weight (EFW) is $\geq 10^{\text{th}}$ centile and $<20^{\text{th}}$ 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 (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:
- $$\begin{array}{ccccc} \text{Right uterine artery} & & \text{Left uterine artery} & & \text{Total uterine artery} \\ \text{Doppler ultrasound} & + & \text{Doppler ultrasound} & = & \text{Doppler ultrasound} \\ \text{PI value} & & \text{PI value} & & \text{PI value} \end{array}$$
- 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:

$$\begin{array}{l} \text{uterine artery} \\ \text{Doppler ultrasound} \\ \text{PI value (obtained)} \end{array} \times 2 = \begin{array}{l} \text{Total uterine artery} \\ \text{Doppler ultrasound} \\ \text{PI value} \end{array}$$

	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. EFW <10th centile:

If the pt will go on Pathway D0-1, OR the EFW is <3rd c, refer to FMU

If the EFW is >3rd c and <10th c, and the allocated pathway is A or C, book a repeat scan at 25 weeks on level 4^[L1]

6.1.1.7. If any of HC, AC or FL <5th centile (but EFW >=10th c): Refer to FMU for scan review (usually an FMU scan review only will occur)

6.1.1.8. Multiple pregnancies are allocated to the appropriate multiple pregnancy ultrasound scan pathway and not to one of the 5 Growth Scan Care Pathways. Referral to FMU is also according to different criteria. ([see Multiple Pregnancy and Birth Guideline](#))

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

Growth Scan Pathway Screening Questions	
Have you had a baby (not a twin) that weighed less than 2.5kg (5lb 9oz)?	
Are you 40 yrs old or over?	
Do you smoke at all (or were you told your CO level was >3ppm)?	[HS2][LI3]
Was your booking BMI greater than or equal to 35?	
Are you of Black or South Asian (Indian subcontinent including: Bangladesh, Bhuta, India, Maldives, Nepal, Pakistan and Sri Lanka) ethnic origin?	
Do you have a congenital uterine abnormality?	
Do you have high Blood pressure ($\geq 140/90$ or requiring treatment)?	
Are you taking aspirin (or were advised to do) so as a result of the 12 week screening test?	
Low PAPP-A ($<0.31\text{MoMs}$)	NB: Low result will be flagged on Viewpoint
Is there a 2 vessel cord?	

6.1.3. Flowchart A: Allocation to Growth Scan Care Pathway

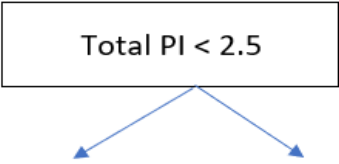
NB: If only 1 x <u>UtArt</u> Doppler obtained use PI = 1.25 as threshold	Total PI < 2.5 		Total PI 2.5 - 2.99	Total PI 3.0 - 3.49	Total PI ≥ 3.5	Multiple Pregnancy (MC twins and triplets go to FMU)
	No to all Qs	<u>Yes</u> to any Qs				
Pathway	A	C	D0	D1	D2	
Risk of placental dysfunction	Low	Moderate (late onset)	Moderate (early onset)	High (early onset)	High (early onset)	
Growth scan			Refer to ANC	Refer to ANC	Refer to FMU (Badgernet)	24/40
			28/40	28/40		28/40
		32/40	32/40	32/40		32/40
	36/40	36/40	36/40	36/40		36/40
			39/40			
ANC F/U	No additional action required		Check seeing MW or Doctor: 25/40 and 31/40 OR If under SS, check 25/40 appt			

Table 1. to show additional ultrasound growth scans and BP checks needed for each of the 5 pathways [LI4][HS5]

	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					

6.1.3.1. 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
- 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^[HS6]^[LI7]^[HS8]/crossing of centile lines • new hypertension^[HS9]^[LI10] • 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)^[HS11]^[LI12] eg: Pre existing Diabetes (28/32/36/40 scans) & GDM additional 32/40 scan only (Mon Diabetes clinic). • 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
- Requests for 'crossing centiles' that do not conform to ultrasound department criteria.^[LI13]

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:

- Referrals should be made via Badgernet 'Maternity Ultrasound Triage Referral'

to maternity US .

- Check existing appointments to avoid duplication.
- Check previous growth scan >14 days ago.
- 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 (Mon – Sat) 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.

The FMU team can be contacted for advice, or to answer queries via Badgernet 'Fetal Medicine Referral'. 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 from 25+0 weeks

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 stored:
- presentation
 - placental site eg. Lowest placental edge in relation to cervical internal os
 - head circumference (HC), femur length (FL) and abdominal circumference (AC) (use best AC image measurement)
 - liquor volume – the deepest vertical pool (DVP) that is cord and limb-free
 - umbilical artery (umbA) Doppler ultrasound PI
 - MCA Doppler if $\geq 32+0/40$
- 6.4.1.2. At each ultrasound growth scan the EFW should be calculated
- 6.4.1.3. If the umbA Doppler ultrasound PI and MCA Doppler ultrasound PI have been measured the cerebroplacental ratio (CPR) will calculate automatically but will not print in Viewpoint.

6.4.2. Umbilical Artery Doppler ultrasound measurement technique

- 6.4.2.1. The umbilical artery Doppler 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 will 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 < 10 th centile		
Umbilical artery Doppler ultrasound PI > 95 th 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

Growth Scan Referral Pathway 25+0 → 34+6/40

(NB: In event of both SGA pathway and also urgent scans e.g. ↓FM's or SFD)

SGA RISK: AC↓ ≥ 40 centiles from anomaly +/- EFW <10th centile ABNORMAL DOPPLER: Umbilical Artery PI > 95th centile +/- Cerebro Placental Ratio (CPR) < 1.1	
Finding:	Referral pathway:
Normal growth + Normal Doppler PI and CPR	36/40 scan as planned if ≥ 7 days from scan. (NB: No ANC referral)
Normal growth + Normal Umbilical Doppler BUT MCA could not be obtained	No action
Normal growth + Abnormal umbilical Doppler PI or CPR	Refer FMU If AEDF/REDF/CPR<1.1 for immediate review in FMU (Refer to MAU if FMU staff nor available)
Normal Growth - EFW >95th Centile	No action. (Wait for 36 week scan) Only if patient has risk factors for GDM and has not previously been screened should the CMW be contacted to arrange OGTT using EPR Powerchart to generic team-
SGA risk (AC↓ +/- EFW 3rd - 9th centile) + Normal Umbilical Doppler PI + CPR	Repeat scan in 2-3 weeks and arrange follow up ANC on the same day
SGA risk (AC↓ +/- EFW <3rd centile) + Normal Umbilical Doppler PI + CPR	Refer to FMU
SGA risk + Normal Umbilical Doppler BUT MCA could not be obtained	Refer to FMU FGA Clinic
SGA risk + Abnormal umbilical Doppler PI +/- CPR	Refer FMU If AEDF/REDF/CPR<1.1 for immediate review in FMU (Refer to MAU if FMU staff nor available)
MCA Doppler VMAX (in viewpoint) >100cm/s	Refer to FMU
Oligohydramnios (PD<2cm)	If history of PV leaking: MAU same day If no history of PV leaking: refer ANC

Polyhydramnios (AFI>=25)	Refer ANC, or, if AFI >30, refer FMU (unless known diabetic) No action if diabetic If not known diabetic, irrespective of prev negative GTTs, contact CMW to arrange OGTT
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If other concerns following scan then refer for review. Please highlight "for review" on report and email.

Growth Scan Referral Pathway $\geq 35/40$

(NB: In event of both SGA pathway and also urgent scans e.g. $\downarrow$ FM's or SFD

SGA RISK: AC $\downarrow \geq 40$ centiles from anomaly +/-or EFW $< 10^{\text{th}}$ centile	ABNORMAL DOPPLER: Umbilical Artery PI $> 95^{\text{th}}$ centile +/-or Cerebro Placental Ratio (CPR) < 1.1
Finding:	Referral pathway:
Normal growth (EFW $> 20^{\text{th}}$ centile @ 36/40 only) + Normal Doppler PI and CPR	No further additional non-pathway scans required. (NB: No ANC referral)
Normal growth (EFW $\geq 10^{\text{th}}$ + $< 20^{\text{th}}$ centile) @36/40 only + Normal Doppler PI and CPR	Rescan in 2-3 weeks (@ 38-39/40) (Unless Pathway D1 – appointment already made) JR: Make BN referral to 'JR Maternity Ultrasound referral' (NB: No ANC referral)
Normal growth + Normal umbilical Doppler PI and MCA could not be obtained	No action
Normal growth + Abnormal umbilical Doppler PI or CPR	Refer FMU If AEDF/REDF/CPR < 1.1 for immediate review in FMU (Refer to MAU if FMU staff not available)
Normal Growth - EFW $> 95^{\text{th}}$ Centile	Refer ANC No glucose testing or GTT. If patient has risk factors for GDM and has not previously been screened refer diabetes clinic

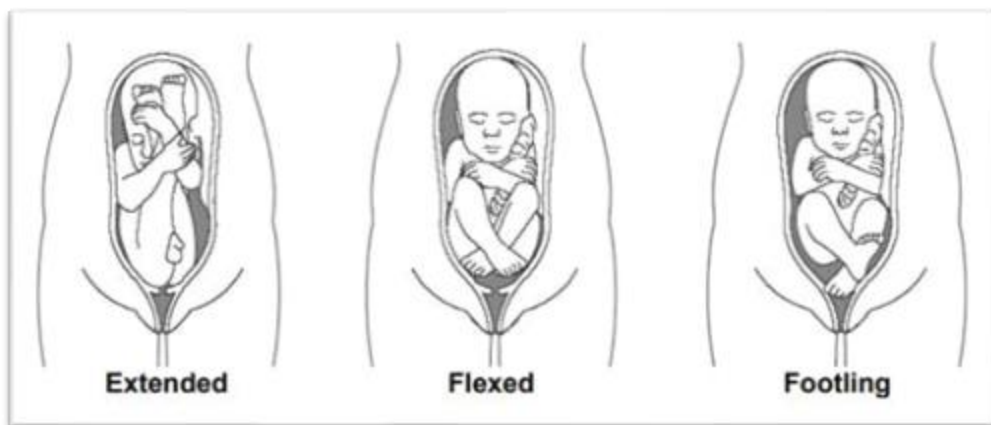
SGA risk + Normal Umbilical Doppler PI and CPR	Refer FMU
SGA risk + Abnormal umbilical Doppler PI +/-or CPR	Refer FMU. If AEDF/REDF/CPR<1.1 for immediate review in FMU (Refer to MAU if FMU staff not available)
SGA risk + Normal Umbilical Doppler and MCA could not be obtained	Refer FMU
MCA Doppler VMAX (in viewpoint) >100cm/s	Refer FMU
Oligohydramnios (PD<2cm)	If history of PV leaking: MAU same day If no history of PV leaking: refer ANC
Polyhydramnios (AFI>=25)	Refer ANC or if AFI >30, refer FMU (unless known diabetic) No action if diabetic No glucose testing or GTT. If patient has risk factors for GDM and has not previously been screened refer diabetes clinic

6.4.6. Other scan findings

6.4.6.1. Breech presentation/ transverse lie: action required

- Breech / Transverse <35+0 weeks - No action is required.
- Breech / Transverse ≥35+0 weeks
 - Position: Please record the position of the legs (extended, flexed or footling) that of the back (left right or midline) and whether there is neck extension.
 - Placental site: please re check this
 - Breech nulliparous women: refer to Breech Clinic (via Badgernet 'Maternity Breech Clinic Referral' for the first available Tuesday appointment after 36+0 weeks.
 - Breech multiparous women: refer to Breech Clinic (via Badgernet 'Maternity Breech Clinic Referral') for first available Tuesday appointment after 37+0 weeks
 - Transverse nulliparous: recheck placental site and refer to Breech Clinic (via Badgernet 'Maternity Breech Clinic Referral') for the first Tuesday after 36+0 weeks.
 - Transverse multiparous: ensure the woman has an antenatal check with midwife or consultant clinic at 38 weeks to recheck the lie.

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6.4.6.2. Placental site

- Placenta praevia - if the placenta is over the internal os. Describe whether the placenta is anterior or posterior.
- Low lying placenta – if the lowest border of the placenta is within 20mm of the internal os, but not covering it. Describe whether the placenta is anterior or posterior. Please also state

the distance from internal cervical os (in mm). Transvaginal ultrasound may be required with a posterior placenta

- If the placenta is found to be low or praevia, check that the woman has a subsequent antenatal clinic appointment.
- In women whose placenta is anterior low or praevia, ask if they have had a caesarean section or previous uterine surgery that breached the cavity eg myomectomy. If they have, check they have been referred to FMU placenta clinic. There is no need for re referral if they have already been seen.

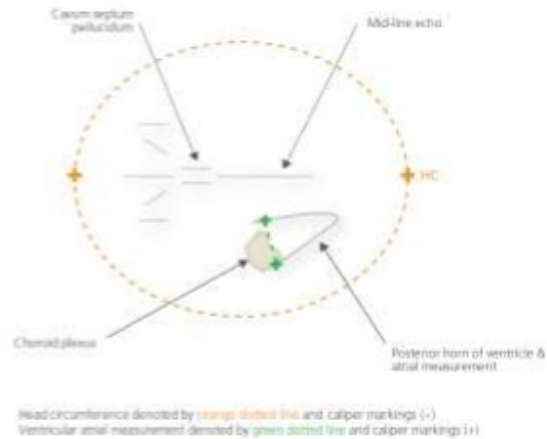
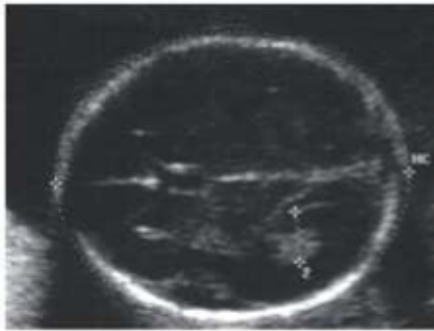
6.4.6.3....Liquor volume

- The deepest vertical pool (cord and limb-free) should be measured at a growth scan. This should always be recorded on Viewpoint. If this is normal, use the "normal with AFI" function and record the PD measurement.
- If the PD is ≥ 8 cms, record the AFI. If the AFI is ≥ 25 to 30cms this is mild polyhydramnios. If the AFI is >30 this is moderate-severe polyhydramnios
- If the PD is <2 cms this is oligohydramnios

See Growth scan referral pathways if abnormal liquor volume

head circumference (LI15)(HC), femur length (FL) and abdominal circumference (AC) (use best AC image measurement) - Refer to Appendix 4

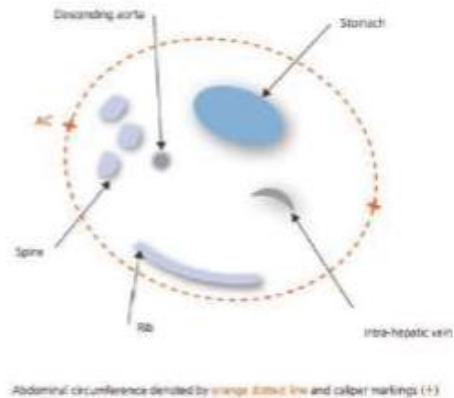
Head circumference and ventricular atrium



Essential criteria for imaging acquisition (in bold measurements required by FASP):

1. Image should be stored
2. Symmetry: The two hemispheres should be symmetrical
3. Anterior and posterior ventricles should be visible
4. Cavum of the septum pellucidum should be visible
5. No cerebellum should be visualised
6. Ellipse placement should adequate to the size of the head
7. **HC callipers** placement should be along the outer border of the skull
8. Callipers of the BPD should be placed "outer to outer"
9. **Vp callipers** placement should be "inner to inner" perpendicular to the ventricular cavity
10. Region of interest size should be more than 30% of the total picture size

Abdominal circumference

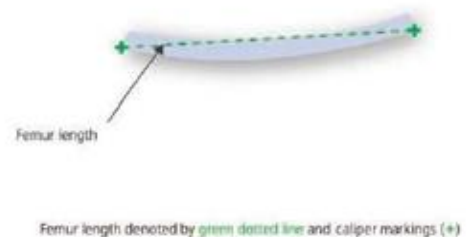


Essential criteria for imaging acquisition (in bold measurements required by FASP):

1. Image should be stored
2. AC should be as circular as possible
3. Stomach bubble visible
4. Umbilical vein anterior 1/3rd and level of portal sinus
5. No kidney present
6. Single straight rib
7. **AC** calliper placement on the outer border of the skin
8. Region of interest size should be more than 30% of the total picture size

Note: If the stomach is not visible, please ensure that it is present by waiting to see it fill. Check for it early in your examination and if not visible, again at the end. If still not visible rescan in approximately 30 minutes. If still not visible, refer to FMU.

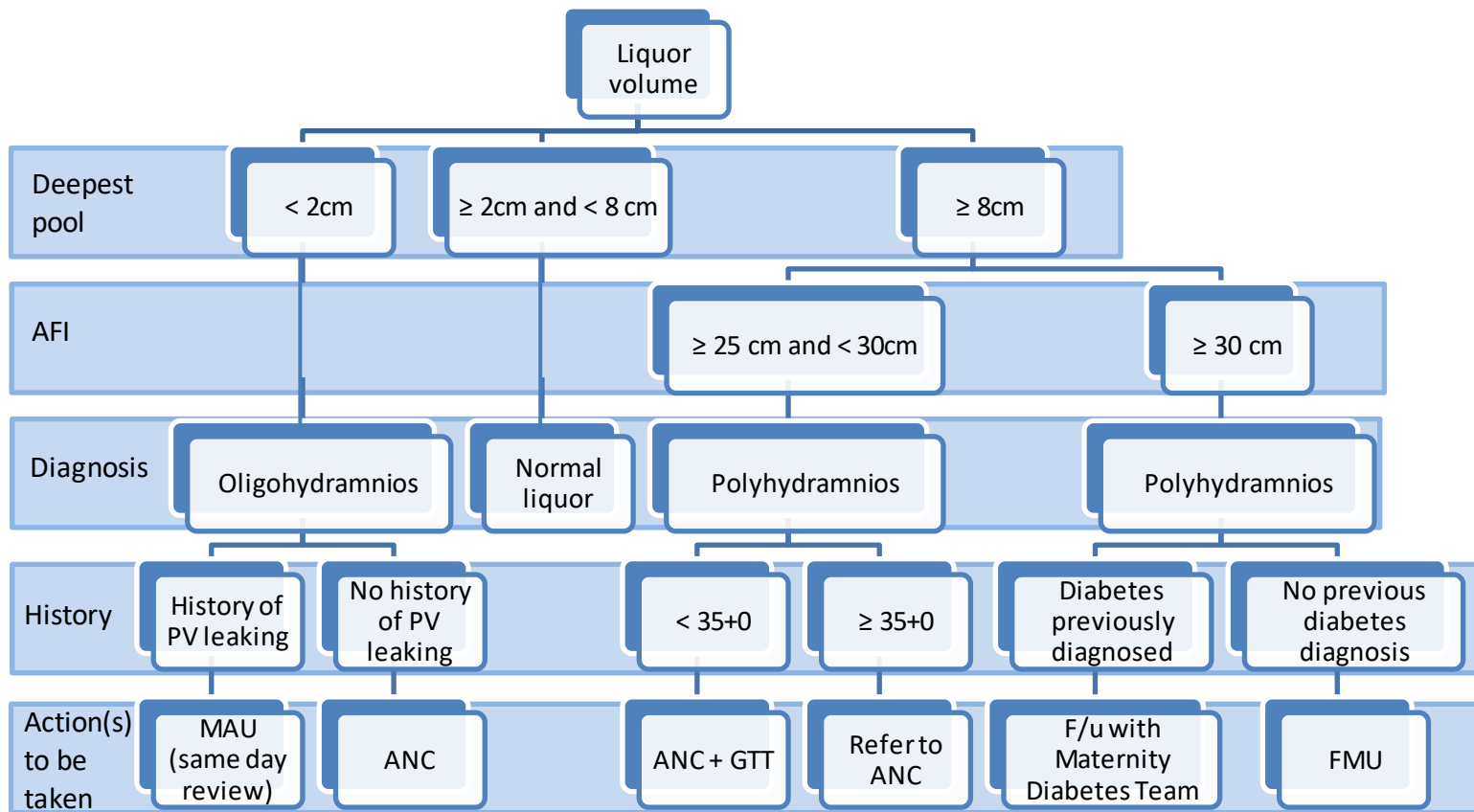
Femur Length



Essential criteria for imaging acquisition (in bold measurements required by FASP):

1. Image should be stored
2. Ends of the femur clearly visible
3. Angle of the femur less than 45 degrees to the ultrasound beam
4. **FL** callipers placed outer to outer in the middle of the femur extremities
5. Region of interest size should be more than 30% of the total picture size

6.4.7. Flowchart B. Sonographer action(s) following ultrasound assessment of liquor volume^[L116]



6.4.6.4....
MCA Doppler

- Measure $\geq 32+0/40$
- If the Vmax of the MCA is $>100\text{cm/sec}$ refer to FMU for review. No other MCA measurement (excluding where CPR is <1.1) should prompt referral.

-

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 all of 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 $\geq$ 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 this 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 any of 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 $> 95^{\text{th}}$ c
- CPR < 1.1
- EFW $< 3^{\text{rd}}$ 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 $> 95^{\text{th}}$ 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

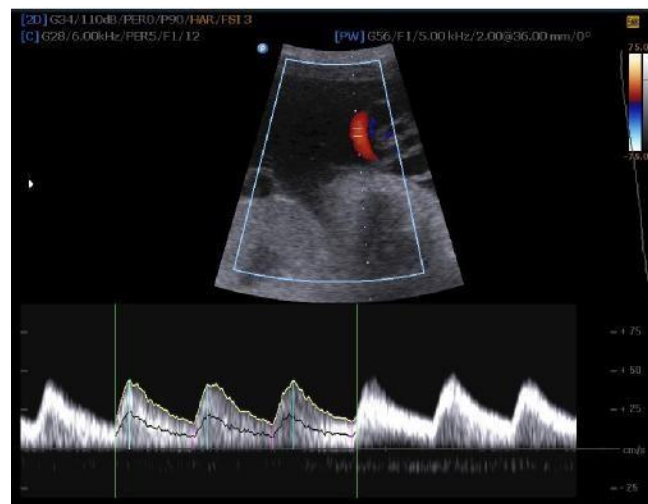
12.1.5.3. The UmbA Doppler signal should be obtained from the sampling of a free loop of the umbilical cord, during fetal quiescence in absence of significant limbs/breathing movements (Fig 1). The PI and RI should be reported.

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

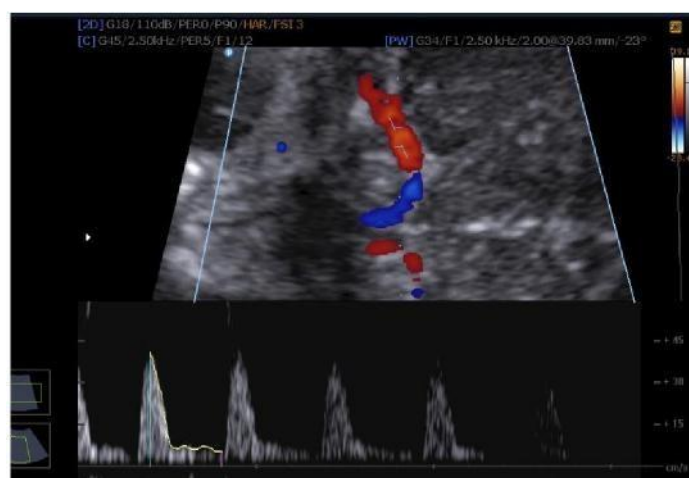
is seen. Absent or reversed EDF should then be reported.

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



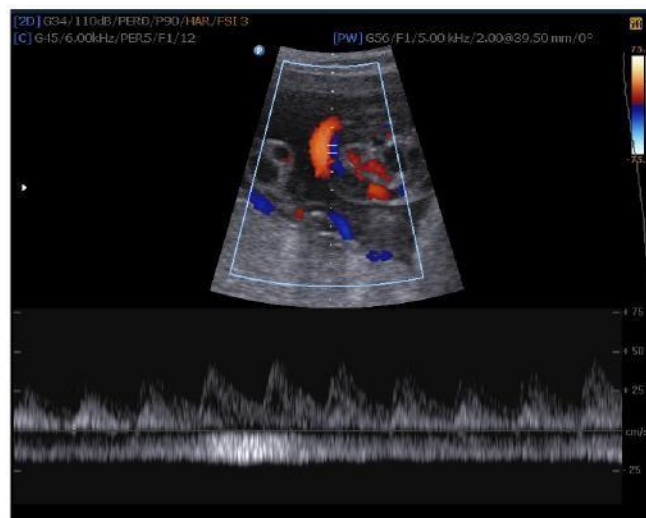
12.1.6. Common Errors

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 ☒	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? (<i>tick all that apply</i>)		
Patients ☒	Family/Carers ☒	Not applicable ☐
Staff ☒	Other (<i>specify</i>):	
Does the guideline, service or function involve direct engagement with the target audience?		
Yes ☒ 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. Pictorial 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 advice from a paediatrician before if the pregnant person is less than 18 years old.
				x		
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. Pictorial 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.				