

QIPP: Reducing perinatal mortality and morbidity through improved antenatal detection of fetal growth restriction

Summary

Enhanced antenatal recognition of fetal growth problems improves the chance that babies are delivered in good condition, and reduces perinatal mortality and morbidity, resulting in an estimated 50 fewer stillbirths and neonatal deaths and 12 fewer cases of cerebral palsy in the West Midlands. The required investment can be offset manifold and result in potential saving of £ 5.4 Million p.a., due to reduced neonatal intensive care, cerebral palsy and litigation.

Introduction: The Need

Intrauterine growth restriction (IUGR) is strongly linked to perinatal mortality and life-long morbidity¹. A baby affected by IUGR is more likely to die before it is born, or need neonatal intensive care, or develop cerebral palsy. The only effective management is to deliver at-risk babies after identification and appropriate investigation of those at risk.

Problems with fulfilling this need

Currently, maternity services are not good at monitoring growth and identifying IUGR antenatally. This is confirmed by regional reports of key performance indicators, including IUGR detection based on routine data collection from the WM IfH programme, which shows that only 30% of cases are currently detected². **A major underlying reason for this is the chronic shortage in ultrasound services.** Intrauterine growth restriction is a key feature in many perinatal deaths. Independent peer reviews have shown that in many cases, the bad outcome would have been avoided if there had been earlier recognition and investigation of growth failure, and timely delivery of the affected fetus.

Proposed solution

Improved detection of growth restriction requires evidence based protocols, supported by the appropriate level of ultrasound resources. Preliminary results from the Birmingham community growth scanning pilot show that it is on course to deliver substantially increased antenatal detection of IUGR, with a significant improvement evident already in the short period since implementation in mid 2010³. Based on these results, it is expected that the programme, once fully established, will lead to timely detection of at least 60% of babies with IUGR.

Additional benefits of the service, already apparent through the Birmingham pilot, include improved contact with midwife and maternal reassurance, reduced barriers for referrals, and improved equity of fetal growth assessment.

Costs of enhanced service

Improved detection of IUGR requires:

- Evidence based protocols** for fetal growth screening and assessment; these were developed by the Perinatal Institute in collaboration with stakeholders including the Regional Ultrasound Group. It is supported by a rolling programme of GROW training and accreditation. Annual regional cost: **£150,000**.
- Appropriate ultrasound resources:** Community growth scans, calculated for the Birmingham CoGS pilot, cost £10 per pregnancy, or **£720,000** p.a. for the West Midlands.
- Early delivery of pregnancies with IUGR:** With the prevalence of IUGR in WM maternities about 14% [Q2], about 10,000 pregnancies are affected each year in the region. If 60% are detected (up from currently 30%), this would represent 3000 more cases referred for further assessment, and it is estimated that up to a third of these, or 1000 pregnancies, would be considered serious enough to require earlier delivery (from 34 weeks onwards). At a cost of induction of labour of approx £200 each, this would mean an increased costs of **£ 200,000**.
- Caesarean sections:** Induction of labour for babies identified as IUGR brings, according to regional figures, an increased risk of emergency CS, from a baseline 14% to 19% i.e. 5% of 1000 = 50 additional CS. At an approx cost £2,000 each this would represent an additional **£ 100,000**.
- Increased stay on NNU** may result from earlier delivery. While most babies born from 34 weeks do NOT require intensive neonatal unit care, the total regional NNU cost (72,000 births) for babies from 34 weeks gestation is just over 5M; this represents **£ 74,000** for the estimated 1000 deliveries required to be undertaken for IUGR.

¹ Kady S, Gardosi J. Perinatal mortality and fetal growth restriction. *Best Practice Res Clin Obstet Gynaecol* 2004;18:397-410.

² PEER Report – Q2, 2010/11 – Perinatal Institute http://www.pi.nhs.uk/pnm/maternitydata/Q2_2010-11_Perinatal_KPI_report.pdf

³ Birmingham Community Growth Scanning (CoGS) project – preliminary report <http://www.pi.nhs.uk/cogs/>

Benefits

Although the potential benefits are many and substantial, they are generally difficult to quantify because of a lack of readily available data. The following are conservative estimates:

- Lower rates of perinatal mortality**, to which IUGR is the single largest contributor¹. Improved identification and investigation of the at-risk pregnancy results in a reduction of stillbirth⁴. Excluding congenital anomalies and pre-viable deaths, about 100 perinatal deaths with IUGR occur at relatively mature gestational ages (34+ weeks), and it is estimated that better detection could lead to avoidance of at least half of these deaths, i.e. **50 each year**.
- Reduced asphyxia during childbirth**. IUGR results in diminished reserve, and if this is not recognised antenatally, the risk of complication during labour is increased and can result in a severely compromised baby⁵. Hypoxic Ischemic Encephalopathy (HIE) occurs in 2 per 1000 births, i.e. approx 144 cases annually in the region. These unfortunate babies each require intensive neonatal management, which we estimate to cost at least 10,000 per case (representing increased NNU stay @ 1000 per day plus subsequent need for care). Better detection of IUGR would result in at least 25% fewer such cases, i.e. 36 x 10,000 or **£ 360,000** savings per annum in the region.
- Reduced neonatal unit costs** for IUGR babies at term: Although preterm babies require the longest treatment, most episodes of intensive care are afforded to mature babies born at term, since they constitute the largest number of births. From 36 weeks, based on week-by-week neonatal admission figures in the West Midlands with an annual birth rate of 72,000, there are 1,996 excess days due to IUGR. At a daily NNU cost of £1,000 per day, this represents a potential saving of **£2M**.
- Reduction in cerebral palsy (CP)**: IUGR at term is associated with a significantly increased risk of cerebral palsy⁶. The incidence of CP is approximately 2/1,000 and the majority (two-thirds) arise from term pregnancies, i.e. there are about 100 new cases of CP per year occurring after term delivery. Based on previous work, 24% of term births leading to CP are IUGR⁶, and we estimate that at least half of these, i.e. 12 cases per year, could be prevented through earlier recognition and timely delivery. At an estimated lifetime cost of CP of £1M in 2000⁷ (excluding social care costs), we estimate that the annual saving would be at least £ 100,000 per case, or **£ 1.2** for the Region.
- Reduced litigation**: According to the NHSLA, inappropriate antenatal risk assessment is a principal factor in litigation⁸. Assessment of fetal growth is central to this. The cost of *obstetric* litigation in the West Midlands runs at an average rate of £12M per annum over the last 5 years⁹. We estimate that at least a quarter of these costs could be saved by better recognition of IUGR leading to more careful monitoring, better management of the affected baby = **£3M**.

Summary of Cost – Benefit

	Investment/Expenditure	Cost–WM (72,000 births) (x 1000 £)	Cost per birth (£)
1	Implementation and support of evidence based protocols & training	150k	2.1
2	Enhanced ultrasound resources - CoGS model [x]: £ 10 per pregnancy	720k	10.0
3	Induction of labour for delivering at-risk fetuses with IUGR	200k	2.8
4	Caesarean section for delivering at-risk fetuses with IUGR	100k	1.4
5	Increased cost of NNU stay for some of the IUGR babies delivered earlier	74k	1.0
	Total investment	1,246k	17.3
Savings			
1	50 fewer perinatal deaths p.a. in West Midlands (costs unable to quantify)	?	
2	Reduced intrapartum related brain damage/HIE	360k	5.0
3	Reduced NNU stay for babies with IUGR delivering at term	2,000k	27.8
4	Reduced incidence of cerebral palsy	1,200k	16.7
5	Reduced costs of obstetric litigation	3,000k	41.7
	Total savings	6,560k	91.1

Q - improved antenatal detection allows better, focussed care and overall enhanced quality of the service

I - innovative use of customised growth charts and extension of the service into the community

P - substantial savings through reduced need for intensive care and reduced litigation

P - prevention of perinatal loss and brain injury by identification and timely delivery of babies at risk

⁴ Neilson JP, Alfirevic Z. Doppler ultrasound for fetal assessment in high risk pregnancies. *Cochrane Database Syst Rev* 2000: CD000073.

⁵ Confidential Enquiries into Intrapartum Deaths *Perinatal Institute* 2010

⁶ Jacobsson B Ahlin K, Francis A, et al Cerebral palsy and restricted growth status at birth. *Br J Obstet Gynaecol* 2008;115: 1250-5.

⁷ Kruse M, Michelsen S I, Flacks EM, et al Lifetime cost of cerebral palsy. *Developmental Medicine & Child Neurology* 2009;51:622-8

⁸ NHS Litigation Authority - Stillbirth Claims 2009 www.nhs.uk/NR/rdonlyres/3DCA11D2-49E9-4E4F-97B0-260B0BDD0E6C/0/NHSLitigationAuthorityStudyofStillbirthClaims.pdf

⁹ NHSLA Factsheets re obstetric litigation in the West Midlands <http://www.nhs.uk/Publications/>