Customised Antenatal Growth Charts

Adapted with permission
Perinatal Institute

2017
Aims of Training

- Promote best practice
- Understanding of risk assessment at booking
- Increase knowledge of customised growth charts
- Standardise fundal height measurement
- Understanding of referral criteria
Parameters of normal growth

- What is the average size baby at term?
- What is the local definition of SGA?
- What is the local definition of LGA?
Birth weight

2500g = SGA?

4500g = LGA?
Antenatal Detection

Using population standards to assess fetal growth in the 3rd trimester will miss most cases of SGA. Population standards group all women together and predict they will all have the same size baby at term.
Fetal growth restriction

associations

- Stillbirth
- Neonatal deaths
- SIDS
- Perinatal morbidity
- Cerebral palsy
- Effects in later life
‘Unexplained’ Stillbirths in West Midlands, 2001
n=231; <10th percentile: 140 = 62%
Stillbirths – Wigglesworth classification: consistently about two-thirds are ‘Unexplained’
Maternal, Newborn and Infant Clinical Outcome Review Programme

MBRRACE-UK

Saving Lives, Improving Mothers’ Care Lessons learned to inform future maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009-2012

December 2014

perinatal institute
for maternal and child health
The report recommends that in all those organisations where the mortality rate is higher than the UK average, organisations should review the quality of care mum and baby received to understand whether the death might have been prevented.

Even where rates are below the UK average, local reviews should be carried out. This will help units reach standards for preventing deaths similar to those in other European countries.

Why do babies die?

All babies’ deaths are classified to help us understand what the underlying causes are so that care can be targeted to prevent future deaths. This is done by recording the main reason for the death (see right). But there may be other problems that have contributed. A baby who dies of an infection, for example, may also have a congenital abnormality which makes that baby more vulnerable to infection. The system used by MBRRACE-UK also records these underlying factors.

As hospital staff become used to this system of classifying deaths, fewer deaths will be described as ‘unknown’ in future reports.
RECODE classification

- Unclassified: 16.6%
- Congenital Anomalies: 17.4%
- Misc.: 2.9%
- Intrapartum Asphyxia: 2.9%
- Mother: 2.5%
- Placenta: 9.2%
- Umbilical cord: 3.5%
- Infection: 2.1%
- Fetal Growth Restriction: 42.9%
Fetal growth surveillance

Methods

- Manual palpation
  - Landmarks

- Fundal height measurements
  - Tape measure
  - Interpretation
  - Documentation

- Ultrasound
  - Biometry
  - Estimated fetal weight
  - Liquor volume
  - Doppler

[Population based fundal height chart]
RCOG Guidelines

Green-top Guideline No. 31
2nd Edition | February 2013

The Investigation and Management of the Small-for-Gestational-Age Fetus

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

Booking assessment (first trimester)

**Minor risk factors**
- Maternal age ≥35 years
- M/C singleton pregnancy
- Nulliparity
- BMI ≤20
- BMI 25–34.9
- Smoker 1–10 cigarettes per day
- Low fruit intake pre-pregnancy
- Previous pre-eclampsia
- Pregnancy interval <6 months
- Pregnancy interval ≤60 months

**Major risk factors**
- Maternal age ≥40 years
- Smoker ≥15 cigarettes per day
- Paternal SGA
- Cocaine
- Daily vigorous exercise
- Previous SGA baby
- Previous stillbirth
- Maternal SGA
- Chronic hypertension
- Diabetes with vascular disease
- Renal impairment
- Antiphospholipid syndrome
- Heavy bleeding similar to menses
- PAPP-A <0.4 MOM

Women unsuitable for monitoring of growth by STH measurement
- e.g. Large fibroids (BMI) >35

3 or more

3 or more

One risk factor

One risk factor

Consider aspirin at <16 weeks if risk factors for pre-eclampsia

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.

Reassess at 20 weeks
- PAPP-A <0.4 MOM (major)
- Fetal echogenic bowel (major)

Uterine artery Doppler at 20–24 weeks

Assessment of fetal size and umbilical artery Doppler in third trimester

Reassess during third trimester
- Institute serial assessment of fetal size and umbilical artery Doppler if develop:
  - Severe pregnancy induced hypertension
  - Pre-eclampsia
  - Unexplained APH abruption
Risk assessment at booking

Major and Minor risk factors (very difficult to fully implement)
Serial growth scans are recommended if:-

- 1 major risk factor
- 3 minor risk factors

Reassess during the 3rd trimester – serial assessment of fetal size and Doppler if:-
- Severe PIH
- Pre eclampsia
- Unexplained APH
- Abruption

Women unsuitable for monitoring growth by FH measurement
e.g. large fibroids, BMI>35, polyhydramnios
Points from RCOG guideline

- Women with an SGA fetus between 24-35 weeks – should receive a single dose of corticosteroids if delivery is being considered

- CTG should not be used as the only form of surveillance in SGA fetuses in 3rd trimester

- Early admission should be recommended in women in spontaneous labour with an SGA fetus in order to instigate continuous fetal heart monitoring

- Element 1 - Reducing smoking in pregnancy
- Element 2 - Risk assessment and surveillance for fetal growth restriction
- Element 3 - Raising awareness of fetal movement
- Element 4 - Fetal monitoring during labour
Algorithm and Risk Assessment Tool: Screening and Surveillance of fetal growth in singleton pregnancies

**Low Risk**
- No known risk factors

**Increased Risk:** one or more of the following:

- **Maternal Risk Factors**
  - Maternal age >40 years
  - Ongoing smoker (at booking)
  - 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 - e.g.
  - Large fibroids
  - BMI >35

**Current Pregnancy Complications**
- Early Pregnancy
  - PAPP-A <0.415 MoM
  - Fetal echogenic bowel
- Late Pregnancy
  - Severe pregnancy-induced hypertension or pre-eclampsia (PIH and proteinuria)
  - Unexplained antepartum haemorrhage

**No risk factors**

**Low Risk Care**
- Serial assessment (2-3 weekly) of symphys fundal height (SFH) from 26-28 weeks until delivery
- SFH measurements plotted on chart

**Suspected abnormal growth**
- (SFH <10th centile or serial measurements which demonstrate slow or static growth)

- Direct referral for assessment (as soon as practically possible and should be within 72 hours) for estimated fetal weight (EFW), liquor volume and umbilical artery Doppler

**Abnormal growth or abnormal umbilical artery pulsatility index**

**High Risk Care**
- Serial assessment of fetal weight and umbilical Doppler from 26-28 weeks until delivery. EFWs plotted on chart

**One or more risk factors**

**Normal**

**Refer to RCOG guidance on management of the SGA fetus**
Risk assessment at booking

‘low risk’

‘increased risk’
Women are unique
Centile calculator

Ethnicity: European
Parity: 0
Height: 165 cm
Booking weight: 65 kg
Gender: Female
Birthweight: 3500 g
Gestation: 40 wks

Calculate Centile: 56.2

About Centile Calculator  Close
GROW

Gestation Related Optimal Weight

www.perinatal.org.uk
Customised growth chart

• Generate once EDD by scan established

Adjusted for
• Height
• Weight
• Ethnic origin
• Parity

And not for
• Paternal
• Fetal
Co-efficients for the UK GROW web application

Using a multiple regression model, the term (280) day birthweight for a non-smoking British European primip of average weight (64kg) and average height (163cms) is calculated as 3453.4

To this additional components are added to the Term Optimal Weight (TOW) as follows:

\[ TOW = 3453.4 + wtao + htao + sexao + ethao + parao \]

When you input individual maternal characteristics the software then “adds on” or “subtracts from” the average
Standardised Fundal Height Measurement
Fundal Height Measurement

- Primary screening tool
- Acceptable to women
- Easy to perform
- Non-invasive
- Inexpensive
Standardising Practice

- Intra observer variation
- Inter observer variation
- Bladder volume
- Tape measure
- Frequency of assessment
Semi recumbent-empty bladder
Fundal height

Identify the fundus
Identify top of the symphysis pubis
Semi recumbent-empty bladder

Measure the longitudinal axis, with an non-elastic tape measure and numbers hidden.
6. Plot measurement on customised growth chart and refer for USS if required
Considerations

- Descent of the head
- Malpresentation
- Multiple Pregnancies
- Already having serial scans – how frequent is serial?
- Obesity
Is this normal growth?
Referral recommendation
USS with EFW above 10\textsuperscript{th} centile
USS with EFW above 10\textsuperscript{th} centile
USS with EFW below 10th centile
Referral recommendation
Referral recommendation
Is this normal growth?
Referral recommendation

![Graph showing growth chart with marked points and centile lines.](image)
Fetal growth screening implementation strategy

- Standardised fundal height measurement
- Serial plotting on customised charts
- Clear referral protocols
- Good back-up / access to investigations
- Revolving door policy
Growth Assessment Protocol (GAP)

- Face-to-face training
- E learning
- Competency assessments
- Template fetal growth protocol
- Monitoring detection rates
- Completion of baseline audit
- GAP SCORE-Audit of ‘missed cases’ of FGR
- GAP leads (midwife, obstetrician, sonographer)
- PI support
E-learning

Module 1 – Theory
Module 2 - Practice

- Can be accessed from anywhere with an internet connection
- Will take approximately 1 hour to complete
- User can update themselves as required (every 12 months recommended)
- Email address required for every user
  - Account will be set up and login details emailed to them
- Key leads will have a training log of all users who have completed online training
Log in details will be emailed to users with details of how to access the system.
User works through the course material
Test at the end of each module

Assists learner to retain information

Can take test as many times as required

Can print own certificate

A. Accelerated growth
B. Stotic growth
C. Slow Growth
D. Normal growth
Competency Assessment

- **Knowledge of:**
  - Definitions of FGR
  - Research evidence
  - Risk assessment at booking
  - Customised growth chart and referral criteria
  - Standardised fundal height
  - Customised centile at birth and on-going management

- **Demonstration of:**
  - Production of a GROW chart
  - Standardised fundal height
  - Plotting measurements on a chart
Welcome to GROW web-app, the new on-line application for customised assessment of fetal growth and birth weight designed as an intrinsic component of the GAP programme.

The GROW software includes functionality for:

- generation of the customised antenatal chart to plot fundal height and estimated fetal weight measurements throughout pregnancy
- calculation of the customised birthweight centile for the baby
- reporting rates of fetal growth restriction and antenatal detection by unit/Trust

Please visit the help section for further details on how to use this application.

The functionality is also available as a web service which can be integrated with existing Maternity Information Systems. If your unit/Trust would prefer to use the web service, please contact the GROW team on 0121 607 0101.
Confirm mother’s details are correct. If so select “yes”.

If mothers details are incorrect, re enter chart ID number. If details remain incorrect, generate a new chart, and use the new chart ID number.
Input unit responsible for antenatal care

All maternity units in the United Kingdom are listed with the additional option for ‘no antenatal care’ or ‘other’ for care received outside of UK/private.
Obtaining a birthweight centile

**Customised Birthweight Centile, Chart ID - 52754625**

<table>
<thead>
<tr>
<th><strong>Mother / Booking Details</strong></th>
<th><strong>Baby / Birth Details</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EDD</strong></td>
<td><strong>Unit responsible for antenatal care</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Baby DOB</strong></td>
</tr>
<tr>
<td><strong>Maternal Height</strong></td>
<td><strong>Gestation at birth</strong></td>
</tr>
<tr>
<td>165 cm</td>
<td>40 weeks 0 days</td>
</tr>
<tr>
<td>booking weight</td>
<td><strong>Outcome</strong></td>
</tr>
<tr>
<td>64 kg</td>
<td><strong>Live birth</strong></td>
</tr>
<tr>
<td>Maternal Ethnicity</td>
<td><strong>Gender</strong></td>
</tr>
<tr>
<td>British European</td>
<td>female</td>
</tr>
<tr>
<td>Parity</td>
<td><strong>Birth Weight</strong></td>
</tr>
<tr>
<td></td>
<td>2975 g</td>
</tr>
<tr>
<td>Please check that the Chart ID corresponds with the mother's details</td>
<td><strong>Antenatal referral for suspected SGA or FGR by fundal height</strong></td>
</tr>
<tr>
<td></td>
<td><strong>SGA or FGR detected antenatally by USS</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Early pregnancy assessment</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Birthweight Centile</strong></td>
</tr>
</tbody>
</table>

**Complete birth details**
Confirm if SGA / FGR was suspected (from a fundal height) or detected by scan antenatally.

Antenatal suspicion of SGA or FGR leading to referral for further investigation is usually on the basis of a fundal height measurement below the 10th centile line, or sequential measurements suggesting no or slow growth.

Antenatal detection / diagnosis of SGA indicates an ultrasound estimated fetal weight (EFW) below the birth centile, or sequential measurements with slow or no growth, and/or one or more abnormal Dopplers.
Input baby birth details

Identify early pregnancy assessment for low or increased risk for fetal growth restriction.

RCOG Guideline and NHS Care Bundle Algorithm recommend serial fundal height measurements for low-risk women, and serial ultrasound scans for women at increased risk of SGA or fetal growth restriction. The information requested here will improve the interpretation of referral rates.

To review the NHS England Saving Babies Lives care bundle algorithm …..click here
New edit function for centile page outcome, gender, birth weight

- Birthweight centile is identified.
- <10th centile or >90th centile = red box
Alterations can be made to:-
Outcome
Gender
Birth weight

Edit function:
### SGA/FGR Referral and Detection Rates
#### NHS Trust - 2015/16

**a) Response Rate**

<table>
<thead>
<tr>
<th>Hospital / Trust</th>
<th>Predicted No. of births per year</th>
<th>No. of completed records</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4700</td>
<td>1191</td>
<td>101.4%</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4700</td>
<td>1191</td>
<td>101.4%</td>
</tr>
</tbody>
</table>

**b) SGA/FGR referral and detection rates**

<table>
<thead>
<tr>
<th></th>
<th>Antenatal referral for suspected SGA/FGR</th>
<th>SGA detected antenatally</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q1 Apr-Jun 2015/16</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SGA at birth</strong></td>
<td>188</td>
<td>54.4</td>
</tr>
<tr>
<td><strong>Antenatal referral</strong></td>
<td>13.5</td>
<td>47.3</td>
</tr>
<tr>
<td><strong>Q2 Jul-Sep 2015/16</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SGA at birth</strong></td>
<td>158</td>
<td>53.8</td>
</tr>
<tr>
<td><strong>Antenatal referral</strong></td>
<td>13.1</td>
<td>47.3</td>
</tr>
<tr>
<td><strong>Q3 Oct-Dec 2015/16</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SGA at birth</strong></td>
<td>155</td>
<td>54.5</td>
</tr>
<tr>
<td><strong>Antenatal referral</strong></td>
<td>14.5</td>
<td>47.3</td>
</tr>
<tr>
<td><strong>Q4 Jan-Mar 2015/16</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SGA at birth</strong></td>
<td>150</td>
<td>50.0</td>
</tr>
<tr>
<td><strong>Antenatal referral</strong></td>
<td>13.1</td>
<td>47.3</td>
</tr>
</tbody>
</table>

* GUA = GAP User Average – the average rate for all participating Units across the UK
Benefits of Data collection

- Baseline SGA, with AN referral and detection rates
- Quarterly reports
- Benchmarking against other units (anonymously)
- ‘National picture’ now GAP in 76% of units
- Can identify ‘missed cases’ to audit
- Can monitor performance and improvement
- Commissioning support – Ultrasound resources
- PI - Evaluation of GAP
‘Missed case’ audit

- For each case:
  - To identify why the FGR was missed if possible
  - To identify if there are any training issues

- Overall
  - To identify themes/system failures
  - To focus service provision
  - To provide evidence for commissioning support/services
GAP-SCORE

- We provide an electronic audit tool to audit ‘missed cases’ in an standardised manner

- GAP-SCORE = Standardised Case Outcome Review and Evaluation.
GAP-SCORE

- Based on risk at booking/throughout pregnancy and serial scanning (RCOG guideline, 2014 & NHS England Saving Babies Lives Care Bundle, 2016)
- Use of customised growth chart
- Plotting and referring
- Growth scans
- Provides taxonomies and action plans