

Ultrasound Service Modelling

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Full report: www.pi.nhs.uk/ultrasound/modelling.htm

Background

- SHA request that this be performed as part of ultrasound workforce planning
- Investment bid approval contingent on this being undertaken
- Change is necessary to accommodate national (National Screening Committee, NICE) and regional (PI/RUG) standards

Aims & methods

- Aim: to quantify the proposed expansion in service necessary to adopt national and regional guidelines
- Routine antenatal ultrasound only
- Service-based (births at West Midlands units) using data from 2007
- Excludes
 - Diagnostic, invasive, fetal medicine workload i.e. only routine workload
 - Long term trends
 - birth rate, deprivation, obesity

Modelling parameters 1

Constant(s)	Constant despite changes to service
Pregnancy attrition	Reflects miscarriages throughout pregnancy
Variable(s)	Changes made to ultrasound service
Appointment times	Changes to content of scans requiring more time
Number/type of scans offered	<p>I) Routine ultrasound package - number of scans offered to all women</p> <p>II) <i>Indications</i> for non-routine scans (3T) %women defined as high-risk</p> <p>III) <i>Number/frequency</i> of non-routine scans (3T) offered to high-risk women</p> <p>IV) Uptake rate for scans - assumed to be 100% except for NT</p> <p>V) Recall rates - % scans needing to be repeated because satisfactory images cannot be obtained</p>

Modelling parameters 2

- Estimates of constants & variable
 - West Midlands data – RUG surveys
 - UK data
 - NSC surveys
 - Other published studies
 - Otherwise “Best guess”

Attrition rates

Trimesters	Pregnancies	Attrition rate → birth
First trimester	74,350	3.93%
Second trimester	73,542	1.20%
Third trimester	72,541	0.60%
At birth	71,539	0.00%

DOASS rates

Appointment times

	Routine scan durations	mins
1st trimester	Dating*	12
	Extra time NT*	6
	Recall NT*	18
2nd trimester	Mid trimester†	20
	Mid trimester + extra content ‡	10
	Recall mid trimester ‡	25
3rd trimester	Growth†	15
	Non-growth†	15

* UK data NSC Ultrasound Survey 2002

† West Midlands data RUG Workforce/workload survey 2007

‡ Best guess

First trimester

- NSC model of best practice, combined screening
- **Estimates used (1st trimester):**
- Uptake of first trimester screening 90% (Stafford pilot)
- Recall rate for dating scan including NT 16% (Glasgow study)

First trimester

Scan type	Current		Proposed	
	Scans	Hours	Scans	Hours
Dating	74,350	14,870	7,435	1,487
Dating + NT	-	-	66,915	20,075
Recall NT	-	-	10,706	3,212
1st trimester	74,350	14,870	85,057	24,774

- + 9,903 scanning hours
- + 67% scanning time within trimester
- + 15% scanning time all trimesters

Second trimester

- NICE antenatal care guidelines inclusion of cardiac OFTs
- Recording of images will also increase appointment times
- **Estimates used (2nd trimester):**
- Recall rate for mid T scan (current) 10% (Best guess)
- Recall rate for mid T + OFT 15% (NSC estimate)

Second trimester

Scan type	Current		Proposed	
	Scans	Hours	Scans	Hours
Mid T	73,542	24,514	-	-
Mid T + OFT	-	-	73,542	36,771
Recall mid T	7,354	2,451	11,031	4,596
2nd trimester	80,896	26,965	84,573	41,367

- + 14,402 scanning hours
- + 53% scanning time within trimester
- + 21% scanning time all trimesters

Third trimester

- RUG Subgroup Standard
 - Serial US assessment where SFH not possible
 - Serial US assessment for high-risk pregnancy
 - Referrals from SFH screening low-risk
 - Referrals from DFM low-risk
- **Estimates used (2nd trimester):**
- no recall scans for growth
- no change in non-growth third trimester scans

Continued....

Estimates scans/pregnancy

Current activity non-growth scans/pregnancy	0.37	WM workforce/workload survey
Current activity growth scans/pregnancy	1.02	WM workforce/workload survey
Proposed: high-risk population or SFH screening not possible	4.5	Fetal growth assessment at 3 week intervals from 28 weeks, half of pregnancies will delivery before the scan due at 40 weeks
Proposed: low-risk SFH screening true +ve (diagnosis of IUGR)	4	Fetal growth assessment at 2 week intervals, duration will depend on gestation of diagnosis and delivery
Proposed: low-risk SFH screening false +ve (not IUGR)	1	Single scan will confirm SFH screening as false +ve
Proposed: low-risk DFM	1	Single scan

Estimates % offered scans

Proposed: high-risk population or SFH screening not possible	25%	Prevalence of risk factors - risk categories are not mutually exclusive
Proposed: low-risk SFH screening true +ve (diagnosis of IUGR)	4.8%	Target of 60% detection of IUGR (prevalence 8%)
Proposed: low-risk SFH screening false +ve (not IUGR)	15%	From SFH screening
Proposed: low-risk DFM	10%	Review by Frøen

Third trimester

Scan type	Current		Proposed	
	Scans	Hours	Scans	Hours
Growth	73,828	18,457	105,655	26,414
Non-growth	27,030	6,758	27,030	6,758
3rd trimester	100,859	25,215	132,685	33,171

- + 7,957 scanning hours
- + 32% scanning time within trimester
- + 12% scanning time all trimesters

Summary

	Current		Proposed		
Trimester	Scans	Hours	Scans	Hours	Change
1 st trimester	74,350	14,870	85,057	24,774	+67%
2 nd trimester	80,896	26,965	84,573	41,367	+53%
3 rd trimester	100,859	25,215	132,685	33,171	+32%
All trimesters	256,105	67,050	302,316	99,312	+48%

+ 48% scanning time

Summary

- West Midlands obstetric ultrasound service needs to expand by 48%
- Increase in the annual scanning requirement of:
 - 46,210 scans
 - 32,262 scanning hours

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