

**A regional audit for the detection of
Small-for-Gestational-Age (SGA) babies within
the Thames Valley area**

OAHSN 13th July 2016

<p>Oxford University Hospitals  NHS Trust</p> <p>Oxford  Academic Health Science Network</p> <p> UNIVERSITY OF OXFORD</p>		<p>Milton Keynes University Hospital  NHS Foundation Trust</p> <p>Yosuke Matsumiya Grainne Millwood Nidhi Singh</p>
<p>Lawrence Impey Clara Serrecchia Raffaele Napolitano</p>	<p>Katherine Edwards Eric Ohuma Jane Hirst</p>	<p>Buckinghamshire Healthcare  NHS Trust</p> <p>Katherine Robertson Rebecca Davies Aparna Reddy</p>
<p>Great Western  Hospitals NHS Foundation Trust</p> <p>Colin Down Anita Sinha</p>	<p>Royal Berkshire  NHS Foundation Trust</p> <p>Stelios Myriknas Alex Grammatis Mark Sellinger</p>	<p>Frimley Health  NHS Foundation Trust</p> <p>Charlotte Benson Caitlin Scott Pampa Sarkar</p>

intergrowth21.ndog.ox.ac.uk

Which of these are previous SGAs? Centiles

- 41+2 Male 2.8kg
- 37+0 Female 2.4kg
- 36+5 Male 2.3kg
- 34+4 Female 2.0kg
- 3.02
- 13.6
- 14.38
- 22.07

Appendix I: Summary of Risk Factors for a Small-for-Gestational-Age Neonate.**Table A: Available from history at booking (usually prior to 12 weeks)**

Risk category	Definition of risk	Definition of outcome measure	Estimate measure	Point estimate and 95% CI
Maternal Risk Factors				
Age	Maternal age \geq 35 years ²²	BW < 10th centile population	OR	1.4 (1.1-1.8)
	Maternal age > 40 years^{22†}	BW < 10th centile population	OR	3.2 (1.9-5.4)
Parity	Nulliparity ²⁵	BW < 10th centile population*	OR	1.89 (1.82-1.96)
BMI	BMI < 20 ²⁸	BW < 10th centile customised	OR	1.2 (1.1-1.3)
	BMI 25-29.9 ²⁸	BW < 10th centile customised	RR	1.2 (1.1-1.3)
	BMI \geq 30 ²⁸	BW < 10th centile customised	RR	1.5 (1.3-1.7)
Maternal substance Exposure	Smoker ³²	BW < 10th centile customised	AOR	1.4 (1.2-1.7)
	Smoker 1-10 cigarettes per day ²⁹	BW < 9.9th centile population	OR	1.54 (1.39-1.7)
	Smoker \geq 11 cigarettes per day^{29†}	BW < 9.9th centile population	OR	2.21 (2.03-2.4)
	Cocaine^{38†}	BW < 10th centile population	OR	3.23 (2.43-4.3)
IVF	IVF singleton pregnancy ⁴¹	BW < 10th centile	OR	1.6 (1.3-2.0)
Exercise	Daily vigorous exercise^{32†}	BW < 10th centile customised	AOR	3.3 (1.5-7.2)
Diet	Low fruit intake pre-pregnancy ^{22‡}	BW < 10th centile customised	AOR	1.9 (1.3-2.8)
Previous Pregnancy History				
Previous SGA	Previous SGA baby^{8†}	BW < 10th centile customised	OR	3.9 (2.14-7.12)
Previous Stillbirth	Previous stillbirth^{8†}	BW < 10th centile customised	OR	6.4 (0.78-52.56)
Previous pre-eclampsia	Pre-eclampsia ⁹	BW < 10th centile population	AOR	1.31 (1.19-1.44)
Pregnancy Interval	Pregnancy interval < 6 months ³³	SGA not defined*	AOR	1.26 (1.18-1.33)
	Pregnancy interval \geq 6 months ³³	SGA not defined*	AOR	1.29 (1.2-1.39)

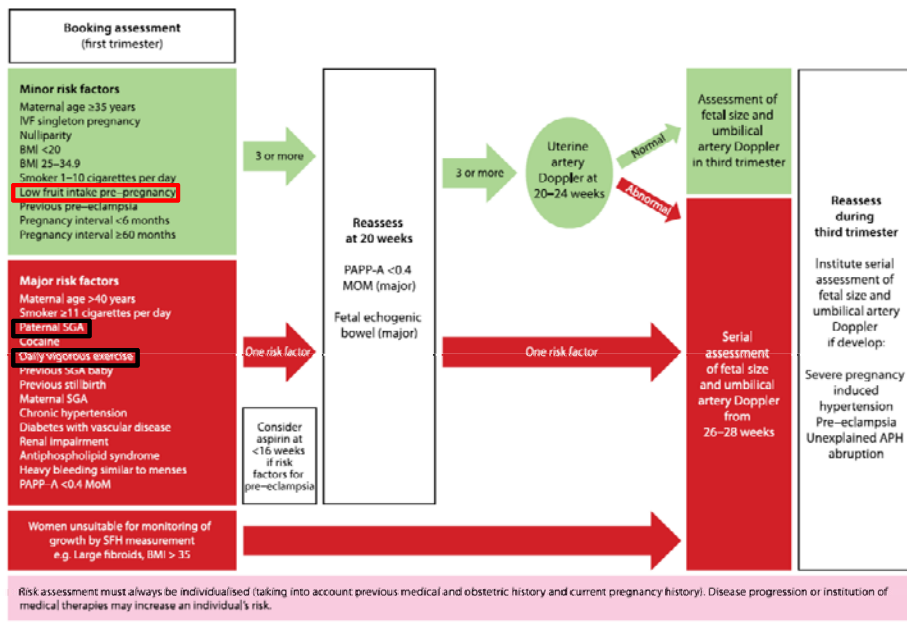
Background

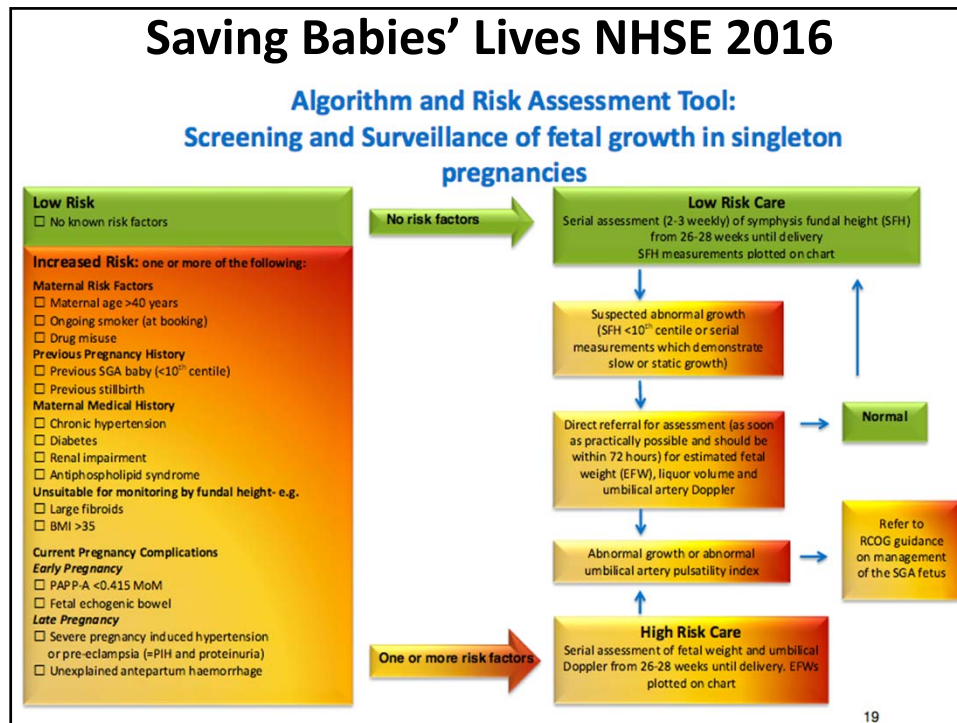
- SGA related to increased perinatal morbidity and mortality (RCOG GTG 31 2013)
- SGA accounts for approximately half of all stillbirths (*Smith TOG 2015, Gardosi et al BMJ 2013*)
- England stillbirth rate 4.7/1000 with 25% variation (*Saving Babies' Lives, NHSE 2016*)

Aims

- Detection rate of SGA babies
 - Current routine care detects 1/4 (*Smith TOG 2015*)
- How they were detected
- Neonatal outcomes
- Compare with RCOG guidelines

RCOG Greentop Guideline





Method and definitions

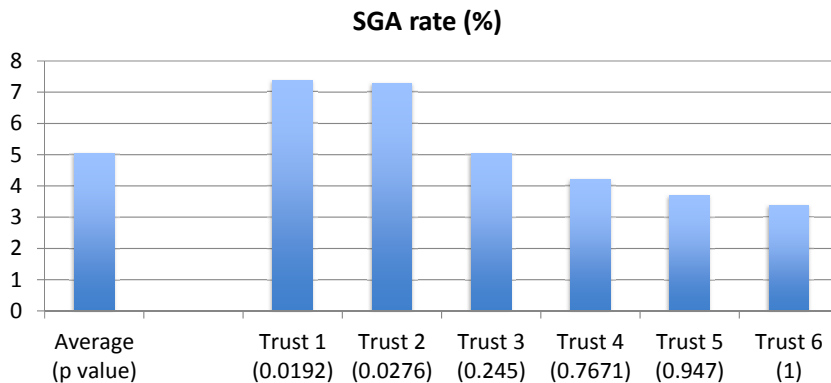
- Retrospective local and regional audit using same proforma across all Trusts
- All deliveries in March 2015
- SGA = birthweight less than 10th centile using INTERGROWTH-21st standard
- Gestation = after 33 weeks gestation
- Exclusion = multiple pregnancies or fetal abnormalities

Parameters

<p>Unit</p> <p>Audit number</p> <p>NHS number (mother)</p> <p>NHS number (baby)</p> <p>Data Collection sheet for each SGA baby</p> <p>Key details</p> <p>Date of del (state)</p> <p>Gestation at del (state)</p> <p>Birthweight (state)</p> <p>Centile use Intergrowth data</p> <p>Gender M F</p> <p>Mode del em CS ei CS SVD ID Breech</p> <p>Onset of labour spont IOL pre-labour cs</p> <p>If IOL or ELCS, why SGA SROM PET dates other (state)</p> <p>Detected antenatally Y N (if yes detected at what gestation)</p> <p>How first detected SFH (customised or not?) USS as high risk USS as PET other (state)</p> <p>Neonatal Outcome</p> <p>Apgars pH Admission to NNU?</p> <p>Antenatal details</p> <p>Age at delivery</p> <p>Parity</p> <p>Last scan before del (date) AC / EFW / AFI / MCA / UA (PI and/or RI)</p> <p>Number of extra USS</p>	<p>SGA Guideline risk factors</p> <table border="1"> <thead> <tr> <th></th> <th>Present</th> <th>Absent</th> <th>Not recorded</th> </tr> </thead> <tbody> <tr> <td colspan="4">Minor Risk factors</td> </tr> <tr><td>Mat age >=35</td><td></td><td></td><td></td></tr> <tr><td>IVF singleton</td><td></td><td></td><td></td></tr> <tr><td>Nulliparity</td><td></td><td></td><td></td></tr> <tr><td>BMI <20</td><td></td><td></td><td></td></tr> <tr><td>BMI 25-34.9</td><td></td><td></td><td></td></tr> <tr><td>Smoker 1-10/day</td><td></td><td></td><td></td></tr> <tr><td>Low fruit intake AN</td><td></td><td></td><td></td></tr> <tr><td>Prev Pre-eclampsia</td><td></td><td></td><td></td></tr> <tr><td>Last preg <6/12</td><td></td><td></td><td></td></tr> <tr><td>Last preg >60/12</td><td></td><td></td><td></td></tr> <tr> <td colspan="4">Major Risk Factors</td> </tr> <tr><td>Mat age >40</td><td></td><td></td><td></td></tr> <tr><td>Smoker >=11/day</td><td></td><td></td><td></td></tr> <tr><td>Paternal SGA</td><td></td><td></td><td></td></tr> <tr><td>Cocaine</td><td></td><td></td><td></td></tr> <tr><td>Daily vigorous exercise</td><td></td><td></td><td></td></tr> <tr><td>Prev SGA baby</td><td></td><td></td><td></td></tr> <tr><td>Prev still birth</td><td></td><td></td><td></td></tr> <tr><td>Mat SGA</td><td></td><td></td><td></td></tr> <tr><td>Chronic HTN</td><td></td><td></td><td></td></tr> <tr><td>Diabetes WITH vasc disease</td><td></td><td></td><td></td></tr> <tr><td>Renal impairment</td><td></td><td></td><td></td></tr> <tr><td>APL syndrome</td><td></td><td></td><td></td></tr> <tr><td>Heavy bleeding (similar to menses)</td><td></td><td></td><td></td></tr> <tr><td>PAPP-A<0.4 (please state figure)</td><td></td><td></td><td></td></tr> <tr><td>Echogenic bowel</td><td></td><td></td><td></td></tr> <tr><td>BMI >35 or large fibroids</td><td></td><td></td><td></td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th></th> <th>Indicated?</th> <th>Performed? +ve/-ve</th> </tr> </thead> <tbody> <tr> <td>Serial growth scans 28/40 (>=3 major RF)</td> <td></td> <td></td> </tr> <tr> <td>Uterine artery Doppler 20-24/40 (>=3 minor RF)</td> <td></td> <td>If performed, PI/RI value</td> </tr> </tbody> </table>		Present	Absent	Not recorded	Minor Risk factors				Mat age >=35				IVF singleton				Nulliparity				BMI <20				BMI 25-34.9				Smoker 1-10/day				Low fruit intake AN				Prev Pre-eclampsia				Last preg <6/12				Last preg >60/12				Major Risk Factors				Mat age >40				Smoker >=11/day				Paternal SGA				Cocaine				Daily vigorous exercise				Prev SGA baby				Prev still birth				Mat SGA				Chronic HTN				Diabetes WITH vasc disease				Renal impairment				APL syndrome				Heavy bleeding (similar to menses)				PAPP-A<0.4 (please state figure)				Echogenic bowel				BMI >35 or large fibroids					Indicated?	Performed? +ve/-ve	Serial growth scans 28/40 (>=3 major RF)			Uterine artery Doppler 20-24/40 (>=3 minor RF)		If performed, PI/RI value
	Present	Absent	Not recorded																																																																																																																											
Minor Risk factors																																																																																																																														
Mat age >=35																																																																																																																														
IVF singleton																																																																																																																														
Nulliparity																																																																																																																														
BMI <20																																																																																																																														
BMI 25-34.9																																																																																																																														
Smoker 1-10/day																																																																																																																														
Low fruit intake AN																																																																																																																														
Prev Pre-eclampsia																																																																																																																														
Last preg <6/12																																																																																																																														
Last preg >60/12																																																																																																																														
Major Risk Factors																																																																																																																														
Mat age >40																																																																																																																														
Smoker >=11/day																																																																																																																														
Paternal SGA																																																																																																																														
Cocaine																																																																																																																														
Daily vigorous exercise																																																																																																																														
Prev SGA baby																																																																																																																														
Prev still birth																																																																																																																														
Mat SGA																																																																																																																														
Chronic HTN																																																																																																																														
Diabetes WITH vasc disease																																																																																																																														
Renal impairment																																																																																																																														
APL syndrome																																																																																																																														
Heavy bleeding (similar to menses)																																																																																																																														
PAPP-A<0.4 (please state figure)																																																																																																																														
Echogenic bowel																																																																																																																														
BMI >35 or large fibroids																																																																																																																														
	Indicated?	Performed? +ve/-ve																																																																																																																												
Serial growth scans 28/40 (>=3 major RF)																																																																																																																														
Uterine artery Doppler 20-24/40 (>=3 minor RF)		If performed, PI/RI value																																																																																																																												

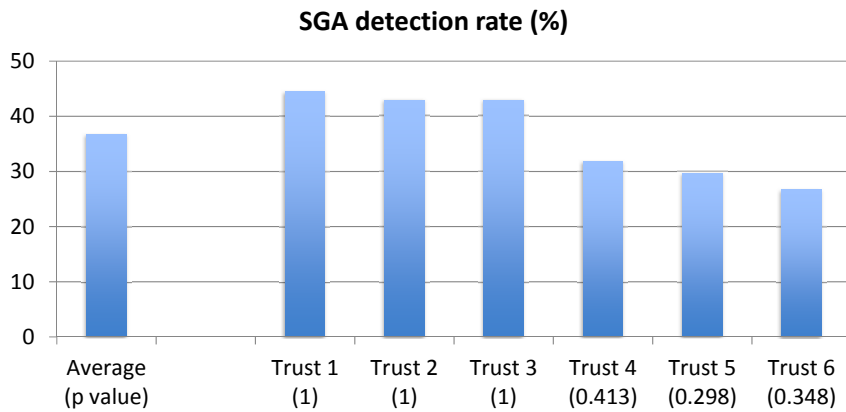
Results

- No. SGA = 128, total deliveries = 2540
- SGA rate = 5.04% (range 3.69 – 7.23%)
 - p values (0.0192 – 0.947)



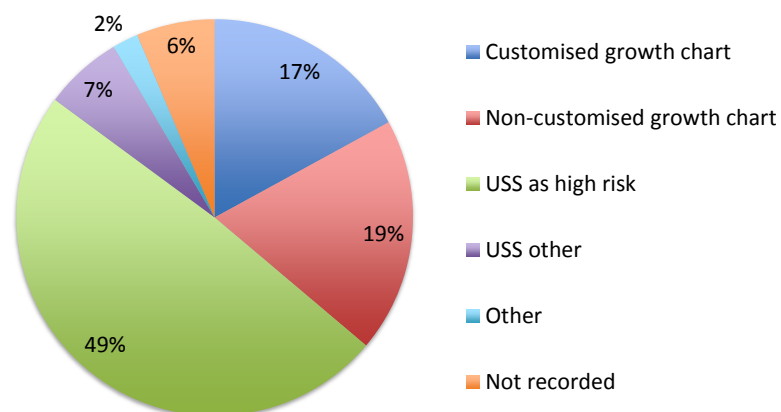
Regional SGA detection rate

- No SGA detected antenatally = 47/128
 - Average 36.7% (range 26.7 – 44.4%)
 - p values 0.2978 – 1 (no significant difference)



Method detected

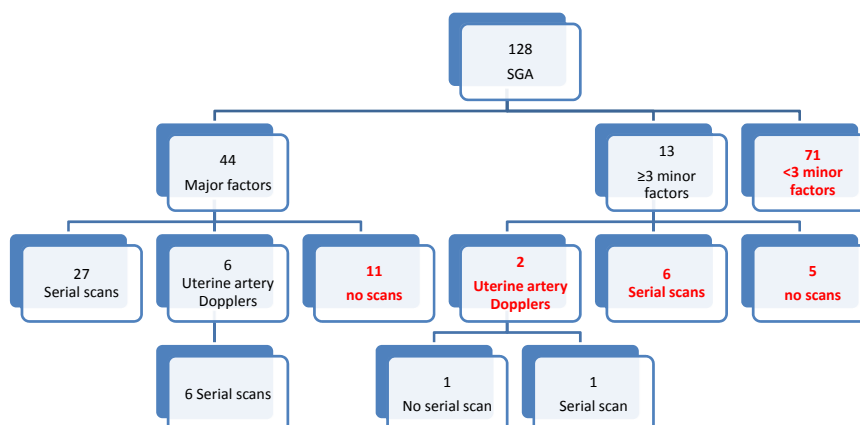
Out of 47 cases detected antenatally



Neonatal outcomes

- Number too small for statistical analysis
 - 5 minute Apgars ≤ 7 = 3
 - pH < 7 = 0
 - Admission to NNU = 19
- Number of stillbirths not available from dashboard / MBBRACE

Are we following RCOG GTG for USS?



How accurate are growth scans?

- 56 cases that recorded centiles at last scan:
 - False negatives ($\geq 10^{\text{th}}$ centile at last scan) = 36
 - True positives ($\leq 10^{\text{th}}$ centile at last scan) = 20
 - Sensitivity = 35.7%
- Would need to look at all USS to work out specificity / NPV / PPV
- On average an extra 3.5 scans performed for those that were detected antenatally (range 2.75 – 4.75)
- NB Hadlock vs INTERGROWTH-21st
 - Awaiting INTERGROWTH-21st EFW chart

Conclusions and recommendations

- Currently picking up 36.7% SGA antenatally
- Using the same standard for SGA allows comparison and accrual for regional data
 - Re-audit. Attempt prospectively at all births / USS?
- RCOG vs NHSE screening algorithms for stratifying risk of SGA

Further discussions

- How do we pick up SGAs that do not have risk factors?
 - 71/128 had <3 minor factors or no risk factors
 - Customised GROW chart?
 - Possibly increase detection rate by 25% (*Smith TOG 2015*, 2 units 43% detection rate)
 - Serial or 3rd trimester USS?
 - *Nicolaidis vs Gardosi* (RSM 2015)
 - POP study (*Sovio et al Lancet 2015*) - universal 3rd trimester increases detection x3
 - Oxford study ongoing
 - Quality control for USS
 - Hadlock vs INTERGROWTH?
 - False positives and unnecessary inductions?
 - Which are the unwell SGA (MCA / CPR) / fetal growth restriction?
- Even if SGA is picked up, risk of stillbirth only reduced by 50%
 - Management of SGA is as important as detection

Thank you! Any questions?

- References
 - INTERGROWTH-21st app: <http://intergrowth21.ndog.ox.ac.uk/>
 - Saving Babies' Lives Bundle, *NHSE March 2016*
 - Small-for-Gestational-Age Fetus, Investigation and Management, *RCOG Greentop Guideline No.31 2013*
 - Prevention of Stillbirth, Gordon Smith, *TOG 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, *Sovio et al, Lancet 2015*