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Screening and Management of the Small for Gestational Age Fetus in the UK: A Survey of Practice

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BACKGROUND

Antenatal detection of the small for gestational (SGA) fetus has become an important indicator of quality of antenatal care in the UK. This has been driven by a desire to reduce stillbirth in this at risk group.

METHODS

We conducted a postal survey of 187 NHS consultant units within the UK to determine what the current practice for the detection and subsequent management of the suspected SGA fetus was following the guidance from the Royal College of Obstetricians and Gynaecologists (RCOG) in 2013.

RESULTS

The survey was performed in 3 rounds between 2016 and 2017 with a response rate of 65%. 85% of units assessed risk factors for SGA at booking. 81% of units used a customized symphysis fundal height (SFH) chart to screen for SGA with 95% of them using a cut off of <10th centile to refer for ultrasound assessment.

When ultrasound is used to detect SGA, 80% of units used estimated fetal weight (EFW), with 89% of these using a cut off of <10th centile to diagnose SGA. Umbilical artery (UA) Doppler monitoring was undertaken in 97% of management and 94% delivered after 37 weeks.

Only 24% of units had a dedicated fetal growth clinic, whilst 48% of units were able to offer computerised CTG to monitor the SGA fetus.

CONCLUSIONS

Overall there is consistency in the screening methods for SGA (customised SFH charts) and identification of suspected SGA (SFH <10th centile, EFW <10th centile, UA monitoring and induction of labour at term). There was a low uptake of computerized CTG to monitor SGA babies and a low number of specialised fetal growth clinics.

Introduction

There has been growing interest in identifying the small for gestational age (SGA) fetus over recent years within the UK with new developments in screening for the SGA fetus (1, 2), due to greater awareness of the association between a low birth weight and stillbirth. The stillbirth rate within the United Kingdom (UK) remains one of the highest in industrialised countries (3.87 per 1000 births) (3) but remains uncommon at term (2.0 per 1000 births) (4). To date, reducing the incidence of stillbirth remains problematic (5, 6).

Historically, strategies to prevent stillbirth have focussed on risk factors identifiable in early pregnancy (7-14). However, risk factors alone predict less than 20% of all stillbirths (14). In 39% of stillbirths the cause remains unknown, although 1/3 were likely to be growth restricted (14).

The SGA fetus is at increased risk of stillbirth (7, 8, 15), neonatal adverse outcome (16) with potential life-long health risks (17, 18). Therefore, the focus of stillbirth prevention has moved to more easily identified group of SGA fetuses in the hope that actively managing these pregnancies will reduce the stillbirth rate.

Unfortunately, our tools to identify the SGA fetus are not as reliable as we would wish. The standard approach advocated for all pregnant women in the UK by The National Institute for Health and Care Excellence (NICE) relies upon serial measurement of the maternal abdomen with a tape measure from 24 weeks to generate the symphysial fundal height (SFH) (19). SGA is suspected when SFH measurement is <10th centile or there is static growth over two measurements. SFH measurement in isolation has a sensitivity of just 30-40% (1, 20) and no randomised controlled studies of the effectiveness of customised SFH charts (21).

When there is a reduced SFH measurement, referral for ultrasound assessment of fetal growth is recommended. If estimated fetal weight (EFW) is <10th centile for gestation a diagnosis of a SGA fetus can be made (9, 22, 23). However, antenatal detection of SGA with ultrasound is

limited with up to 41% of SGA fetuses remaining undiagnosed and a false positive rate of up to 20% (24). The countries that have instigated routine third trimester ultrasound screening for SGA, either as a national policy or research, have not demonstrated significantly better detection rates (13).

The Royal College of Obstetricians and Gynaecologists (RCOG) has produced guidance for the management of the SGA fetus (23) but acknowledges that the most appropriate regimen for surveillance remains unclear (25). The RCOG recommends that the SGA fetus should have growth assessed with ultrasound every 2 weeks with additional fetal blood flow (Doppler) assessment. Timing of delivery should be based upon deterioration in growth or fetoplacental Doppler (<37 weeks) or when the pregnancy exceeds 37+0 weeks even if all other factors are normal (23).

Interestingly, not all national guidelines are as prescriptive (26). Canadian (27) guidance suggests close monitoring of fetal condition with ultrasound after 37 weeks but with no defined time to deliver. Irish (28), United States of America (26) and New Zealand guidelines (29) are also more conservative, suggesting that in the presence of normal Doppler studies the SGA fetus can be left until 38-39 (Ireland and USA) or 40 weeks (New Zealand).

Much of the evidence for lack of harm from delaying delivery comes from the DIGITAT study, which showed no adverse effects from induction of labour vs delayed delivery (30). This has been interpreted by some as evidence in favour of delivering earlier, because of continued risk of stillbirth, although this study was underpowered to make a judgement regarding perinatal mortality or severe morbidity. Recently, some objections to 'routine' early delivery for SGA in the absence of any abnormal clinical findings have been raised. In a recent UK study delivery was deferred until 40 weeks if fetal assessment was normal (31).

This increased intervention and delivery of SGA fetuses at a late preterm or early term gestation, whilst well intentioned, is not without potential risks. There is a substantial body of evidence that being born <39 weeks has an impact upon a child's later academic achievement

(32-35). SGA fetuses born at term have a cerebral palsy risk 5-7 times greater than normal birth weight babies (36, 37), although the possible influence of earlier delivery on this outcome remains unknown.

The desire to reduce stillbirth at the population level is powerful but currently leads to substantial and costly interventions for a large number of women which impacts upon women's choice and increases the burden on the health care system. It is worth highlighting that for most women individualised risk of stillbirth, even with suspected SGA baby, remains low. New innovative strategies are being developed but their impact is uncertain at present (Saving Babies Lives Care Bundle) (38).

We designed this survey to ascertain the current provision of SGA screening and management of these pregnancies following the introduction of guidance from the Royal College of Obstetricians and Gynaecologists (RCOG) in 2013.

Methods

A postal survey was conducted in line with our previous surveys (39, 40). The survey was sent to all consultant led NHS hospitals in the UK (England, Wales, Scotland, Northern Ireland, Channel Islands and Isle of Man). The first round was sent in March 2017, followed by a second round in July 2017 to those who had not responded to the initial survey. The survey consisted of sixteen questions (5 on screening and 11 on management) to explore the local approaches to screening and identification of pregnancies at risk of SGA (Appendix One). Further questions were designed to assess the management pathways in place for SGA pregnancies and what if any intervention was offered for antenatal and intrapartum care.

Results

210 NHS consultant units were identified, 23 were excluded, as they no longer provided obstetric services or had merged leaving 187 eligible trusts. 122 units responded to the survey, achieving an overall response rate of 65% (122/187). Of the 122 responders, 20 units (16%) reported a delivery rate of <2500 births, 61 (50%) a rate of 2500-5000 births and 41 units (34%) a rate of >5000 births.

Clinical Risk Assessment

103 trusts (85%) offered clinical risk assessment for SGA at booking (Table One). 62 (51%) units offered aspirin for pregnancies deemed high risk for SGA. A further 55 (45%) units only prescribed aspirin if there was a history of pre-eclampsia and not for SGA risk factors only.

Screening for SGA

Nearly all units used customised fetal growth charts (20) to screen pregnancies for SGA (99, 81%). The rest used either population charts (19, 16%), such as the WHO population chart (4, 3%), or newer charts such as the IG21 chart (2). Out of 122 units that use SFH, 107 (88%) informed us that they used a SFH measurement below a predetermined centile to determine the need for assessment with ultrasound. The remaining 15 (12%) units gave no information.

Only 58/107 (54%) specified the cut-off for referral; 55 (95%) units used a SFH <10th centile as a threshold, one used the 5th centile (2%) and two used the 3rd centile (3%), 102 units (84%) use a static growth reading over two measurements as an indication for referral.

98 units (80%) use ultrasound measurement of EFW to define whether a fetus is SGA. The commonest EFW centile for diagnosis of SGA was <10th (74/83, 89%), <5th (8/83, 10%) and <3rd (1/83, 1%). 46 responders (38%) used an AC, either alone or in combination with EFW, to define SGA with the majority using an AC <10th (25/36, 69%), <5th (7/36, 19%) and <3rd (4/36, 11%) centiles. Other markers of concern expressed by responders included static growth between measurements (72, 59%).

Management of suspected SGA

29 trusts (24%) offered an assessment in a dedicated fetal growth clinic. The majority of these clinics are led by a consultant obstetrician (27, 93%), of whom half (13, 48%) were sub-specialists in maternal and fetal medicine. A further 2 fetal growth clinics were midwife led (7%) (Table Two).

Doppler ultrasound assessment used to monitor SGA included; umbilical artery (UA) (117, 97%), middle cerebral artery (MCA) (59, 49%), DV (40, 33%), uterine artery (UtA) Doppler (27, 22%) and cerebroplacental ratio (CPR). Some units also used biophysical profile (BPP) (12, 10%) and liquor volume assessment (9, 7%) (Table Three). 73 responders (60%) did not offer additional investigations for SGA cases unless other features of concern were present.

A number of units offer further investigations with maternal blood infection screening (39, 32%), amniocentesis (genetics) (30, 25%), non-invasive prenatal testing (9, 7%) and amniocentesis (infection) (1, <1%). Further referral to a fetal medicine specialist was made in 4 units (3%).

Management of SGA with normal Doppler

We asked a series of questions about the management of the SGA fetus with normal Doppler studies to determine standard practice. The frequency of follow up scans varied from weekly (27, 22%), fortnightly (83, 69%), to every 3 weeks (5, 4%) or on a case-by-case basis (5, 4%).

In the presence of SGA with normal Doppler studies, most units did not perform CTG unless there were other concerns like decreased fetal movements (79, 67%). Some units did routinely offer CTG assessment for SGA pregnancies; either weekly (9, 7%), twice weekly (28 24%) or timed with scans (2, 2%). Short-term variability (STV) quantification was available on computerised CTG in 63 units (53%), but was only used to inform SGA management in 57 (48%) units.

Many trusts routinely offered induction of labour delivery following the diagnosis of SGA with normal Dopplers, at the following gestational ages; 36-37 weeks (7, 6%), 37-38 weeks (76, 62%), 38-39 weeks (18, 15%), 39-40 weeks (9, 7%) or >40 weeks (3, 2%) (Table Four). The mean induction rates for responding units in 2012 was 24% (IQR 20-29) and in 2016 was 30% (IQR 25-34). 76 units (70%) reported that in their opinion SGA surveillance had been in part responsible for an increase in inductions in their units, whilst 32 trusts (30%) did not feel this to be the case.

Birth weight centile was determined using customised growth charts, such as GROW, in 89 (75%) trusts, 28 (24%) used traditional population charts, such as the WHO chart, and only one trust (1%) used newer population charts, such as IG21.

Discussion

This is the first survey to assess the real life impact of national guidance on the screening and management of SGA pregnancies. Surveys are subject to potential bias, as the responses may not reflect the actual practice. We have been, therefore, cautious not to over interpret the results presented but do feel that they give an insight in the local implementation of national guidance within a state funded health care system which should in theory allow for the approach to management to be more consistent. Our data show that, there are many aspects of care that are consistently provided, such as SGA screening with customised SFH charts with planned delivery at term. However, wide variations in some practices remain.

Half of all units used aspirin to reduce the risk of SGA. With this number rising to >90% if risk factors for preeclampsia were also included. However, we did not critique each individual unit's risk factor screening criteria. Since this survey has been performed new evidence has emerged on the benefits of a higher dose of 150mg of aspirin taken at night to prevent preterm preeclampsia (41). We feel that it is likely that many units will begin to use this dose

to prevent SGA as well but we were not able to address this question at the time of surveying.

The majority of units used SFH <10th centile as a screening tool for SGA followed by ultrasound assessment using EFW <10th centile to confirm the diagnosis of SGA. The almost universal use of UA Doppler once SGA is diagnosed is reassuring. It is also reassuring to note the general consistency of a 2 weekly follow up for SGA fetuses with normal Doppler as suggested by the RCOG. Our survey highlighted that only 48% of units had regular access to computerised CTG with STV to monitor SGA foetuses, despite this being a recommendation for surveillance of SGA pregnancies in combination with ultrasound. This recommendation is based upon evidence of metabolic acidaemia and early neonatal death when the STV is <3.0ms (42).

Whilst the majority of units conform to the RCOG guidance to deliver from 37 weeks, some units are clearly bolder, deferring delivery for SGA with normal Doppler to as late as 41 weeks. This may be, at first view concerning, however, it is relevant to note that other countries' national guidelines advocate a more nuanced approach to timing of delivery as discussed earlier. In addition, at present, there is no definitive evidence that a policy of early induction materially affects the stillbirth rate overall. The balance therefore is between number of interventions or inductions performed in a population of women with an SGA fetus versus the potential to reduce stillbirth.

There has been a general increase in inductions of labour across the UK since the year prior to the GTG on SGA and the year prior to this survey. There are many reasons why the induction rate may have increased over this time, including increased awareness of other potential risks for stillbirth such as reduced fetal movements and a greater awareness amongst clinicians and woman that induction is unlikely to increase the risk of caesarean section (43).

Conclusion

It is reassuring to note the commonality in many aspects of SGA screening and management. However, there are still many inconsistencies, which raise concerns about the effect of national guidance to reduce stillbirth. This may reflect a difficulty to follow guidance when it relies heavily upon the use of ultrasound and trained sonographers for which in the UK there is a national shortage (44).

The findings of this survey suggest that there is an urgent need for more high quality studies on a standardised approach to the management of the SGA fetus, particularly if the goal is to identify the subset of SGA fetuses that is at highest risk of mortality and morbidity.

It is possible that future advance in management may come from non-ultrasound based screening or prognostic tools, such as biomarkers of placental function, the most likely of which to be available being sFlt-1 and PlGF, although these remain research tools at present.

Whilst the response to the survey varied by unit size we feel that it provides a fair reflection of the size of maternity units within the UK and as such can be considered representative. We would also suggest that the low number of specialist fetal growth clinics may make standardisation of care within and between organisations more difficult and could be considered a goal for clinical service development.

Contribution to authorship

AS conceived the idea. AS and CD performed the survey and analysed the data. UA and ZA reviewed and provided internal critique of the manuscript.

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Ethics

This was a survey of practice and contained no patient identifiable data and therefore did not require ethical review

Declaration

None of the authors report a conflict of interests

References

1. Gardosi J, Mongelli M, Wilcox M, Chang A. An adjustable fetal weight standard. Ultrasound Obstet Gynecol. 1995;6(3):168-74.
2. Papageorghiou AT, Ohuma EO, Altman DG, Todros T, Cheikh Ismail L, Lambert A, et al. International standards for fetal growth based on serial ultrasound measurements: the Fetal Growth Longitudinal Study of the INTERGROWTH-21st Project. Lancet. 2014;384(9946):869-79.
3. Flenady V, Koopmans L, Middleton P, Froen JF, Smith GC, Gibbons K, et al. Major risk factors for stillbirth in high-income countries: a systematic review and meta-analysis. Lancet. 2011;377(9774):1331-40.
4. Iliodromiti S, Mackay DF, Smith GC, Pell JP, Sattar N, Lawlor DA, et al. Customised and Noncustomised Birth Weight Centiles and Prediction of Stillbirth and Infant Mortality and Morbidity: A Cohort Study of 979,912 Term Singleton Pregnancies in Scotland. PLoS Med. 2017;14(1):e1002228.
5. Froen JF, Friberg IK, Lawn JE, Bhutta ZA, Pattinson RC, Allanson ER, et al. Stillbirths: progress and unfinished business. Lancet. 2016;387(10018):574-86.
6. RCOG. Each Baby Counts: Key Messages from 2015. In: RCOG, editor. London2016.
7. Froen JF, Gardosi J, Thurmann A, Francis A, Stray-Pedersen B. Restricted fetal growth in sudden intrauterine unexplained death. Acta Obstet Gynecol Scand. 2004;83(9):801-7.
8. Gardosi J, Kady SM, McGeown P, Francis A, Tonks A. Classification of stillbirth by relevant condition at death (ReCoDe): population based cohort study. BMJ. 2005;331(7525):1113-7.
9. Bukowski R, Hansen NI, Willinger M, Reddy UM, Parker CB, Pinar H, et al. Fetal growth and risk of stillbirth: a population-based case-control study. PLoS Med. 2014;11(4):e1001633.
10. Yerlikaya G, Akolekar R, McPherson K, Syngelaki A, Nicolaides KH. Prediction of stillbirth from maternal demographic and pregnancy characteristics. Ultrasound Obstet Gynecol. 2016.
11. Waldenstrom U, Cnattingius S, Norman M, Schytt E. Advanced Maternal Age and Stillbirth Risk in Nulliparous and Parous Women. Obstet Gynecol. 2015;126(2):355-62.
12. Wikstrom AK, Stephansson O, Cnattingius S. Previous preeclampsia and risks of adverse outcomes in subsequent nonpreeclamptic pregnancies. Am J Obstet Gynecol. 2011;204(2):148 e1-6.
13. Sovio U, White IR, Dacey A, Pasupathy D, Smith GC. 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.
14. Stillbirth Collaborative Research Network Writing G. Association between stillbirth and risk factors known at pregnancy confirmation. JAMA. 2011;306(22):2469-79.

15. Heazell AE, Li M, Budd J, Thompson JM, Stacey T, Cronin RS, et al. Association between maternal sleep practices and late stillbirth – findings from a stillbirth case-control study. BJOG. 2017.
16. Baschat AA, Cosmi E, Bilardo CM, Wolf H, Berg C, Rigano S, et al. Predictors of neonatal outcome in early-onset placental dysfunction. Obstet Gynecol. 2007;109(2 Pt 1):253-61.
17. Lienhardt A, carel J, Preux P, Coutant R, Chaussain J. Amplitude of pubertal growth in short stature children with intrauterine growth retardation. Horm Res. 2002;57(Suppl 2):88-94.
18. Stein C, Fall C, Kumaran K, Osmond C, Cox V, Barker D. Fetal growth and coronary heart disease in south india. Lancet. 1996;348(9037):1269-73.
19. NICE. Antenatal care: Routine care for the healthy pregnant woman. London: National Institute of Health and Clinical Excellence; 2008.
20. Gardosi J, Francis A. Controlled trial of fundal height measurement plotted on customised antenatal growth charts. BJOG. 1999;106(4):309-17.
21. Carberry AE, Gordon A, Bond DM, Hyett J, Raynes-Greenow CH, Jeffery HE. Customised versus population-based growth charts as a screening tool for detecting small for gestational age infants in low-risk pregnant women. Cochrane Database Syst Rev. 2014;5:CD008549.
22. Poon LC, Tan MY, Yerlikaya G, Syngelaki A, Nicolaides KH. Birthweight in live births and stillbirths. Ultrasound Obstet Gynecol. 2016.
23. RCOG. The investigation and management of the small-for-gestational-age fetus. Green-top guideline No31. 2013.
24. Poljak B, Agarwal U, Jackson R, Alfirevic Z, Sharp A. Diagnostic accuracy of individual antenatal tools for prediction of small-for-gestational age at birth. Ultrasound Obstet Gynecol. 2017;49(4):493-9.
25. Grivell RM, Wong L, Bhatia V. Regimens of fetal surveillance for impaired fetal growth. Cochrane Database Syst Rev. 2012;6:CD007113.
26. McCowan LM, Figueras F, Anderson NH. Evidence-based national guidelines for the management of suspected fetal growth restriction: comparison, consensus, and controversy. Am J Obstet Gynecol. 2018;218(2S):S855-S68.
27. Lausman A, Kingdom J, Maternal Fetal Medicine C. Intrauterine growth restriction: screening, diagnosis, and management. J Obstet Gynaecol Can. 2013;35(8):741-8.
28. Clinical Practice Guideline: Fetal Growth Restriction - Recognition, Diagnosis & Management. In: Institute of Obstetricians and Gynaecologists RCoPoIaDoCSaP, Health Service Executive, editor. 2017.
29. McCowan L, Bloomfield F. Guideline for the Management of Suspected Small for Gestational Age Singleton Pregnancies After 34 weeks Gestation. In: Network NZMaFM, editor. New Zealand2013.
30. Boers KE, Vijgen SM, Bijlenga D, van der Post JA, Bekedam DJ, Kwee A, et al. Induction versus expectant monitoring for intrauterine growth restriction at term: randomised equivalence trial (DIGITAT). BMJ. 2010;341:c7087.
31. Veglia M, Cavallaro A, Papageorghiou A, Black R, Impey L. Small for Gestational Age Babies After 37 Weeks: An Impact Study of a Risk Stratification Protocol. Ultrasound Obstet Gynecol. 2017.
32. MacKay DF, Smith GC, Dobbie R, Pell JP. Gestational age at delivery and special educational need: retrospective cohort study of 407,503 schoolchildren. PLoS Med. 2010;7(6):e1000289.
33. Rose O, Blanco E, Martinez SM, Sim EK, Castillo M, Lozoff B, et al. Developmental scores at 1 year with increasing gestational age, 37-41 weeks. Pediatrics. 2013;131(5):e1475-81.
34. Chan E, Quigley MA. School performance at age 7 years in late preterm and early term birth: a cohort study. Arch Dis Child Fetal Neonatal Ed. 2014;99(6):F451-7.
35. Savchev S, Sanz-Cortes M, Cruz-Martinez R, Arranz A, Botet F, Gratacos E, et al. Neurodevelopmental outcome of full-term small-for-gestational-age infants with normal placental function. Ultrasound Obstet Gynecol. 2013;42(2):201-6.
36. Jacobsson B, Ahlin K, Francis A, Hagberg G, Hagberg H, Gardosi J. Cerebral palsy and restricted growth status at birth: population-based case-control study. BJOG. 2008;115(10):1250-5.

37. Himmelmann K, Ahlin K, Jacobsson B, Cans C, Thorsen P. Risk factors for cerebral palsy in children born at term. Acta Obstet Gynecol Scand. 2011;90(10):1070-81.
38. Widdows K, Roberts SA, Camacho EM, AEP H. Evaluation of the implementation of the Saving Babies' Lives Care Bundle in early adopter NHS Trusts in England. Manchester, UK: University of Manchester; 2018.
39. Sharp AN, Alfirevic Z. Provision and practice of specialist preterm labour clinics: a UK survey of practice. BJOG. 2014;121(4):417-21.
40. Sharp AN, Stock SJ, Alfirevic Z. Outpatient induction of labour in the UK: a survey of practice. Eur J Obstet Gynecol Reprod Biol. 2016;204:21-3.
41. Poon LC, Wright D, Rolnik DL, Syngelaki A, Delgado JL, Tsokaki T, et al. Aspirin for Evidence-Based Preeclampsia Prevention trial: effect of aspirin in prevention of preterm preeclampsia in subgroups of women according to their characteristics and medical and obstetrical history. Am J Obstet Gynecol. 2017;217(5):585 e1- e5.
42. Turan S, Turan OM, Berg C, Moyano D, Bhide A, Bower S, et al. Computerized fetal heart rate analysis, Doppler ultrasound and biophysical profile score in the prediction of acid-base status of growth-restricted fetuses. Ultrasound Obstet Gynecol. 2007;30(5):750-6.
43. Middleton P, Shepherd E, Crowther CA. Induction of labour for improving birth outcomes for women at or beyond term. Cochrane Database Syst Rev. 2018;5:CD004945.
44. Intelligence CfW. Securing the future workforce supply: Sonography workforce review: www.cfwi.org.uk 2017 [Available from: https://www.bmus.org/static/uploads/resources/Sonography_workforce_review.pdf.

Table 1. Screening processes for SGA fetuses in UK obstetric clinics.

Screening for SGA risk factors at booking	***N* = 121**
Yes	103 (85%)
No	18 (15%)
Aspirin for high risk of SGA	***N* = 121**
Yes	62 (51%)
Yes but only if history of pre-eclampsia	55 (45%)
No	4 (3%)
SFH chart used	***N* = 122**
Customised growth chart (i.e. GROW)	99 (81%)
Traditional population chart (i.e. WHO chart)	19 (16%)
Newer population chart (i.e. IG21 chart)	4 (3%)
SFH criteria for referral for USS (non-exclusive)	***N* = 122**
SFH below a defined centile	107 (88%)
$<10^{th}$	55/58 (95%)
$<5^{th}$	1/58 (2%)
$<3^{rd}$	2/58 (3%)
Static growth over two measurements	102 (84%)

Table 2. Diagnostic criteria for ultrasound (non-exclusive) and referral.

EFW below a predetermined centile:	***N* = 98/122 (80%)**
10^{th}	74/83 (89%)
5^{th}	8/83 (10%)
3^{rd}	1/83 (1%)
AC below a predetermined centile:	***N* = 46/122 (38%)**
10^{th}	25/36 (69%)
5^{th}	7/36 (19%)
3^{rd}	4/36 (11%)
Static Growth over two measurements	***N* = 122** 72 (59%)
Dedicated fetal growth clinic	***N* = 122**
Yes	29 (24%)
No	93 (76%)

Table 3. Surveillance and investigation of SGA fetuses.

Ultrasound parameters for SGA surveillance (non-exclusive)	***N* = 121**
Umbilical artery (UA) Doppler	117 (97%)
Middle cerebral artery (MCA) Doppler	59 (49%)
Ductus venosus (DV) Doppler	40 (33%)
Uterine artery (UtA) Doppler	27 (22%)
Cerebro-placental ratio (CPR)	24 (20%)
Biophysical profile (BPP)	12 (10%)
Liquor volume (LV)	9 (7%)
Additional investigations (non-exclusive)	***N* = 121**
None unless other features	73 (60%)
Screening for infections (maternal blood)	39 (32%)
Amniocentesis (genetics)	30 (25%)
Non-invasive prenatal testing (NIPT)	9 (7%)
Fetal medicine specialist review	4 (3%)
Screening for infections (amniocentesis)	1 (<1%)
Frequency of ultrasound assessment on SGA fetuses with normal Dopplers	***N* = 120**
Weekly	27 (22%)
Every 2 weeks	83 (69%)
Every 3 weeks	5 (4%)
Each case decided on its merits	5 (4%)
CTG monitoring	***N* = 118**
Weekly	9 (7%)
Twice weekly	28 (24%)
With scans	2 (2%)
Only if other factors (e.g. reduced fetal movements)	79 (67%)
Monitoring with short term variability (STV) on cCTG	***N* = 119**
Available and used routinely	57 (48%)
Available but not used routinely	6 (5%)
Not available	56 (47%)

Table 4. Intrapartum management of the SGA fetus

Gestation for delivery of SGA fetus with normal Dopplers	***N* = 122**
36-37 weeks	7 (6%)
37-38 weeks	76 (62%)
38-39 weeks	18 (15%)
39-40 weeks	9 (7%)
40+ weeks	3 (2%)
Induction rates per year **Mean (IQR)**	
2012	24% (24, 29)
2016	30% (25, 34)
Birthweight assessment	***N* = 122**
Customised charts e.g. GROW	89 (75%)
Population centile e.g. WHO	28 (24%)
New population centile e.g. IG21	1 (1%)