

# Maternity and Children Quality Improvement Collaborative (MCQIC)

**Stillbirth Webinar Series** 

Improving Outcomes through Assessment of Fetal Wellbeing

Wednesday 20 April 2022





# Welcome and introduction







# **Angela Cunningham (Chair)**

MCQIC Maternity Clinical Lead Healthcare Improvement Scotland



# Agenda



Time	Торіс	Lead
11.30-11.35	Housekeeping	<b>Dagmara Lukowiec</b> Senior Project Officer Healthcare Improvement Scotland
11.30-11.35	Welcome, introductions & aims	<b>Angela Cunningham (Chair)</b> Midwifery Clinical Lead, MCQIC Healthcare Improvement Scotland
11.35-12.15	Assessment of fetal wellbeing in practice:	<b>Jane Ramsay,</b> Consultant Obstetrician, NHS Ayrshire & Arran
		Marie Anne Ledingham, Consultant
		Obstetrician, NHS Great Glasgow &
		Clyde
12.15-12.40	Panel-led Q&A:	
	<ul> <li>Jane Ramsay, Consultant Obstetrician, NHS Ayrshire &amp; Arran</li> <li>Marie Anne Ledingham, Consultant Obstetrician, NHS Great Glasgow &amp; Clyde</li> <li>Brian Magowan, Consultant Obstetrician and Gynaecologist, NHS Borders</li> </ul>	Angela Cunningham (Chair)
12.40-12.45	Next Steps	Angela Cunningham (Chair)
12.45	Thank you and close	



- Sharing individual experiences around assessment of fetal wellbeing.
- Discuss options for a collaborative approach to improve outcomes.
- Discussion of fetal wellbeing outcomes in the QI journey.
- Connect with others through the panel-led Q&A session.

## **Stillbirth Webinar Series Context**

- Concerns raised about stillbirth rate during Covid-19 period (March September 2020).
- HoMs interested in carrying out a 'deep dive' into existing data.



Monthly rate of stillbirths per 1,000 total (live + still) births in Scotland

### **Reported themes based on completed questionnaires**



Improving rates of perinatal morbidity and mortality in Ayrshire – The long and winding road.

# **Dr Jane Ramsay**

Consultant Obstetrician NHS Ayrshire and Arran





Improving rates of perinatal morbidity and mortality in Ayrshire – The long and winding road.

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# Setting the scene



- Why do 17 babies die every day in the UK?
- In the UK 1/200 babies are stillborn
- 1/300 dies within four weeks of birth
- This level of death is unacceptable
- Stillbirth rates have remained the same for the last ten years.







# Meanwhile....June 2015



Rate per 1,000 births *	UK ^	England	Scotland	Wales	Northern Ireland	Crown Dependencies
Stillbirths <sup>†</sup>	4.20	4.26	3.78	3.78	4.33	3.25
	(4.06 to 4.35)	(4.1 to 4.42)	(3.3 to 4.32)	(3.18 to 4.5)	(3.58 to 5.24)	(1.65 to 6.40)





- August 2013 discussed at Governance, questions from SANDS
- Stillbirth rates from 2012 and the 1<sup>st</sup> half of 2013 appeared to be increasing in comparison to National data
  - Can't predict and prevent every case: abruption/preterm birth/congenital abnormalities
  - Some deaths are preventable
  - Must have data to understand where we can improve: own deep dive



# Causes of stillbirth for 2011 and 2012 in Ayrshire and Arran

- Risk factors for stillbirth not acknowledged
  - care plan inappropriate
- When identified high-risk: 58% deaths small (<10<sup>th</sup> centile)
- Of those deaths with small baby
  - 50% had reduced fetal movements prior to presentation
    - Either didn't report or no scan done
- 30% of small babies died after 37 wks (term)
- Of 35 cases reviewed at least 9 (25%) potentially preventable
- Findings presented to maternity governance August 2014
- Training and initiate the *GAP programme* for better detection of SGA by the end of 2014
  - Obvious issues around Sonographer workforce



# What is GAP/Grow:



# Risk factors screening and protocol

APPENDIX II: Screening for Small-for-Gestational-Age (SGA) Fetus



Royal College of Obstetricians & Gynaecologists



Green-top Guideline No. 31 2nd Edition | February 2013 | Minor revisions – January 2014



Risk assessment must always be individualised (taking into account previous medical and obstetric history and current pregnancy history). Disease progression or institution of medical therapies may increase an individual's risk.

# Risk factors screening and protocol

#### Algorithm and Risk Assessment Tool: Screening and Surveillance of fetal growth in singleton

#### pregnancies



# **Risk Assessment**

Risk factor Screening for Antenatal clinics To initiate Serial Growth scans

Please complete  $1^{\mbox{st}}$  assessment at booking and  $2^{\mbox{nd}}$  section at 16 weeks File in hand held notes

If any risk factors positive at either booking or 16 weeks visit: For serial Ultrasound to FEW and umbilical Doppler from

	28 wks
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•	Every 4	l week	\$
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Until delivery

ŧ.		
	Risk Factors at booking	Please Tick box
	Maternal age >40 years	
	Drug misuse	
	Previous Pregnancy History	
	Previous SGA baby (<10th centile)	
	Previous stillbirth	
	Maternal Medical History	
	Chronic hypertension	
	Diabetes	
	Renal impairment	
	Antiphospholipid syndrome	
	Unsuitable for monitoring by fundal height	
	Large fibroids	
	BMI >35	

Criteria met for serial Ultrasound sc	an	Yes 🗌 No 🗌			
Ultrasound request card completed		if yes, date completed	D D	M	Y Y
Signature					

Risk Factors at 16 weeks	Please Tick box
Ongoing smoker ≥10/day	
CO level ≥ 16	

Criteria met for serial Ultrasound scan	Yes 🗆 No 🗆
Ultrasound request card completed	if yes, date completed
Signature	
No Risk Factors Identified	Tick:

If no risk factors follow Guideline GMat22: Abdominal palpation performed by a midwife at each assessment from **24 weeks** gestation. This should include measurement of the SFH in centimeters which

#### Covid amendments (RCOG) 2020

ू Risk factor Screening for Antenatal clinics To initiate Serial Growth scans

Styles

& Arra

Please complete 1<sup>st</sup> assessment at booking and file in hand held notes. Complete 2<sup>nd</sup> section at 16 weeks If any risk factors positive at either booking or 16 weeks visit:

Addressograph sticker

For serial Ultrasound for Estimated fetal weight (EFW) and umbilical Doppler from

Every 4 weeks/ until delivery

Risk Factors at booking	Please Tick box	
-	Scan from 28 weeks	Scan from 32 wks if AC
		>10th cent at 20wk scan
Maternal age ≥ 40 years		
Drug misuse		
Previous Pregnancy History		
Previous pregnancy Small for Gestational Age		
baby (<10th centile)		
Previous stillbirth: Appropriate growth		
Previous pregnancy fetal growth restriction (<5th		
centile or any Doppler abnormality)		
Previous stillbirth: SGA present		
Maternal Medical History		
Chronic hypertension		
Diabetes		
Renal impairment		
Antiphospholipid syndrome/SLE		
Unsuitable for monitoring by fundal height	•	
Large fibroids		
Body mass index (BMI) ≥ 35		

Criteria met for serial Ultrasound scan	Yes 🗌 No 🗌
Ultrasound request card completed	if yes, date completed D D M M Y Y
Signature	

Risk Factors at 16 weeks	Please Tick box	
Ongoing smoker ≥10/day		
Carbon Monoxide (CO) level ≥ 16		
Pappa A <5th centile		

Criteria met for serial Ultrasound scan	Yes 🗆 No 🗆
Ultrasound request card completed	if yes, date completed D D M M Y Y
Signature	
No Risk Factors Identified	Tick

If no risk factors follow GMat22: Abdominal palpation performed by a midwife at each assessment *from* 24 weeks gestation (generally at routine visit 26-28 wks). This should include measurement of the SFH in vertices the better that better the set of th

# Problems

- Probably over diagnosis/alarmist
  - What is difference between SGA and IUGR
- AFFIRM effect
- Delivery at 37 weeks
  - Induction overload
  - Failed inductions
  - New data on Late preterm complications
- Solutions from SBL version 2



# Local protocols (most recent based on SBL V2 March 2019)

The Perinatal Institute is pleased to announce the launch of the GROW 2.0 softwar

The new software includes the following features-

- · Fully electronic application
- · Assists risk assessment throughout pregnancy
- · Mother's app to view growth chart
- · Auto-plots SFH & EFW measurements
- · Identifies slow and accelerated growth



Trust Name	Hospital Name	Year		
All	$\sim$	All	$\checkmark$	2020/21 🗸

#### NHS Ayrshire & Arran - Expected Births: 3100

#### SGA/FGR Referral and Detection Rates

Centile:			Trust / Hospital			National GAP Average				Top Ten GAP Average			
10th 3rd		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	<b>Q</b> 4
Completed records [1]	Ν	719	714	894	623	-	-	-	-	-	-	-	-
Completed records [1]	%	92.8	92.1	115.4	80.4	-	-	-	-	-	-	-	-
	n	36	25	21	23	-	-	-	-	-	-	-	-
SGA at birth [2]		5.0	3.5	2.3	3.7	4.5	4.4	4.5	4.3	5.0	3.9	4.4	4.1
	n	22	14	14	17	-	-	-	-	-	-	-	-
Antenatal referral for SGA [3a]		61.1	56.0	66.7	73.9	52.5	54.1	52.4	53.1	62.1	65.2	59.8	54.4
False positive	n	116	145	153	85	-	-	-	-	-	-	-	-
antenatal referral for SGA [3b]	%	17.0	21.0	17.5	14.2	15.0	16.1	16.3	16.3	17.6	19.5	20.5	19.0
	n	24	19	15	17	-	-	-	-	-	-	-	-
Antenatal detection of SGA [4a]	%	66.7	76.0	71.4	73.9	56.3	58.1	58.7	59.1	71.5	76.7	73.3	67.7
False positive	n	88	99	105	58	-	-	-	-	-	-	-	-
antenatal detection of SGA [4b]	%	12.9	14.4	12.0	9.7	8.3	8.7	8.7	8.7	12.1	12.6	13.1	14.1

100%

Numbers in brackets refer to definitions below

Trust Name	Hospital Name	Year	
All	$\sim$	All	2020/21 🗸

#### NHS Ayrshire & Arran - Expected Births: 3100

SGA Rate and Gestation at Delivery

			Trust /	Hospital		National GAP Average			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	Ν	719	714	894	623	-	-	-	-
Completion rate [1]	%	92.8	92.1	115.4	80.4	-	-	-	-
SGA rate (<10th centile) [2a]	n	95	86	115	78	-	-	-	-
	%	13.2	12.0	12.9	12.5	12.8	13.0	13.1	12.9
Babies <10th centile delivered	n	33	23	45	18	-	-	-	-
at or after 40+0 weeks [2b]	%	34.7	26.7	39.1	23.1	32.0	31.0	29.7	29.3
SCA unto (22 und comtile) [2 c]	n	36	25	21	23	-	-	-	-
SGA rate (<3rd centile) [3a]	%	5.0	3.5	2.3	3.7	4.5	4.4	4.5	4.3
Babies <3rd centile delivered	n	15	6	7	10	-	-	-	-
at or after 38+0 weeks [3b]	%	41.7	24.0	33.3	43.5	53.5	52.9	51.5	51.5

2000

Numbers in brackets refer to definitions below

#### SGA Detection Rates in AMU over 3 years since full uptake of GAP programme





# The good news story: stillbirths

- 21 % reduction in rate of stillbirth (2013-15) in line with McQIC aims (15%)
- 50% reduction to end of 2016, with our lowest rate ever
- Over 3.5 years of data collection statistically significant reduction (p=0.049).





NHS A&A crude stillbirth rate per 1000 births from 2013 to end of August 2021\*

\*cases reported to MBRRACE-UK by AMU (excludes deaths in other units, TOPs and LFL)



# Thank you









Consultant in Fetal and Maternal Medicine The Queen Elizabeth Hospital Glasgow





# INTERGROWTH-21st

The International Fetal and Newborn Growth Consortium for the 21<sup>st</sup> Century

- The International Fetal and Newborn Growth Consortium for the 21st Century, or INTERGROWTH-21st, global, multidisciplinary network
- 300 researchers and clinicians from 27 institutions in 18 countries worldwide coordinated from the University of Oxford.
- Dedicated to improving perinatal health globally and committed to reducing the millions of preventable newborn deaths that occur as a result of preterm birth or poor intrauterine growth
- 60,000 pregnancies in 8 International centres follow up to age 2
- All pregnancies dated by US, mothers screened for other illnesses, standard machines, training package for sonographers, quality control

Maternal, Newborn and Infant Clinical Outcome Review Programme



#### MBRRACE-UK Perinatal Mortality Surveillance Report

UK Perinatal Deaths for Births from January to December 2019

Rate per 1,000 births <sup>§</sup>	2013	2014	2015	2016	2017	2018	2019
Stillbirths	4.20	4.12	3.87	3.93	3.74	3.51	3.35
Stilbirths	(4.06 to 4.35)	(3.98 to 4.33	(3.73 to 4.01)	(3.79 to 4.07)	(3.60 to 3.87)	(3.37 to 3.64)	(3.21 to 3.48)
Neonatal deaths <sup>‡</sup>	1.84	1.76	1.74	1.72	1.67	1.64	1.62
	(1.75 to 1.94)	(1.67 to 1.86)	(1.65 to 1.84)	(1.63 to 1.81)	(1.58 to 1.77)	(1.54 to 1.73)	(1.53 to 1.71)
Extended perinatal deaths <sup>†</sup>	6.04	5.88	5.61	5.64	5.40	5.13	4.96
	(5.87 to 6.21)	(5.71 to 6.04)	(5.44 to 5.77)	(5.48 to 5.28)	(5.24 to 5.57)	(4.97 to 5.30)	(4.8 to 5.12)

§ excluding terminations of pregnancy and births <24<sup>+0</sup> weeks gestational age

° during the period reported different laws existed in Northern Ireland for the termination of pregnancy

<sup>†</sup> per 1,000 total births

<sup>‡</sup> per 1,000 live births

Data sources: MBRRACE-UK, PDS, ONS, NRS, PHS, NIMATS, States of Guernsey, States of Jersey © 2021, re-used with the permission of NHS Digital. All rights reserved.

Figure 1: Stillbirth, neonatal, and extended perinatal mortality rates for the UK and by country of residence: United Kingdom, for births from 2013 to 2019



births <sup>§</sup>		England	Scotland	Wales	Ireland <sup>o</sup>	Crown Dep.
Stillbirths <sup>†</sup>	3.35	3.33	3.22	4.02	3.24	1.89
	(3.21 to 3.48)	(3.19 to 3.47)	(2.72 to 3.71)	(3.31 to 4.74)	(2.5 to 3.98)	(0.04 to 3.73)
Antonortum	2.96	2.95	2.79	3.59	2.88	1.89
Antepartum	(2.83 to 3.08)	(2.81 to 3.08)	(2.33 to 3.26)	(2.91 to 4.27)	(2.18 to 3.58)	(0.04 to 3.73)
Introport unt	0.26	0.26	0.20	0.23	0.27	0.00
mrapartum	(0.22 to 0.29)	(0.22 to 0.3)	(0.08 to 0.33)	(0.06 to 0.41)	(0.05 to 0.48)	(0.00 to 1.41)
University timin of	0.13	0.12	0.22	0.20	0.09	0.00
Unknown uning.	(0.11 to 0.16)	(0.10 to 0.15)	(0.09 to 0.35)	(0.04 to 0.36)	(0.00 to 0.21)	(0.00 to 1.41)

# Why we still need to be concerned...

- Uk has higher rates of stillbirth than many other European countries (Netherlands, Andorra, Denmark, Croatia, Finland, Iceland 1/500 or lower)
- 18% stillbirths occur in women with identifiable risk factors at booking (SBLV2)



Figure 1: Stillbirth rate against linear trend required to meet a 50% reduction by 2025

# Rationale for Intergrowth-21st project

- 60% 4 million neonatal deaths worldwide annually associated with LBW
- 50% stillbirths associated with FGR
- Hypothesis that identification of SGA/FGR and timely intervention may reduce risk of NND
- Traditionally US charts assessment fetal growth based on small populations in US and UK- not representative of worldwide population
- Production of fetal and newborn growth standards- large multicentre, multi-ethnic, longitudinal fetal growth standard based on early assessment of gestational age
- FGLS (SFH and US from 14 weeks)
- Preterm postnatal follow up study (26- 37 weeks)
- Newborn cross sectional study (12 months- anthropomentric data, morbidity and mortality)

#### International standards for fetal growth based on serial ultrasound measurements: the Fetal Growth Longitudinal Study of the INTERGROWTH-21<sup>st</sup> Project

Aris T Papageorghiou, Eric O Ohuma, Douglas G Altman, Tullia Todros, Leila Cheikh Ismail, Ann Lambert, Yasmin A Jaffer, Enrico Bertino, Michael G Gravett, Manorama Purwar, J Alison Noble, Ruyan Pang, Cesar G Victora, Fernando C Barros, Maria Carvalho, Laurent J Salomon, Zulfiqar A Bhutta\*, Stephen H Kennedy\*, José Villar\*, for the International Fetal and Newborn Growth Consortium for the 21st Century (INTERGROWTH-21<sup>s</sup>)†

- Background: Fetal Longitudinal Growth study, part of Intergrowth-21<sup>st</sup> project, aim to produce international growth and size standards for foetuses. Based on same methodology and conceptual approach as WHO standards published 2006
- Setting: 8 international urban populations in which of the nutritional needs of the population were met and adequate antenatal care provided. FLGS involved accurate dating (CRL) and serial growth scans 5 weekly (HC, BPD, OCFD, AC, FL) until 42 weeks
- Findings:13,108 women screened, 4607 (32%) eligible, 4321 (94%) analysed (low risk of adverse outcomes). Calculated 3<sup>rd</sup>, 5<sup>th</sup>, 10<sup>th</sup>, 50<sup>th</sup>,90<sup>th</sup>, 95<sup>th</sup> and 97<sup>th</sup> centile curves according to gestational age for these ultrasound measures

# Fetal Longitudinal Growth Study- Advantages

- Accurate pregnancy dating <14 weeks
- Low risk population (multi-ethnic, adequate nutrition)
- Standardised ultrasound assessment- Philips machines
- Standardised measurement protocol developed
- Training of ultrasonographers and quality control
- 3 measurements assessed for reproducibility- blinded
- Spot checks 10%
- Longitudinal rather than cross sectional data
- Prospective study



# But how good are the charts and which is best....?





American Journal of Obstetrics & Gynecology MFM Volume 4, Issue 2, March 2022, 100545

### Customized GROW vs INTERGROWTH-21<sup>st</sup> birthweight standards to identify small for gestational age associated perinatal outcomes at term

Emily Fay, MD; Oliver Hugh, MSc; Andre Francis, MSc; Ronit Katz, DPhil; Kristin Sitcov, BS; Vivienne Souter, MD; Jason Gardosi, MD, FRCOG

#### STUDY DESIGN

This retrospective cohort study used data from a multicenter perinatal quality initiative, including a multiethnic dataset of 125,826 births from 2012 to 2017. Of the singleton term births, 92,622 had complete outcome data including stillbirth, neonatal death, 5-minute Apgar score <7, neonatal glucose instability and need for newborn transfer to a higher level of care or neonatal intensive care unit admission. The customized GROW and INTERGROWTH-21<sup>st</sup> birthweight standards were applied to determine small for gestational age (<10th percentile) according to their respective methods and formulae. The associations with adverse outcomes were expressed as relative risks with 95% confidence intervals and population attributable fractions.

**RESULTS:** GROW and INTERGROWTH-21<sup>st</sup> classified 9578 (10.3%) and 4079 (4.4%) pregnancies as small for gestational age, respectively. For all of the outcomes assessed, GROW identified more small for gestational age infants with adverse outcomes than INTERGROWTH-21<sup>st</sup>, including more stillbirths, perinatal deaths, low Apgar scores, glucose instability, newborn seizure, and transfers to a higher level of care. Moreover, 13 of 27 stillbirths (48%) that were small for gestational age by either method were identified as small for gestational age by GROW but not by INTERGROWTH-21<sup>st</sup>. Similarly, additional cases of all other adverse outcome indicators were identified by GROW as small for gestational age, whereas INTERGROWTH-21<sup>st</sup> identified in only 1 category (glucose instability) 9 of 295 cases (3.1%), which were not identified as small for gestational age by GROW.

**CONCLUSION:** Customized assessment using GROW resulted in increased identification of small for gestational age term infants that were at significantly increased risk of an array of adverse pregnancy outcomes.

# Customised (Grow) versus Intergrowth-21<sup>st</sup> publications (March 2020)

Citation	Title	Study Population	Key Points
Anderson et al, AJOG 2016	INTERGROWTH-21st vs customized birthweight standards for identification of perinatal mortality and morbidity.	53,484, New Zealand	IG21 had disproportionality higher SGA rates among different ethnic groups, and failed to identify many at-risk SGA infants that were identified by GROW
Savirón-Cornudella et al, JPM 2017	Comparison of fetal weight distribution improved by paternal height by Spanish standard versus Intergrowth 21st standard	5,243, Spain	GROW had higher detection rate than IG21
Francis et al, AJOG 2018	Customized vs INTERGROWTH-21 st standards for the assessment of birthweight and stillbirth risk at term	1.25 million, 10 countries	IG21 standard mostly reflected differences in physiological pregnancy characteristics. GROW identified a greater number of SGA that are at increased risk of stillbirth.
Pritchard et al, JMFNM 2018	INTERGROWTH-21st compared with GROW customized centiles in the detection of adverse perinatal outcomes at term	71,487, Victoria, Australia	IG21 was less likely to identify obese women as SGA; GROW identifies additional cases that are at increased risk of adverse outcome.
Odibo et al, AOGS 2018	Customized fetal growth standard compared with the INTERGROWTH-21st century standard at predicting small-for-gestational-age neonates	1,054, USA	GROW detected more SGA neonates but was less specific.
Webster et al, UOG 2019	Impact of ethnicity on adverse perinatal outcome in women with chronic hypertension: a cohort study	4,481, UK	GROW had significantly higher sensitivity (40 vs 16%) identifying cases of NICU admission compared to IG21, with similar specificity.
Prichard et al, PLOS Med 2019	Identification of the optimal growth charts for use in a preterm population: An Australian state-wide retrospective cohort study.	28,968, Victoria, Australia	GROW better reflects fetal growth restriction within a pre-term population compared to Intergrowth-21.
Fay et al, AJOG 2019	Customized GROW vs INTERGROWTH-21st birthweight standards for identifying SGA associated perinatal outcomes	125,826, Washington, USA	GROW results in a higher number of SGA babies that are at significantly increased risk of a wide array of adverse outcomes.
Vieira et al, PLOS Med 2019	Determination of birth-weight centile thresholds associated with adverse perinatal outcomes using population, customised, and Intergrowth charts: A Swedish population-based cohort study	233,379, Sweden	GROW rates were consistent across centile bands while IG21 had a 3.1% SGA and 25.1% LGA rate. Chart specific thresholds are required.
Francis et al, BJOG 2019	Stillbirth risk and SGA rate in subgroups according to maternal size: comparison of GROW, IG21, and WHO fetal growth standards	1.25 million, 10 countries	SGA according to GROW reflects stillbirth rates, while SGA by IG21 reflects maternal size.

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Citation		Title	Study Population	Key Points
Cartwright et : 2020	al, J Perinatol	Neonatal morbidity and small and large size for gestation: a comparison of birthweight centiles	45,505, New Zealand	GROW centiles are more useful in identifying neonates at increased risk of morbidity
Fernandez-Alt Pregnancy and	oa et al, BMC d Childbirth 2020	INTERGROWTH21st vs customized fetal growth curves in the assessment of the neonatal nutritional status: a retrospective cohort study of gestational diabetes	234 women with gestational diabetes (GDM), Brazil	GROW centiles are better than IG21 in identifying neonates with mainutrition after GDM pregnancies

#### The Lancet Regional Health - Europe 8 (2021) 100167



Research paper

International versus national growth charts for identifying small and large-for-gestational age newborns: A population-based study in 15 European countries

Alice Hocquette, MSc<sup>3,\*</sup>, Mélanie Durox, MSc<sup>a</sup>, Rachael Wood, PhD<sup>b</sup>, Kari Klungsøyr, MD<sup>c</sup>, Katarzyna Szamotulska, PhD<sup>a</sup>, Sylvan Berrut, MSc<sup>a</sup>, Tonia Rihs, PhD<sup>a</sup>, Theopisti Kyprianou<sup>f</sup>, Luule Sakkeus, PhD<sup>s</sup>, Aline Lecomte, MSc<sup>h</sup>, Irisa Zile, PhD<sup>j</sup>, Sophie Alexander, PhD<sup>j</sup>, Jeannette Klimont, Mag<sup>e</sup>, Henrique Barros, PhD<sup>j</sup>, Miriam Gatt<sup>an</sup>, Jelena Isakova<sup>n</sup>, Béatrice Blondel, PhD<sup>a</sup>, Mika Gissler, PhD<sup>o</sup>, Jennifer Zeitlin, DSc<sup>a</sup>

#### ABSTRACT

*Background:* To inform the on-going debate about the use of universal prescriptive versus national intrauterine growth charts, we compared perinatal mortality for small and large-for-gestational-age (SGA/LGA) infants according to international and national charts in Europe.

*Methods:* We classified singleton births from 33 to 42 weeks of gestation in 2010 and 2014 from 15 countries (N = 1,475,457) as SGA (birthweight <10th percentile) and LGA (>90th percentile) using the international Intergrowth-21st newborn standards and national charts based on the customised charts methodology. We computed sex-adjusted odds ratios (aOR) for stillbirth, neonatal and extended perinatal mortality by this classification using multilevel models.

*Findings:* SGA and LGA prevalence using national charts were near 10% in all countries, but varied according to international charts with a north to south gradient (3.0% to 10.1% and 24.9% to 8.0%, respectively). Compared with appropriate for gestational age (AGA) infants by both charts, risk of perinatal mortality was increased for SGA by both charts (aOR[95% *confidence interval* (CI)]=6.1 [5.6–6.7]) and infants reclassified by international charts from SGA to AGA (2.7 [2.3–3.1]), but decreased for those reclassified from AGA to LGA (0.6 [0.4–0.7]). Results were similar for stillbirth and neonatal death.

*Interpretation:* Using international instead of national charts in Europe could lead to growth restricted infants being reclassified as having normal growth, while infants with low risks of mortality could be reclassified as having excessive growth.

# Original Research

#### OBSTETRICS

#### Comparison of estimated fetal weight percentiles near term for predicting extremes of birthweight percentile

Ulla Sovio, PhD; Gordon C. S. Smith, DSc

#### AJOG at a Glance

#### Why was this study conducted?

This study aimed to determine which method of estimating fetal weight percentile best predicts extreme birthweight percentile.

#### Key findings?

In an unselected population-based cohort study, where a blinded research ultrasound scan was performed at 36 weeks' gestation in 3875 pregnancies, the widely used Hadlock method was better at predicting small and large for gestational age birthweight percentile than the novel method described by INTERGROWTH-21st (IG21), a multinational prospective cohort study.

#### What does this add to what is known?

This study uses blinded ultrasound scans to compare methods for estimating fetal weight percentiles. The study indicated that the Hadlock method should be used instead of the IG21 method in screening for extremes of birthweight percentile.





BMC Pregnancy Childbirth. 2022; 22: 25. Published online 2022 Jan 10. doi: 10.1186/s12884-021-04324-0

#### Which chart and which cut-point: deciding on the INTERGROWTH, World Health Organization, or Hadlock fetal growth chart

Jessica Liauw,<sup>®1</sup> Chantal Mayer,<sup>1</sup> Arianne Albert,<sup>2</sup> Ariadna Fernandez,<sup>1</sup> and Jennifer A. Hutcheon<sup>1</sup>

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**Methods:** We linked antenatal ultrasound measurements for fetuses > 28 weeks' gestation from the British Columbia Women's hospital ultrasound unit with the provincial perinatal database. We estimated the risk of perinatal morbidity/mortality (decreased cord pH, neonatal seizures, hypoglycemia, and perinatal death) associated with select centiles on each fetal growth chart (the 3rd, 10th, the centile identifying 10% of the population, and the optimal cut-point by Youden's Index), and determined how well each centile predicted perinatal morbidity/mortality.

**Results:** Among 10,366 pregnancies, the 10th centile cut-point had a sensitivity of 11% (95% CI 8, 14), 13% (95% CI 10, 16), and 12% (95% CI 10, 16), to detect fetuses with perinatal morbidity/mortality on the INTERGROWTH, WHO, and Hadlock charts, respectively. All charts performed similarly in predicting perinatal morbidity/mortality (area under the curve [AUC] =0.54 for all three charts). The statistically optimal cut-points were the 39th, 31st, and 32nd centiles on the INTERGROWTH, WHO, and Hadlock charts respectively.

**Conclusion:** The INTERGROWTH, WHO, and Hadlock fetal growth charts performed similarly in predicting perinatal morbidity/mortality, even when evaluating multiple cut points. Deciding which cut-point and chart to use may be guided by other considerations such as impact on workflow and how the chart was derived.

# So where should we go from here??

- Consensus on charts to use?
- Consensus on definitions of SGA and FGR?
- Consensus on management of early and late onset fetal growth restriction?

# SGA or FGR?

# Consensus definition of fetal growth restriction: a Delphi procedure

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# **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 delivery <34 weeks
- birthweight <10th centile with evidence of placental dysfunction as defined below for current pregnancy.

#### Definition of FGR in a current pregnancy: defined as either of the following:

- EFW or abdominal circumference (AC) <3<sup>rd</sup> centile
- EFW or AC <10<sup>th</sup> centile with evidence of placental dysfunction (either):
  - Abnormal uterine artery Doppler (mean pulsatility index >95<sup>th</sup> centile<sup>70</sup>) earlier in pregnancy (20 – 24 weeks) and/or
  - Abnormal umbilical artery Doppler (absent or reversed end diastolic flow or pulsatility index >95<sup>th</sup> centile).

#### Suboptimal fetal growth:

Increase in EFW <280g over 14 days (20g per day) from 34 weeks <sup>7172</sup>.

# Management of SGA and FGR- Saving babies Lives

- Absent or reversed end diastolic flow in the umbilical artery is a feature of FGR prior to 32 weeks.
- A normal umbilical artery Doppler after 32 weeks of gestation does not mean that the fetus is not growth restricted, nor that there is no evidence of fetal compromise.
- After 34 weeks providers with capacity may wish to use assessment of Middle Cerebral Artery (MCA) Doppler pulsatility indices (PI) to help identify and act upon potential fetal compromise in later pregnancy
- Trusts caring for such women should have access to personnel who can carry out DV Doppler assessment and computerised CTG. If Trusts do not have access to DV Doppler or access that is intermittent then computerised CTG must be provided for monitoring and a pre-established referral pathway should be present to enable assessment of women by a specialist fetal medicine service within 72 hours.

#### <u>Saving-Babies-Lives-Care-Bundle-Version-Two-Updated-Final-Version.pdf</u> (england.nhs.uk)

# Management of SGA and FGR- saving babies Lives

- For fetuses with an EFW <3rd centile in later pregnancy delivery should be initiated at 37+0 weeks' gestation (or earlier if there are other concerning features present depending on the protocol).
- In fetuses with an EFW between the 3rd and 10th centile, other features must be present for delivery to be recommended prior to 39 weeks, as described above, for the definition of FGR (for example, fetal [based on Doppler assessment] or maternal [maternal medical conditions or concerns regarding fetal movements]). If FGR cannot be excluded, then delivery after 37 weeks should be discussed with the mother and an ongoing management plan individualised.
- For all fetuses with an EFW or AC <10th centile where FGR has been excluded, delivery or the initiation of induction of labour should be offered at 39+0 weeks after discussion with the mother.
- For women who decline induction of labour or delivery after 39+0 weeks, counselling must include a discussion regarding evidence that there is no increase in risk for the baby or for the mother from delivery/induction at this gestation and that there is no evidence to determine how fetuses with SGA/FGR should be monitored if pregnancy continues.







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