National Women & Infants Health Programme

QUICK SUMMARY DOCUMENT

Fetal Growth Restriction – Recognition, Diagnosis and Management

This summary document is a resource for all clinicians working in healthcare in Ireland who are involved in the care of women with Fetal Growth Restriction.

Following a comprehensive literature review a number of evidence-based recommendations for management of Fetal Growth Restriction – Recognition, Diagnosis and Management were agreed upon.

Key Recommendations

Classification

1. We recommend classifying Fetal Growth Restriction (FGR) into early-onset FGR if diagnosed before 32 weeks' gestation or late-onset FGR if diagnosed after 32 weeks' gestation. *Best Practice*

Screening and prevention

2. We recommend that women should have a booking visit by 14 weeks' gestation. This should include confirmation of gestational age, a comprehensive medical and obstetric history and screening for risk factors for Fetal Growth Restriction. *Best Practice*
3. We recommend that women with a history of placenta-mediated Fetal Growth Restriction or pre-eclampsia are offered aspirin 150 mg daily before 16 weeks' gestation, but ideally earlier than this. We do not recommend commencing aspirin after 16 weeks' gestation as there is no evidence at present of benefit. *1C*
4. Symphysis-fundal height can be used as a primary screening method for Fetal Growth Restriction in the antenatal setting in women classified as normal-risk with a body mass index (BMI) between 18.5 and 24.9. There should be a low threshold for sonographic assessment if there is any difficulty in clinically assessing fetal size, for example because of maternal obesity, multiple fibroids or a history or suspicion of polyhydramnios. *1B*
5. We recommend that women with a history of Fetal Growth Restriction or significant risk factors for Fetal Growth Restriction undergo serial sonographic evaluation of fetal weight, Deepest Vertical Pool (DVP) and Umbilical Artery Doppler (UAD). The timing of these scans should be individualised but there is no evidence of benefit in repeating these more frequently than every four to six weeks. *1C*
6. Clinicians should be aware that significant risk factors for Fetal Growth Restriction may include previous stillbirth, pre-existing hypertension, pre-existing diabetes mellitus, renal impairment, antiphospholipid syndrome, maternal age >40 years, current pregnancy induced hypertension or pre-eclampsia, current smoker of >10 cigarettes per day, maternal cocaine use and a body mass index (BMI) of greater than 35 or where clinical measurement of fetal size is limited due to maternal habitus. *Best Practice*
7. Third trimester growth ultrasound scans should not be routinely offered to women in the absence of significant risk factors for Fetal Growth Restriction or clinical concerns. From current evidence, they do not confer any benefit to mother or baby. *1A*
8. We recommend the use of population based fetal growth charts such as the Hadlock equation and growth chart for estimation of fetal weight. *1B*

Diagnosis

9. All women with Fetal Growth Restriction should have a thorough history taken at the time of its detection. This should include the identification of modifiable risk factors such as smoking and alcohol use. *Best Practice*
10. Women should have a detailed ultrasound scan at diagnosis to review fetal biometry, Deepest Vertical Pool (DVP) and Umbilical Artery Doppler (UAD). A review of fetal anatomy should be carried out in cases of severe early-onset Fetal Growth Restriction. *Best Practice*

11. Input from a Maternal Fetal Medicine specialist should be sought in cases of severe early-onset Fetal Growth Restriction <3rd centile, early-onset Fetal Growth Restriction with abnormal Umbilical Artery Doppler (UAD), or if there is evidence of any additional concerning sonographic features such as polyhydramnios, oligohydramnios, structural anomalies or soft markers. The intention of this review is to counsel and guide further investigations, offer invasive testing and instigate a fetal surveillance management plan going forward. Subsequent to this, in the event of sonographic and neonatal support availability locally to adequately monitor these cases and provide expert care in the event of a preterm delivery, care can be transferred back to the referring hospital for ongoing surveillance and delivery. *Best Practice*
12. Maternal screening for congenital infections such as Cytomegalovirus (CMV) testing can also be considered with additional viral screens requested if relevant risk factors are identified. *1C*

Management

13. We recommend fetal biometry, Deepest Vertical Pool (DVP) and Umbilical Artery Doppler (UAD) measurement is done every 2 weeks if Umbilical Artery Doppler (UAD) measurements are normal and estimated fetal weight >3rd centile. *1C*
14. We suggest weekly Umbilical Artery Doppler (UAD) measurements if Umbilical Artery Doppler (UAD) PI >95th centile or Estimated Fetal Weight (EFW) <3rd centile. *2C*
15. We recommend twice weekly Umbilical Artery Doppler (UAD) measurement if there is Absent end-diastolic flow (AEDF) in the Umbilical Artery Doppler (UAD) in the absence of any other indication for delivery. Twice weekly Umbilical Artery Doppler (UAD) measurements can also be considered on a case-by-case basis in the presence of plateauing of growth, oligohydramnios or other fetal concerns. *1C*
16. We recommend Umbilical Artery Doppler (UAD) measurement three times per week if there is Reversed end-diastolic flow (REDF) in the Umbilical Artery Doppler (UAD) in the absence of any other indication for delivery. *1C*
17. Ductus Venosus (DV) Doppler measurement can be used as an indicator of the optimal timing of delivery in severe early-onset Fetal Growth Restriction with abnormal Umbilical Artery Doppler (UAD). If not done locally, this should prompt consideration for referral to a Maternal Fetal Medicine specialist. *1C*
18. Although the Middle Cerebral Artery/Umbilical Artery Doppler PI ratio Cerebro-placental ratio (CPR) can be a helpful adjunct to Umbilical Artery Doppler (UAD) measurement to identify late-onset Fetal Growth Restriction, there are limited data to support its routine use in Fetal Growth Restriction surveillance or appropriate timing of delivery at present. The absence of MCA Doppler assessment facilities in a maternity unit / hospital does not need to prompt referral to a tertiary unit / hospital, due to the insufficient evidence to support its routine use. *2B*
19. We recommend using Deepest Vertical Pool (DVP) for the assessment of amniotic fluid in Fetal Growth Restriction pregnancies. *Best Practice*
20. Although a normal biophysical profile (BPP) is reassuring for the clinician, BPP is not recommended in isolation for routine fetal surveillance particularly in early-onset Fetal Growth Restriction and should not be relied upon solely to time delivery. *Best Practice*
21. Daily CTG monitoring after 26 weeks, or at a gestational age which would trigger intervention, should be considered when there is absent end diastolic flow or reversed end-diastolic flow in the Umbilical Artery Doppler (UAD). *Best Practice*
22. It is reasonable to advise women that continuing low to moderate intensity exercise during pregnancy for 30 minutes most days of the week is considered safe in Fetal Growth Restricted pregnancies. *1A*
23. Women and partners with a Fetal Growth Restriction affected pregnancy should be offered support by staff and provided with contact details for further supportive care, if desired. Consideration of referral to the social work counselling team should be given, especially in the event of a prolonged hospital admission. *Best Practice*

Delivery

24. We suggest delivery no later than 39+0 weeks if the Estimated Fetal Weight (EFW) is 3rd-9th centile with normal Dopplers and no plateauing of growth. *2C*
25. We recommend delivery by 37+0 weeks if the Estimated Fetal Weight (EFW) <3rd centile or Umbilical Artery Doppler (UAD) PI >95th centile. Delivery between 34-37 weeks can be considered if there are other mild associated abnormalities such as oligohydramnios or suboptimal interval growth. *1B*
26. We recommend delivery by 34+0 weeks in Absent end-diastolic flow (AEDF). Earlier delivery may be indicated in cases of suboptimal interval growth or a deterioration in sonographic values. *1B*
27. We recommend delivery by 30+0 weeks in Reversed end-diastolic flow (REDF). Earlier delivery may be indicated in cases of suboptimal interval growth or deterioration of sonographic variables. *1B*
28. Delivery should be considered between 26-30 weeks if there is absent or reversed a-wave in DV Dopplers with an abnormal Umbilical Artery Doppler (UAD). *1C*
29. We recommend delivery at any time for any maternal indication in Fetal Growth Restriction pregnancies. *Best Practice*
30. We recommend delivery in the fetal interest at any time after 26 weeks if abnormal CTG findings such as spontaneous repeated decelerations or fetal bradycardia. *Best Practice*
31. Delivery before 26+0 weeks in the fetal interest should be individualised based on discussion with the woman, obstetrics and neonatology teams due to the guarded neonatal outcomes at this gestation. *Best Practice*
32. We strongly recommend the administration of a course of timed antenatal corticosteroids, ideally within seven days of delivery, if delivery is anticipated at a gestational age of between 24+0 and 34+6 weeks. *1A*
33. A course of antenatal corticosteroids should consist of 24 mg of dexamethasone phosphate, or alternatively 24 mg of betamethasone phosphate, administered intramuscularly in two divided doses of 12 mg, given 24 hours apart. Administration of the second dose after a 12 hour interval may be considered when delivery is imminent. *1C*
34. Magnesium sulphate for fetal neuroprotection should be administered if less than 32 weeks' gestation and delivery is anticipated. *1A*
35. We recommend sending the placenta for histological examination in Fetal Growth Restriction pregnancies. *Best Practice*

Subsequent pregnancy

36. All women who have had a pregnancy affected by Fetal Growth Restriction should be offered postnatal support and the opportunity for follow-up discussion, if desired. *Best Practice*
37. Due to the higher risk of recurrence and impact on future pregnancies, all women who have experienced an adverse perinatal outcome as a result of Fetal Growth Restriction (for example a preterm birth or perinatal loss) should be offered an appointment for postnatal counselling, review of placental histology, investigation of underlying causes and a discussion on risk recurrence and modifiable risk factors, if applicable. *Best Practice*
38. We recommend that women are managed in a consultant led clinic in subsequent pregnancies with regular sonographic surveillance of fetal growth. *Best Practice*

Diagnosis and Management of Fetal Growth Restriction

Clinical suspicion or significant risk factors for example previous FGR, PET, pre-existing DM or HTN, previous stillbirth, renal disease, smoker. (See Table 1 for risk factors)

Sonographic assessment of fetal weight (Hadlock)

CLASSIFICATION OF FGR

Early onset FGR <32 weeks: An AC or EFW <3rd centile OR late changes in the umbilical artery Doppler (defined as AEDF or REDF) OR An AC or EFW <10th centile combined with Uterine artery mean PI >95th centile and/or Umbilical artery Doppler PI >95th centile

Late-onset FGR >32 weeks: An AC or EFW <3rd centile Or at least two out of three of the following: An AC or EFW <10th centile, An AC or EFW crossing two quartiles, Abnormal Doppler findings defined as an UAD PI >95th centile or a CPR <5th centile

Investigations

Ensure accurate dating

Detailed ultrasound – anatomy, placenta, amniotic fluid, UAD

Consider genetic testing especially if early onset FGR, severe FGR, congenital anomalies, polyhydramnios or soft markers

Screening for congenital infections

Fetal biometry every 2 weeks

MANAGEMENT

Deliver at any time in the maternal interest

Deliver any time >26 weeks if abnormal CTG findings such as spontaneous repeated decelerations or fetal bradycardia

Normal UAD

EFW 3rd-9th centile

UAD and AFI/DVP every 2 weeks

Deliver by 39 weeks

EFW <3rd centile

UAD and AFI/DVP weekly

Deliver by 37 weeks

UAD Increased Resistance (PI >95th centile)

UAD and AFI/DVP weekly

Deliver by 37 weeks or earlier if other associated abnormalities e.g. oligohydramnios, suboptimal interval growth

UAD AEDF

UAD and AFI/DVP twice weekly

CTG daily when >26/40

Consider inpatient admission if above cannot be facilitated as an outpatient

Deliver by 34 weeks

Timed corticosteroids

IV Magnesium sulphate 4 gram loading dose followed by 1gram/hr maintenance dose if <32 weeks

UAD REDF

Inpatient admission

UAD and AFI/DVP three times per week

CTG daily when >26/40

Deliver by 30 weeks

Timed corticosteroids

IV Magnesium sulphate 4 gram loading dose followed by 1 gram/hr maintenance dose if <32 weeks

Abbreviations: FGR fetal growth restriction, PET preeclampsia, HTN hypertension, DM diabetes mellitus, UAD umbilical artery Dopplers, CTG cardiotocograph, EFW estimated fetal weight, AFI amniotic fluid index, DVP deepest vertical pool, PI Pulsatility Index, AEDF absent end-diastolic flow, REDF reversed end-diastolic flow

Table 1: Risk Factors for Fetal Growth Restriction

Maternal Demographics	• Parity • Body mass index (BMI) less than 20 or greater than 25 • Extremes of maternal age (<16 years or >40 years) • Assisted conception • Ethnicity (minorities, non-white) • Low socio-economic status
Maternal co-morbidities and prior history	• Hypertension/pre-eclampsia/previous pre-eclampsia • Systemic lupus erythematosus • Pre-existing diabetes mellitus • Inflammatory bowel disease • Major renal disease, lung disease or heart disease • Previous FGR pregnancy • Previous stillbirth • Recurrent pregnancy losses • Antiphospholipid syndrome
Fetal	• Chromosomal abnormalities or genetic syndromes • Structural anomalies • Congenital infections (CMV, Toxoplasmosis, Rubella, Varicella, Syphilis, Malaria, Zika, HSV) • Multiple pregnancy
Placental	• Placental developmental abnormalities (for example abnormal placental shape/position, diffuse distal villous hypoplasia, delayed villous maturation/distal villous immaturity) • Maternal vascular malperfusion (characterised by features such as infarction, accelerated villous maturation, focal distal villous hypoplasia, decidual vasculopathy) • Fetal vascular malperfusion (defined as any pathology with evidence of abnormal perfusion of the placenta from the fetus or vice versa; may be of fetal, umbilical, mechanical or placental aetiology) • Chronic inflammatory processes (for example chronic histiocytic intervillositis, villitis of unknown aetiology) • Miscellaneous conditions such as massive perivillous fibrinoid deposition and maternal floor infarction
Environmental	• Substance misuse • Smoking • Alcohol • High altitude/hypoxia • Irradiation • Environmental pollutants • Exposure to teratogens (for example warfarin, methotrexate)

Auditable standards

Audit using the key recommendations as indicators should be undertaken to identify where improvements are required and to enable changes as necessary, and to provide evidence of quality improvement initiatives.

Auditable standards for this guideline include:

1. Number of women attending for a booking ultrasound scan by 14 weeks' gestation.
2. Number of women with a previous history of placenta mediated FGR or PET commencing low-dose aspirin therapy by 16 weeks.
3. Number of women with a history of FGR referred for fetal growth assessment.
4. Adherence to the Guideline's recommended ultrasound biometry and Doppler measurement schedule.
5. Number of women who received antenatal corticosteroids within one week of delivery if less than 35+0 weeks' gestation.
6. Number of women offered a postnatal visit if they experienced an adverse perinatal outcome as a result of FGR.

Recommended reading:

1. HSE nomenclature/glossary for audit www.hse.ie/eng/about/who/nqpsd/ncca/nomenclature-a-glossary-of-terms-for-clinical-audit.pdf
2. HSE National Framework for developing Policies, Procedures, Protocols and Guidelines How_to_Develop_HSE_National_Policies_Procedures_Protocols_and_Guidelines_gQBQ4os.pdf
3. Melamed N, Baschat A, Yinon Y, *et al.* FIGO (international Federation of Gynecology and obstetrics) initiative on fetal growth: best practice advice for screening, diagnosis, and management of fetal growth restriction. *Int J Gynaecol Obstet Off Organ Int Fed Gynaecol Obstet* 2021; 152 Suppl 1: 3–57. DOI: 10.1002/ijgo.13522
4. Lees CC, Stampalija T, Baschat AA, *et al.* ISUOG Practice Guidelines: diagnosis and management of small-for-gestational-age fetus and fetal growth restriction. *Ultrasound Obstet Gynecol* 2020; 56: 298–312. DOI: 10.1002/uog.22134
5. Martins JG, Biggio JR, Abuhamad A. Society for Maternal-Fetal Medicine Consult Series #52: Diagnosis and management of fetal growth restriction. *Am J Obstet Gynecol* 2020; 223: B2–B17. DOI: 10.1016/j.ajog.2020.05.010
6. Boers KE, Vijgen SMC, Bijlenga D, *et al.* Induction versus expectant monitoring for intrauterine growth restriction at term: randomised equivalence trial (DIGITAT). *BMJ* 2010; 341: c7087–c7087. doi: https://doi.org/10.1136/bmj.c7087
7. Lees CC, Marlow N, van Wassenaer-Leemhuis A, *et al.* 2 year neurodevelopmental and intermediate perinatal outcomes in infants with very preterm fetal growth restriction (TRUFFLE): a randomised trial. *Lancet Lond Engl* 2015; 385: 2162–2172. DOI: 10.1016/S0140-6736(14)62049-3

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https://www.hse.ie/eng/about/who/acute-hospitals-division/woman-infants/clinical-guidelines/

https://www.rcpi.ie/faculties/obstetricians-and-gynaecologists/national-clinical-guidelines-in-obstetrics-and-gynaecology/