

Growth Assessment Protocol (GAP) Guidance

<https://perinatal.org.uk/GAPguidance.pdf>

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1 | INTRODUCTION

The Perinatal Institute provides the Growth Assessment Protocol as a licensed and supported service to assist clinicians and their health organisations with the assessment of fetal growth. This priority has arisen from evidence that many adverse outcomes in maternal and perinatal care are associated with unrecognised fetal growth problems, and can be prevented by improved awareness and detection of the pregnancies affected.

This document should be read in conjunction with the [GAP service level agreement](#) which sets out the proposed partnership between the PI's GAP team and each organisation's 'champions' / leads tasked with implementing and running the programme. A recent, [award](#) winning analysis of Office of National Statistics (ONS) data has emphasised the benefits of thorough implementation and adherence to GAP protocol on stillbirth prevention [1].

Here, we summarise the main components of GAP, and present the Care Pathway with evidence based guidelines which can be adapted into local protocols.

2 | IMPLEMENTATION OF THE GAP PROGRAMME

The main components of GAP are training, protocols, growth charts, benchmarking and missed case audit.

2.1 Training and accreditation of all staff involved in maternity care

Face to face training and remote workshops on all aspects of theory as well as practice including standardised fundal height measurements, ultrasound and Doppler parameters, generation and plotting on customised charts, early pregnancy risk assessment and referral pathways, and data collection and audit. This is supported by e-learning with theoretical and practical modules, which include a short theoretical assessment and provision of an e-certificate. A designated e-learning lead/administrator can be given access to local e-learning accounts and compliance reports.

2.2 Adoption and local adaptation of growth assessment protocols and guidelines

Includes the GAP Care Pathway, with early pregnancy 'booking' risk assessment, triage for low risk care through serial fundal height measurement, and indications for referral; and increased risk care, obstetric review, serial growth scans with assessment of size as well as growth rate, and appropriate additional Doppler investigations and implications for management.

2.3 Implementation and training in use of customised GROW software

Provision of GROW-App, (stand-alone or integrated with hospital electronic record), for plotting measurements of standardised fundal height (SFH) and estimated fetal weight (EFW). The growth chart is customised for constitutional variation (ethnic origin, maternal size, parity) and optimised by excluding pathological factors (e.g. high BMI, smoking), thus improving the ability to identify abnormal growth while reducing false positive diagnoses.

2.4 Recording pregnancy outcome and generating reports on progress

The software prompts the recording of key indicators following delivery of the baby, including the birthweight centile and, if SGA, whether it was detected antenatally. The false positive rate is also calculated. Standardised unit-specific reports are generated for local feedback and benchmarking against a baseline (established before GAP was implemented) to assess progress and compare with national GAP user average.

2.5 Missed case audit

Software and training is also provided to allow clinicians to undertake a 'standardised clinical outcome review and evaluation' (SCORE) of their SGA deliveries that were not recognised antenatally. GAP leads are encouraged to undertake this regularly on a proportion of cases, to check for avoidable factors such as failure to follow risk assessment protocol, inaccurate measurement or plotting, lack of referral for investigation, etc.

2.6 Further information is available in the [GAP service level agreement](#):

Annex A – Key responsibilities - sets out the respective roles and responsibilities for the Perinatal Institute and the local health service to ensure effective implementation and running of the GAP programme.

Annex B – Help Desk Services - outlines the support that hospitals and individual users can expect when assistance is required from the Perinatal Institute, including clinical and technical helpdesks.

Annex C – GROW Software, data Items and user accounts - provides details of the various software and user accounts available to support the programme, including growth charts with API links to information systems, audit tools for benchmarking and missed case review, and individual (clinical) and bulk (research) centile calculators.

3 | THE GAP CARE PATHWAY

3.1 Introduction

Following publication in 2019 of NHS England's Saving Babies' Lives Care Bundle version 2 (CBv2) [2], the Perinatal Institute has undertaken consultations on aligning it for NHS Trusts in the GAP programme, while maintaining the benefits of a tried and tested protocol that has been credited as a main contributor to the reduction of stillbirth rates in England [1, 3, 4, 5].

Our care pathway seeks to balance the need to identify, investigate and appropriately manage at-risk pregnancies with the aim to avoid unnecessary intervention. It continues the emphasis on surveillance according to risk assessment, by standardised fundal height (SFH) and estimated fetal weight (EFW) measurements, serially plotted on customised charts to improve the distinction between constitutional and pathological smallness [6, 7, 8, 9]. A focus of the revised pathway is a new, evidence-based definition of slow growth (see Section B).

Concerns about the ultrasound and Doppler capacity demands of CBv2, expressed at the 2019 National GAP User Symposium, have been confirmed by a survey we conducted in association with the British Medical Ultrasound Society (BMUS), which showed that most ultrasound services in the NHS cannot currently meet the requirements [10]. The Society of Radiographers have also expressed concern [11].

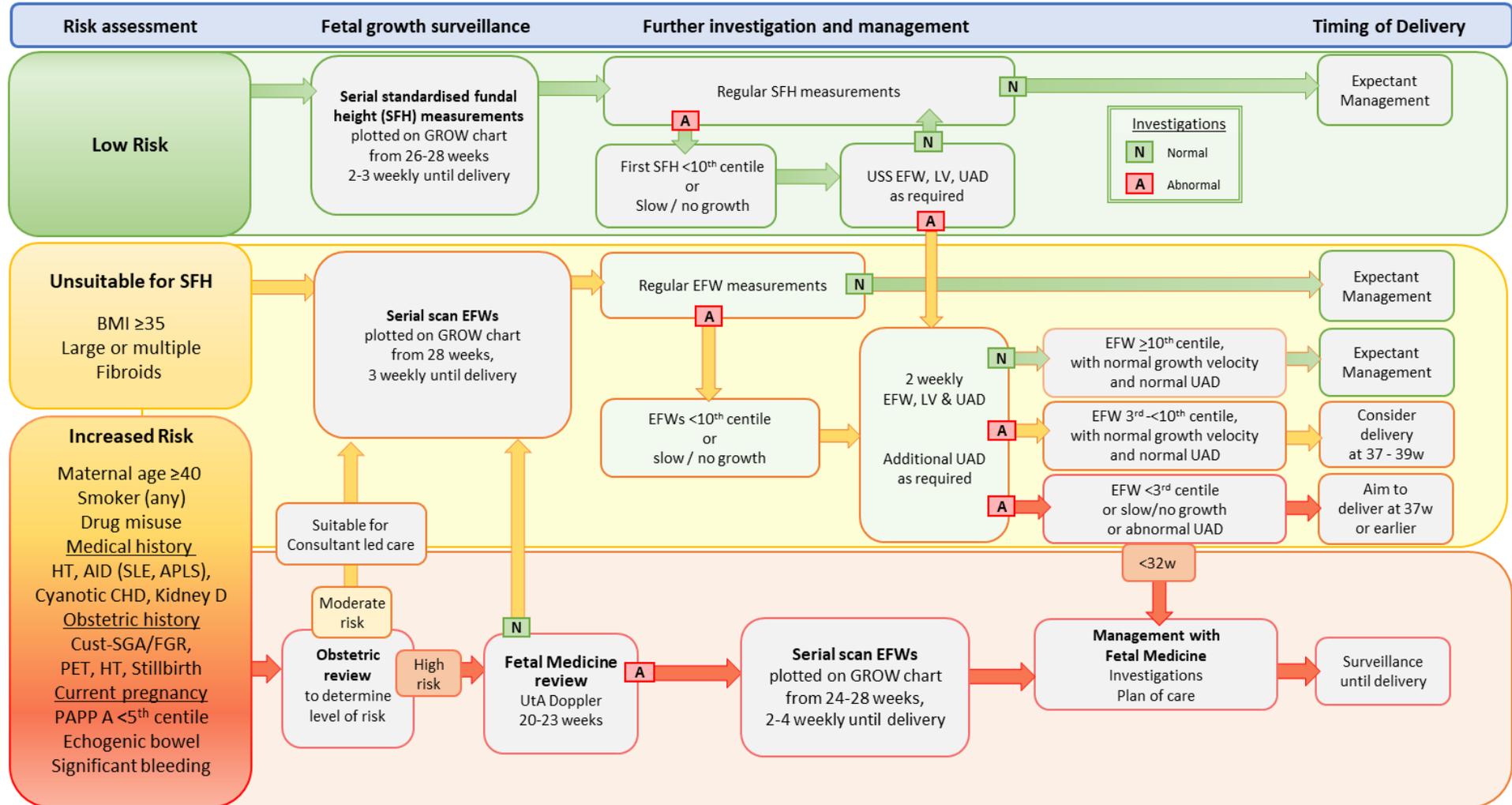
We have therefore developed a Care Pathway which can be implemented in two phases, according to maternity unit capacity. Phase I should be achievable with current resources, while sonographic services seek to acquire the additional training and resources required for Phase II. These Explanatory Notes are designed to be read in conjunction with Care Pathway algorithms I and II.

Disclaimer: We have made this guidance as evidence based as possible. It is intended to supplement, not substitute maternity care, which needs to be personalised and based on good clinical judgement. The Perinatal Institute and its staff cannot be held responsible for any adverse outcome.

GAP Care Pathway (Phase I)

Risk assessment, surveillance, investigation and management

See notes in sections 3.4 – 3.6 of GAP Guidance (<https://perinatal.org.uk/GAPguidance>)

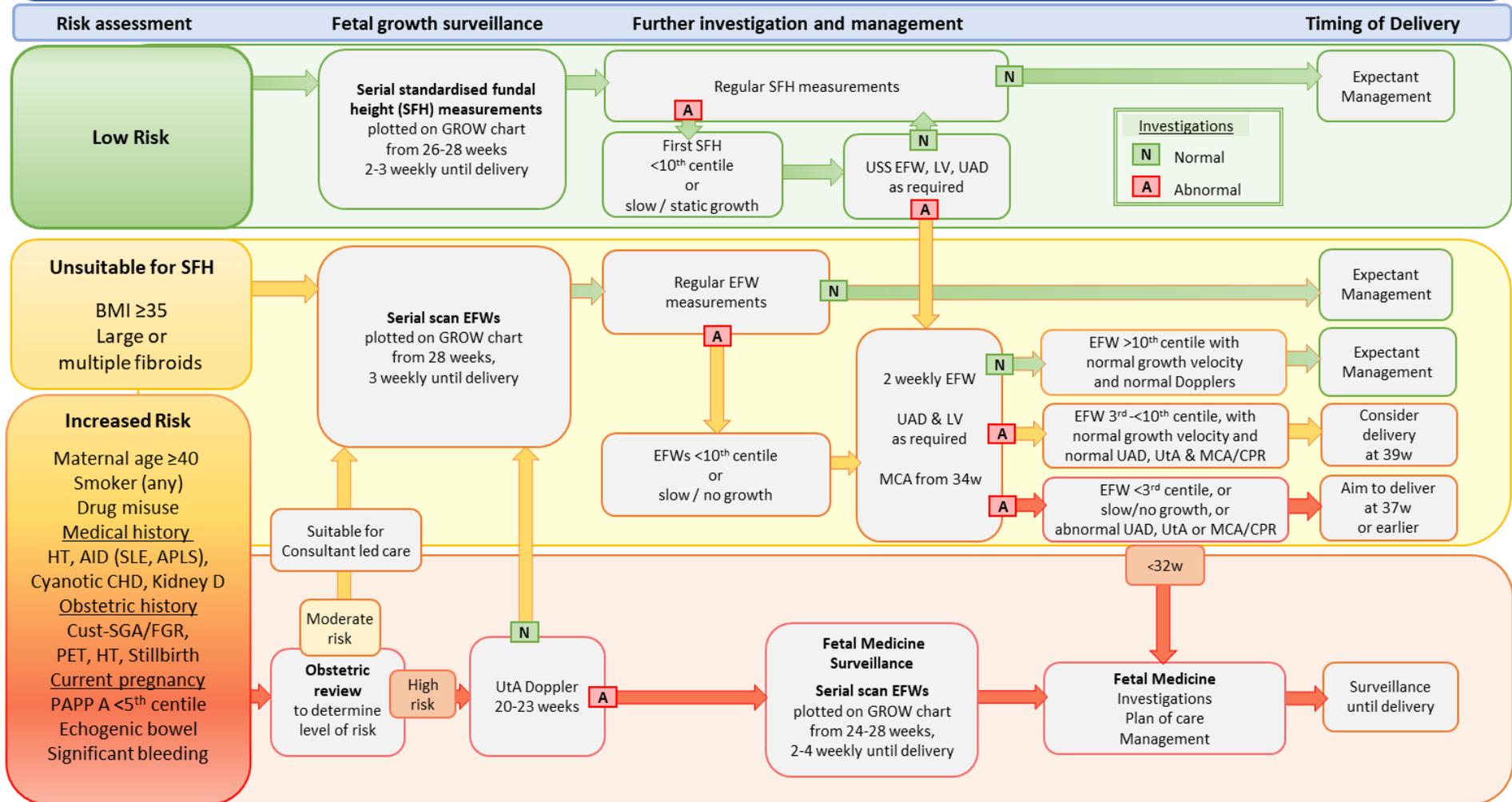


Abbreviations: AID= Autoimmune Disease; APLS= Antiphospholipid Syndrome; BMI= Body Mass Index; CHD= Coronary Heart Disease; EFW= Estimated Fetal Weight; FGR= Fetal Growth Restriction; SFH= Standardised Fundal Height; HT= Hypertension; LV= Liquor Volume; PET= Pre-eclampsia; SGA= small for gestational age; SLE= systemic lupus erythematosus; UAD= Umbilical Artery Dopplers; UtA = Uterine Artery Doppler.

GAP Care Pathway (Phase II)

Risk assessment, surveillance, investigation and management

See notes in sections 3.4 – 3.6 of GAP Guidance (<https://perinatal.org.uk/GAPguidance>)



Abbreviations: AID= Autoimmune Disease; APLS= Antiphospholipid Syndrome; BMI= Body Mass Index; CHD= Coronary Heart Disease; CPR= Cerebro-Placental Ratio; EFW= Estimated Fetal Weight; FGR= Fetal Growth Restriction; SFH= Standardised Fundal Height; HT= Hypertension; LV= Liquor Volume; MCA = Middle Cerebral Artery; PET= Pre-eclampsia; SGA= small for gestational age; SLE= systemic lupus erythematosus; UAD= Umbilical Artery Dopplers; UTA = Uterine Artery Doppler.

3.4 Risk Assessment

1. Early pregnancy risk assessment and triage into the correct care pathway is essential. As the significance of risk factors is often determined by the severity of current and previous conditions and various other circumstances, moderate and high risk categories are amalgamated into an 'Increased risk' group, which should undergo obstetric review to help determine the appropriate pathway and level required for investigations and surveillance.
2. Pre-existing diabetes, diabetes arising during pregnancy, or twins and other multifetal pregnancy are covered by their respective NICE guidelines and are out of scope of this document.
3. Previous 'SGA', if determined by customised centiles, is more likely to be due to fetal growth restriction (FGR) than if SGA is determined by population centiles (on which CBv2 is based). It is therefore represents increased risk and is often the only available indicator of the likelihood that there was indeed previous FGR, as it is often missed antenatally. Obstetric review should consider severity, gestational age at onset (if known), gestational age at delivery and associated factors such as preeclampsia.
4. Previous stillbirth is considered an increased risk, regardless of size and stated cause, unless placental insufficiency has been reliably excluded by histopathological examination.
5. Calculating an estimated fetal weight (EFW) at the time of the anomaly scan is not recommended, as good evidence is lacking about its efficacy to predict adverse outcome. Preliminary results presented at the 2019 Fetal Growth conference [12] suggest that the narrow normal range at 20-23 weeks can frequently lead to a false positive suspicion of SGA. The error is substantially increased with population based fetal weight standards. If units nevertheless wish to assess EFW at this time, we recommend using the customised centile calculator which works from 20 weeks gestation and is available from the [GAP Team](#).
6. For women with a history of, or significant risk factor(s) for, placental dysfunction (including history of pre-eclampsia or fetal growth restriction), Aspirin 75-150mg nocte is recommended from 12 weeks to birth according to latest NICE guidelines [13].
7. The recommended initial **obstetric review** of pregnancies considered at increased risk of early or late onset FGR should determine next steps according to severity of risk and unit policy.

Phase 1: Pregnancies considered high risk should be referred to maternal-fetal medicine (MFM) services, where available, for investigation and review:

- if uterine artery (UtA) Doppler is normal → moderate risk pathway;
- if UtA Doppler is abnormal → continue under MFM surveillance

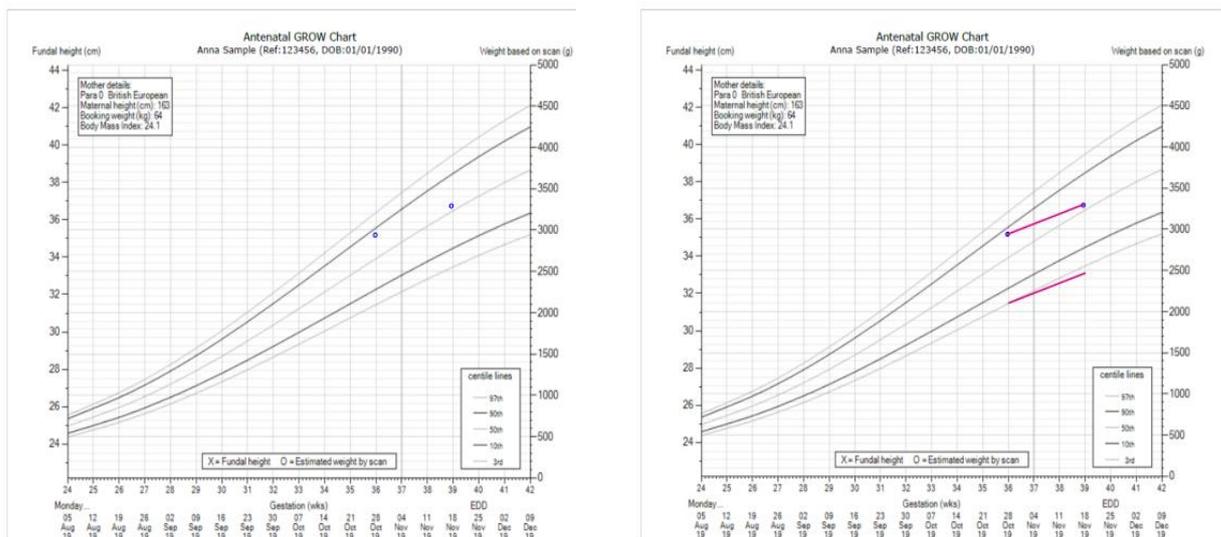
Where MFM services are not available, frequent assessment from 24 weeks throughout the third trimester is recommended, as per Care Pathway.

Phase 2: Pregnancies considered high risk can have UtA Doppler performed in the ultrasound department, with referral to MFM if abnormal.

3.5 Fetal growth surveillance

1. The **low risk pathway** follows the existing algorithm, with 2-3 weekly clinical assessment and fundal height measurement from 26-28 weeks until delivery, according to unit policy, using a standardised technique [14] and with measurements plotted on the customised GROW chart. If suboptimal growth is suspected (first fundal height measurement <10th centile; or slow or no growth), direct referral for growth scan and Doppler is recommended. If resources permit, a scan EFW should be repeated in 3 weeks' time to ascertain velocity, as a single scan cannot provide reassurance about the growth trajectory of the fetus (see B4).
2. **Where SFH is unreliable** because of high BMI (35+) or large or multiple fibroids [6], growth monitoring by serial ultrasound scan is indicated. Where resources allow, this should be done 3 weekly and, where resources permit, starting from **28 weeks** (rather than 32), as an EFW at this gestational age serves as an important **baseline** for assessment of fetal growth in the third trimester.
3. **Normal growth rate / velocity** varies with gestational age and is highest in the middle of the third trimester. It also varies with the customised growth potential of each fetus. For example, the average (50th centile) velocity, expressed in grams per day (g/d), can range from 22g/d between 28-31 weeks in a small mother with a baby of expected term weight of 3100g, to 32g/d between 34-37 weeks for a larger mother expecting a baby weighing 3700 g - i.e. 50% higher. Similarly, the 10th and 3rd centile growth rates shown on the GROW chart also vary with gestational age and expected birthweight.
4. Slow growth by **serial SFHs** is defined as a trajectory which is less (slower) than the slope of the curve (growth velocity) indicated by the **10th centile line** on the customised chart, over the same gestational age. The 10th centile is the appropriately sensitive screening tool to identify cases that need referral for ultrasound biometry.

5. Slow or 'restricted' growth by **serial EFWs** is defined as a growth rate between scan measurements which is slower than the slope of the **3rd centile line** on the customised chart at the same gestational age. A growth rate less than the slope of the customised 3rd centile line predicts adverse perinatal outcome [15]. For precision and reduced effect of scan error, routine serial EFW measurements to assess growth velocity should be at least 2 weeks apart [8]. While third trimester EFW measurements in routine NHS practice have been shown to be accurate to within +/-10% in 70% of cases [16], consideration should be given to the clinical implication of potential scan error, as well as the overall need for quality assurance. The Perinatal Institute has developed a free audit tool for EFW error, available from the [GAP Team](#).
6. In 2020/21, we will be introducing auto-plotting and digital assessment in the **new GROW App**, with alerts if the growth rate is outside the normal range at the respective stage in pregnancy. In the interim, visual assessment is required to compare serial SFH and EFW measurements with the 10th and 3rd centile reference lines. Plotting can be assisted by set-squares, available from the [GAP Team](#).



The figures below illustrate an example of manual assessment of growth rate:

Fig 1 (left) has two sample EFW measurements plotted at 36 and 39 weeks. The two measurements each lie between the 50th and 90th centile but taken in sequence, they suggest slow growth. This is confirmed in **Fig 2** (right), where a line is drawn through the two plots to delineate the slope. Using a set square, a parallel line is drawn through the 3rd centile line over the same gestational age interval; this shows that the growth rate is slower than the lowest accepted rate in this pregnancy, over this gestation interval. The use of a set square to draw parallel lines is illustrated in a [short video clip](#).

3.6 Further Investigation and Management

1. The Care Pathway outlines the suggested level of surveillance when placental insufficiency is suspected - by an EFW <10th centile, or by slow growth, with or without abnormal Dopplers. At early gestations i.e. before 32-34 weeks, fetal medicine involvement should be sought.
2. In pregnancies with evidence of growth restriction (EFW<3rd centile and/or slow growth rate, and/or abnormal Dopplers), delivery will be indicated by 37.0 weeks or earlier, depending on severity and Doppler findings. If growth velocity and Dopplers are normal, an EFW <3rd centile should still be considered FGR and the baby delivered before the end of 37 *completed* weeks (37 weeks 6 days).
3. An EFW between the 3rd and 10th centile, on a customised chart adjusted for constitutional variation, is also associated with increased risk of adverse perinatal outcome. Concern about early term delivery because of an association with special educational needs (SEN) in infancy and childhood [17] needs to be balanced by the significantly increased cerebral palsy risk in SGA babies delivered at term [18]. Furthermore, the risk of stillbirth is also increased; the majority of deaths prevented since the introduction of GAP had late onset FGR in the 3rd to 10th centile band [19]. Consideration of timing of delivery should include uterine and middle cerebral artery Doppler findings: if all Dopplers are normal, expectant management to 39 weeks is likely to be safe [20]. When such investigations are not available and growth restriction cannot be excluded (Phase I), earlier delivery is advisable, as indicated in the care pathway.

3.7 Audit

Ongoing audit of detection rates is essential to monitor progress. The GROW App will produce the following reports to assist units – quarterly or half yearly, depending on the size of the service:

1. Proportion of babies born <10th and <3rd centile
2. Antenatal detection rates of babies born <10th and <3rd centile
3. False positive detection rates of babies born <10th and <3rd centile

The reports will also include a national average comparison and a top 10-unit comparison. With approval of participating units, reports can also be produced for networks and regions.

Optional data fields will be added in the GROW App in 2021 to enable units to undertake a more thorough assessment of service and outcome. These will include:

- Proportion of pregnancies identified as increased risk in early pregnancy, and care offered
- Aspirin use and outcome
- Third trimester scan regime and outcome, stratified according to risk factors

In addition, the new GROW-App will integrate with the GAP-SCORE tool which will facilitate ongoing case-note review of 'missed' SGA cases (neonates with birthweight <10th or <3rd centile) and reasons why they were not detected antenatally.

3.8 Conclusion

The new GAP Care Pathway introduces the main recommendations of version 2 of the Care Bundle while retaining and building on the key elements of the successful GAP algorithm and customised surveillance. The Care Pathway is presented in two phases, with Phase I to be used until the training and resource requirements are fulfilled to be able to deliver Phase II.

3.9 Next steps

1. Our regular, free on-line training workshops include Q & A about the new GAP Care Pathway. Dates are posted on www.perinatal.org.uk/Diary/Diary.aspx. To register, please write to [GAP Team](#).
2. E-learning modules are being updated and prepared to be available through NHS E-learning for Health.
3. Expected release of new GROW App with auto-plotting: spring 2021.

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