Service Area	**Birmingham Women's NHS Foundation Trust** **Fetal Medicine Department**
Indicator name	**Annual Report for Specialised Services**
Indicator definition Include - Precise definition of what is being measured and how this will be reported e.g. % patients seen within 18 weeks - Define any numerators and denominators as appropriate - Define time periods	An Annual Report (for 10/11) detailing provision of Specialised Services (broken down into separate service areas where applicable) • Details of each the specialised service* provided inc. brief description of the service, key contacts, and staffing • Activity in each area • Details of clinical audits or monitoring carried out (or planned) • Details of SUI reporting mechanisms • Details of Patient and Public Engagement activity • Feedback on one or two key outcome measures • Development plans and challenges/issues from service perspective
Rationale for inclusion	Enhance communication, accountability and openness between Provider Trusts and Commissioners and allow better monitoring of activity and quality of patient care
Required outcomes	• Annual Report for the year 2010-2011 to be provided to the WMSCT by 30th Sept 2011 • A meeting between WMSCT and Trust to take place to discuss the Annual Report and review progress. Meeting to be arranged annually.
Data source and collection method	Viewpoint Fetal Medicine System – Fetal Medicine Department BWNFT BWNFT hospital Lorenzo system
Organisation responsible for data collection	BWNFT
Frequency of collection	Report to be provided annually
Baseline period / date/value if appropriate	2010/2011 Similar extensive reports are available for previous years if required
Baseline value if appropriate	Activity data: • Contracting data • Clinical activity data including key outcome measures for all procedures
Assessment of goal achievement for indicators with substantial inherent variability	Annual report covers work of Fetal Medicine Department at BWNFT All aspects detailed in the indicator definition are covered by the report
Partial completion – arrangements made for partial completion leading to stepped payments? (add detail)	No

Birmingham Women's NHS
NHS Foundation Trust

The Fetal Medicine Centre Birmingham and the West Midlands Region

Annual Report April 2010 - March 2011

Editor **Prof. M.D. Kilby; Clinical Lead in Fetal Medicine.**

1. Introduction

The Fetal Medicine Centre at the Birmingham Women's Foundation Trust continues to offer local, Regional a supra-regional service for prenatal diagnosis and fetal therapy.

The successful delivery of the service to patients both in South Birmingham and from other Primary Care Trusts is a credit to the hard work of our multidisciplinary team and its interaction with affiliated teams in neonatal paediatrics and the paediatric subspecialties of surgery, cardiology and genetics.

In addition, we continue to work closely with the Newborn Networks and the Regional Specialist Services Agency to deliver a 'seamless' service. In September 2006, the Birmingham Women's Hospital was designated the Perinatal centre for West Midlands, funded by the Regional Specialist services team.

We provide training opportunities in RCOG recognized training schemes for subspecialty training and ATSM places. We have trainees from the UK, China and most recently Argentina.

As well as Fetal Medicine services there are also several maternal medicine clinics providing specialist care (not funded by the RSSG).

2. Midwifery Report *Veronica Donovan*

The Fetal Medicine midwifery / sonographer team continues to lead:

- An amniocentesis clinic
- Sonographer led fetal echocardiography / cardiology screening service
- 1st Trimester fetal cardiology screening service

Mrs Helen Baker has completed fetal echocardiography training and is continuing with amniocentesis training. This will be completed before end of 2011.

The midwives also continue to support the fetal medicine medical staff on detailed scan lists offering support to women with a suspected or diagnosed fetal abnormality, those undergoing diagnostic procedures or treatment and couples who experience pregnancy loss.

3. Patient and Public Involvement

The department produces patient information leaflets for specific conditions to complement the specific information given to patients in a formal letter at consultation. These leaflets have been produced in collaboration with the West Midlands Neonatal Networks and will be cascaded for use throughout this geographical area. Patient representation has been utilized in the development of patient information leaflets.

The department plans to undertake an annual satisfaction survey 2011-2012 and continue its contacts with patient support groups.

The survey from 2010-2011 provided very positive and helpful feedback from service users.

4. Summary of Clinical Governance

4.1 Audit

The Centre monitors operator competency, miscarriage rates and procedure related risks against the RCOG green top guidelines (2005) on amniocentesis and CVS. This guidance is being updated (2010) and Professor Kilby is one of the co-authors. Outcomes of other procedures, such as fetoscopic laser ablation and in-utero transfusion outcomes are monitored against best evidence, and outcomes published in the public domain. In addition, Professor Kilby has Chaired the First Trimester intervention audit within the West Midlands Perinatal Institute that has audited demographics, workload and outcomes of first trimester CVS. Over this year, the infrastructure for managing an increased referral rate (both within BWH and regionally) has been put in place for the implementation of first trimester combined screening (introduced in February 2011). The results of audit and outcomes of the Regional CVS service for consecutive years has been be submitted for publication and is undergoing peer review. Guidelines for all Fetal Medicine procedures, including procedure related risks and benefits are updated annually. Professor Kilby has nationally been one of the co-authors of the RCOG "Greentop" Guidelines on the management of Monochorionic twin pregnancies and Amniocentesis/CVS. Professor Kilby Chaired the National CVS/Amniocentesis for Scotland published in January 2011.

Professor Kilby is Chair of the NICE committee reviewing national recommendations to the NHS on the management of twin and triplet pregnancies (to be published in September 2011) and is a member of the FASP group auditing CVS/Amniocentesis nationally.

All core audits, including outcome data for all invasive procedures, are reported in the full fetal medicine (this) annual report.

Mr. Thompson and Bill Martin have worked closely with the Neonatal networks in the West Midlands to represent obstetric and fetal medicine views and collect data to define pressures within these services in our Region.

Dr Martin, Dr Johnston (Secretary from 2010) and Professor Kilby (President from June 2011) are all members of the National Executive Committee of the British Maternal Fetal Medicine Society. Dr Martin is also the senior obstetric representative for BAPM on behalf of the BMFMS.

4.2 Training

There is a large commitment towards training within the centre. This year have completed RCOG accredited training for one trainees (appointed a Consultant in Hong Kong) and initiated training in two others (one part-time as a NIHR clinical lecturer). We also have Regional SpRs undergoing special modular training in obstetric ultrasound and two visiting international fellows (One from the Chinese University of Hong Kong and one from Argentina).

In addition, we continue to have visiting SpRs for the ATSM in Fetal Medicine and for amniocentesis training. The centre is accredited for first trimester screening by the Fetal Medicine Foundation.

It is now part of the training curriculum requirements for paediatric cardiology SpRs to attend 50 sessions in fetal echocardiography. The first 25 sessions are performed under the guidance of a Radiographer Advanced Practitioner after which they join the Consultant Paediatric cardiology sessions. It also forms part of the training for sub-specialty trainees in Fetal Medicine.

We also continue to train our fetal medicine Midwives in ultrasound examination of the fetus and members of the department form part of the Faculty delivering formal MSc teaching to the Birmingham City University Course Module on Fetal Medicine.

4.3 Incident reporting / Serious Untoward Incidents

The Fetal Medicine Centre follows the Trust policy on the reporting of incidents and Serious Untoward Incidents (SUIs) through the Directorate and Trust risk management structure,

There has been no SUI's reported by The Fetal medicine Centre in 2010-2011.

5. Human Resources

The service is provided on a sessional basis by a team of NHS consultant's ad University staff, and is supported by a dedicated midwifery and administrative team and works closely with the Birmingham Women's Hospital obstetric staff. The team works within the Maternity Services Directorate, and is supported by the Regional Specialized Services Agency.

6. Business Summary

In 2010-2011 Fetal Medicine continued to be regionally commissioned through a block contract by the West Midlands Specialist Commissioning Group and the annual report has been submitted to this group in September 2011.

6.1 Service Developments 2010-2011

Service developments throughout the year have included:

- Fetal Medicine working as a reference centre for Siemens Ultrasound through the planning of collaborative educational courses, training and trailing of new technology.
- Expansion of the Fetal cardiology Service via implementation of a third consultant led Fetal cardiology Clinic
- 1st Trimester screening cardiology scans offered to all women with an increased risk of fetal cardiac anomaly.
- Work on a new Fetal Medicine Centre to commence November 2011 with completion around April/May 2012. This will improve additional and improved accommodation for the Fetal Medicine Service.

6.2 Research and Development 2010-2011

1. Fetal Medicine Research.

There are several NIHR portfolio studies run with the PI's within our Department. These studies are listed:

a) **The PLUTO study** (Funded by the HTA and PI M Kilby). Assessment of percutaneous vesicoamniotic shunting in fetuses with congenital bladder neck obstruction. Completed in December 2010.

b) **Microarray study** (funded by SPARKS and PI M Kilby). Assessment of a focused and high-resolution microarray platform in diagnosis of chromosomal anomalies in babies with structural abnormalities.

c) **RCT to assess timing of transfusions in babies with alloimmunisation** (Funded by MRC in Australia and PIs S Pretlove & M Kilby).

d) **SOLOMON Trial.** (EU funding. PIs S Pretlove and M Kilby). RCT to assess selective versus non-selective laser ablation in fetoscopic laser ablation in the treatment of TTTS.

e) **Maternal HAIR study.** (NIHR funding and PI B Martin). Assessment of drug metabolites in human hair in mothers with babies who have structural malformations.

f) **Screening for Twin to twin transfusion syndrome in the first trimester in monochorionic twins** (funded by Wellbeing of Women and a CRLN portfolio study).

2. Pre- and early pregnancy.

a) **The PROMISE Study** (HTA funding PI M Kilby). RCT to evaluate vaginal progesterone in the first trimester of patients with a history of recurrent miscarriage.

b) **TABLET study.** (MRC/HTA EME funding and PIs A Coomarasamy and M Kilby). In collaboration with EAPU to study thyroid autoantibody status and thyroid hormone replacement in women who have had miscarriage.

There is also a range of laboratory based basic science projects using patients from the centre and funded by grants to Professor Kilby.

7. Activity Report

7.1 Overall Clinical Activity

The Fetal Medicine Centre operators as the regional referral centre for the West Midlands and also treats patients an increasing number of patients from outside the West Midlands area (mainly for fetal cardiology opinions and most significantly for the management of twins to twin transfusion syndrome). West Midland patients are funded under a block contract with the Specialist Commissioning Group and further income is received from out of area patients in line with a set tariff.

A total of 6388 examinations and procedures were undertaken in the Fetal Medicine Centre in 2010-2011. The majority of this activity (94%) was from within the West Midlands area and funded through the block contract.

Table 1 shows the number of examinations performed over the last three financial years.

	2008-2009	**2009-2010**	**2010-2011**
WMSSA	6162	6161	6003
Other Region	575	479	385
Total	6737	6640	6388

Table1. Fetal Medicine Contracted Examinations 2008-2011

The Fetal Medicine Service also covers the pre pregnancy counselling/pregnancy loss clinics (PPCC). This also involves a proportion of patients seen for consultations prior to a pregnancy who have serious medical disorders. In 2010-2011 there were 1228 attendances to the PPCC (outpatient appointments) which was made up of new and follow up patients.

A full breakdown of fetal medicine examinations and PPCC attendances by PCT is shown in tables 17 and 18 in the appendices.

Fetal Medicine is a consultant lead service; Figure 1 demonstrates the expertise given to patients by individual consultants, associate specialists, specialist radiographers and midwives performing amniocentesis (excluding pre-pregnancy clinics). The clinical care delivered by subspecialty trainees is supervised.

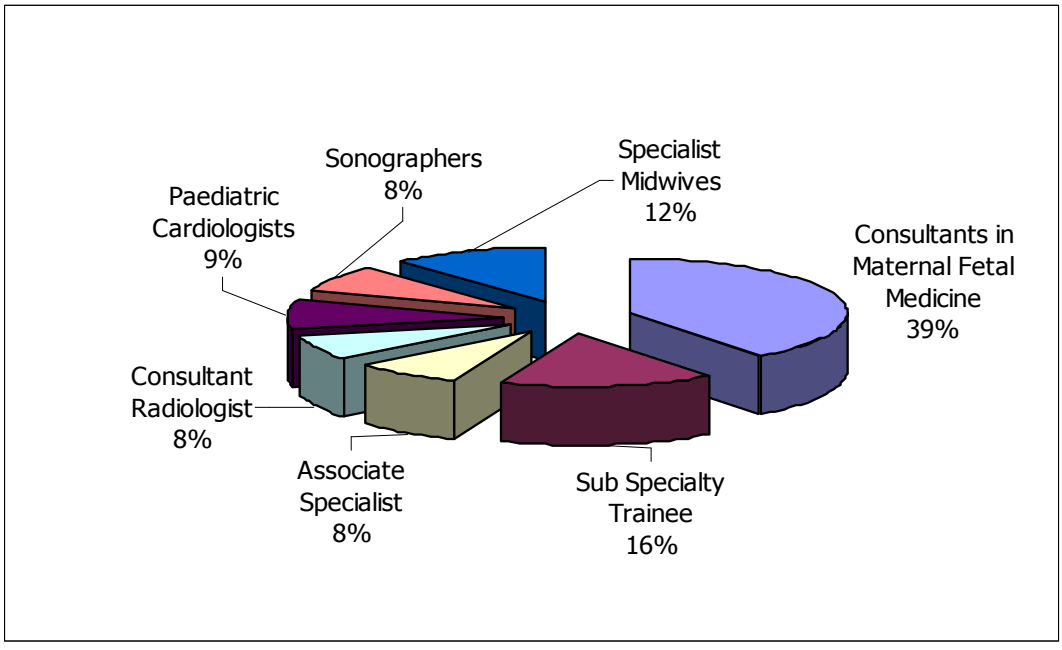


Figure 1. Total workload by Operator – 2010-2011

7.2 Detailed Scans *Mr Peter Thompson & Dr Tara Selman*

4014 detailed scans were performed on 1098 Patients by the Fetal medicine consultants, SSTS, Sonographers and Midwives; this figure includes 95 patients with Rhesus disease,26 undertaken due to a raised AFP on serum screening and 5 for 1st trimester detailed scan, this is shown in comparison with the 2 previous years in table 2.

	2008-2009	2009-2010	2010-2011
Detailed Scan	3764	3878	3893
Raised AFP Detailed	50	32	26
Detailed Rhesus Scan	164	220	95
	3978	**4130**	**4014**

Table 2. Fetal Medicine Detailed Ultrasound Scans 2008-2011 (1st trimester is not shown above as this is a new examination which commenced early 2011)

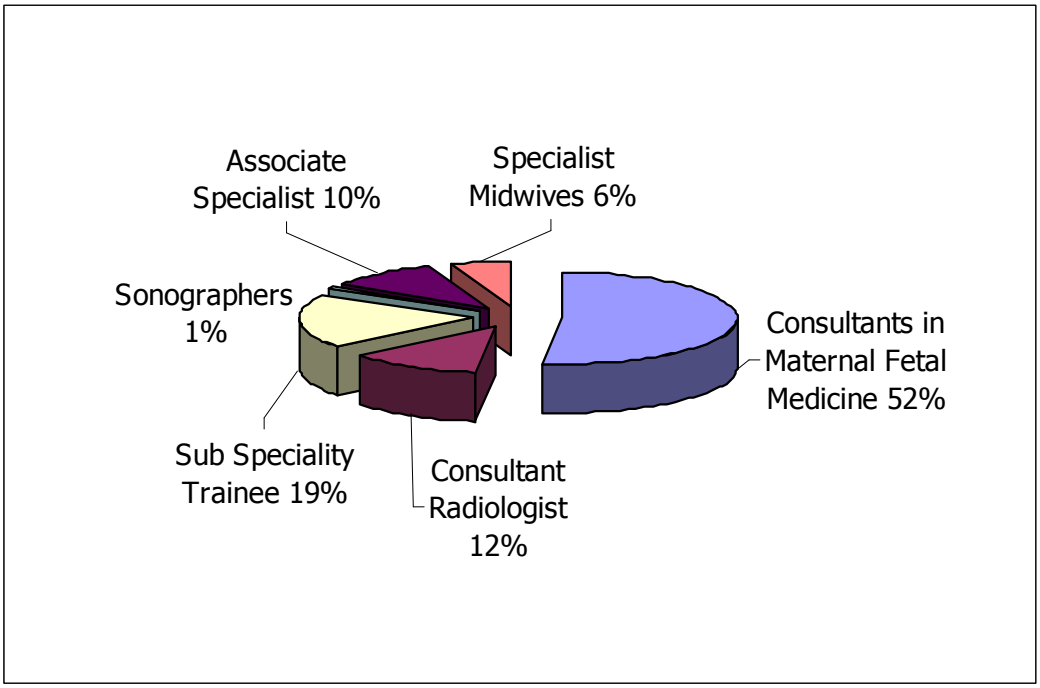


Figure 2. Detailed Scans by Operator 2010-2011

Table 15 in the appendix details all the abnormalities detected at the centre in 2010-2011.

7.3 Perinatal/ Paediatric Cardiology: *Marguerite Usher-Somers*

Paediatric Cardiology continues to be a regional and supraregional service. The service is provided primarily by Dr Paul Miller and Dr Tarak Desai, who are based at Birmingham Children's Hospital. Dr Tracey Johnston and Dr Sam Pretlove provide Fetal Medicine Support to the Paediatric Cardiologists and patients. The service is also supported by 3 Specialist Midwife sonographers and a Specialist sonographer trained in perinatal cardiology.

The West Midlands Fetal Medicine Centre also continues to offer a First Trimester Cardiac screening service to those women who have congenital heart disease (CHD), family history of CHD, previous affected pregnancy with CHD, pregnancies where the nuchal translucency is ≥3.5mm, pregnancies where a chromosomal anomaly has been identified and patients are continuing with the pregnancy.

	2008-2009	2009-2010	2010-2011
WMSSA	1134	1076	1233
OUT OF REGION	62	71	17
	1196	1147	1250

Table 3. Fetal Echocardiography including First Trimester Cardiac Scans activity 2008-2011 by referral area
(First Trimester Scans is incorporated in 2010-2011 figures only)

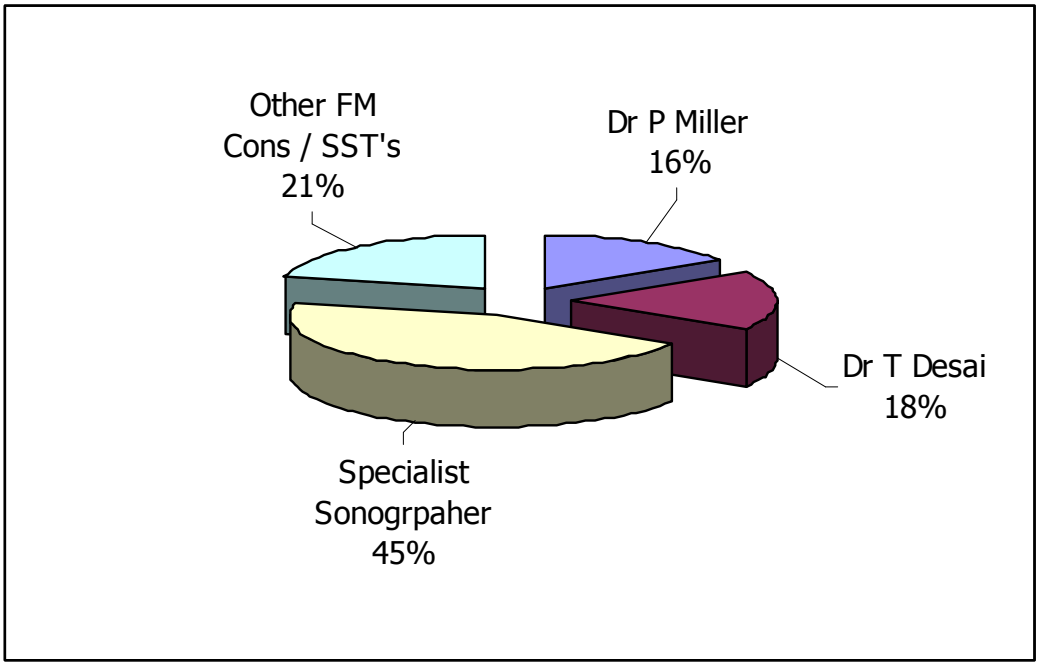


Table 3. Fetal Cardiac Scans by Operator 2010-2011

Table 14 in the appendices shows a breakdown of cardiac anomalies for 2010-2011.

7.4 4` First Trimester Chorionic Villus Sampling (CVS): *Gill Nava*

The regional CVS Service continues to be administered from the Fetal Medicine Centre but with the introduction of first trimester screening and other centres offering first trimester CVS the number of referrals is decreasing.
The CVS performed due to an increased risk form first trimester screening and cystic hygroma / increased nuchal translucency are included in this group.

Indication for CVS	2008-2009	2009-2010	2010-2011
Maternal Age	25*	14	11
Clinical Genetics	52	48	40*
Prev Chromosome abn	30	16	21
Prev fetal abn (structural)	0	2	0
Increased risk from 1st Trimester		22**	14*
Cystic hygroma / Increased NT		31	55*
Other	1	0	0
Total CVS performed	108	133	141

Table 4. BWH indications for CVS 2008 – 2011. * includes 1 twin pregnancy
** includes 4 twin pregnancies

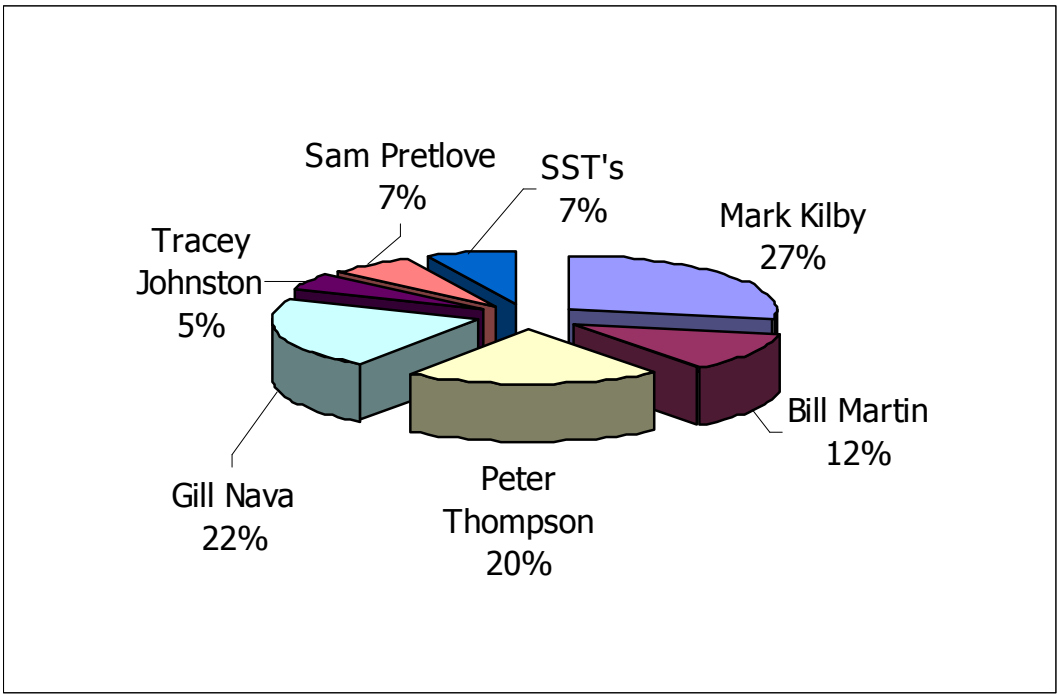


Figure 4. CVS by Operator 2010-2011

Abnormality	Number	Outcome
Trisomy 21	17	TOP x 15, LB x 2
Trisomy 18	6	TOP x 6
Trisomy 13	1	TOP x 1
45XO	5	TOP x 5
Mosaic Result	1	Normal on Amnio – IUD at 24 weeks
Trisomy 9	1	TOP x 1
CNVs Chr 11q24,2q25	1	TOP x 1 30/40, hydropic cardiac anomaly
Triploidy	1	TOP x 1

Table 5. Abnormalities detected on CVS – non Clinical Genetics patients.

There were 55 CVS performed for cystic hygroma / increased nuchal translucency, 31 (56%) of those had chromosome abnormalities. 29 out of the 31 terminated the pregnancy.

Abnormality	Number	Outcome
Duchene Muscular Dystrophy	2	TOP x 2
Huntington's Disease	1	TOP x 1
Leigh's Disease	1	TOP x 1
Micro Syndrome	1	TOP x 1
MDR3 Deficiency	1	TOP x 1
Congenital Nephrotic Syndrome	1	TOP x 1
Myotonic Dystrophy	1	TOP x 1
Sickle Cell Disease	1	TOP x 1
SMA	1	TOP x 1
Epidermolysis Bullosa	1	TOP x 1
Mosaic XO	1	TOP x 1
Balanced Translocation	2	LB x 2

Table 6. Abnormalities detected on first trimester CVS – Clinical Genetics patients

Outcome after CVS	2008-2009	2009-2010	2010-2011
TOP for chromosome or genetic anomaly	8%	16%	43%
TOP for social reasons	1%	0%	0%
TOP for abnormality, normal chromosomes		1%	1%
Miscarriage	0%	1%	5%
NND	0%	1%	0%
SB	0%	1%	0%
Livebirth (Normal)	47%	55%	51%

Table 7. Outcome information for first trimester CVS (%) quoted as % of known outcome

There were 99/141 known outcomes at the time of the annual report 2010-2011. Abnormal outcome is more likely to be represented as miscarriage and termination unless reported by patients. Some patients had not yet delivered.

Of the total 141 CVS performed 5 miscarriages were reported (3.5% of 141 or 5% of 99).
One miscarriage was at 14 weeks after a CVS for maternal age, the result was normal.
One miscarriage occurred at 15 weeks after a CVS for SMA, the result was normal. Both of these were within a month after the CVS procedure.
One CVS was performed in a MC/DA twin pregnancy for insulin resistance syndrome.

The result was normal but TTTS developed and the pregnancy miscarried at 18 weeks. Two miscarriages occurred at 14 and 15 weeks in the cystic hygroma group, both karyotypic results were normal.

These figures are again to be collated into the Regional Audit of CVS services (Chaired by Prof Kilby **http://www.pi.nhs.uk/CVS/**.)

7.5 Second trimester (>14 weeks) placental biopsy for fetal abnormality

There were 15 Chorionic Villus Samplings performed because of abnormalities detected on ultrasound after 14 weeks gestation.

Indication	Number	Chromosome Result	Outcome
Exomphalus	4	3 x normal 1 x no result – sample too small	2x misc at 16 & 17 wks 1 x not yet delivered 1 x TOP – 18 weeks
Oligohydramnious	2	2 x normal	1 x misc 23/40 1 x not yet delivered
Congenital bladder neck obstruction	2	1 x normal 1 x no result	1 x LB 1 x TOP at 18/40
Multiple fetal abnormalities	2	1 x Tri 18 1 x normal	1 x TOP 1 x TOP
Cardiac Defect	1	1 x normal	1 x LB
Short Long Bones	1	1 x normal	1 x abruption at 30/40. NND
TRAP sequence	1	1 x normal	LB after Rita
SGA	1	1 x normal	1 x LB
MC/DA twins discordant LV and NT	1	1 x normal	LB x 2

Table 8. Indication and outcomes for placental biopsy 2010-2011

Outcome after CVS	2009-2010	2010-2011
TOP for chromosome abnormality	16.6%	7%
TOP for structural abnormality	25%	20%
Miscarriage/IUD	16.6%	20%
SB	12.5%	0%
NND	4%	7%
LB	25%	40%

Table 9. Outcome information for CVS / placental biopsy after 14 weeks

Two of the miscarriages occurred in fetuses with exomphalus at 16 and 17 weeks gestation and one in a fetus with severe oligohydramnious at 23 weeks, 1 week after the placental biopsy.

8. Amniocentesis *Veronica Donovan*

The Amniocentesis service continues to be provided by a group of specialist staff. All operators are trained to the basic standard as recommended by the RCOG. The department provided a training service for SPR's rotating through the hospital.

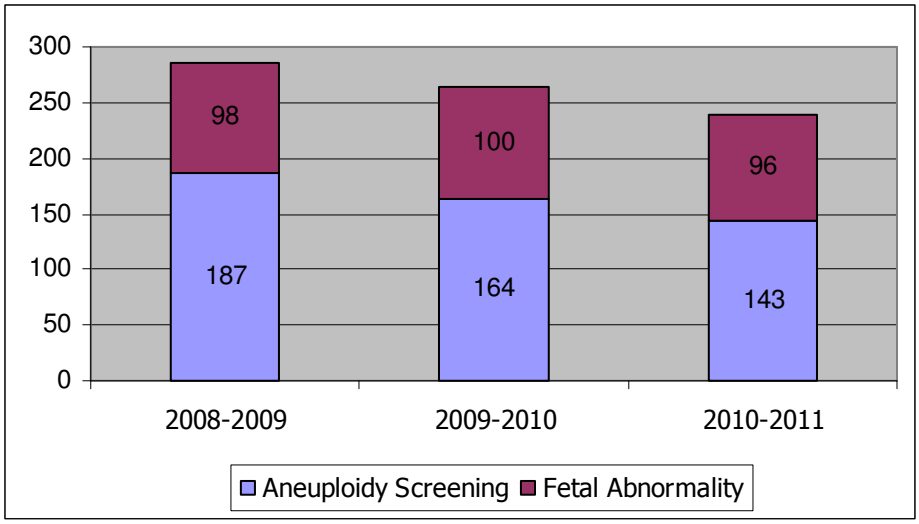


Figure 5. Total number of amniocentesis performed 2008-2011

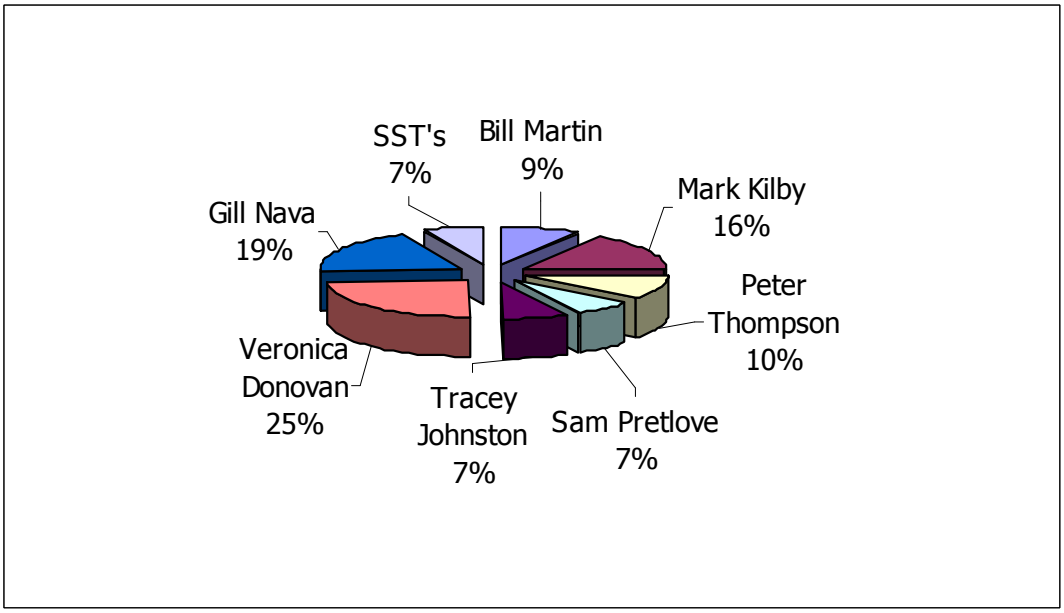


Figure 6. Amniocentesis by operator 2010-2011

8.1 Amniocentesis for Aneuploidy

There were 143 amniocentesis performed for screening for aneuploidy. The main indications are illustrated in figure 7 compared with the two previous years. (NB figures include West Midlands and out of area patients)

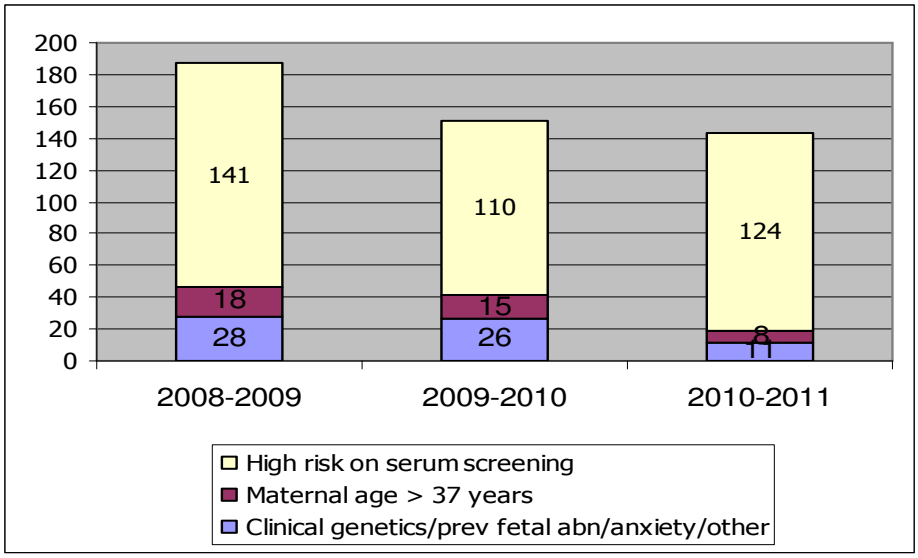


Figure 7.Indications for amniocentesis for aneuploidy screening 2008-2011

Indication	Number	Aneuploidy/genetic condition detected	Outcome
High risk serum screening / NT	124	T21 x 6 T18 T13 46 xy22qs 47XXX Mosaic 47XXY Turners	TOP x4, LB x 2 TOP TOP LB LB LB LB IUD
Maternal Age > 37	8	All normal karyotypes	All LB
Previous fetal abn/maternal anxiety/clinical genetics/other	11	Mosaic Turners Balanced Translocation	TOP LB
Total	143 incl 6 sets of twins		

Table 10. Aneuploidy detected by indication (for screening amniocentesis)

8.2 Amniocentesis for karyotyping in fetal abnormality/suspected fetal abnormality

96 amniocentesis were performed for karyotyping on patients with a fetal abnormality or a suspected fetal abnormality following detailed scan, incl 4 twin pregnancies. The chromosome abnormalities detected and pregnancy outcome are detailed in Table 11.

Abnormality	Number	Outcome
Trisomy 21	4	TOP x 4
Trisomy 18	4	TOP x 4
Trisomy 13	2	TOP x 1, NND x 1
Mosaic 8	1	TOP
Inversion	1	LB
Monosomy X	1	TOP

Unbalanced	2	TOP x 2
47XXX	1	LB
Mosaic Turners	1	LB
Di George	1	TOP

Table 11. Chromosome abnormalities detected on amniocentesis for fetal abnormality

8.3 Outcomes after amniocentesis

Outcome	Amnio for fetal abnormality	Amnio for screening	Total births from Amnio
LB	66	122	188
TOP	22	8	30
MISC	2	2	4
SB/IUD/NND	3	3	6
Unknown	2	5	7

Table 12. Pregnancy outcome after amniocentesis for fetal karyotyping

Of the 4 miscarriages two were from abnormal pregnancies. One fetus had a cardiac defect and the other was diagnosed with Skeletal Dysplasia. 1 miscarriage was within a week of the procedure, while the other was 4 weeks after the Amniocentesis. The remaining two miscarriages were following Amniocentesis performed for Screening. Both miscarriages occurred 3 – 4 weeks following the procedure.

Thus the overall miscarriage rate for 2010-2011 for known outcomes following amniocentesis was 1.6%.

The mean percentage for the past 5 years is 0.98%.

8.4 Amniocentesis for Maternal age

A total of eight amniocentesis were performed for maternal age. Four were outside referrals and four were BWH patients. The ages ranged between 35 and 43 years. All had been appropriately counselled with regard to the risks.

9. Fetal Blood Sampling: *Bill Martin*

A total of 22 fetal blood samples were performed in 2010 to 2011. Eight of these were in association with late termination of pregnancy. There were 3 performed for investigation of anaemia, all had rhesus disease.

In 8 the sample was intracardiac, in 5 from the fetal intrahepatic vein and in 9 from the umbilical cord (cordocentesis). In 18 cases, fetal blood sampling was performed for rapid karyotyping when an associated fetal anomaly was detected (after 20 weeks). In 1 of these the test was performed as part of the investigation of hydrops fetalis. In 3 cases (as mentioned above) it was used to assess fetal anaemia, and 1 case to assess the possibility of fetal CMV infection.

The karyotype was normal in 16, abnormal in 3 (14%), not performed in 3.

The indications for fetal blood samples compared with previous years are shown in Figure 6.

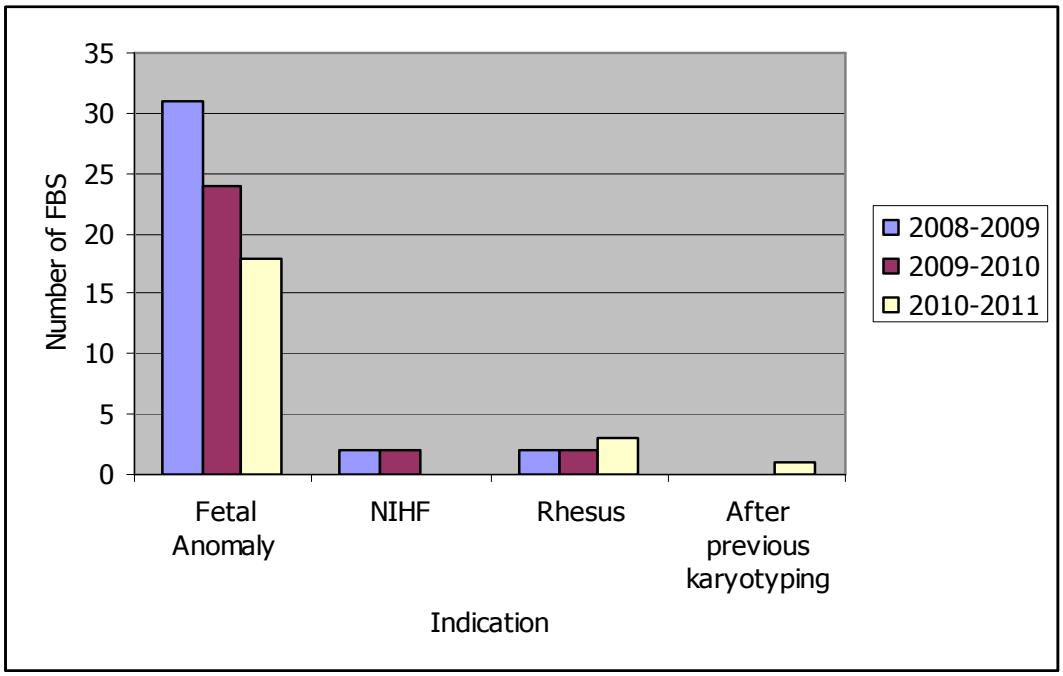


Figure 6. Indication for fetal blood sample 2008-2011

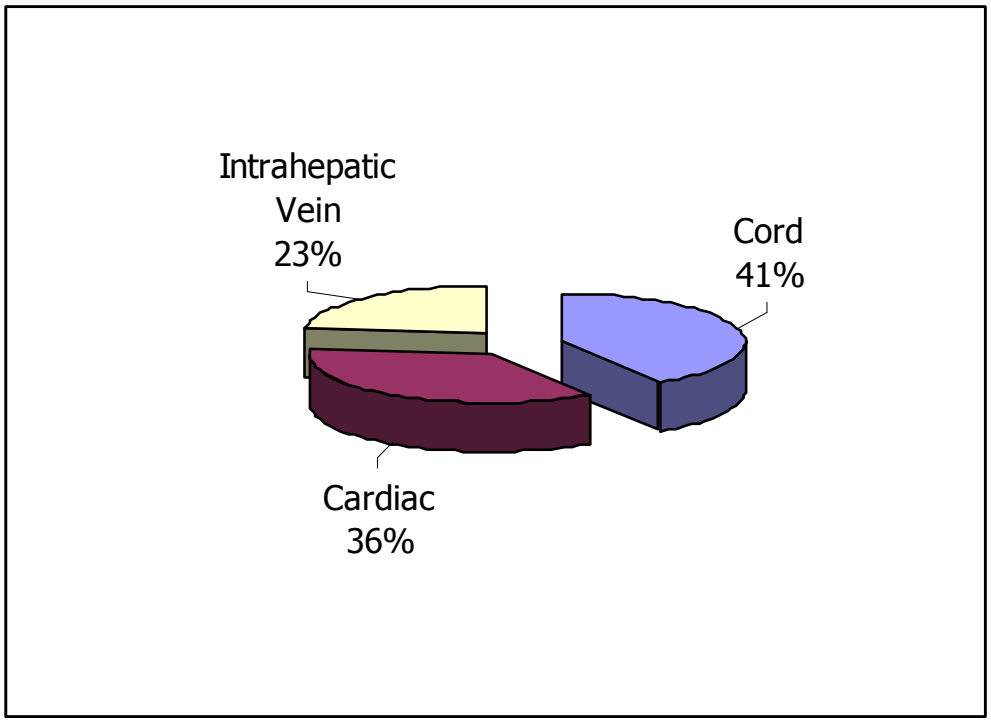


Figure 7. Site of Sampling 2010-2011

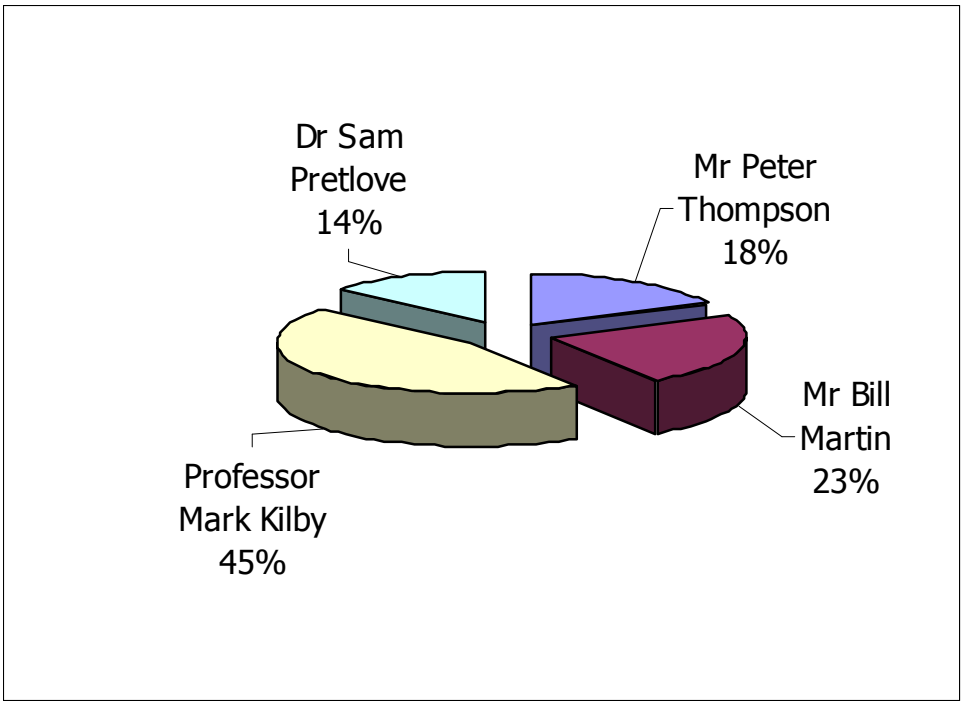


Figure 8. Fetal Blood Sampling by Operator 2010-2011

10. In-utero blood transfusions: *M Kilby*

Between April 2010 and March 2011 there were 21 in-utero transfusions performed on seven† pregnancies with fetal anaemia (secondary to maternal alloimmunisation)(†additional transfusion for FAIT discussed separately).

Of these 1/7 (14%) of pregnancies had red cell alloimmunisation complicated by anti-Kell antibodies, 6/7 (86%) had anti D antibodies. In addition, there was an IUT for severe FAIT in which a previous baby had presented with ultrasound appearances of ICH†.

The gestational age (GA, median) at first transfusion was 27 weeks (95%CI 19.1 – 30.5). Twenty one in-utero transfusions were performed (17 (80.9%) were intravascular and four (9.9%) were intraperitoneal (IPT), performed prior to 20 weeks). Of the intravascular transfusions, 71.4% were performed via the intra-hepatic vein and 28.6% were performed after cordocentesis. The median fetal haemoglobin (excluded the babies who had IPT prior to 20 weeks) prior to transfusion was 8.5g% (95%CI 7.2 – 9.7) (all below 5th centile for GA). All babies were live born at median GA of 33.5 weeks (95%CI 32.4 – 34.9).

In two cases, who had a past history of hydrops and IUD prior to 20 weeks (in a previous pregnancy) maternal IVIG therapy and intraperitoneal transfusions were commenced at 16 weeks.

In addition, there was a case of NAIT† that had a platelet transfusion intravascularly at 24weeks (and commenced IVIG infusion 1g/Kg weekly from 16 weeks) [in previous pregnancy had a stillbirth with massive intracranial haemorrhage at 21 weeks]. The fetal platelet count was 53x10^6/L. As the fetal platelet count was indicating only mild thrombocytopenia adjuvant IVIG therapy was continued and a

live born baby with a platelet count of $77X10^6$/L was delivered by caesarean section at 36 weeks.

Thus, overall 22 transfusions were performed, all with live births. This is a reduction in previous years (and in line with international data since the introduction of antenatal anti-D prophylaxis).

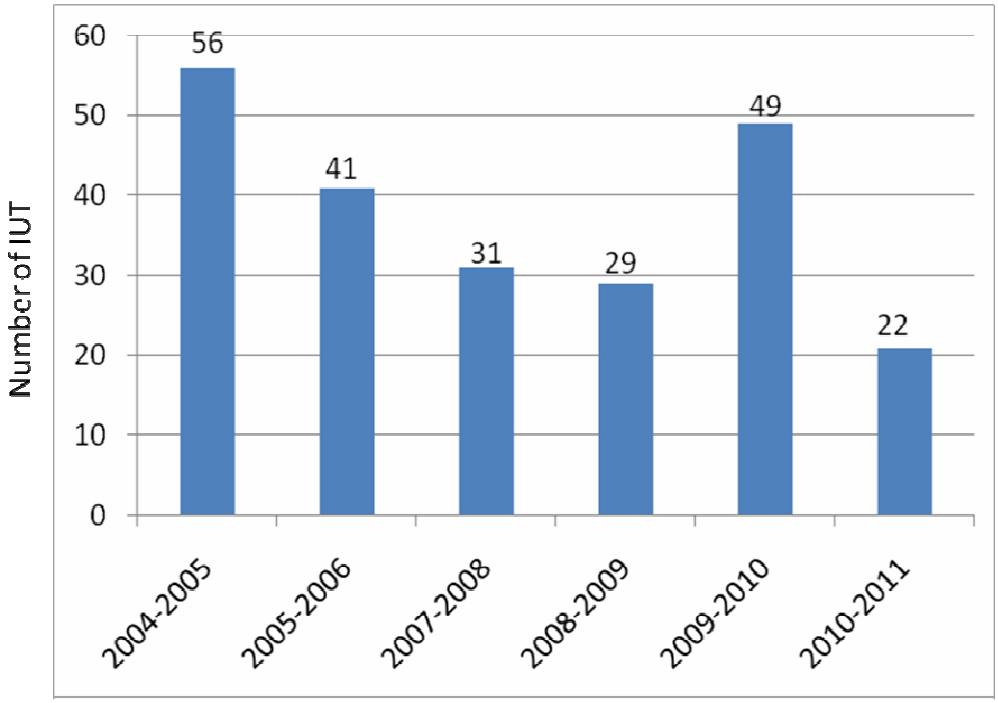


Figure 9. Number of in utero transfusions (FBT) performed 2004-2010

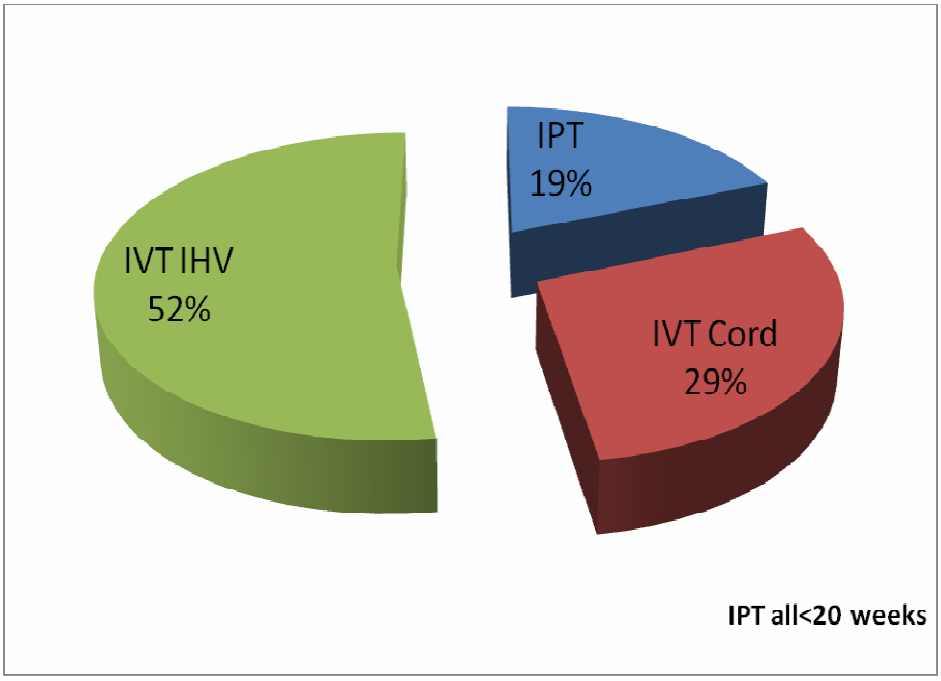


Figure 10. Site of Transfusion 2009-2010

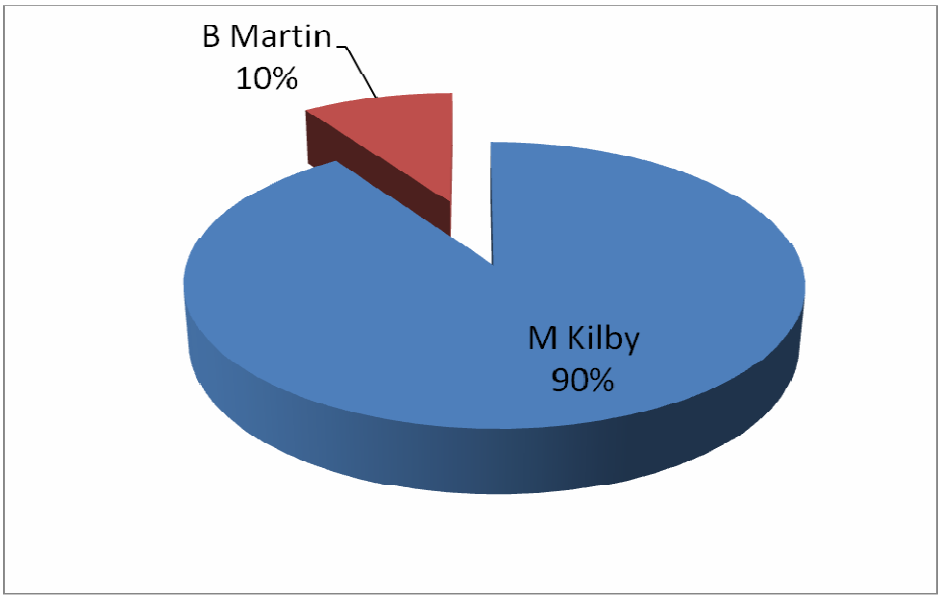


Figure 11. Transfusions by Operator 2010-2011

11. Management of Twin-twin transfusion syndrome (TTTS) *M Kilby*

Between 1st April 2010 and 31st March 2011, there were 30 pregnancies with TTTS considered for fetoscopic laser coagulation; all were monochorionic twins. 28 pregnancies had Quintero stage III or greater (90% Stage III & 3.3% stage IV). There were two pregnancies complicated by stage II disease or less (6.6%). These pregnancies were all offered and accepted fetoscopic laser ablation (FLA).

The principle operators were MK in 24/30 (80%) and WM in 6/30 (20%).

In 83% of pregnancies a selective technique was utilised (in three cases there was randomisation to the Solomon Trial). A median of six AVA were coagulated using a Diode laser (range 5 - 11 AVA)

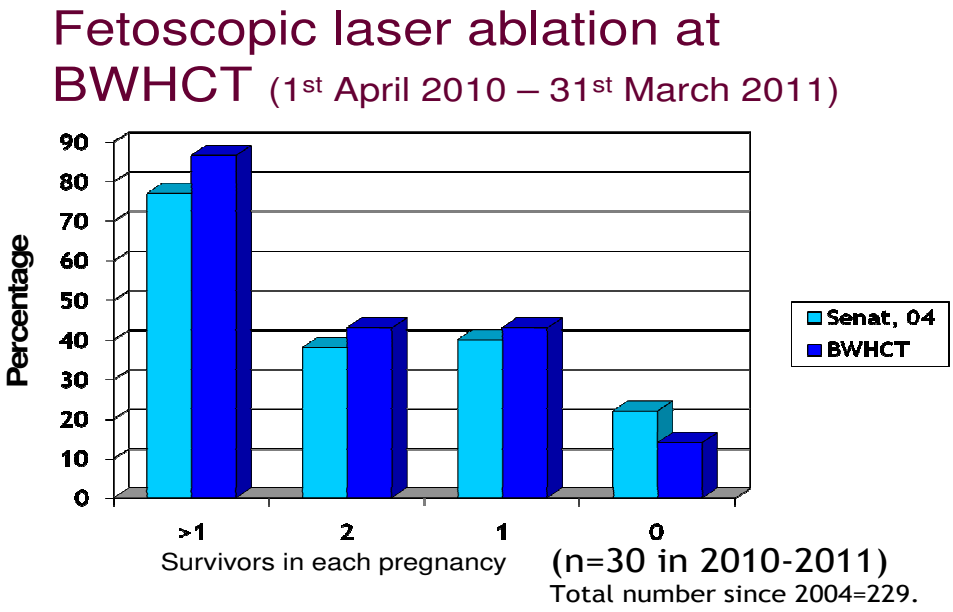
The median gestational age at presentation and operation was 19 weeks (95% CI 19 – 21 wks). Of the pregnancies complicated by double fetal losses, this complication occurred at a range of between 1-4 weeks post-FLA. All these were miscarriages associated with bleeding and/or PPROM (rather than immediate double IUD).

Following examination of the cohort in total (2010-2011), the overall fetal survival post-FLA 65% (39/60 fetuses). Of these, there were single survivors in 43% of pregnancies (13/30). In 43 % (13/30) of pregnancies there were two survivors and in 14% of pregnancies there was a double pregnancy loss (4/30) (all through miscarriage).

Thus, in 86.6 % of pregnancies there was at least one survivor. The median prolongation of pregnancy in weeks was 14 weeks (95%CI 12.4 -15.1 wks.)

The median gestation of delivery (of pregnancies with at least one survivor) was 33 wks (95% CI 31-33 wks). This was with a policy of 'elective delivery' between 34-36

weeks, usually by caesarean section. These data indicate that outcomes in this single centre cohort (between 2009-2010) are similar to internationally published data.



11.1 TRAP sequence.

There were n=3 twin pregnancies complicated by TRAP.
All were treated by RITA.
The gestational age range of treatment was between 12-24 weeks.
Delivery was at Gestational age range of between 28 and 34 weeks.
All 'pump twins survived' (100%).

12. Other invasive fetal therapy

During the course of 2010-2011 there were 7 procedures performed on 6 patients all from within the west Midlands area.

Two fetal drainages were performed; one was due to congenital pelviureteric function obstruction and that other due to hydrothorax, where an amniodrainage was also performed.
There was 1 fetal shunt inserted on a fetus that was diagnosed with congenital bladder neck obstruction.

There were three amniodrainages performed for polyhydramnious, one woman had polyhydramnious secondary to TOF and limb reduction. The other woman had a fetus with pleural effusions and polyhydramnious. And there was one woman who had unexplained polyhydramnious which required two amniodrainges.

13. Pre-pregnancy Counselling / Pregnancy Loss Clinic (PPCC)

Ruth Kirchmeier

Within the Fetal Medicine Department, the PPCC continues to provide a regional service for couples who have experienced the following:

- Recurrent first trimester miscarriages
- Second trimester miscarriages
- Stillbirth or neonatal death
- Fetal anomaly
- Pre-existing maternal disease
- Previous severe pre-eclampsia

The aims of the clinic are:

- To carry out relevant investigations to identify any causes of pregnancy loss.
- To suggest any treatment which might be beneficial in a subsequent pregnancy.
- To make an individualised plan of care, treatment and support for a subsequent pregnancy.
- To provide support and counselling following pregnancy loss and in any subsequent pregnancy.
- To provide pre-pregnancy counselling for women with maternal disease.

Midwifery input and bereavement support are provided by the team of specialist midwives in Fetal Medicine, Ruth Kirchmeier, Gill Jongman, Brenda Bolger, Nia Carnevale, Jane Meredith and Sarah Bourne. Invaluable to the smooth running of the clinic, secretarial support is provided by Vicki Morrison-Thomas.

13.1 PPCC activity

There were 1228 attendances to the Pre-Pregnancy counselling / pregnancy loss clinic in 2010-2011. This is made up of new and follow up patients. This is a slight increase on last year of 1188 attendances.

Figure 12 demonstrates the distribution of referral according to their source, for women coming for an appointment with the Consultants and the Specialist Midwives.

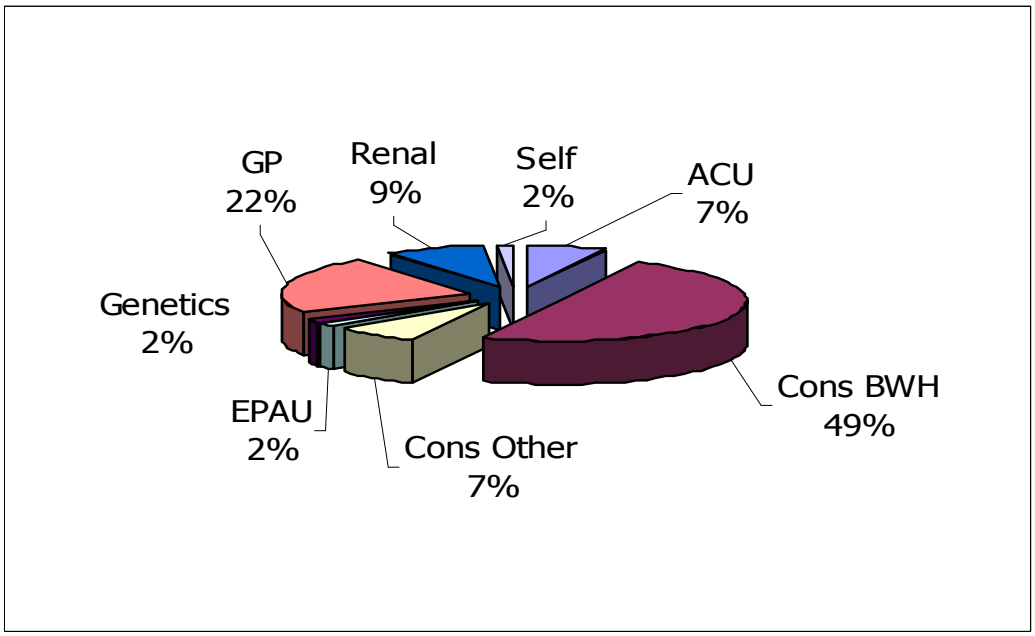


Figure 12. Referral by source 2010-2011

The reasons for referral fall into 3 main categories:

- Pregnancy loss
- Fetal anomaly
- Maternal disease

However due to the complex nature of the work which is carried out within the PPCC department, it is difficult to accurately give precise figures and categorize patients into referral reasons as many of these patients fall into several categories.

Pregnancy Loss

Women who experience recurrent first trimester miscarriages are comprehensively investigated in the clinic according to the RCOG Guidelines. If all the tests are normal, this service is midwifery led and support and reassurance scans will be offered in future pregnancies.

All women booked under the Fetal Medicine Team who experiences a second trimester pregnancy loss, stillbirth or neonatal death will be followed up in monthly clinics carried out by the Fetal Medicine Consultants and the Lead Specialist Midwife, these clinics are shown in appendix 1.

Women who have experienced unexplained fetal loss will have a preliminary appointment with the midwives to carry out appropriate pregnancy loss investigations prior to their review appointment with the consultant. Support, reassurance scans and counselling will be offered in subsequent pregnancies.

Fetal Anomaly

All women booked under the Fetal Medicine Team who terminate a pregnancy or whose baby's die following birth due to fetal anomaly, will be offered follow up in one of the consultant clinics. In addition a number of women booked elsewhere who have been seen for diagnosis in the Fetal Medicine Department and who opt for a

post mortem after termination, will be offered follow up in one of the Fetal Medicine consultant clinics.
If it is a complex anomaly where a possible genetic reason is suspected they will be seen in the combined Genetic/ Fetal Medicine Loss Clinic held once a month by Professor Mark Kilby and Consultant Geneticist Dr Denise Williams. There were 21 patients seen within this clinic during April 2010 to March 2011.

Maternal disease:

- **SLE/Rheumatological/Immunological disease**

Once a month Professor in Rheumatology Dr Caroline Gordon and Consultant Obstetrician Dr Tracey Johnson carry out a combined Rheumatology/Obstetric clinic to provide pre-pregnancy counselling for women with pre-existing rheumatological or immunological disease who are planning future pregnancies.

- **Renal disease**

Once a month Consultant Renal Physicians Dr Graham Lipkin and Dr Clara Day and Consultant Obstetricians Dr Tracey Johnson and Dr Ellen Knox carry out a combined Renal/ Obstetric clinic to provide pre-pregnancy counselling for women with pre-existing renal disease who are planning future pregnancies.

- **Haematological disease**

Once a month Consultant Haematologist Dr Will Lester provides pre-pregnancy counselling for women with pre-existing haematological disease, who are planning future pregnancies. Many of these women will need to commence clexane thromboprophylaxis as soon as they know they are pregnant and can contact PPCC specialist midwives directly to coordinate this.
In addition when required, Dr Lester has joint appointments with the obstetricians to provide haematology advice in making a plan of care for future pregnancies.

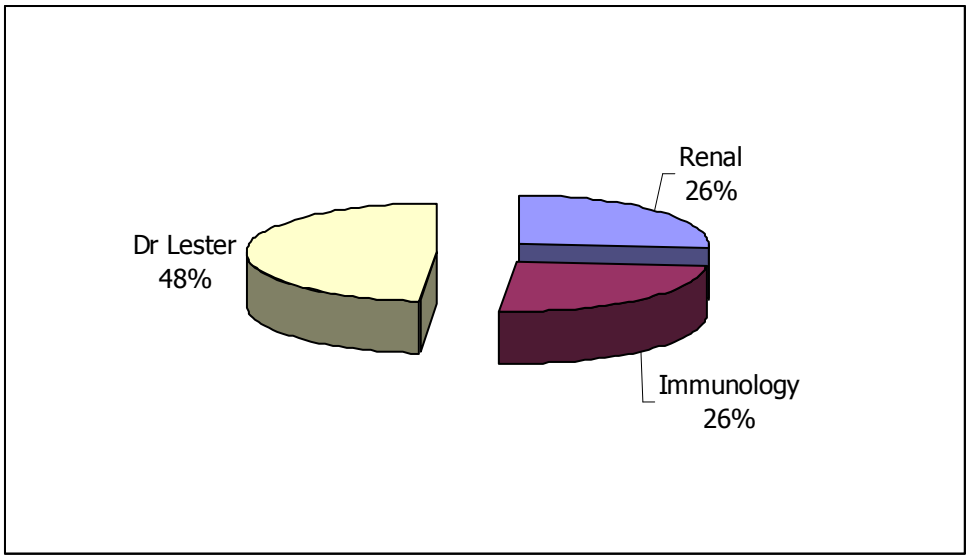


Figure 13. Number of patients seen in each Specialist Clinic – 2010-2011

For all of these clinics an initial work up is carried out by the PPCC specialist midwives to ensure that all relevant investigations are carried out and are up to date.

The subsequent review with the consultants addresses the following issues:

- Is there current active disease and if so what would the risks of embarking on a pregnancy be, both for the mother and baby?
- If disease currently stable is medication suitable for pregnancy?

- If not, appropriate alternative medication is discussed and the importance of allowing time to assess whether remaining stable on these drugs is stressed.
- General pre-pregnancy lifestyle advice.

As the importance of pre-pregnancy counselling for women with complex medical conditions is recognised, the numbers being referred from the regional renal and rheumatology clinics has steadily risen

Previous PET
In collaboration with AEPC, the PPCC is the designated regional centre for the investigation of women who have experienced severe pre-eclampsia in previous pregnancy.

12.2 Miscarriage Support Group

A Miscarriage Support Group in conjunction with the Miscarriage Association continues to be held on a monthly basis at Birmingham Women's Hospital. The group is coordinated by Alison Noakes, a previous patient of the clinic. Ruth Kirchmeier, Specialist Midwife and Caroline Brannigan, Specialist Nurse from EPAU, provide professional support. Patients seem to greatly appreciate the opportunity to be able to discuss their experiences informally with others who have been through similar events.

14. Conclusion: *M Kilby*

This is a comprehensive report documenting a summary of the multidisciplinary work taking place in the Fetal Medicine Centre. It is hoped that this information will be of help to those working with the profession, the clinicians that refer us patients, the RSSG and the patients using the service.

Within these data are the entire core audits that underpin our clinical practice and provide a working model of clinical governance in action. It is a testament to all those who work with us to provide excellent clinical care.

1st September 2011

Mark Kilby MB BS, MD, MRCOG
Professor of Maternal & Fetal Medicine,
Birmingham Women's Hospital, University of Birmingham, Metchley Park Rd, Edgbaston, BIRMINGHAM, UK, B15 2TG.

Appendix 1.

Consultants supporting the Pre Pregnancy Counselling / Pregnancy Loss Clinic

- Mr Bill Martin carries out a monthly Pre-Pregnancy Counselling/ Pregnancy Loss Clinic.
- Mrs Tracey Johnston carries out a monthly Pre-pregnancy Counselling/ Pregnancy Loss Clinic and in addition is the lead Consultant Obstetrician for the regional Immunology and Renal clinics.
- Professor Mark Kilby carries out a monthly combined Genetic/Pregnancy Loss Clinic.
- Mr Peter Thompson is the lead Consultant Obstetrician for the regional adult cardiology clinic.
- Dr Sam Pretlove carries out a monthly Pre-Pregnancy Counselling/ Pregnancy Loss Clinic.
- Dr Ellen Knox carries out a monthly Pre Pregnancy Counselling/ Pregnancy Loss Clinic and in addition covers the immunology and renal clinic and is also the lead in the multiple pregnancy clinics.
- Dr Will Lester carries out a sporadic Pre Pregnancy Counselling /Pregnancy Loss Clinic and in addition is the lead in Haematology

The following consultants are available for combined appointments with the Maternal Fetal Medicine Consultants:

- Dr Denise Williams (Consultant Geneticist)
- Dr Graham Lipkin (Consultant Renal Physician)
- Dr Sarah Thorne (Consultant Cardiologist)
- Dr Caroline Gordon (Consultant Rheumatologist)

Appendix 2.
Academic Staff

- Professor Mark Kilby – Clinical Coordinator in Maternal and Fetal Medicine(NHS); Deputy Head of Division of Reproduction & Child Health (Academic)

NHS Staff

- Mr Peter Thompson – Consultant Obstetrician and Medical Director
- Mr Bill Martin – Consultant in Fetal Medicine
- Dr Tracey Johnston – Consultant in Fetal Medicine and Clinical Director of Maternity Services
- Dr Gill Nava – Associate Specialist
- Dr Paul Miller – Consultant Paediatric Cardiologist
- Dr Tarak Desai – Consultant Paediatric Cardiologist
- Dr Sam Pretlove – Consultant in Fetal Medicine

Obstetric Radiology Staff

- Dr Josephine McHugo – Consultant Obstetric Radiologist

Sub Specialty Trainees

- Dr Stephen Suen – SST
- Dr Tara Selman – SST
- Dr Katie Morris – SST/Clinical lecturer.
- Dr Sharon Cooley, NMH Dublin (six month visit).

Midwifery/ Sonographer Staff

- Veronica Donovan – Clinical Midwife Manager / Sonographer
- Helen Baker – Specialist Midwife / Sonographer
- Ruth Kirchmeier – Specialist Midwife
- Nia Carnevale – Midwife
- Gill Jongman – Midwife
- Brenda Bolger – Midwife
- Jane Meredith – Midwife
- Sarah Bourne – Midwife
- Marguerite Usher-Somers – Specialist Sonographer
- Jill Agnew – Specialist Sonographer
- Sandra Smith – Midwifery Assistant
- Frances Rich – Midwifery Assistant / Clerk

Administrative Staff

- Nick Reading – General Manager, Maternity
- Samantha Mostyn – Administrator
- Emma Prentice – Clinic Secretary / Audit

- Alison Hill – PA and secretary to Prof Kilby & Dr Johnston
- Elaine Smith – PA and Secretary to Mr Martin, Mr Thompson and Dr Pretlove
- Vicki Morrison-Thomas – Pre-pregnancy clerk
- Debbie Caughtry(locate) – Clinical assistant

Appendix 3.
Fetal Anomalies detected on ultrasound scans:

1. Fetal Cardiology. Abnormal fetal echocardiograms

Cardiac Anomaly Detected	**Number**
DORV, VSD, Hypoplastic aortic arch	1
Ventricular disproportion LV<RV	12
Mild TR	1
Left ventricular aneurysm	1
Univentricular heart	4
CCTGA	4
Complex hypoplastic right heart with possible absent pulmonary valve	1
Truncus	1
Critical aortic stenosis	2
?PA with VSD, ? common arterial trunk	1
RV<LV	2
Common atrium, VSD, RV>LV	1
Double outlet ventricle, TGA, PS, VSD, small posterior ventricle	1
Cardiomyopathy	1
Dextrocardia	1
Ventricular hypertrophy, outlet VSD	1
Dextrocardia DILV PA	1
Septal and myocardial hypertrophy	1
?Truncus ? PA VSD	1
VSD	25
AVSD	18
Dyskinetic function of IVS	1
Inlet to outlet VSD	1
ASD	1
TGA DILV	1
TGA DIV DORV	1
TGA DORV mild sub PS	1
TGA	1
TGA, VSD PS	1
TOF	5
Fallot type DORV	1
Fallots with absent pulmonary valve syndrome	1
Ectopic beats	14
CHB	2
Sinus bradycardia	1

Table 14. Cardiac Anomalies Detected 2010-2011

Appendix 4.
2. Abnormal detailed scans

Fetal abnormality	2010-2011	
	BWH	**Regional**
RENAL		
Renal	34	73
CARDIAC		
Cardiac	24	63
ABDOMINAL		
Gastroschisis	2	18
Diaphragmatic Hernia	6	9
Exomphalos	3	14
Ovarian Cyst	3	1
Other Abdomen	1	5
RESPIRATORY		
Cystic Lung Lesion	2	6
Other Respiratory		1
SKELETAL		
skeletal	6	9
LIMB		
Talipes	8	13
Other Limb	14	20
HEAD AND NECK		
Cystic Hygroma	1	12
Other Head and Neck		2
Facial	6	20
Nuchal oedema / thickness	18	62
HYDROPS (and pleural eff / ascites)		
Hydrops (and pleural eff / ascites)	6	20
GASTROINTESTINAL		
Gastrointestinal (inc hyperechogenic bowel)	25	21
CNS		
Anencephaly	4	4
Spina Bifida and / or Hydrocephalus	3	8
Encephalocele	2	2
Microcephaly		
Holoprosencephaly	1	2
Dandy Walker Cyst	2	2
Agenesis of corpus callosum	4	8
CPC	2	11
Ventriculamegaly	17	26
other CNS	6	12
TWIN COMPLICATIONS NOT TTTS		
Twin complications not TTTS	14	45
SACROCCYGEAL TERATOMA		
Sacroccygeal teratoma		1

Table 15. Anomalies picked up from ultrasound scans 2010-2011

Appendix 5.

Exam desc	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
Amnio drainage	1	0	1	0	0	0	1	0	1	0	0	2	6
Amniocentesis	23	16	21	21	22	24	22	30	20	14	17	18	248
Ascites Scan	0	0	1	0	0	0	0	0	0	0	0	0	1
Cervix assessment	0	0	0	0	0	0	1	0	1	1	6	1	10
Chorionic villus sampling	9	9	23	6	14	7	15	21	16	15	14	23	172
Consultant fetal cardiac	44	60	55	51	34	57	43	75	46	41	43	49	598
Dating scan	3	3	3	3	1	3	0	2	4	1	6	5	34
Detailed Rhesus scan	8	10	6	15	16	5	0	5	3	9	8	10	95
Detailed scan	314	337	358	317	356	374	279	327	281	305	276	369	3893
Ductus Venosus Doppler	4	6	3	6	6	4	2	11	4	7	5	2	60
Early Pregnancy Scan	0	0	0	2	1	0	0	1	1	0	0	1	6
Fetal blood sample	3	1	4	1	3	2	2	3	0	2	2	1	24
Fetal blood transfusion	2	3	2	2	4	4	0	1	2	3	2	3	28
Fetal drainage	0	0	0	0	0	0	0	0	1	0	1	0	2
Fetal heart rate	1	1	0	0	0	0	0	0	0	0	0	0	2
Fetal shunt	0	1	0	0	0	0	0	0	0	0	0	0	1
RITA	0	0	0	0	0	0	0	0	0	0	1	1	3
Fetocide	2	0	6	1	4	0	2	1	3	1	0	3	23
Fetoscopy	1	5	2	3	3	7	0	1	1	5	2	4	30
Growth scan	3	3	7	5	3	5	3	5	2	2	2	3	43
Liquor volume	6	3	2	3	2	1	2	4	2	1	5	1	32
MCA doppler	11	5	6	9	9	3	4	9	6	7	4	8	81
Nuchal translucency scan	2	1	7	3	3	6	4	14	4	10	11	7	72
Placenta Site	1	0	1	0	0	0	1	0	0	0	0	1	4
Radiographer fetal cardiac	47	49	52	47	57	44	56	44	48	62	57	68	631
Raised AFP detailed scan	1	1	3	1	3	1	1	2	2	3	3	5	26
Selective reduction	0	2	1	0	0	1	0	1	2	0	0	0	7
Umbilical artery doppler	15	11	8	13	9	4	8	17	8	10	17	10	130
Uterine artery doppler	2	2	2	0	0	2	0	1	1	1	1	5	17
Viability scan post procedure	0	0	0	0	0	0	0	0	0	0	0	1	1
Viability scan	5	9	13	16	11	11	8	5	5	9	7	9	108
	508	538	587	525	561	565	454	580	464	509	490	610	6388

Table 16. Fetal Medicine Procedures 2010-2011 by month

Appendix 6.

PCT Name	Count
HEREFORDSHIRE PCT	307
SOUTH BIRMINGHAM PCT	1,339
SHROPSHIRE COUNTY PCT	52
WALSALL TEACHING PCT	265
COVENTRY TEACHING PCT	112
TELFORD AND WREKIN PCT	17
WOLVERHAMPTON CITY PCT	123
HEART OF BIRMINGHAM TEACHING PCT	619
DUDLEY PCT	505
SANDWELL PCT	476
BIRMINGHAM EAST AND NORTH PCT	244
NORTH STAFFORDSHIRE PCT	62
STOKE ON TRENT PCT	82
SOUTH STAFFORDSHIRE PCT	524
WORCESTERSHIRE PCT	542
WARWICKSHIRE PCT	524
SOLIHULL CARE TRUST	134
	5,927
OATS	
KINGSTON PCT	1
MILTON KEYNES PCT	1
NOTTINGHAM CITY PCT	3
SALFORD PCT	7
STOCKPORT PCT	17
ASHTON, LEIGH AND WIGAN PCT	8
WARRINGTON PCT	5
BURY PCT	11
TAMESIDE AND GLOSSOP PCT	1
BRIGHTON AND HOVE CITY PCT	1
LEEDS PCT	3
SHEFFIELD PCT	1
DERBYSHIRE COUNTY PCT	40
DERBY CITY PCT	12
NOTTINGHAMSHIRE COUNTY TEACHING PCT	26
LINCOLNSHIRE TEACHING PCT	10
COUNTY DURHAM PCT	2
NORTH LANCASHIRE TEACHING PCT	2
WIRRAL PCT	1
HALTON AND ST HELENS PCT	16
WESTERN CHESHIRE PCT	4
HEYWOOD, MIDDLETON AND ROCHDALE PCT	2
NORTH YORKSHIRE AND YORK PCT	5
EAST RIDING OF YORKSHIRE PCT	4
HULL TEACHING PCT	2
BRADFORD AND AIREDALE TEACHING PCT	21
LEICESTERSHIRE COUNTY AND RUTLAND PCT	87
LEICESTER CITY PCT	3
NORTHAMPTONSHIRE TEACHING PCT	10
CAMBRIDGESHIRE PCT	1
NORFOLK PCT	2
SUFFOLK PCT	1
EASTERN AND COASTAL KENT PCT	1
OXFORDSHIRE PCT	7
GLOUCESTERSHIRE PCT	4
WILTSHIRE PCT	1

CORNWALL AND ISLES OF SCILLY PCT	1
CARDIFF & VALE UNIVERSITY LHB	3
ANEURIN BEVAN LHB	5
POWYS TEACHING LHB	6
NORTH EAST LINCOLNSHIRE CARE TRUST PLUS	2
	340

Table 17. Fetal Medicine Activity (examination) by PCT – 2010-2011

PCT Name	Attendances
NEWHAM PCT	1
BRIGHTON AND HOVE CITY PCT	1
SOUTH BIRMINGHAM PCT	66
WALSALL TEACHING PCT	3
COVENTRY TEACHING PCT	2
WOLVERHAMPTON CITY PCT	2
HEART OF BIRMINGHAM TEACHING PCT	37
DERBYSHIRE COUNTY PCT	1
DERBY CITY PCT	1
DUDLEY PCT	13
SANDWELL PCT	24
BIRMINGHAM EAST AND NORTH PCT	20
STOKE ON TRENT PCT	2
SOUTH STAFFORDSHIRE PCT	10
WORCESTERSHIRE PCT	19
WARWICKSHIRE PCT	4
GLOUCESTERSHIRE PCT	1
SOLIHULL CARE TRUST	5
Total	212
SOUTH BIRMINGHAM PCT	15
WALSALL TEACHING PCT	2
HEART OF BIRMINGHAM TEACHING PCT	12
DUDLEY PCT	1
SANDWELL PCT	6
BIRMINGHAM EAST AND NORTH PCT	1
SOUTH STAFFORDSHIRE PCT	1
WORCESTERSHIRE PCT	2
Total	40
NEWHAM PCT	2
EALING PCT	1
SOUTH BIRMINGHAM PCT	276
WALSALL TEACHING PCT	11
COVENTRY TEACHING PCT	2
TELFORD AND WREKIN PCT	3
WOLVERHAMPTON CITY PCT	8
HEART OF BIRMINGHAM TEACHING PCT	112
DERBY CITY PCT	2
DUDLEY PCT	48
SANDWELL PCT	84
BIRMINGHAM EAST AND NORTH PCT	56
SOUTH STAFFORDSHIRE PCT	26
WORCESTERSHIRE PCT	51

WARWICKSHIRE PCT	17
GLOUCESTERSHIRE PCT	8
SOLIHULL CARE TRUST	17
Total	724

Table 18. PPCC activity by PCT – 2010-2011