Scottish Neonatal Transport Service

Cuthbertson Building, Glasgow Royal Infirmary

Alexandra Parade, Glasgow, G31 2HR

PERINATAL COLLABORATIVE TRANSPORT STUDY (CoTS)

FINAL REPORT

Ms Catriona Macintyre-Beon
Dr Charles Skeoch
Dr Lesley Jackson
Dr Phil Booth
Prof Alan Cameron

On behalf of the CoTS Steering Group and
The Scottish Neonatal Transport Service

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SUMMARY

Background, aims and methods

The in-utero transport (IUT) of a fetus is a universally accepted method of ensuring that a pregnant woman is in the correct facility to receive appropriate medical or obstetric care for her and, if indicated, neonatal care for the newborn infant. This element of obstetric and midwifery care requires staff time and service infrastructure that has not previously been defined.

With the support of NHS Quality Improvement Scotland (NHS QIS), a Scotland-wide study was undertaken of all IUTs occurring during the six month period, 21st August 2006 until 25th February 2007. Forty one units delivering infants in Scotland participated, including the 22 Community Midwifery Units (CMUs) which are central to the delivery of midwifery care in Scotland.

The original aims of the study were:

- to establish the number of in-utero transfers (IUTs) in Scotland, analysing them according to clinical issues and decision making processes.

- to make recommendations about the need to have a “joined up service” offering advice and co-ordination for both in-utero and ex-utero transfers.

- to understand the toll on the families of mothers subjected to IUT, financially and in terms of the effect of the displacement (e.g. childcare, work, etc)

Following a decision by the project steering group (Appendix 11.2) that the third aim above required a longer term follow up of all the families involved using a retrospective questionnaire based study, this aim was dropped from the current study. However, additional funding was received from BLISS, the National Charity for the Newborn, to fund this aspect of the study and this work is underway, with a report expected in summer 2008.

Data on all IUTs into and out of each participating unit were collected using questionnaires designed specifically for this study. Further information on the number of staffed neonatal cots available and day to day variations in occupancy was also collected from regional neonatal centres.

Key findings

There were 599 IUTs during the six month period, 72% (n=434) from CMU to Consultant Led Units (CLU), and 28% (n=165) between CLUs including 14.3% (n=86) between tertiary units. A total of 34 women (5.7%) were transferred past their nearest tertiary unit.

Ninety four percent of CMU transfers followed agreed pathways of care.

Summary of recommendations

The results of this study support those previously published within the Expert Group on Acute Maternity Services (EGAMs) Report, 2003. The recommendations made within this report will be relevant to service planning and policy groups including the

Scottish Government Maternity Services Action Group and their neonatal sub group. The primary recommendation of this work is to:

- establish the exact reason why, when unit occupancy was less than 70% or between 70-100%, staffed neonatal cots were unavailable.
- recommend the review of staffing levels by unit to ensure that staffed cots are available in all neonatal units throughout Scotland and that no neonatal units remain 'closed' in breach of agreed acceptable levels.

The following recommendations aim to improve all aspects of IUTs in Scotland:

- Establish the feasibility of identifying and introducing rapid bedside testing to predict and/or establish the existence of premature labour. This, if appropriate, would include the development of protocols for use.
- Forthcoming guidance (British Association of Perinatal Medicine Guidelines) for IUTs including the use of tocolytics should be considered for national implementation and any outstanding anomalies investigated further.
- The feasibility of establishing a safe and reliable 24-hour national service for the co-ordination and undertaking of IUTs should be established.
- All IUTs should be recorded on a national database. Regular analysis both nationally and regionally should be undertaken with feedback to individual and networking units.
- National guidance should be developed that clearly defines the most appropriate level of seniority for obstetricians, neontaologists, midwives and neonatal nurses who may be involved in the decision making associated with IUTs.
- As part of a wider examination of the method of transfer, the reason for women being transported in private vehicles should be established. The level of support required from healthcare staff during the journey should also be considered. This work should be undertaken in conjunction with the Scottish Ambulance Service. The need for guidance on who should accompany women during transfer irrespective of labour status should also be considered.
- Monitoring of outcomes associated with specialist neonatal and obstetric units, including emergency caesarean section rates, should be routinely carried out throughout Scotland in relation to IUTs.
- The report of the financial, practical and emotional implications of IUTs on families (BLISS report) should be considered on publication.

1.0 INTRODUCTION

The Perinatal Collaborative Transport Study (CoTS) began in May 2006 and ran for 10 months until February 2007. The main purpose of the study was to quantify the number and type of in-utero transfers (IUTs) taking place in Scotland over a 6-month period. An in-utero transfer is the transfer of a woman in labour from one hospital or facility to another in order to provide an appropriate level of care for the mother, the baby, or both. Information was collected on a range of issues including the clinical reason why the transfer took place, the process of planning and organising the transfer and the outcome for mother and baby. This was the first time that national information on in-utero transfers taking place in Scotland had been collected and analysed and it therefore provides valuable information on the planning and delivery of maternity care in Scotland.

1.1 Background

The classification of maternity units in Scotland is based on an eight point scale according to the level and type of care provided and ranges from a planned homebirth (level 1a) through community maternity units (levels 1b, 1c and 1d) to consultant-led units (levels IIa, IIb, IIc, III and IV) (Appendix 11.1; NHS QIS, 2007). Care in community maternity units (CMUs) is managed by midwives often with GP support whereas care in consultant-led units (CLUs) is managed by consultant obstetricians and midwives with a range of other specialists available. CLUs at levels IIb, IIc and III provide special facilities for infants including special care baby units and neonatal intensive care. There is one level IV (quaternary) unit in Scotland, the Queen Mother's Hospital in Glasgow, which accepts referrals from all over Scotland and in conjunction with the Royal Hospital for Sick Children, Yorkhill, Glasgow provides highly specialist services including cardiac, surgical and metabolic care. All CMUs and CLUs up to level IIb have procedures and guidelines in place covering the transfer of mothers and/or infants to another hospital offering a higher level of care when this is necessary. Therefore there is a pathway for escalation of clinical care or dependency for both mother and fetus if required.

Of the 52,727 births that took place in Scotland in 2005, 1,924 (3.6 %) took place in a CMU, mainly in remote and rural areas (SPCERH, 2007). Although the overall number of births taking place in CMUs is small, a large proportion of IUTs taking place in Scotland originate in a CMU therefore these transfers are considered separately from CLU to CLU transfers in the analysis.

For the purposes of this study an in-utero transfer (IUT) was defined as:

> *"The transfer of the mother to another hospital for maternal care or predicted neonatal care for her newborn(s)"*

An IUT is a method of ensuring that the mother and fetus are in the appropriate facility at the time of intended delivery given any clinical situation. An IUT may therefore reflect a normal planned system of maternity provision with the level of care escalated acutely according to the needs of the mother or fetus. For example, a situation where a diagnosis at time of presentation of the mother in labour led the care-giver to believe that a safe delivery would be best achieved in another maternity unit with different facilities. In this situation the referring caregiver should discuss the case with a senior obstetrician or neonatologist in the potential receiving unit or labour ward. Once agreement to accept the transfer is reached, discussion would be required regarding the physical means of transferring the mother and fetus, which

staff should accompany the mother, and the appropriate level of care required during the transfer. Arrangements would then be made with appropriate pre-transfer management considered and initiated, eg, drug or fluid administration. In some cases the transfer may be necessary because the birth plan may have changed requiring, for example, the services of an anaesthetist, not available locally, to allow epidural anaesthesia. In other circumstances the transfer may be necessary because of a shortage of suitable facilities for a mother and her infant either in the labour ward or the neonatal unit.

At present in Scotland the number and short term outcome of IUTs is unknown and this study aimed to address this gap in knowledge in what is a major area of patient care affecting many different professional disciplines. To optimise clinical provision for this potentially vulnerable group, it is essential to have a good knowledge of the demography, clinical characteristics and present service provision. The results from the study may also inform a number of reorganisation initiatives such as the Scottish Government Maternity Services Action Group and their neonatal review sub-group.

Work originally undertaken by the Clinical Standards Advisory Group (CSAG) (1993 and 1995) examined access to and availability of neonatal intensive care, with particular reference to the referral of patients across district boundaries to regional and national centres. Data from a regional survey in Trent region described in the 1993 report stated that:

> *"It is accepted that non-referral units should have easy access to intensive care beds in a regional or sub-regional centre and that sub-regional centres should not normally need to transfer their own in born babies..."*

The term "inappropriate transfer" was used to describe transfers when these criteria were not met.

Subsequent reports (Cusack et al, 2007; Gill et al, 2004; Parmanum et al, 2000) have consistently cited the following criteria:

1. Pregnant women should not travel beyond their nearest referral centre.
2. Tertiary centres should not transfer mothers or babies who are booked for care with them.

The second edition of guidance published by the British Association of Perinatal Medicine (BAPM, 2001) reiterated a recommendation from the second CSAG report in 1995 which stated:

> *"That, as a quality measure, events when a baby (or mother) is transferred inappropriately, are recorded and a goal of reducing such journeys to 10% of all transfers is set"*.

Evidence from other parts of the UK suggests that most major perinatal centres in the UK are regularly unable to meet demand due to a lack of neonatal cots (Cusack et al, 2007; Gill et al, 2004; Parmanum et al, 2000).

In addition to IUTs, transfer of an infant from one hospital to another may take place after birth and this is known as an ex-utero transfer (EUT). Although it has long been held that IUT is the safest method of moving an infant, the establishment of a national Scottish Neonatal Transport Service (a group of professionals who will care

for a newborn infant and undertake an ex-utero transfer) means that this may no longer always be the case. Since 2003, four neonatal transport teams based in three regions in Scotland and funded by all NHSScotland Boards have provided this service. These teams accept the request to move the baby, organise the appropriate staff and equipment and undertake the transfer by road or air ambulance in accordance with the principles of the Scottish Neonatal Transport Service.

2.0 AIMS

The original aims of the study were:

- to establish the number of in-utero transfers (IUTs) in Scotland, analysing them according to clinical issues and decision making processes.
- to make recommendations about the need to have a "joined up service" offering advice and co-ordination for both in-utero and ex-utero transfers.
- to understand the toll on the families of mothers subjected to IUT, financially and in terms of the effect of the displacement (e.g. childcare, work, etc).

Following a decision by the project steering group (Appendix 11.2) that the third aim above required a longer term follow up of all the families involved using a retrospective questionnaire based study, this aim was dropped from the current study. However, additional funding was received from BLISS, the National Charity for the Newborn, to fund this aspect of the study and this work is underway, with a report expected in summer 2008.

3.0 METHODS

3.1 Data collection

Data collection was undertaken via a questionnaire survey of all 41 participating maternity units in Scotland (Table 3.1) using a questionnaire designed by the project Executive Group (Appendix 11.2). The questionnaire was piloted for two weeks in the Queen Mother's Hospital in Glasgow to assess potential problems prior to being rolled out to all units via local coordinators (Appendix 11.3). To ensure full understanding of the study procedures, local coordinators were either visited by study staff or attended a local coordinators meeting in Glasgow.

The questionnaire survey was carried out between 21st August 2006 and 25th February 2007. Data were collected on every IUT in Scotland during this time period from all units currently delivering maternity care in Scotland. Each unit was allocated an identifying number for subsequent analysis.

Table 3.1 Maternity units in Scotland with unit identifier

	Unit	Level of Unit
1.	Aberdeen Maternity Hospital, Aberdeen	III
2.	Dr Gray's Hospital, Elgin	IIb
3.	Chalmers Hospital, Banff	Ib
4.	Peterhead Community Hospital, Peterhead	Ib
5	Fraserburgh Hospital, Fraserburgh	Ib
6.	Aboyne Hospital, Aboyne	Ib
7.	Princess Royal Maternity, Glasgow	III
8.	Queen Mothers Hospital, Glasgow	IV
9.	Southern General Hospital, Glasgow	IIc
10.	Royal Alexandra Hospital, Paisley	IIb (CLU)/Id (CMU)
11.	Inverclyde Royal Hospital, Greenock	Ic
12.	Vale of Leven Hospital, Alexandra	Ic
13.	Dunoon and District General Hospital, Dunoon	Ic
14.	Victoria Hospital, Rothesay	Ic
15.	Wishaw General Hospital, Wishaw	IIc
16.	Stirling Royal Infirmary, Stirling	IIc
17.	Ayrshire Maternity Unit, Crosshouse	IIc
18.	The War Memorial Hospital, Arran	Ib
19.	Dumfries and Galloway Royal Infirmary, Dumfries	IIc
20.	Clenoch Birthing Centre, Galloway Community Hospital, Stranraer	Ic
21.	Raigmore Hospital, Inverness	IIc
22.	Caithness General Hospital, Wick	IIa
23.	Belford Hospital, Fort William	Ic
24.	Campbeltown Hospital, Campbeltown	Ic
25.	Mid Argyll Hospital, Lochgilphead	Ic
26.	Lorne & Island District General Hospital, Oban	Ic
27.	Western Isles Hospital, Stornoway	IIb
28.	Islay Hospital, Islay	Ic
29.	Dunaros Hospital, Mull	*Now closed*
30.	Dr Mackinnon Memorial Hospital, Isle of Skye	Ib
31.	Ninewells Hospital, Dundee	III
32.	Perth Royal Infirmary, Perth	Ib
33.	Midwife Unit, Montrose Infirmary, Montrose	Ib
34.	Royal Infirmary of Edinburgh	III
35.	St Johns Hospital, Livingston	IIc
36.	Borders General Hospital, Melrose	IIc
37.	Balfour Hospital, Orkney	Ib
38.	Gilbert Bain Hospital, Shetland	Ic
39.	Forth Park Hospital, Kirkcaldy	Ic/IIc
40.	Midwife Unit Arbroath Infirmary, Arbroath	Ib
41.	Uist and Barra Hospital, Benbecula	Ib

Each unit was asked to complete a questionnaire for each transfer either into or out of the unit. In this way, for each IUT that took place, data were collected by both the referring hospital and the receiving hospital. For each IUT, staff were asked to record:

- the primary clinical reason for considering a transfer.
- whether the woman was in labour at the time of transfer.
- the highest grade of obstetric, paediatric, midwifery or neonatal nursing staff involved/consulted in the decision to move/accept each woman.
- the number of maternity units contacted prior to locating a suitable maternal bed/neonatal cot.

- the time taken, in minutes, to organise the IUT.
- whether tocolytic therapy was administered to the mother (tocolysis may be administered in an attempt to delay delivery of a pre-term infant until after the transfer has taken place; it should only be used if there is evidence of uterine activity and, if used, its effect should be assessed prior to transfer).
- whether delivery occurred within 48 hours of the maternal and neonatal outcomes.
- whether specialist maternal or neonatal care was required.

All CLUs with neonatal units were also asked to provide:

- a daily log of the level of occupancy classified as being <70%, between 70% and 100% and greater than 100%.
- a daily log of whether neonatal intensive care cots were available that day.

Nursing and midwifery staffing levels in these units are commonly set to allow for only 70% occupancy, an approach supported by the BAPM Standards (2001).

In addition, all tertiary units were asked to provide an explanation for why the transfers were required.

As part of the process of organising an IUT, units may make use of the Bed Bureau (a division of the Department of Capacity Management, University of Edinburgh, and based in the Royal Infirmary of Edinburgh) in order to facilitate the finding of a suitable cot or bed for the mother. The Bed Bureau requests information twice in every 24 hour period from seven neonatal units in Scotland (Aberdeen Maternity; Princess Royal Maternity and Queen Mothers Hospital, Glasgow; Ninewells Hospital, Dundee; Ayrshire Maternity; the Royal Infirmary of Edinburgh) on how many intensive care spaces they have available for use.

During the study period, regular contact was maintained by e-mail and telephone with all local coordinators to ensure that all IUTs were recorded. All missing data were retrieved retrospectively by matching information from the referring and receiving units involved in each individual IUT. If any discrepancies were noted these were resolved by contacting the appropriate unit. Any such differences were resolved prior to analysis.

All study data were held on a password protected personal computer in a locked room accessible only to the study team.

3.2 Data analysis

All data were entered into a survey-specific Microsoft Access ® database and transferred to SPSS V14 for descriptive analysis.

Data were analysed according to whether the transfer was from one CLU to another CLU, or from a CMU to a CLU.

4.0 RESULTS

Over the six month recording period (21st August 2006 – 25th February 2007), 599 in-utero transfers (IUTs) were recorded in Scotland. There was no seasonal variation and the mean number of IUTs per calendar month was 94 (range 79-112 per month).

Seventy-two per cent (n=434) of IUTs originated in midwifery led units (CMUs) of which 94% (n=408) followed the agreed pathway of referral to the designated named CLU for that CMU.

The remaining 27.6% (n=165) of IUTs were from one CLU to another CLU of which 52% (n=86) involved transfers from one tertiary (level III) unit to another (Wishaw General Hospital is included in the latter figures as it currently fulfils the criteria for a tertiary unit although it is not shown as such in Table 3.1).

A total of 5.7% (n= 34) of women were transferred beyond their nearest tertiary referral centre, 1.0% (n=6) originating in a CLU and 4.7% (n=28) originating in a CMU.

4.1 Consultant-Led Unit to Consultant-Led Unit Transfers

4.1.1 Primary clinical reason for transfer

The primary clinical reasons why CLU to CLU transfers took place are summarised in Table 4.1.

Table 4.1 Primary Clinical Reason for CLU to CLU Transfer (n=165)

Reason	n	%
Threatened premature labour	53	32.1
Prolonged rupture of membranes	42	25.4
Ante-partum haemorrhage	17	10.3
Pre-eclampsia	9	5.4
IUGR	4	2.4
Pregnancy induced hypertension	2	1.2
UTI	2	1.2
Thromboembolic disease	1	0.6
Breech	1	0.6
Other	34	20.6
Missing	0	0

Three primary reasons (threatened premature labour, prolonged rupture of membranes and ante-partum haemorrhage) accounted for over two-thirds of all CLU to CLU transfers with threatened premature labour alone being the primary reason for a third of transfers.

4.1.2 Medical staff involvement in decision to transfer

The highest grade of obstetric, midwifery and paediatric staff involved in the decision to transfer is shown in Tables 4.2 and 4.3.

Table 4.2 Highest grade of obstetric/midwifery staff involved in decision to transfer (n=165)

Grade	n	%
Consultant	114	69.1
Staff Grade	1	0.6
Associate Specialist	3	1.8
Senior Registrar	24	14.5
Registrar	7	4.2
G Grade Midwife	3	1.8
F Grade Midwife	2	1.2
Middle Grade SHO	5	3.0
Missing	6	3.6

In 69.1% (n=114) of IUTs, a consultant obstetrician was involved in the decision to transfer (Table 4.2). In cases where a woman was transferred because of concern about the threat of premature delivery, the level of consultant obstetrician involvement in the decision to transfer was similar irrespective of whether or not the woman was thought to be in labour at the time of transfer (73% compared with 70%, respectively).

Of the 5.4% (n=9) women transferred because they were suffering from pre-eclampsia and 1.2% (n=2) because of pregnancy induced hypertension, half had their care discussed with, or directly provided by a consultant obstetrician, senior registrar, associate specialist or staff grade.

A consultant paediatrician was involved in/consulted about the decision to transfer in 22.4% of cases (Table 4.3).

Table 4.3 Highest grade of paediatric staff involved in decision to transfer n=165)

Grade	n	%
Consultant	37	22.4
Associate Specialist	2	1.2
Senior Registrar	25	15.1
Registrar	25	15.1
Middle Grade SHO	4	2.4
No Medical/Paediatric Involvement	49	29.7
Missing	23	13.9

In cases where there was a threatened premature delivery, consultant paediatricians were involved in the decision to transfer in 12.9% of cases but there was no paediatric staff involvement in the discussion or arrangement of transfer in 59.5% of these cases.

4.1.3 Use of tocolytics prior to transfer

Fifty-three women (32.1%) were transferred from one CLU to another CLU because of concern about a threatened premature labour. Of these, 62.3% (n=33) were thought to be in established premature labour, 9.4% (n=5) were thought not to be in labour, and in the remaining 28.3% (n=15) the labour status was uncertain at the time of transfer. Of the women thought to be in established premature labour, 36% (12/33) received tocolytic therapy prior to transfer. Of those thought not to be in established premature labour, two of the five received tocolytic therapy and among those whose labour status was uncertain, four of the fifteen received tocolytic therapy prior to transfer.

4.1.4 Organising the in-utero transfer

The number of telephone calls, from one maternity unit to another, that were required to organise each IUT is summarised in Table 4.4.

Table 4.4 Number of telephone calls required to organise the CLU to CLU transfer (n=165)

	n	%
1	2	1.2
2	50	30.3
3	48	29.1
4	29	17.6
5	10	6.1
6	5	3.0
7	3	1.8
8	6	3.6
9	6	3.6
10 or more	3	1.8
Missing	3	1.8

In a majority of cases (61.6%, n=100), no more than three telephone calls were required to organise the IUT, although in 13.9% of cases six or more calls were required. The Bed Bureau in Scotland was utilised in 37.6% (n=62) of CLU to CLU transfers.

The actual amount of time (in minutes) spent by staff in the ward arranging each IUT was also recorded and the results are summarized in Table 4.5.

Table 4.5 Number of minutes spent organising each CLU to CLU transfer (n=165)

	n	%
<30 Mins	129	78.2
30-60 Mins	23	13.9
60-90 Mins	4	2.4
90-120 Mins	2	1.2
Missing	7	4.2

In the majority of cases (78.2%, n=129), ward staff took less than 30 minutes to organise the transfer, although in a small number of cases (3.6%, n=6) this was more than an hour.

In 80% (n=132) of cases only one maternity unit had to be called in order to arrange the transfer. Of the remaining cases, 8.5% (n=14) had to contact two units, 5.4% (n=9) had to contact three units and 3% (n=5) had to contact four units.

In the 109 cases where information was recorded on the number of neonatal units that had to be called in order to arrange the IUT, only one neonatal unit had to be called in 74.3% (n=81) of cases. Of the remainder, 10.1% (n=11) had to contact two units, 8.2% (n=9) had to contact three units and 7.3% (n=8) had to contact four units.

4.1.5 Method of transfer

Most CLU to CLU transfers were by ambulance (92.6%, n=151) with a small number by private car (6.1%, n=10), air ambulance (0.6%, n=1) and air (0.6%, n=1).

In 80% of cases, women were accompanied during the transfer by a midwife either alone (in 64.8% of cases) or with other medical staff (9.1% of cases) (Table 4.6). Data was not provided in 20% of cases.

Table 4.6 Type of clinical staff accompanying mother on IUTs from CLU to CLU (n=165)

Type of staff	n	%
Midwife x 1	107	64.8
Midwife x 2	2	1.2
Midwife & Paramedic	9	5.4
Obstetric, Medical Staff & Midwife	5	3.0
Anaesthetic Staff & Midwife	1	0.6
Paediatric Medical Staff	8	4.8
Missing	33	20.0

4.1.6 Maternal and neonatal outcomes following transfer

In 46.7% (n=77) of the 165 CLU to CLU transfers, delivery occurred within 48 hours of admission to the receiving unit. The method of delivery is shown in Table 4.7.

Table 4.7 Method of delivery for births occurring within 48 hours of CLU to CLU transfer (n=77)

Type of staff	n	%
Spontaneous vertex (vaginal) delivery (SVD)	30	39.0
Emergency caesarean section	30	39.0
Assisted delivery	7	9.1
Elective caesarean section	5	6.5
SVD/Assisted breach	1	1.3
Missing	4	5.2

In those cases where delivery occurred within 48 hours of the IUT taking place, 39% (n=30) of deliveries were by spontaneous vertex delivery (normal vaginal delivery) and 39% (n=30) were by emergency caesarean section.

Of the 77 women who delivered within 48 hours of their transfer, 89.6% (n=69) were transferred to the post natal ward following delivery and had an uneventful recovery period; 7.8% (n=6) of women were transferred to a high dependency unit and 2.5% (n=2) required admission to an adult intensive care unit following delivery.

More than three-quarters (76.6%) of the babies born to mothers who delivered within 48 hours of their CLU to CLU transfer taking place required some form of special care, with 53.2% (n=41) requiring admission to a neonatal intensive care unit and 23.4% (n=18) requiring admission to a special care baby unit. Two stillbirths and two early neonatal deaths (deaths within the first week of life) were also reported (Table 4.8).

Table 4.8 Neonatal outcome for births within 48 hours of CLU to CLU transfer (n=77)

Outcome	n	%
Neonatal Intensive Care	41	53.2
Special Care	18	23.4
Transferred to Post Natal Ward	9	11.7
Stillbirth	2	2.6
Early Neonatal Death	2	2.6
Missing Data	5	6.5

Of the 53 women who were transferred from CLU to CLU because of a threatened premature labour, 26.4% (n=14) delivered within 48 hours of the transfer taking place of whom 78.6% (n=11) were thought to be in established premature labour at the time of transfer, one was thought not to be in labour and in 13.3% (n=2) of cases the status of labour was uncertain at the time of transfer.

4.2 Community Midwifery Unit to Consultant Led Unit Transfers

Of the 599 IUTs recorded during the study period, 72.5% (n=434) were transfers from Community Midwifery Units (CMUs) to Consultant-Led Units (CLUs). As mentioned previously, 94% of these transfers followed the agreed pathway of referral to the designated named CLU for each CMU.

In the majority of cases these transfers involved singleton pregnancies with only eight twin pregnancies recorded (1.8%).

4.2.1 Primary clinical reason for transfer

The primary clinical reasons given for transfers between CMUs and CLUs are summarised in Table 4.9.

Table 4.9 Primary reason for transfer from CMU to CLU (n=434)

Primary reason for transfer	n	%
Threatened Premature Labour	69	15.9
Failure to Progress	67	15.4
Premature Rupture of Membranes	44	10.1
Pregnancy Induced Hypertension	28	6.4
Pre-Eclampsia	26	6.0
Ante-Partum Haemorrhage	23	5.3
Meconium Staining	23	5.3
Requirement for Epidural	16	3.7
Foetal Distress	9	2.1
Intra-uterine Growth Restriction	9	2.1
Breach Presentation	7	1.6
Airway Tract Infection	6	1.4
Cervical Suture in Situ	6	1.4
Maternal Diabetes	3	0.7
Thromboembolic Disease	2	0.5
Others	92	21.2
Missing	4	0.9

Of the 434 CMU to CLU transfers, 60.4% (n=262) of women were thought to be in labour at the time of transfer, 27.2% (n=118) were thought not to be in labour, and among the remaining 54 women diagnosis of labour was uncertain at the time of transfer.

In 9.3% (n=26) of cases, CTG (cardiotogography or fetal heart monitoring) provided cause for concern. In a further 13 cases (3.0%), ultrasound scanning performed prior to transfer was a cause of concern.

4.2.2 Medical staff involved in/consulted about the decision to transfer

The highest grade of obstetric, midwifery and paediatric staff consulted prior to the decision to transfer being made is shown in tables 10 and 11, respectively.

Table 4.10 Highest grade of obstetric/midwifery staff consulted prior to decision to transfer from CMU to CLU (n=434)

Grade	n	%
Consultant	96	22.1
Senior Registrar	36	8.3
Registrar	43	9.9
Associate Specialist	5	1.1
Staff Grade	1	0.2
Middle Grade SHO	3	0.7
GP	21	4.9
F Grade Midwife	100	23.2
G Grade Midwife	126	29.2
Missing	3	0.7

Table 4.11 Highest grade of paediatric/midwifery staff consulted prior to decision to transfer from CMU to CLU (n=434)

Grade	n	%
Consultant	10	2.3
Senior Registrar	2	0.5
Registrar	5	1.1
Staff Grade	2	0.5
GP	1	0.2
G Grade Midwife	6	1.4
F Grade Midwife	1	0.2
No paediatric staff consulted	372	85.7
Missing	35	8.1

Obstetric medical staff were involved/consulted in the decision to transfer in 42.4% of cases but paediatric medical staff involvement was rare, with no paediatric staff involvement in 85.7% of cases.

4.2.3 Use of tocolytics prior to transfer

Tocolytic therapy was administered, prior to transfer, to 19.4% (n=7/36) of women who were thought to be in established premature labour at the time of transfer and in 11.1% (n=3/27) of cases where it was uncertain whether or not they were in established premature labour at the time of transfer.

4.2.4 Organising the in-utero transfer

The Bed Bureau was rarely contacted by CMUs when organising transfers to CLUs (3.6%, n= 6) which may reflect the fact that the pathway for referral is working correctly, ie, that the CMU staff know exactly who to contact to arrange the transfer and which unit the mother/baby will be transferred to.

In 86.2% of cases, only one or two telephone calls were required in order to arrange the transfer to the CLU (compared with 31.5% for CLU to CLU transfers) which is likely to reflect the correct operation of the agreed pathway of referral. Of the remainder, in 8.5% (n=37) of cases, three calls were required and in 4.4% (n=19) of cases, four or more calls were required.

In almost all cases (95.4%, n=414), arranging the transfer took less than 30 minutes with only one case taking more than an hour to organise.

4.2.5 Method of transfer

Over half (55.1%, n=239) of all CMU to CLU transfers took place by emergency ambulance with 10.6% (n=46) requiring an air ambulance, the latter reflecting the remote location of many CMUs (eg, Orkney and Shetland). Almost a quarter of transfers (24%, n=104) took place by private car (Table 4.12).

Table 4.12 Method of Transfer from CMU to CLU (n=434)

	n	%
Ambulance Emergency	239	55.1
Ambulance Elective	26	6.0
Air Ambulance	46	10.6
Private Car	104	24.0
Missing	19	4.4

Of the 311 CMU to CLU transfers that took place by ambulance, the woman was accompanied by a midwife in 83.3% (n=259) of cases, either alone in 68.2% (n=212) of cases or with other medical staff in 15.1% (n=47) of cases (Table 4.13).

Table 4.13 Grade of staff member accompanying mother during CMU to CLU ambulance transfer (n=311)

Grade	n	%
Midwife	212	68.2
Midwife & Paramedic	46	14.8
Paramedic	29	9.3
Obstetric Medical Staff & Midwife	1	0.3
Missing	23	7.4

4.2.6 Maternal and neonatal outcomes following transfer

In 68% (n=298) of the 434 CMU to CLU transfers, delivery occurred within 48 hours of the transfer taking place and in 85.8% (n=248) of these cases the women was transferred to the postnatal ward and had an uneventful recovery.

Eighteen women who delivered within 48 hours of the transfer taking place required admission to a high dependency medical unit (6.2%) and one women required admission to an adult intensive care unit (0.3%). In 11 instances of the 289 women who delivered within 48 hours following transfer no data were collected on the outcome.

Just under a quarter of the babies born to mothers who delivered within 48 hours of their CMU to CLU transfer taking place required some form of special care (compared with 82% for CLU to CLU transfers), with 5.7% (n=17) requiring admission to a neonatal intensive care unit and 18.1% (n=54) requiring admission to a special care baby unit (Table 4.14).

Table 4.14 Births within 48 hours of CMU to CLU transfer, Neonatal Outcome (n=298)

Neonatal outcome	n	%
Admitted to Post Natal Ward with Mother	213	71.5
Special Care Unit Admission	44	14.8
Neonatal Intensive Care Admission	17	5.7
Stillborn	7	2.3
Missing Data	17	5.7

Of those babies delivered to women within 48 hours of the transfer taking place, the majority (71.5%) were admitted to the postnatal ward with the mother. There were seven stillbirths (2.3%) and no early neonatal deaths.

4.3 Neonatal Cot Occupancy

A daily log was obtained from all CLUs during the six month audit period. Table 4.15 shows the level of occupancy for five of the six tertiary neonatal units in Scotland during the six-month (182 day) study period (Ninewells Hospital in Dundee; Wishaw General; Aberdeen Maternity; Princess Royal Maternity, Glasgow; and the Simpson Centre for Reproductive Health in Edinburgh). The Queen Mother's Hospital in Glasgow was excluded due to the unique nature of its function as a Level 4, quaternary, neonatal unit. At baseline, all units reported that they were currently staffed to a level sufficient to allow for 70-80% cot occupancy in line with BAPM guidance, ie, if a unit has 10 intensive care cots they will only have sufficient staffing to allow seven cots to be occupied at any one time. However, if necessary, the remaining three cots could be used, and in such cases a unit would be said to have occupancy of greater than 100%.

Table 4.15 shows the total number of days when cots were not available for each of the five units during the 182 days of the study period. Also shown is the number of days per unit when no cots were available when occupancy was recorded as being more than 100%, 70-100%, or less than 70% during the 182 day study period.

Table 4.15 Number of Days when Units were not accepting new admissions during study period (182 days) by occupancy rate

Tertiary Unit	**Total number of days (/182) when no cots available**	Number of days (/182) when occupancy >100%	Number of days (/182) when occupancy at 70-100%	Number of days (/182) when occupancy <70%
Wishaw General	**43 (24%)**	34 (18.6%)	7 (3.8%)	2 (1.0%)
Princess Royal Maternity, Glasgow	**74 (41%)**	24 (13.2%)	45 (27.7%)	4 (2.2%)
Royal Infirmary of Edinburgh	**54 (30%)**	10 (5.5%)	33 (18.1%)	11 (6.0%)
Aberdeen Maternity Hospital	**112 (62%)**	6 (3.3%)	56 (30.7%)	50 (27.5%)
Ninewells Hospital, Dundee	**49 (27%)**	42 (23.0%)	7 (3.8%)	0 (0%)

Units can experience occupancy of over 100% for a number of reasons, for example, the need to co-locate multiple births or the need to accommodate babies of mothers too ill to be moved themselves. Evidence has identified a link between increased mortality and high levels of occupancy of neonatal units and therefore this situation should, as far as possible, be avoided (BAPM, 2001; Parmanum et al, 2000).

Given that units are generally staffed to cope with an occupancy rate of 70-80%, it is expected that a unit would report that cots are available if occupancy is less than 70%. However, in all but Ninewells Hospital, there were occasions when units reported that no cots were available when occupancy was less than 70%. This was particularly the case for Aberdeen, where on 50 separate days when occupancy was recorded as less than 70% the unit was declared ‘full’. It is possible that this reflects planned care for local cases that are expected but have not yet arrived.

A brief survey of consultant obstetricians in the tertiary units identified that in almost all cases transfers between tertiary units occurred because of a lack of available staffed neonatal cots and that this was the case during the period of the study and more generally.

5.0 CONSIDERATION OF THE FINDINGS

5.1 General

- On average, 94 IUTs occurred each month. This equates to an average annual rate of 1,128, approximately 2% of the total Scottish birth rate (General Register Office Scotland, 2006 figures).
- During the six months of data collection for this study, almost three-quarters of the IUTs recorded involved transfers from CMUs to CLUs (434) and of these, 94% followed the agreed pathway of referral (ie, what should have happened did happen).
- Of the 165 CLU to CLU transfers, 47.8% (n=79) were transfers from level II CLUs according to agreed pathways of care**.** The remaining 52.2% (n=86) involved transfers of women from one tertiary unit to another.
- A total of 5.6% (n=34) of women were transferred past their nearest tertiary unit, the majority (82.3%, n=28) originating from CMUs.
- During the study period, 4.7% (n=28) of women were transferred from a tertiary to a non-tertiary unit. The reason provided for this was the need to free up a tertiary bed for a more potentially serious case.
- Providing services as locally as possible and avoiding transfers past the nearest unit is advocated by the CSAG (1993) guidance, BAPM, 2001 and the EGAMs Report, 2003. It would appear that for 34 women (5.6%) this was not the case.
- The proportion of time that individual neonatal units were not accepting new admissions varied considerably, from 24% to 62% of the total time, and included periods when stated occupancy was less than 70%.

Recommended Action

The results of this work support the summary recommendations previously published by the Working Group associated with the EGAMS Report, 2003. Further work is recommended to improve all aspects of IUTs in Scotland.

5.2 Primary clinical reason for transfer

- The most frequently cited primary clinical reason for transfer for both CLU to CLU and CMU to CLU transfers was threatened premature labour (32% and 16%, respectively). Despite this being the case, only a quarter of CLU to CLU transfers for threatened premature labour actually resulted in delivery within 48 hours of admission to the receiving unit. This may be an indication that management delayed delivery or that there were challenges associated with accurately establishing the presence of pre-term labour.
- These findings highlight the need for a more precise way of predicting premature labour, as a more accurate prediction could reduce the overall need for IUTs.

5.3 Establishing the status of labour

- Threatened premature labour is different to established premature labour however, on occasions, establishing the difference between the two can be difficult.
- Utilisation of a rapid bedside test to exclude premature labour with a high negative predictive value would be beneficial but not all units were able to provide this examination out of hours.
- Near patient testing for cervical fibronectin and measurement of cervical length are two possible methods:
  - Meta-analysis suggests that fetal fibronectin has a sensitivity of 77% and a specificity of 87% in predicting delivery within seven days in women who are suspected of being in premature labour. (Leitich,*et. al.* 1999).
  - Cervical length can be measured either digitally or by transvaginal ultrasound and research shows that 50% of women with a cervical length of less than 15mm will deliver within seven days but only 1% of women with a cervical length of greater or equal to 16mm will deliver within seven days (Iams *et. al.* 1996).

Recommended Action

Further work is undertaken to establish the feasibility of identifying and introducing reliable, rapid bedside testing with a high negative predictive value in order to predict and establish premature labour in all units. This, if appropriate, would include the development of protocols for monitoring these women prior to IUT. This review should include consideration of the findings of the systematic review of rapid response tests to aid in diagnosing preterm labour in symptomatic women, produced by the Institute of Health Economics, Canada (IHE, 2008) and the impending

Cochrane Review on fetal fibronectin testing for reducing the risk of preterm birth (Berghella et al, 2007).

5.4 The use of tocolytics prior to transfer

- Tocolytic therapy may be used in a situation where uterine contractions are established and there is a need to "buy" some time to allow administration of ante-natal steroids and arrange and execute an IUT.

- Some guidance on this topic is available from the Royal College of Obstetricians and Gynaecologists Clinical Guidelines (RCOG, 2006). Evaluating the current evidence, the report considers that tocolysis reduces the proportion of births occurring up to seven days after starting treatment, but there is no evidence that perinatal loss or morbidity is improved. They conclude therefore that it is reasonable not to use tocolysis. However, the guideline suggests that the groups of women most likely to benefit are:

  "…*those who are still very preterm, those needing transfer to a hospital that can provide neonatal intensive care or those who have not yet completed a full course of corticosteroids to promote fetal lung maturation…".*

- This form of therapy is clearly used in Scotland in some units but its role in IUT and the method of monitoring such women prior to transfer is not applied consistently or systematically.

- In this study, of those women thought to be in established premature labour prior to transfer, tocolysis was used in 36% (n= 59) of CLU to CLU and 19.4% (n=32) of CMU to CLU transfers. It is not possible to say from the data available why this was the case. However, the lack of clear guidance and/or approach to systematic use and the difficulty in robustly identifying premature labour may be major factors.

- The British Association of Perinatal Medicine (BAPM) is currently developing guidelines for IUTs which will include advice about the use of tocolysis in this situation.

Recommended Action

Forthcoming guidance (BAPM Guidelines) for IUTs including the use of tocolytics should be considered for national implementation and any outstanding anomalies investigated further.

5.5 Organising the transfer

- The results of this study show that the majority of transfers are organised in less than 30 minutes (78.2% for CLU to CLU and 95.4% for CMU to CLU) but more telephone calls were required to organise the CLU to CLU than the CMU to CLU transfers (31.5% and 86.2%, respectively requiring only one or two calls). This may reflect the correct operation of agreed pathways of referral in the CMUs. Nearly one-fifth (18.2%) of CLU to CLU transfers took more than 30 minutes to organise with 37.6% requiring more than three phone calls to arrange.

- It is common practice for the personnel who are providing the clinical care within the referring unit to also organise the IUT whether this be a large and busy labour ward or a small CMU. This has administrative implications for clinical staff.

- The results suggest that there is scope for assessing the feasibility of developing some sort of centralised service, supported by non-clinical staff, in order to free up clinicians' time, particularly in CLUs. The primary role of such a service would be to identify labour ward space and neonatal cots, arrange transport, prepare documentation and ensure that all procedures are followed. This is an administrative role that would be concerned with processes only after the decision to transfer had been made by clinical staff.

- The role of the Bed Bureau also needs to be considered, as it would appear that it is not used routinely. During this study it was utilised in less than a third of CLU to CLU transfers, and in only 3.6 % of CMU to CLU transfers.

Recommended Action

There would be benefit in examining the value of providing a centralised service to reduce the administrative burden on clinicians and to streamline the identification of available beds/cots.

5.6 Seniority of staff involved in decision to transfer

- In 86.1% (n=142) of CLU to CLU transfers, a consultant obstetrician, staff grade/associate specialist doctor or senior registrar was involved in or consulted about the decision to transfer.

- The same transfers involved a lower proportion of paediatric medical staff (38.8%). However, by definition, an IUT should not require paediatric staff, and if such a need is anticipated the transfer should not take place.

- The much lower level of senior obstetric and paediatric staff involvement in the decision to transfer from CMU to CLU reflects not only the different type of service provision in these units, but also the fact that all CMUs have agreed protocols and pathways for referral to their identified 'parent' CLU, an issue covered in detail in the recent NHS QIS funded CMU audit (SPCERH 2007).

- The Expert Group on Acute Maternity Services (EGAMS) Report, 2003, states that: "*any transfer decision should be made at a senior identified level*" but fails to provide a definition of seniority. Therefore seniority should be defined with respect to obstetric, paediatric, midwifery and neonatal nursing staff.

- In 10.3% of cases, the decision to transfer women from one CLU to another CLU was made by staff lower than senior registrar, staff grade /associate specialist or consultant grade. It would appear that in some units these decisions are being made by more junior staff despite most taking place because of clinical situations that may have required a neonatal intensive care cot.

- Despite this, only 38.8% of IUTs involved senior neonatal staff. It may have been unnecessary in some cases to have discussion with a senior neonatal doctor; however, those who work in this specialty are aware that on occasions units are declared "closed" by either the Bed Bureau or relatively junior staff. This may be

at a time when a higher level discussion could lead to solutions not readily considered by less experienced staff.

Recommended Action

National guidance should be developed that clearly defines the most appropriate level of seniority for doctors, midwives and nurses involved in making decisions about whether or not an IUT is required.

5.7 Method of transfer

- The responsibility for moving patients between hospitals currently rests with the Scottish Ambulance Service. The fact that 6.1% (n= 10) of CLU to CLU transfers were undertaken in a private vehicle requires further investigation to identify whether this was due to a shortage of ambulance resource, to clinical decisions or to other reasons.

- During the course of this study, a quarter of CMU to CLU transfers were undertaken by private car (24%, (n=104) and further work is required in order to understand why this is the case. These figures suggest the need for further evaluation on a more detailed basis of the method of transfer under different clinical circumstances. Such a study would require the involvement of the Scottish Ambulance Service.

- The majority of CLU to CLU transfers (80%) were accompanied throughout their journey by either medical or nursing/midwifery staff with the data associated with the remaining 20% not recorded.

- Although few complications were recorded, the ability to provide clinical monitoring during an IUT is limited and facilities for intervention are virtually non-existent, therefore a specific study of the management of IUTs during the journey would be helpful.

Recommended Action

As part of a wider examination of the method of transfer, the reason for women being transported in private vehicles should be established. This examination needs to consider not only the method of transfer but also the level of support required from healthcare staff including the ability or necessity to carry our clinical monitoring during the journey. This work should be undertaken in conjunction with the Scottish Ambulance Service.

5.8 In and ex-utero transfers

- The Expert Group on Acute Maternity Services (EGAMS, 2003) core principles state:

  "Intrapartum care must be provided to women as locally as possible, balancing safe clinical care with informed maternal choice".

  A further core principle states:

  "A comprehensive network for intrapartum care should be developed Scotland-wide on a consistent local, regional and national basis. This

will enable the provision of seamless intrapartum care irrespective of morbidity, within a clear and explicit network identifying entry points, referral pathways, levels of care, transport services and communication pathways."

- Neither of these core principles are at variance with the concept of the need for IUTs in a regional or national network, however they would suggest that a system should be in place to broker a seamless process of organising and executing the IUT in a safe and efficient manner.

- The National Neonatal Transport Service is a national service funded through NHS boards which co-ordinates EUTs, provides partnership education in remote and rural areas and with CMUs. It provides all resources, including vehicles, for moving infants. The number of ex-utero transfers in Scotland per annum is similar to the number of IUTs (http://www.isdscotland.org). Given the links between IUTs and EUTs, the possibility of combining the services to cover both could be explored, leading to systems not dissimilar to that in New South Wales in Australia (SEHD, 2005) and also found in Scandinavia.

- It would be reasonable to explore options for the IUTs, including a process activated by a single telephone call and leading to procurement of a labour ward space, a neonatal cot if required and appropriate transport. Such a system already exists in London (Emergency Bed Bureau). In addition, if necessary, a perinatal advice service could be bolted on, whereby experts in perinatal medicine, neonatology and transport could be conference-called allowing a high level discussion and decision to be made about the most difficult cases.

Recommended Action

The feasibility of developing both a combined EUT and IUT service and a national IUT service should be examined.

5.9 Maternal and neonatal outcomes following transfer

- Of those that delivered within 48 hours of being transferred between consultant led units (46.7%), the emergency caesarean section rate was much higher than the Scottish average. In 2005, throughout Scotland as a whole, the rate of emergency caesarean section was 15.4% (latest available data, ISD Scotland, SMRO2 data, 2004/05). During the study period, a rate of 39% was recorded. The rate of elective caesarean section however was similar to that of the national figure (6.5% vs. 9.5%).

- Despite the raised emergency caesarean section rate, 89.6% (n=69) who delivered within 48 hours of a CLU to CLU transfer had an uneventful recovery period. The remainder (10.4%, n= 8) required high level and intensive care. No women died during the study period following either CLU to CLU or CMU to CLU transfers.

- Of those transferred from CLU to CLU due to pre-eclampsia (n=9) and pregnancy induced hypertension (n=2), just 50% had their care discussed with or directly provided by a consultant obstetrician, staff grade/associate specialist or senior registrar.

- As might have been expected, lower proportions of women transferred from CMU to CLU required admission to a high dependency medical unit (6.2%; n=18) and adult intensive care unit (0.3%; n=1) than in CLU to CLU transfers although the outcome of 11 women was not recorded.

- Of those babies delivered to women within 48 hours of CLU to CLU transfer there were two stillbirths and two early neonatal deaths (death within the first week of life). Overall in Scotland in 2006, there were 296 stillbirths (5.3 per 1000 total births) and 119 early neonatal deaths (2.1 per 1000 live births) (ISD, 2007).

- It is not possible to provide a reliable commentary on the rate of these outcomes within the study period as women requiring transfer are more likely than the overall population to be at risk from an increased incidence of adverse outcome and/or neonatal mortality/morbidity due to the seriousness of their condition.

Recommended Action

Before a more reliable commentary can be made about maternal and neonatal outcomes a detailed examination of the outcomes associated with specialist neonatal and obstetric units, over a longer period of time including overall UK rates, would have to be considered.

5.10 Neonatal occupancy

- According to national statistics, there were on average, 335 available staffed neonatal cots in Scotland in 2007 (Scottish Parliament, 2007). The level of staffed cots is determined by health board and/or regionally with cots generally being 'staffed' based on a 70-80% occupancy rate (see methods for further explanation).

- Any system for neonatal care has to provide a capacity which will avoid as far as possible the movement of mothers or babies past the nearest appropriate CLU (CSAG, 1993, BAPM, 2001, EGAMS Report 2003). This capacity depends on a number of factors which may vary on a day to day (or even hour to hour) basis. The physical number of intensive and special care cots is defined at the commissioning of a unit but may be changed as part of strategic health care planning for a region.

- The UK Neonatal Staffing Study (2003) demonstrated increased mortality in newborn babies who are treated in intensive care units that are over occupied and have inadequate nurse staffing levels.

- The expectation for intensive care nursing for infants should be the same as for adults, that is, one to one nursing. This is endorsed by the BAPM Guidelines. The BLISS report (2007) reported that at that time, no Scottish unit met these BAPM guidelines.

- It is clear from the figures that the number of days on which units reported being 'closed for IUTs' during the study period varied considerably from 43 to 112. This study's figures indicate that only one of the six tertiary units was "open" for IUT admissions at all times when their occupancy was less than 70%. The other four units studied were not accepting admissions on some days, even when they should have had adequately staffed cots. This would appear to indicate that there

were staffing issues that impacted on the ability of units to be in a position to accept babies for care, issues that resulted in IUTs.

- The actual reason for transfer reported by tertiary units was a lack of staffed neonatal cots. This situation directly led to 86 women being transferred between tertiary units and another 65 being transferred to a lower level unit. Lower level units, by their very nature do not have the same specialist staff or equipment. It therefore needs to be considered that the decision to transfer some mothers was not made on the basis of their clinical condition but as a consequence of a lack of staffed cots.

- In CLU to CLU transfers where delivery occurred within 48 hours of the transfer, 76.6% (n= 59) of infants required specialised neonatal care after birth. As may have been expected, the rate was much lower in CMU to CLU transfers (20.5%). This is most likely a reflection of the former group being more vulnerable, which, to some degree would have been anticipated.

- A significant part of the workload associated with neonatal units was derived from CMUs. During the study period, 71 infants born to women who delivered within 48 hours of transfer required specialist care. This equates to an average of 142 infants per year, with 34 of these potentially requiring intensive care. There are associated implications for women, their partners and families who may be displaced from the home environment, sometimes for some considerable time. This has financial, practical and emotional implications. These issues are currently under study in Scotland through a project supported by BLISS, the report of which is anticipated during summer 2008.

Recommended Action/s

Further work needs to be undertaken to establish the exact reason why, when unit occupancy was less than 70%, staffed cots were unavailable. This should include a review of staffing levels to ensure that staffed neonatal cots are available in all units throughout Scotland and that no units remain ‘closed’ in breach of agreed acceptable levels.

The report of the financial, practical and emotional implications of IUTs on families (BLISS report) should be considered on publication.

5.11 Community Midwifery Unit to Consultant Led Unit Transfers

- The care and outcomes achieved by CMUs in Scotland has already been the subject of an audit published by NHS QIS (SPCERH, 2007).

- One of the recommendations of the CMU audit was that NHS boards should develop formal protocols for the safe transfer of women in labour addressing all stages of the transfer. The high level of compliance with agreed pathways suggests that most have such protocols in place.

- This study emphasises the large contribution CMUs make to high quality maternity care in Scotland’s.

- The NHS QIS CMU audit identified similar levels of transfer from CMU to CLU to that found within this study.

- In this study, direct labour related indications accounted for 184 IUTs over the six month period (368 per annum). These included the requirement for epidural, failure to progress, fetal distress, meconium staining and threatened PTL; 54 transfers were for either pre-eclampsia or pregnancy induced hypertension, conditions in pregnancy that may lead to significant and sudden maternal morbidity.

- The number of occasions that the mother was accompanied by a midwife appears to equate with the number of women that were thought to be in labour which is what would be expected.

- There exists however, at the discretion of the referring midwife, the ability to recommend accompanied transfer when women are known to be in labour. It may be helpful for national guidance to be developed in support of these decisions.

Recommended Action

Compliance against agreed pathways continues to be monitored. The need for guidance on accompanying women during transfer irrespective of labour status should be considered.

6.0 SUMMARY OF RECOMMENDATIONS

The results of this work support those previously published by the Working Group of the EGAMS Report, 2003. The following recommendations aim to improve all aspects of IUTs in Scotland:

- Establish the feasibility of identifying and introducing rapid bedside testing with a high negative predictive value in order to predict and/or establish the existence of premature labour. This, if appropriate, would include the development of protocols for monitoring these women prior to IUT.

- As soon as published, the BAPM Guidelines for IUTs including the use of tocolytics should be considered for national implementation.

- The feasibility of establishing a safe and reliable 24-hour national service for the co-ordination and undertaking of IUTs should be considered. The results from this study will be relevant to service planning and policy groups including the Scottish Government Maternity Services Action Group and their neonatal review sub group.

- All IUTs should be recorded on a national database and regular analysis both nationally and regionally undertaken and fed back to individual and networking units.

- National guidance should be developed that clearly defines the most appropriate level of seniority for doctors, midwives and nurses involved in the decision making associated with IUTs.

- As part of a wider examination of the method of transfer, the reason for women being transported in private vehicles should be established. The examination needs to consider not only the method of transfer but also the level of support required from healthcare staff including the ability to carry out clinical monitoring during the journey. This work that should be undertaken in conjunction with the

Scottish Ambulance Service. The need for guidance on accompanying women during transfer, irrespective of labour status, should also be considered and this could form part of the current review of maternity services.

- Monitoring of outcomes associated with specialist neonatal and obstetric units, including emergency caesarean section rates, should be routinely carried out throughout Scotland.

- Establish the exact reason why, when unit occupancy was less than 70% and between 70-100%, staffed cots were unavailable. This should include a review of staffing levels by unit to ensure that staffed cots are available in all units throughout Scotland and that no units remain ‘closed’ in breach of agreed acceptable levels.

- The report of the financial, practical and emotional implications of IUTs on families (BLISS report) should be considered on publication.

7.0 LIMITATIONS

The purpose of this study was to establish the number of in-utero transfers (IUTs) in Scotland, analysing them according to clinical issues and decision making processes. It has identified the extent to which IUTs are occurring in Scotland and that the primary reason for these was a lack of staffed newborn intensive care cots particularly in specialist units. It would appear from these results that this is a significant problem experienced by all units. This work however did not set out to undertake a detailed review of staffing per unit but to provide a general overview. It is therefore recommended that to assist in future planning, a more detailed review is undertaken on a unit basis.

8.0 CONCLUSIONS

This study has captured information about in-utero transfers in Scotland not previously known. It provides reassurance that the majority of transfers, particularly those made from CMU to CLU, are being managed in line with agreed pathways of care.

What is concerning however is that the rate of inappropriate IUT’s in Scotland exceeded the 10% threshold of quality as advocated by the BAPM and that a proportion of women could not be cared for by their nearest tertiary unit. This contravenes existing UK wide best practice guidance. It would appear that in some units, inadequate nurse staffing levels significantly contributed to this situation and this therefore requires urgent review.

There is also a need for further work that should include the development and implementation of national guidance/pathways that support elements of IUT management. This should also include the arrangements for, and the supporting processes and infrastructure that will streamline and ensure a safe and reliable national service.

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11.0 APPENDICES

Appendix 11.1 Classification of Maternity Unit Operating Levels

Operating Level	Description	Responsibility for care
1a	Planned homebirth	Normally two midwives or a midwife and a GP in attendance with support from Scottish Ambulance Service paramedics if required.
1b	Community-based maternity unit	Midwifery managed possibly with GP support and agreed transfer procedures in place for transfer to an appropriate maternity unit as required.
1c	Community-based maternity unit adjacent to a non- obstetric hospital	Midwifery-managed with GP support plus access to hospital medical staff as appropriate and transfer procedures in place to obstetric hospital maternity units as required.
1d	Community maternity unit adjacent to an obstetric hospital maternity unit	Midwifery-managed with GP support or access to hospital medial staff appropriately trained to perform emergency caesarean sections and agreed transfer guidelines to adjacent maternity unit as required.
IIa	Consultant-led maternity unit with no neonatal facility	Consultant obstetricians and midwives with anaesthetic facilities but no paediatric facilities on-site.
IIb	Consultant-led maternity unit with on-site special baby unit	Consultant obstetrician and midwives with anaesthetic and paediatric facilities. Procedures in place for transferring babies to advanced care facilities if required.
IIc	Consultant-led maternity unit	Consultant obstetrician and midwives with access to SCBU and NICU, adult high dependency and intensive care facilities.
III	Consultant-led specialist maternity unit	Consultant specialists in maternal fetal medicine (midwives plus other consultant specialists). Tertiary maternity unit-based care with access to adult and neonatal specialist intensive care facilities.

Source: National Overview of Maternity Services, NHS Quality Improvement Scotland, January 2007.

Appendix 11.2 Project Steering Group Members

Charles Skeoch *	NHS Greater Glasgow & Clyde
Lesley Jackson *	NHS Greater Glasgow & Clyde
Catriona Macintyre-Beon *	Scottish Neonatal Transport Service
Phil Booth *	NHS Grampian
Alan Cameron *	NHS Greater Glasgow & Clyde
Angela Cunningham	NHS Ayrshire & Arran
Ben Stenson	NHS Lothian
Colin Peters	NHS Lothian
Graham Tydeman	NHS Fife
Mike Woods	
Shona Woods	
Norman Smith	NHS Grampian
Pauline Lynch	NHS Tayside
Una Macfadyen	NHS Forth Valley
Rhona Hughes	NHS Lothian
Beatrice Cant	NHS Quality Improvement Scotland

* indicates Project Executive Group Members.
Note: The Scottish Government had observer status on the group.

Appendix 11.3 Local Co-ordinators

NHS Ayrshire & Arran	
Anne Hoyle	Ayrshire Central Hospital
Alan Stout	Arran War Memorial Hospital
NHS Borders	
Brian Magowan	Borders General Hospital
Colin Peters	Borders General Hospital
NHS Dumfries & Galloway	
Margaret Kerr	Dumfries & Galloway District Hospital
Margaret Kerr	Clenloch Birthing Centre
NHS Fife	
Sean Ainsworth	Forth Park Hospital
Lorraine Phillip	Forth Park Hospital
NHS Forth Valley	
Gail Bell	Stirling Royal Infirmary
NHS Grampian	
Joan Milne	Aberdeen Maternity Hospital
Lorna Campbell	Dr Gray's Hospital
Eleanor Brown	Chalmers Hospital
Janice Paton	Peterhead Community Hospital
Mary Watson	Fraserburgh Hospital
Linda Macadie	Aboyne Hospital
NHS Greater Glasgow & Clyde	
D Maclean	Princess Royal Maternity Hospital
Liz Callander	Princess Royal Maternity Hospital
Stewart Guthrie	Queen Mother's Hospital
Clare Gonnella	Queen Mother's Hospital
Irene Woods	Southern General Hospital
Cathy Harkins	Royal Alexandra Hospital
Jo Scobie	Inverclyde Hospital
Betty Adair	Vale of Leven District Gen. Hospital
NHS Highland	
Fiona Mundell	Raigmore Hospital
Isabel Seaton	Raigmore Hospital
Linda Phillips	Raigmore Hospital
Julia Munro	Caithness General Hospital
Mairi Milne	Belford Hospital
Catriona Dreghorn	Campbeltown Hospital
Joanne Thorpe	Mid Argyll Hospital
Hazel Munro	Lorne & Island District Hospital
Eileen Clarke	Lorne & Island District Hospital
Katherine Henderson	Lorne & Island District Hospital
Catherine McDonald	Western Isles Hospital
Margaret Fitsimmonds	Dunaros Hospital
Katie MacLellan	Islay Hospital
Fiona Manwell	Dunoon District General Hospital
Fiona Hood	Victoria Hospital
NHS Lanarkshire	
Fiona Collins	Wishaw General Hospital
NHS Lothian	
Amy Robb	Royal Infirmary of Edinburgh
Carol Murray	St John's Hospital
NHS Orkney	
Michelle Mackie	Balfour Hospital
NHS Shetland	
Teresa Chivers	Gilbert Bain Hospital

NHS Tayside	
Kay Forsyth	Ninewells Hospital
Anne Reilly	Ninewells Hospital
Janice Suttie	Perth Royal Infirmary
Fiona McInnes	Montrose Maternity Unit
Chris Field	Arbroath Maternity Unit
NHS Western Isles	
Leo Murray	Dr Mackinnon Memorial Hospital
Margaret Morrison	The Uist & Barra Hospital

12.0 Glossary

Ante-partum haemorrhage	Haemorrhage occurring before childbirth.
Bed Bureau	A division of the Department of Capacity Management, University of Edinburgh
BAPM	British Association of Perinatal Medicine
Cardiotography (CTG)	The technique of graphically recording some physical or functional aspects of the heart.
Community maternity unit (CMU)	Units that are managed by midwives often with GP support.
Consultant led unit (CLU)	Units that are managed by consultant obstetricians and midwives with a range of other specialists available.
CSAG	Clinical Standards Advisory Group
Ex-utero transfer (EUT)	The transfer of an infant from one hospital to another after birth.
Fetal fibronectin	Fetal fibronectin is an extracellular matrix glycoprotein. Fetal fibronectin in biologic fluids is produced by amniocytes and by cytotrophoblast. It is present throughout gestation in all pregnancies.
High Dependency Unit	Units that provide high dependency care and some short term intensive care (level 2).
In-utero transfer	The transfer of the mother to another hospital for maternal care or predicted neonatal care for her newborn(s).
Meta-analysis	A meta-analysis combines the results of several studies that address a set of related research hypotheses.
Neonatal	Pertaining to the first four weeks after birth.
Neonatal intensive care unit	Highest level (level 3) unit providing the whole range of medical neonatal care but not necessarily all specialist services such as neonatal surgery.
Obstetric	Branch of surgery that deals with pregnancy and labour.
Perinatal	Pertaining to or occurring in the period shortly before and after birth.
Postnatal	Occurring after birth
Premature/pre-term labour	Onset of labour before the 37th completed week of pregnancy dated from the last normal menstrual period.
Prolonged rupture of membranes	A rupture of the membranes before the onset of labour.
Scottish Neonatal Transport Service	A group of professionals who will care for a newborn infant and undertake an ex-utero transfer.
Singleton pregnancy	Gestation with development of one fetus.
Special care baby unit	Units that provide special care but do not

	aim to provide any continuing high dependency or intensive care. This term includes units with or without residential staff.
Spontaneous vertex delivery	Birth of an infant without any mechanical, pharmacologic, or medical assistance.
Tertiary unit	Consultant-led specialist maternity unit.
Tocolytic therapy	The use of pharmacologic agents to inhibit uterine contractions in preterm labour.
Transvaginal ultrasound	A method to look at a woman's reproductive organs, including the uterus, ovaries, cervix, and vagina using ultrasound technology.