Fetal Growth Disorders - Small for Gestational Age (SGA); Fetal Growth Restriction (FGR); Suboptimal growth
Full Clinical Guideline

Reference no.: UHDB/AN/02:22/S3

Contents

This guideline does not address multiple pregnancies or pregnancies with fetal abnormalities.

1. Introduction

50–70% of SGA fetuses are constitutionally small, with fetal growth appropriate for maternal size and ethnicity.
Structurally normal SGA fetuses are at increased risk of perinatal mortality and morbidity but most preventable adverse outcomes are concentrated in the growth restricted group.

A systematic review concluded that in comparison to mild COVID-19 infection, severe COVID-19 infection is associated with a significant increase in risk of having a baby of low birth weight (OR 1.89). However, a histopathology study which examined placentas of women with asymptomatic or mild COVID-19 infection reported no differences in outcomes (including birth weight) compared to COVID-19 negative controls.
Ultrasound to assess fetal biometry and placental function for women who have been seriously or critically unwell from COVID-19 should be undertaken and this approach has been adopted internationally.

Guidance on fetal growth surveillance following COVID-19 was developed along with NHS England and NHS Improvement Saving Babies' Lives Care Bundle.

2. Purpose and Outcomes

The purpose of this guideline is to provide advice that is based on the best evidence where available in order to guide clinicians, regarding the investigation and management of the small–for–gestational age (SGA) fetus.

3. Abbreviations

AC	-	Abdominal Circumference
APH	-	Antepartum Haemorrhage
AREDV	-	Absent/Reversed End–Diastolic Velocities
BMI	-	Body Mass Index
CTG	-	Cardiotocograph
CMV	-	Congenital Cytomegalovirus
DV	-	Diastolic Velocities
ED	-	End Diastolic
EFW	-	Estimated Fetal Weight
FGR	-	Fetal Growth Restriction
FHR	-	Fetal Heart Rate
MCA	-	Middle Cerebral Artery
PI	-	Pulsatility Index
PAPP-A	-	Pregnancy Associated Plasma Protein-A
PIH	-	Pregnancy Induced Hypertension
SD	-	Standard Deviation
SFH	-	Symphysis Fundal Height
SGA	-	Small for Gestational Age
UA	-	Umbilical Artery
UV	-	Umbilical Vein
USS	-	Ultrasound scan

4. Key Responsibilities and Duties

- Identification of risk factors for SGA / FGR (CMW at booking)
- Risk assessment and defining risk as either high or moderate risk (senior obstetrician)
- Clear documentation of aimed care pathway based on level of risk (senior obstetrician)
- SFH low risk care pathway and escalation for low risk pregnancies

Staff managing fetal growth problems should appreciate that small for gestational age (SGA with EFW <10th centile) and Fetal growth restriction (FGR) where a fetus fails to reach its growth potential, are distinct entities. Although SGA babies are at increased risk of FGR compared to appropriately grown fetuses, fetuses <3rd centile are far more likely to be FGR than those between 3rd-10th centile.

For growth surveillance in the presence of diabetes see Diabetes guidelines. For growth surveillance in case of twin pregnancies see multiple pregnancy guidelines.

5. Definitions

Fetal Growth disorder:	includes SGA; FGR and Suboptimal growth
SGA:	EFW/AC or birth weight <10th centile
Suboptimal growth:	increase of EFW <280 gram over a period of 14 days (20 grams per day) from 34 weeks or AC/EFW crossing >20 percentiles (e.g. from 70th centile to below the 50th centile)
Fetal growth restriction	Pathological restriction of growth potential

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 weeks
- Birthweight <10th centile with evidence of placental dysfunction as defined below for current pregnancy

Definition of FGR in a current pregnancy:

Early FGR: Gestational age <32 weeks, in absence of congenital anomalies	**Late FGR:** Gestational age ≥32 weeks, in absence of congenital anomalies
AC/EFW <3rd centile or UA-AEDF	AC/EFW <3rd centile
OR	Or at least two out of three of the following:
AC/EFW <10th centile with either:	1. AC/EFW <10th centile
1. UtA-PI >95th centile and/or	2. AC/EFW crossing centiles >2 quartiles on growth centiles (e.g. from 70th centile to below 20th centile)
2. UA-PI >95th centile	3. MCA/CPR <5th centile or UA-PI >95th centile

6. Small for Gestational Age Risk Assessment

Although risk assessment needs to be clearly documented at booking for all women, risk factors may become apparent at a later stage and will trigger consultant review of fetal growth surveillance.

It is recommended that women who have been seriously or critically unwell due to confirmed COVID19, requiring hospitalisation:

1. For those discharged prior to their anomaly scan:
    a. To have their FASP continued as planned
    b. To have CLC throughout pregnancy (aim for ANC appointment combined with dating scan or anomaly scan)
    c. To have serial growth scans as per high risk pathway
2. For those discharged after their anomaly scan:
    a. To have a scan 2 weeks following resolution of their acute illness with review in ANC
    b. To have CLC throughout pregnancy
    c. To have serial growth scans as per high risk pathway

6.1 Initial booking

At booking by community midwife:

- Risk assessment to be completed for all women (see AN Care guideline)
    - SGA low risk: fetal growth surveillance by SFH measurements as per AN care guidelines
    - SGA at risk: consultant booking by 16 weeks for fetal growth surveillance management plan and aspirin risk assessment
    - Factors identified that may affect SFH accuracy (e.g. BMI ≥35, h/o fibroids): consultant booking for fetal growth surveillance management plan (latest by 24 weeks in the absence of other risk factors)
- promote smoking cessation if applicable as per smoking cessation guideline

6.2 Consultant booking

At consultant booking:

- Review risk factors
- Define risk group as high risk or moderate risk
- Clearly document fetal growth surveillance management plan: Low (SFH only); Intermediate (moderate risk/risk of late onset FGR); Intensive (high risk/risk of early onset FGR)

- No SFH is required when fetal growth surveillance as per this guideline with minimal of 3 growth scans in 3rd trimester planned. If less scans booked for other reasons, clearly document that SFH will be required to monitor fetal growth.
- Book first scan only (prevent block booking ahead)
- Assess pre-eclampsia risk and advise/prescribe Aspirin 150mg (OD at night, 12-36 weeks) if applicable and not contraindicated

For growth surveillance in the presence of diabetes see Diabetes guidelines. For growth surveillance in case of twin pregnancies see multiple pregnancy guidelines.

6.2.1 High risk

Pregnancies complicated by the following risk factors should be considered for an intensive fetal growth monitoring pathway (high risk/risk for early onset FGR):

- Maternal medical conditions (chronic kidney disease, chronic hypertension, autoimmune disease (SLE, APLS), cyanotic congenital heart disease, solid tissue transplant, connective tissue disease)
- Previous FGR (see definitions)
- Previous severe early onset pre-eclampsia prior to 34 weeks
- Previous SGA stillbirth
- Low Papp-A <1st centile (0.2 MOM)
- Echogenic bowel on anomaly scan
- Two vessel cord
- EFW < 10th centile on anomaly scan
- Heavy bleeding 1st trimester or placental haematoma on USS
- Seriously or critically unwell due to confirmed COVID19, requiring hospitalisation, during current pregnancy

6.2.2 Moderate risk inclusive of factors affecting SFH accuracy only

Pregnancies *to be considered* for an intermediate fetal growth monitoring pathway (moderate risk/risk of late onset FGR):

- SGA risk (cumulative risk as per risk assessment tool 3 or more) but NOT considered for high risk pathway
- Low Papp-A ≥1st centile
- Factors identified that may affect SFH accuracy but NOT considered for high risk pathway
- Growth concerns in previous pregnancy necessitating delivery, especially prior to 39 weeks (e.g. FGR as per definition above but EFW/birth weight >10th centile)

7. Intermediate fetal growth monitoring pathway

Fetal growth monitoring:

- Aim for 3 growth scans in the 3rd trimester at 30, 34 and 38 weeks gestational age
- Aim for scans to be a minimum of 3 weeks apart if there are no concerns to minimise false positive rates for diagnosing FGR
- If a scan is considered less than 3 weeks following a growth scan, a consultant opinion is warranted

8. Intensive fetal growth monitoring pathway

Fetal growth monitoring:

- Aim to commence growth scans at 26-28 weeks
- Aim to scan every 3-4 weeks until delivery
- Aim for scans to be a minimum of 3 weeks apart if there are no concerns to minimise false positive rates for diagnosing FGR
- If a scan is considered less than 3 weeks following a growth scan, a consultant opinion is warranted

9. Reduced growth velocity

A diagnosis of suboptimal growth (see definitions) should prompt a repeat ultrasound for biometry in 2 weeks but should not be used in isolation to make decisions regarding birth.

Suspected fetal growth restriction:
The following should be managed as suspected fetal growth restriction until a further assessment of growth can be made:

- Static growth, defined as minimal change in fetal biometry over at least two weeks
- A drop in growth velocity (EFW or AC) of more than 2 quartiles or more than 50 percentiles (see definitions)

10. Fetal growth surveillance ultrasound scans

Fetal growth surveillance scan should consist of:

- Biometry
- UAD (measuring PI)
- Liquor volume with deepest vertical pool (DVP)

In the event clinical signs raise concern but serial USS confirms linear growth on 2 or more occasions refer for medical review

11. Referral to FMMC

Refer to FMMC if:

- Raised PI in presence of fetal growth disorder
- Biometric value or EFW on ultrasound <3rd centile including at FASP anomaly scan
- In case of FGR <34 weeks

12. Investigations in Fetal Medicine department

Investigations as part of the Fetal Medicine consultation to be considered:

- Karyotyping
- Serological screening for congenital cytomegalovirus (CMV) and toxoplasmosis
- Uterine Artery Doppler

13. Growth restriction identified in pregnancy

- When a fetal growth disorder is suspected or diagnosed an assessment of fetal wellbeing should be made to include a discussion regarding fetal movements and a cCTG where there are any concerns. A maternal assessment should be made to include a blood pressure and proteinuria assessment

- For investigations, surveillance and management plan and the optimal gestation for delivery in pregnancies with identified growth restriction follow flow chart Appendix B.

- Any CTG carried out for growth restriction or reduced fetal movement during pregnancy should be reviewed by a senior obstetrician (SpR 3-7 or higher).

- In case of fetal growth disorder, women in spontaneous labour should be counselled for early admission in labour ward for continuous FHR monitoring

14. Mode and timing of Delivery

See appendix B for pregnancies where fetal growth restriction is identified. For other growth disorders follow the links below.

Click here for IOL guideline
Click here for Fetal monitoring in labour guideline

15. Dual Processes during phasing out of CRIS / Implementing Viewpoint

Viewpoint will be implemented on the 24th of July 2023. Pregnancies where serial growth scans have commenced prior to this date need to remain on the CRIS reporting system for the remainder of the pregnancy. See in red specific guidance**.**

16. Monitoring Compliance and Effectiveness

Audits and Risk Management Meetings.

17. References

RCOG Green-top Guideline 31: The investigation and Management of the Small-for-Gestational-Age Fetus, Royal College of Obstetricians and Gynaecologists, 2013 (and peer reviewed document 2022)

Knight M, Tuffnell D, Kenyon S, Shakespeare J, Gray R, Kurinczuk JJ (Eds.) on behalf of MBRRACE-UK. Saving Lives, Improving Mothers' Care - Surveillance of maternal deaths in the UK 2011-13 and lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009-13. Oxford: National Perinatal Epidemiology Unit, University of Oxford 2015

Dan O'Connor et all. for NHS England, 2019; Saving Babies' Lives. A care bundle for reducing stillbirth. Version 2. NHS England.

NHS England and NHS Improvement; Saving Babies' lives care bundle version 3 June 2023

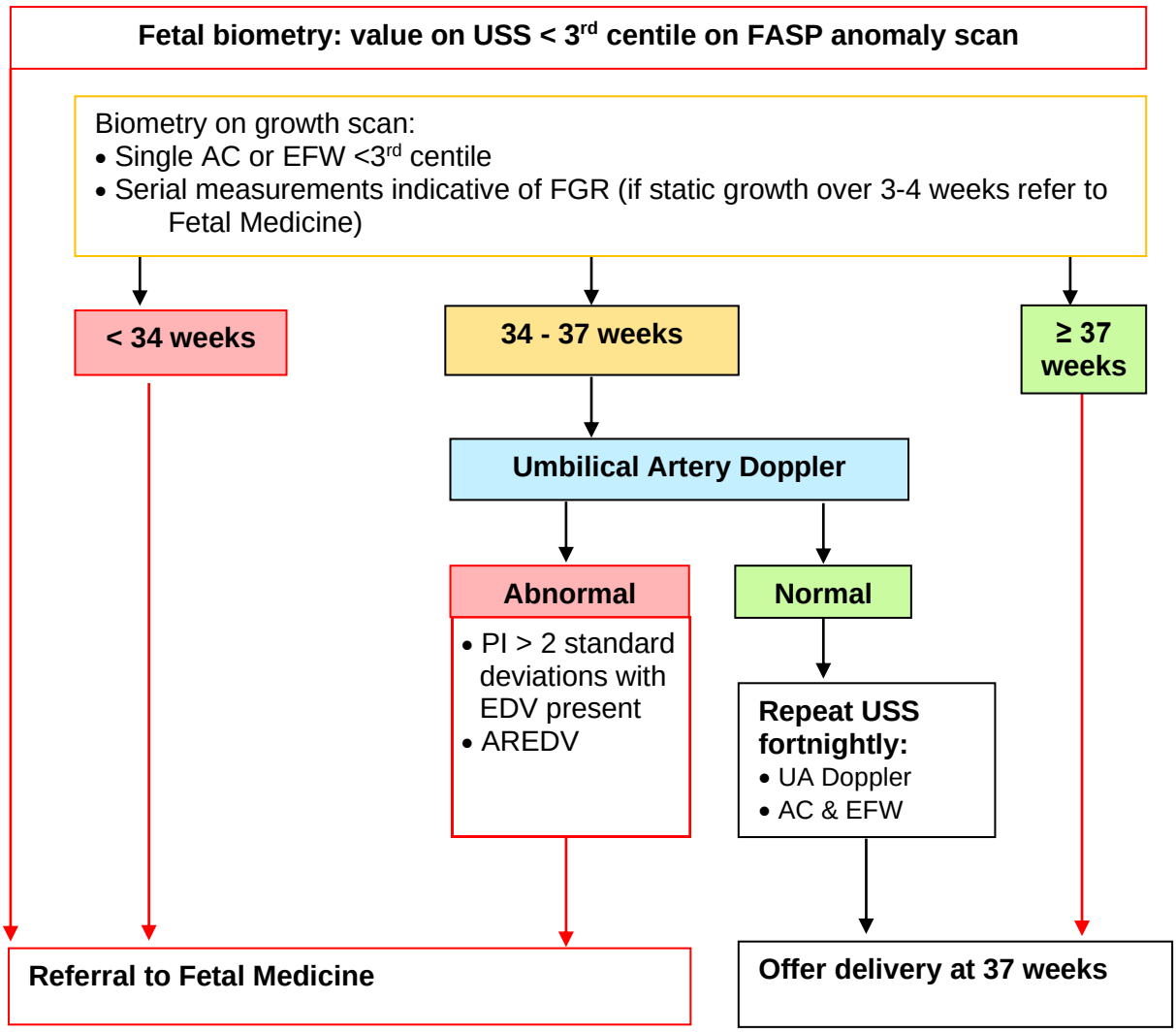
Appendix A

SGA Risk assessment (as per SGA guideline)			
Parity	Nulliparity	1	
	Pregnancy interval > 10 years	1	
	Pregnancy interval < 6 months	1	
Age	≤16 years	3	
	>35 years	1	
	≥40 years	3	
BMI	<18	1	
Lifestyle	Smoking	3	
	Extreme exercise regime / eating disorders	3	
	Substance or alcohol abuse	3	
Medical history	Diabetes	3	
	Chronic hypertension	3	
	Renal impairment	3	
	Autoimmune disorder (Antiphospholipid syndrome, SLE, ALS), thrombophilia	3	
	Solid tissue transplant	3	
	Cyanotic congenital heart disease	3	
	Connective tissue disease	3	
Previous obstetric	Pre-eclampsia	1	
	Severe, early onset pre-eclampsia prior to 34 weeks	3	
	Previous stillbirth	3	
	Previous SGA baby <10th centile / IUGR	3	
	Recurrent miscarriage (3 consecutive medically confirmed < 16 weeks or any ≥ 16 weeks)	3	
	Placental abruption	1	
Current obstetric	Mild PET <30 weeks (normal blood results, asymptomatic, no fetal concerns)	1	
	Severe PIH or Pre-eclampsia	3	
	PAPP-A <0.4 MOM in 1st trimester	3	
	Fetal echogenic bowel or 2-vessel cord	3	
	Heavy bleeding 1st trimester, unexplained APH or placental haematoma on US	3	
Total	**SGA cumulative risk**		

CLC booking for fetal growth surveillance management plan if:

- **SGA cumulative risk ≥ 3**
- **Factors identified that may affect SFH accuracy (e.g. BMI ≥ 35, h/o fibroids)**

MANAGEMENT OF FGR FETUS



	Intergrowth - Boy		Intergrowth - Girl	
	3rd	10th	3rd	10th
35	1700	1950	1710	1920
35+1	1740	1990	1740	1960
35+2	1770	2020	1770	1990
35+3	1800	2050	1800	2020
35+4	1830	2090	1830	2050
35+5	1870	2120	1860	2080
35+6	1900	2150	1890	2110
36	1930	2180	1920	2140
36+1	1960	2210	1950	2170
36+2	1990	2240	1980	2200
36+3	2020	2270	2000	2230
36+4	2050	2300	2030	2250
36+5	2080	2330	2060	2280
36+6	2110	2360	2080	2310
37	**2130**	**2380**	**2110**	**2330**
37+1	2160	2410	2140	2360
37+2	2190	2440	2160	2380
37+3	2220	2470	2180	2410
37+4	2240	2490	2210	2430
37+5	2270	2520	2230	2460
37+6	2290	2540	2250	2480
38	**2320**	**2570**	**2280**	**2500**
38+1	2340	2590	2300	2530
38+2	2370	2620	2320	2550
38+3	2390	2640	2340	2570
38+4	2420	2670	2360	2590
38+5	2440	2690	2380	2610
38+6	2460	2710	2400	2630

39	**2490**	**2730**	**2420**	**2650**
39+1	2510	2760	2440	2670
39+2	2530	2780	2460	2690
39+3	2550	2800	2480	2710
39+4	2570	2820	2500	2730
39+5	2590	2840	2510	2740
39+6	2610	2860	2530	2760
40	**2630**	**2880**	**2550**	**2780**
40+1	2650	2900	2560	2800
40+2	2670	2920	2580	2810
40+3	2690	2940	2600	2830
40+4	2710	2960	2610	2840
40+5	2730	2980	2630	2860
40+6	2750	2990	2640	2870
41	**2760**	**3010**	**2650**	**2890**
41+1	2780	3030	2670	2900
41+2	2800	3050	2680	2910
41+3	2820	3060	2690	2930
41+4	2830	3080	2710	2940
41+5	2850	3090	2720	2950
41+6	2860	3110	2730	2960
42	**2880**	**3120**	**2740**	**2980**

Appendix D Overview of different growth disorders and levels of risk

Intermediate fetal growth monitoring pathway	Intensive fetal growth monitoring pathway
Risk factors for consideration	
• SGA risk (cumulative risk as per risk assessment tool 3 or more) but NOT considered for high risk pathway • Factors identified that may affect SFH accuracy but NOT considered for high risk pathway • Growth concerns in previous pregnancy necessitating delivery, especially prior to 39 weeks, with FGR as per definition in current pregnancy even if EFW/birth weight >10th centile	• Maternal medical conditions (chronic kidney disease, chronic hypertension, autoimmune disease (SLE, APLS), cyanotic congenital heart disease, solid tissue transplant, connective tissue disease) • Previous FGR (see definitions) • Previous severe early onset pre-eclampsia prior to 34 weeks • Previous SGA stillbirth • Low Papp-A <1st centile (0.2 MOM) • Echogenic bowel on anomaly scan • Two vessel cord • EFW < 10th centile on anomaly scan • Heavy bleeding 1st trimester or placental haematoma on USS • Seriously or critically unwell due to confirmed COVID19, requiring hospitalisation, during current pregnancy
Care pathway guidance	
• Aim for 3 growth scans in the 3rd trimester at 30, 34 and 38 weeks gestational age	• Aim to commence growth scans at 26-28 weeks • Aim to scan every 3-4 weeks until delivery
• Aim for scans to be a minimum of 3 weeks apart if there are no concerns to minimise false positive rates for diagnosing FGR • If a scan is considered less than 3 weeks following a growth scan, a consultant opinion is warranted	
Reduced growth velocity	
• A drop in growth velocity (EFW or AC) of more than 20 percentiles should prompt a repeat ultrasound scan for biometry in 2 weeks. For those on CRIS, use WHO centiles tables. Drop of EFW of 20 centiles is comparable to approximate growth of 280 grams over 14 days (20 gram per day average) from 34 weeks gestation.	
To manage as suspected fetal growth restriction until further assessment made	
• A drop in growth velocity (EFW or AC) of more than 2 quartiles (more than 50 percentiles); check full definitions for FGR • Static growth, defined as minimal change in fetal biometry over at least two weeks	
Case discussion with / referral to Fetal Maternal Medicine Centre team	

- Raised PI in presence of fetal growth disorder
- Biometric value or EFW on ultrasound <3rd centile including at FASP anomaly scan
- In case of FGR <34 weeks

Appendix E WHO centile charts

Gestational Age (Weeks)	Abdominal Circumference (mm) by Percentile								
	2.5	5	10	25	50	75	90	95	97.5
14	69	71	73	77	81	86	89	92	95
15	79	81	83	87	92	96	100	103	106
16	89	91	93	98	103	108	112	115	118
17	99	102	104	109	114	119	124	127	130
18	110	113	116	121	126	131	136	139	142
19	121	124	127	132	138	143	148	152	155
20	132	136	139	144	150	155	161	164	167
21	143	147	150	156	162	168	173	177	180
22	154	159	162	167	173	180	186	189	193
23	165	170	173	179	185	192	198	202	205
24	176	181	184	190	197	203	210	214	217
25	186	191	195	201	208	215	222	226	229
26	196	201	205	212	219	226	233	238	241
27	206	211	215	222	230	237	245	249	253
28	215	220	225	232	240	248	256	260	264
29	224	229	234	242	250	258	266	271	276
30	233	238	243	251	260	269	277	282	287
31	241	246	252	260	269	279	287	292	298
32	249	254	260	269	279	288	298	303	308
33	257	262	269	278	288	298	308	313	319
34	265	270	277	287	298	308	318	324	330
35	273	279	286	297	307	318	329	335	342
36	282	287	294	306	317	329	340	346	353
37	290	296	304	316	328	340	352	358	365
38	299	306	313	326	338	351	364	371	378
39	309	316	324	337	350	363	377	384	392
40	319	327	335	349	363	377	391	399	406

doi:10.1371/journal.pmed.1002220.t008

Gestational Age (Weeks)	Estimated Fetal Weight (g) by Percentile								
	2.5	5	10	25	50	75	90	95	97.5
14	70	73	78	83	90	98	104	109	113
15	89	93	99	106	114	124	132	138	144
16	113	117	124	133	144	155	166	174	181
17	141	146	155	166	179	193	207	217	225
18	174	181	192	206	222	239	255	268	278
19	214	223	235	252	272	292	313	328	340
20	260	271	286	307	330	355	380	399	413
21	314	327	345	370	398	428	458	481	497
22	375	392	412	443	476	512	548	575	595
23	445	465	489	525	565	608	650	682	705
24	523	548	576	618	665	715	765	803	830
25	611	641	673	723	778	836	894	938	970
26	707	743	780	838	902	971	1,038	1,087	1,125
27	813	855	898	964	1,039	1,118	1,196	1,251	1,295
28	929	977	1,026	1,102	1,189	1,279	1,368	1,429	1,481
29	1,053	1,108	1,165	1,251	1,350	1,453	1,554	1,622	1,682
30	1,185	1,247	1,313	1,410	1,523	1,640	1,753	1,828	1,897
31	1,326	1,394	1,470	1,579	1,707	1,838	1,964	2,046	2,126
32	1,473	1,548	1,635	1,757	1,901	2,047	2,187	2,276	2,367
33	1,626	1,708	1,807	1,942	2,103	2,266	2,419	2,516	2,619
34	1,785	1,872	1,985	2,134	2,312	2,492	2,659	2,764	2,880
35	1,948	2,038	2,167	2,330	2,527	2,723	2,904	3,018	3,148
36	2,113	2,205	2,352	2,531	2,745	2,959	3,153	3,277	3,422
37	2,280	2,372	2,537	2,733	2,966	3,195	3,403	3,538	3,697
38	2,446	2,536	2,723	2,935	3,186	3,432	3,652	3,799	3,973
39	2,612	2,696	2,905	3,135	3,403	3,664	3,897	4,058	4,247
40	2,775	2,849	3,084	3,333	3,617	3,892	4,135	4,312	4,515

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Documentation Control

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Version	Date	Author	Reason / amendments
1	Sept 2004	Dr J Ashworth Consultant Obstetrician	New
2	June 2016	Dr J Ashworth Consultant Obstetrician Dr M Khurshid Miss S Raouf – Consultant Obstetrician	Review
3	Oct 2018	Guidelines group – obstetric consultants	Early review following audit and QI
3.1	Jan 2019	C Meijer	Added new assessment tool as appendix
3.2	April 2020	UHDB Maternity	COVID19 Pandemic deviated guidance
3.3	October 2020	UHDB Maternity	Increase of scans in third trimester from 2 to 3
3.4	Jan 2021	UHDB Maternity	Aligned with UHDB maternity records and new electronic booking forms that are now aligned.
3.4.1	April 2021	UHDB Maternity	Guideline amended to omit content with site specificity
4	Jan 2022	UHDB Maternity	COVID amendment with guidance for growth scans and extending guidance related to time of delivery
4.1	November 2022	Cindy Meijer – Lead midwife guidelines and audit	Removed two-tiered smoking risk; all smoking in pregnancy considered at risk
4.2 4.3	May 2023 July	Miss S Dixit Consultant Obstetrician Miss S Raouf – ACD Cindy Meijer - RM; MRes	Added to consider serial growth if growth concerns in previous pregnancy necessitating delivery prior to 39 weeks. Terminology consistent with national guidance. Extended for full review by 12 months in view of expected RCOG guideline in November 2023 Added EFW at anomaly scan & amended for implementation of Viewpoint
4.4	August 2023	Cindy Meijer- RM; MRes	Added clear guidance during interim period of implementation of Viewpoint when there is a Dual Process in place when phasing out CRIS for reporting
Intended Recipients: All staff caring for pregnant women			
Training and Dissemination: Cascaded through senior midwives/doctors; Published on Intranet; NHS mail circulation. Article in Business Unit newsletter			
To be read in conjunction with:			
Consultation with:	ACD and guidelines group		
Business Unit sign off:	02/05/2023: V4.2 07/07/2023: V4.3 Maternity Guidelines Group: Miss S Rajendran – Chair 19/06/2023: V4.2 10/07/2023: V4.3 Maternity Governance Committee		

Notification Overview sent to TIER 3 Divisional Quality Governance Operations & Performance: V4.2: 20/06/2023 V4.3: 18/07/2023 V4.4 acceptional sign off my CD R Devraj, HOM N Stringer; DD S Whale	
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