



Place of Birth of Extremely Preterm Babies in the Thames Valley Neonatal Network

April 2015



Contents

EXECUTIVE SUMMARY 3

Introduction..... 5

The Area 6

Methods 7

Results..... 8

Numbers and comparison with adjacent area 8

Demographic data..... 10

Risk factors for preterm birth..... 11

The delivery admission 13

Attempted In Utero transfers 15

In Utero transfers not attempted..... 15

Aspects of care that may have changed place of delivery 16

Neonatal transfer and neonatal outcome..... 18

Conclusion and Recommendations..... 19

References 21

Appendix 22

 @OAHSNMaternity

www.oxfordahsn.org/our-work/clinical-networks/maternity



EXECUTIVE SUMMARY

Preterm birth remains a major contributor to neonatal mortality and long term disability. Extremely preterm babies born in a Level 3 neonatal unit are less likely to die than those born into a Level 2 (or less) setting. Because of this, neonatal networks recommend delivery of extremely preterm babies in a L3 unit. This is not always possible because of the unpredictable nature of preterm delivery, but high antenatal transfer rates can be achieved where there is consistency and cooperation among maternity units.

The Oxford AHSN Maternity Network undertook an audit of the Thames Valley area of all babies meeting the transfer criteria who were born outside the Oxford L3 neonatal unit between 01/04/2012 and 31/03/2014. The principal aim was to determine barriers to in utero transfer to allow recommendations for improvement.

Key Findings

Of 146 neonates meeting the antenatal transfer criteria in the Thames Valley region, 67 (46%) were delivered outside a L3 unit. In > 90% of cases, the baby/babies were transferred from the place of birth to a Level 3 unit after birth.

In utero transfer (IUT) was attempted in 6 (13%) of these cases; in each case the referral pathway to the L3 unit impeded this.

In total, in 41% of cases (18 cases, 21 babies) an IUT could reasonably have been attempted.

No issues were identified with the ambulance services that impeded IUT.

Management of threatened preterm labour was inconsistent and evidence-based diagnostic aids were seldom used. Although the use of steroids for lung maturation (83%) was good, magnesium sulphate for neuroprotection was infrequently used.

Recommendations/actions

A revised referral pathway to improve urgent in utero transfer rate to the John Radcliffe Hospital should be developed and implemented (done: Jan 2015).

Common network guidelines and pathways should be implemented throughout the network for management of threatened preterm labour and in utero transfer.

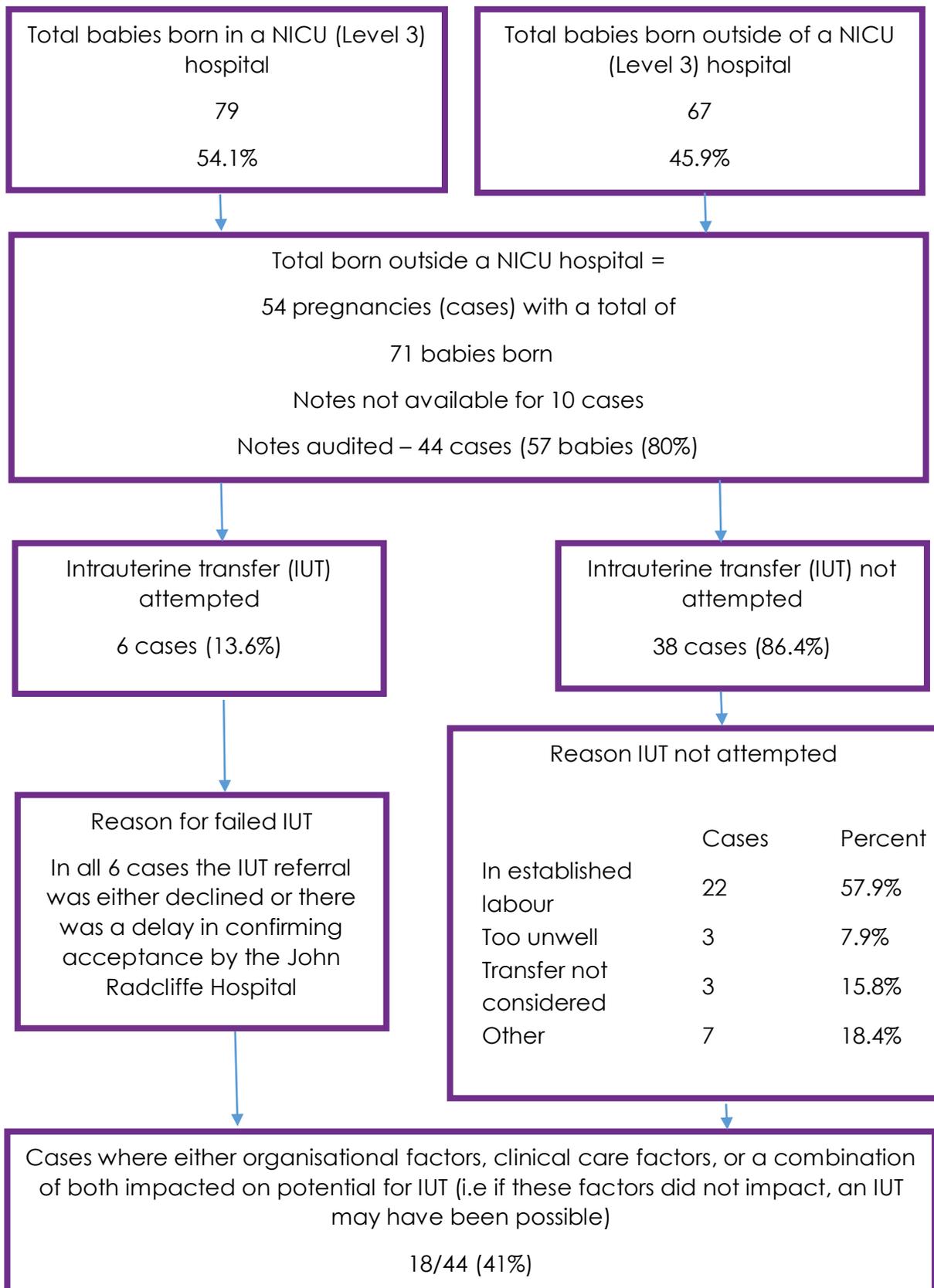
Common network guidelines and pathways should be implemented throughout the network regarding management of small for gestational age babies, and maternal pre eclampsia.

Women should be encouraged to seek advice and assistance from dedicated maternity services in the first instance when experiencing abdominal or back pain, bleeding or pv loss (rather than out of hours services).

There is potential for further work to be done on risk assessment and screening of women for preterm labour, in order to try to prevent, and if not, ensure care takes place in the most appropriate place.

Elective transfer or referral of women at high risk of (either spontaneous or iatrogenic) extreme preterm birth to a unit with a L3 NICU and accompanying specialist maternal or fetal medicine services should be increased.

Fig 1: Overview of Findings

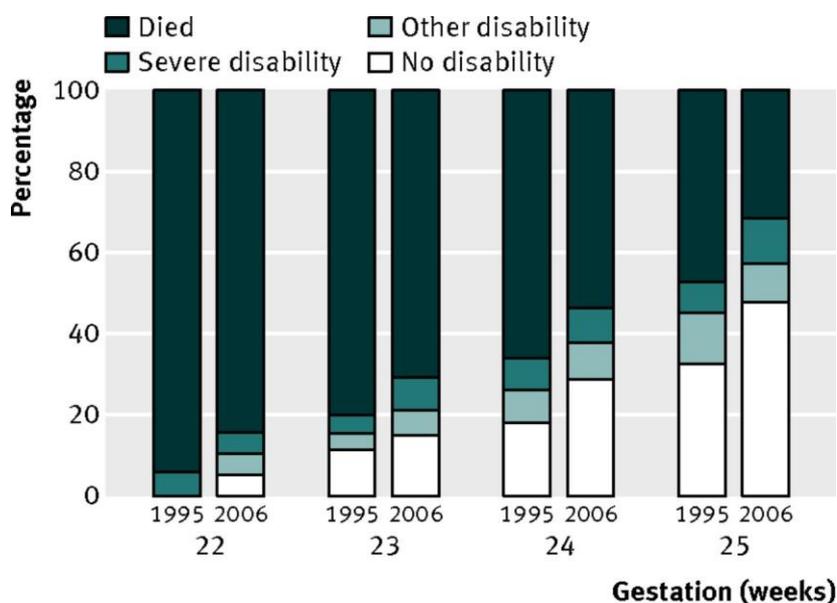


*Definition of case = 1 pregnancy in which at least one fetus met criteria for delivery in a Level 3 unit

Introduction

Preterm birth precedes the development of cerebral palsy in almost 50% of cases, and is a major cause of neonatal death. The risk is strongly related to the gestation at delivery, with babies born before 27 weeks at highest risk. The incidence in the UK remains unchanged, with preterm birth being possibly the greatest challenge for maternity services.

Fig 2: Outcomes for babies born at 22-25 weeks' gestation or less in England in 1995 (EPICure) and 2006 (EPICure 2) cohorts (from Marlow et al 2014)



Marlow et al (2014), using the EPICure 2 data, considered the effect of place of birth and perinatal transfer on survival and neonatal morbidity within a prospective cohort of births of extremely preterm babies in England. Within this cohort of babies (born with a gestation between 22 and 26 weeks), the study found a significantly reduced mortality for those born within a Level 3 neonatal unit when compared with birth in a 'Level 2 or less' setting (AOR 0.73, 95% CI 0.59-0.90). This was attributed to both a reduction in fetal deaths and a reduction in deaths in the first week of life and may therefore be related to both obstetric and neonatal care.

In the Oxford AHSN/ Thames Valley area, currently almost half of the babies who meet the nationally agreed criteria for delivery at a Level 3 Unit (under 27/40 singletons, under 28/40 multiples, or projected birth weight of less than 800g) do not deliver in one. This is a higher percentage than is reported in many other areas. This may reduce survival rates of the extremely preterm babies in the region.

We sought to look at factors that influence place of birth of this group of babies by auditing and analysing cases meeting these criteria but which nevertheless delivered outside of a Level 3 unit.

The aim of this report is

- 1) To identify factors that influence the place of birth of extremely preterm babies in the Thames Valley Neonatal Network/Oxford AHSN area, to promote development of practice and guidelines to improve transfer rates.
- 2) Audit clinical practice, including the use of interventions that can improve neonatal outcome (antenatal maternal administration of steroids and/ or magnesium) and diagnostic tests (fibrinectin, Actim Partus - commercially available kits for improving the diagnostic accuracy of preterm labour).

The Area

The Thames Valley area has an average birth rate of over 27,000 per year, and includes The John Radcliffe and Horton Hospitals (Oxford University Hospitals NHS Trust), Milton Keynes Hospital (Milton Keynes University Hospital NHS Foundation Trust), Wexham Park Hospital in Slough (now part of Frimley Health NHS Foundation Trust) and Stoke Mandeville Hospital (Buckinghamshire Healthcare NHS Trust). There is one Level 3 NICU situated in Oxford, and 4 LNUs and 1 SCU.

Neonatal Intensive Care Units (NICUs) are sited alongside (usually, and in this region) tertiary referral fetal and maternal medicine services. They provide the whole range of medical neonatal care for their local population. Medical staff in a NICU have no clinical responsibilities outside the neonatal and maternity services. Local Neonatal Units (LNUs) provide neonatal care for their own catchment population, except for the sickest babies. They provide all categories of neonatal care, but they are required to transfer babies who require complex or longer-term intensive care to a NICU. Special Care Units (SCUs) provide special care for their own local population. In addition, SCUs provide a stabilisation facility for babies who need to be transferred to a NICU for intensive or high dependency care.

In this region, due to various issues including capacity constraints, some hospitals were historically commissioned to provide care to babies that would normally be cared for at a NICU (Level 3 Unit). This was changed on the 1st April 2012, where upon the John Radcliffe Hospital became the sole provider of these services in the region. The units in the region committed to the Thames Valley Neonatal Network (updated in 2014) policy on transfer of infants to a Neonatal Intensive Care Unit, which includes the requirement to transfer babies under 27/40 or under 28/40 multiples, or an estimated birthweight of under 800g.

John Radcliffe Hospital, Oxford	NICU (Level 3)
Royal Berkshire Hospital, Reading	LNU
Wexham Park Hospital, Slough	LNU
Stoke Mandeville Hospital, Aylesbury	LNU
Milton Keynes General Hospital, Milton Keynes	LNU
Horton General Hospital, Banbury	SCU

Methods

Using data provided by the Thames Valley Neonatal Network we identified babies that were born between 1st April 2012 to 31st March 2014 that met the criteria for birth in a L3 NICU. This was a retrospective casenote review: we audited each available set of maternal and neonatal case records and completed a pre developed proforma.

A two year period was chosen to provide a large sample number. The start date of the audit was the point at which all babies in the audit criteria should be cared for at the John Radcliffe Hospital.

No ethical approval was required as this was an audit study; permission from each Trust's Caldicott Guardian was obtained.

It should be noted that the manner in which the data are collected means that only babies that had an admission to a special care unit were able to be identified. The audit therefore excludes those that died very shortly after birth, including those in which the parents requested no active resuscitation.

From the information gathered, each case was graded by a Consultant Obstetrician and a senior Midwife after identifying contributory factors to the place of birth, as to whether either the place of birth was unpreventable, whether aspects of clinical care may have prevented an in utero transfer (IUT – transfer by ambulance of the pregnant woman between the referring hospital and a Level 3 unit), whether organisational factors may have prevented an IUT, or whether both may have prevented an IUT.

Criteria for preventable lack of in utero transfer were:

- Elective delivery for fetal or maternal wellbeing when the patient was stable enough for a transfer to occur
- Labour that could have reasonably been predicted, such as patients presenting with signs of pre-term labour that were missed, or where diagnostic tests were not used when clinically indicated
- Transfer prevented by problems with units accepting referral, delay in ambulance services or other organisational factors

Results

Numbers and comparison with adjacent area

Seventy one neonates, of 54 pregnancies were identified. These represented 48.6% of all neonates meeting referral criteria born within the total area. Of the 54 pregnancies (cases)(71 babies), records were available for 44 pregnancies which included 32 singleton pregnancies, 11 sets of twins and one set of triplets, a total of 57 babies (82%). Of these babies, postnatal transfer was performed in 51 (91%). In the 6 babies where a neonatal transfer was not performed, 2 died under at under 12 hours of life and the other 4 babies were sets of twins in which one baby had a birth weight of under 800g but were of a gestation over 30 weeks. These twin cases were discussed with the Level 3 unit at the time and it was felt that their care at an LNU was appropriate.

Fig 3

UNIT	TOTAL CASES	RECORDS REVIEWED	RECORDS NOT AVAILABLE
RBH	15	11 (73%)	4 (27%)
Stoke Mandeville Hospital	7	5 (71%)	2 (29%)
Wexham Park Hospital	17	13 (76%)	4 (24%)
Milton Keynes Hospital	13	13 (100%)	0
Horton Hospital	2	2 (100%)	0
TOTAL	54	44	10

Fig 4a shows the breakdown of the numbers in different units in the Thames Valley area and according to the principal antenatal referral criteria. (Neonatal network data)

Fig 4b shows the data in the Wessex Neonatal Network area (a comparable area of 35,000 births) for the same time period. The percentage of babies meeting the criteria born in Level 3 units is consistently higher in this region. It should be noted that in both areas homebirths were extremely rare, but that in Wessex there are 2 NICUs. (Neonatal network data).

Fig 4c shows the data as bar charts.

Fig 4a

Thames Valley Neonatal Network area

CRITERIA FOR DELIVERY IN A UNIT WITH A NICU (LEVEL 3 UNIT)								
<ul style="list-style-type: none"> • Under 27 weeks gestation • If a multiple pregnancy, under 28 weeks gestation • If birth weight expected to be <800g regardless of gestation 								

Place of Birth	Total meeting criteria		<27/40		>27/40 <28/40 Multiples		>27/40 <800g	
	2012-2013	2013-2014	2012-2013	2013-2014	2012-2013	2013-2014	2012-2013	2013-2014
John Radcliffe, Oxford	41 (59%)	38 (50%)	29 (60%)	29 (50%)	5 (56%)	6 (55%)	7 (54%)	3 (43%)
Royal Berkshire, Reading	12 (17%)	7 (9%)	5 (10%)	4 (7%)	4 (44%)	2 (18%)	3 (23%)	1 (14%)
Wexham Park, Slough	6 (9%)	12 (16%)	5 (10%)	9 (16%)	0 (0%)	1 (9%)	1 (8%)	2 (29%)
Milton Keynes NHS Foundation Trust	6 (9%)	9 (12%)	4 (8%)	7 (12%)	0 (0%)	2 (18%)	2 (15%)	0 (0%)
Stoke Mandeville Hospital	3 (4%)	6 (8%)	3 (6%)	5 (9%)	0 (0%)	0 (0%)	0 (0%)	1 (14%)
Horton, Banbury	0 (0%)	3 (4%)	0 (0%)	3 (5%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Home	2 (3%)	1 (1%)	2 (4%)	1 (2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Thames Valley Total	70	76	48	58	9	11	13	7

Place of Birth	Total meeting criteria		<27/40		>27/40 <28/40 Multiples		>27/40 <800g	
	2012-2013	2013-2014	2012-2013	2013-2014	2012-2013	2013-2014	2012-2013	2013-2014
NICU	41 (59%)	38 (50%)	29 (60%)	29 (50%)	5 (56%)	6 (55%)	7 (54%)	3 (43%)
LNU/Home	29 (41%)	38 (50%)	19 (40%)	29 (50%)	4 (44%)	5 (45%)	6 (46%)	4 (57%)

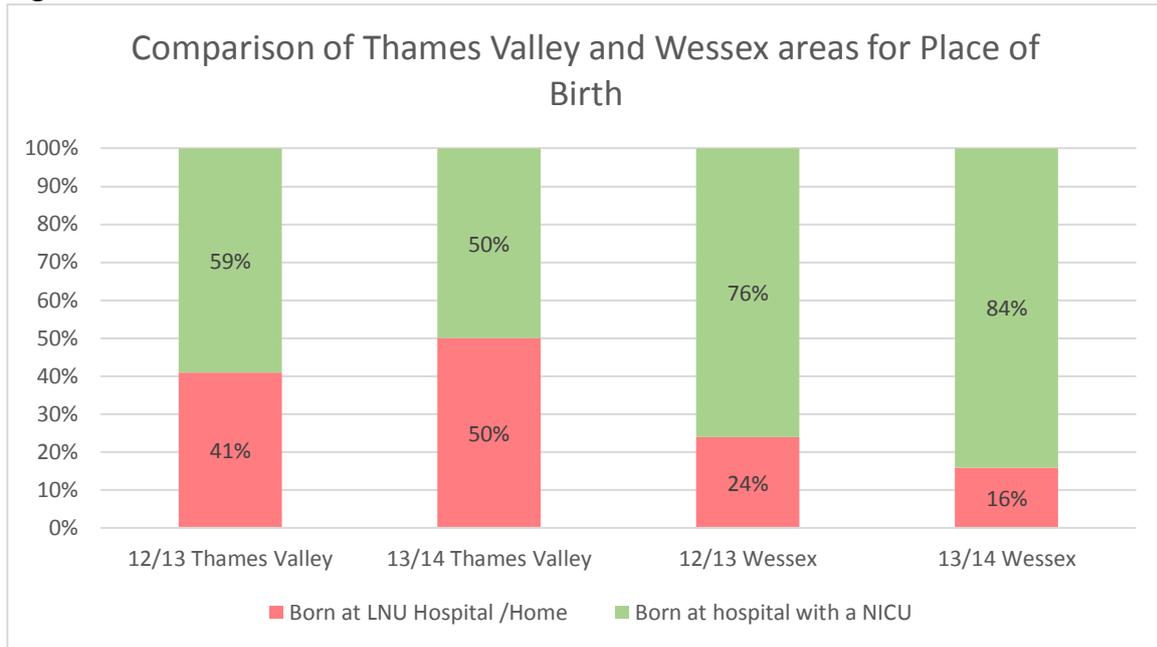
Fig 4b

Wessex Neonatal Network area

Place of Birth	Total meeting criteria		<27/40		>27/40 <28/40 Multiples		>27/40, <800g	
	2012-2013	2013-2014	2012-2013	2013-2014	2012-2013	2013-2014	2012-2013	2013-2014
Queen Alexandra Hospital	43 (46%)	51 (51%)	34 (45%)	40 (53%)	2 (33%)	7 (54%)	7 (58%)	4 (36%)
University Hospital Southampton	28 (30%)	33 (33%)	24 (32%)	22 (29%)	2 (33%)	6 (46%)	2 (17%)	5 (45%)
Poole Hospital FT	6 (6%)	8 (8%)	4 (5%)	7 (9%)	0 (0%)	0 (0%)	2 (17%)	1 (9%)
St Marys Isle of Wight	3 (3%)	3 (3%)	3 (4%)	3 (4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Winchester, HHFT	4 (4%)	2 (2%)	3 (4%)	1 (1%)	0 (0%)	0 (0%)	1 (8%)	1 (9%)
Basingstoke, HHFT	3 (3%)	1 (1%)	3 (4%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Salisbury NHS FT	2 (2%)	1 (1%)	2 (3%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Dorset County, Dorchester	0 (0%)	1 (1%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
St Richard's Hospital (WSHT)	3 (3%)	0 (0%)	1 (1%)	0 (0%)	2 (33%)	0 (0%)	0 (0%)	0 (0%)
Home	1 (1%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Wessex Total	93	100	75	76	6	13	12	11

Place of Birth	Total meeting criteria		<27/40		>27/40 <28/40 Multiples		>27/40, <800g	
	2012-2013	2013-2014	2012-2013	2013-2014	2012-2013	2013-2014	2012-2013	2013-2014
NICU	71 (76%)	84 (84%)	58 (77%)	62 (82%)	4 (67%)	13 (100%)	9 (75%)	9 (82%)
LNU/Home	22 (24%)	16 (16%)	17 (23%)	14 (18%)	2 (33%)	0 (0%)	3 (25%)	2 (18%)

Fig 4c



Demographic data

Just over half of the women from the cohort were Caucasian from the United Kingdom. The mean maternal age was roughly in line with the national average of 29.8 years (ONS, 2012) at 28.5 years. The mean booking BMI was 28, with 5 (9.3%) with a BMI>35. Most of the women were in their first pregnancy, but 20.5% were multiparous with significant history of preterm birth or late miscarriage. Eleven (25%) pregnancies were twins, and one pregnancy was triplets.

The mean gestation at delivery was just over 25 weeks of pregnancy. The outliers of over 28 weeks of pregnancy are babies who had a birth weight of under 800g.

Fig. 5: Gestation at delivery

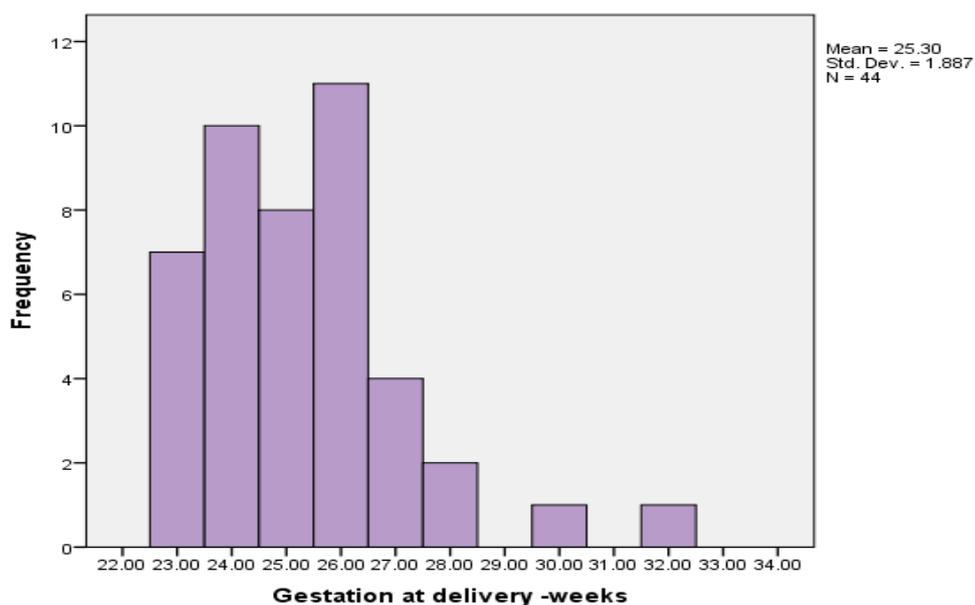
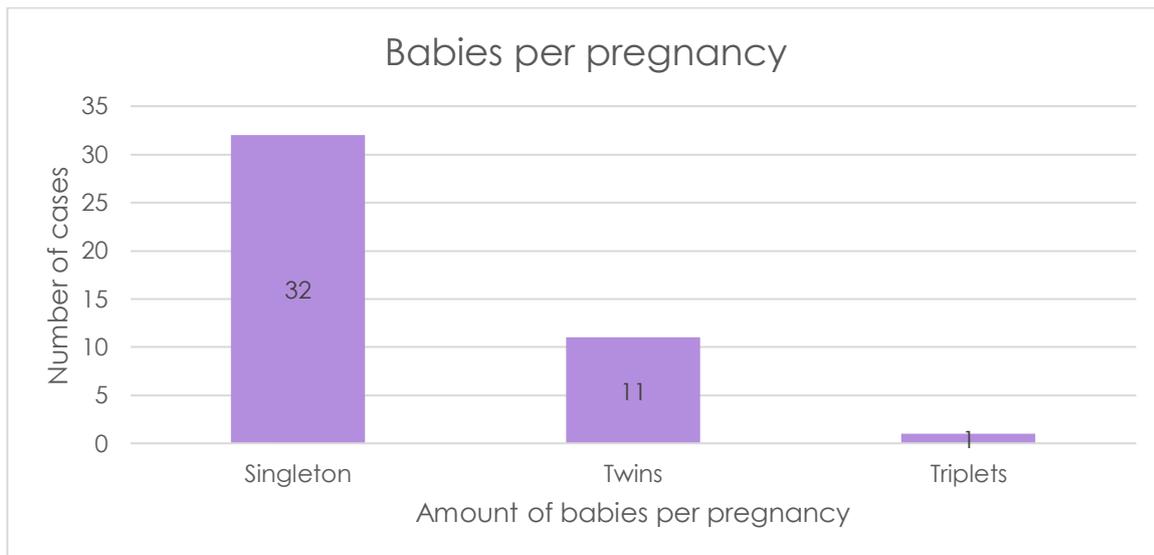


Fig. 6



Risk factors for preterm birth

Risk factors for spontaneous preterm birth

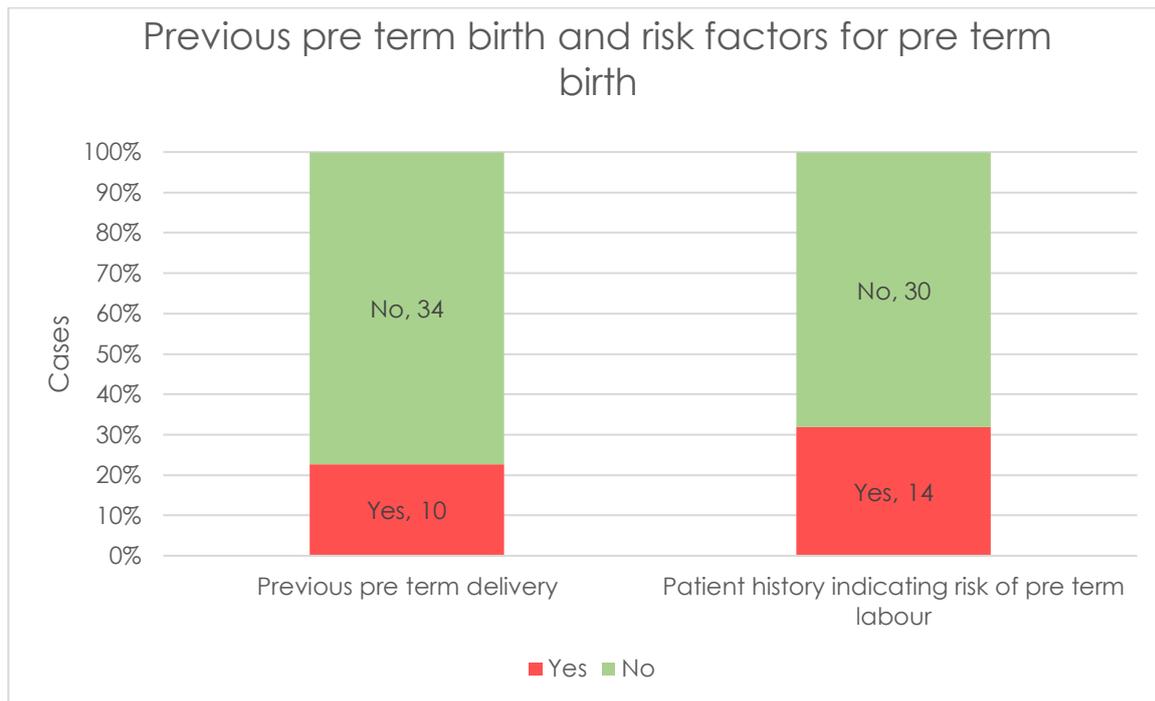
10 (23%) women had previously delivered pre term (under 36 weeks). A further 4 had established risk factors (not including multiple pregnancy) for pre-term birth such as a reduced cervical length. Therefore 32% of the pregnancies were at increased risk of pre-term labour.

Elective cerclage (cervical stitch) was performed in 3 cases, 1 rescue cerclage was placed and there was 1 failed attempt at a rescue cerclage. Rescue cerclage is when a stitch is put in place when the cervix is open with the amniotic sac prolapsing through. The best data suggests only 64% of these women will reach 28 weeks' gestation (Gupta et al, 2010).

Case study

A multiparous woman, 24 weeks pregnant, was admitted to hospital with a vaginal bleed. Her cervix was 3 to 4 cm dilated. A rescue cerclage was attempted but this was unsuccessful. She remained in hospital intermittently bleeding for a further 40 hours until attempts were made to arrange a transfer. Examination following acceptance of the transfer revealed further cervical dilatation to 7cm, and the IUT was cancelled. The baby was born 10 hours later and transferred a few hours after birth but sadly died.

Fig.7



Admission to hospital before preterm birth

We looked at the number of previous admissions to hospital prior to the admission that included delivery. Although the majority delivered in their only admission (2 deliveries were without an admission as they delivered at home), 30% had multiple admissions. In some cases it is clear that if the potential for the woman going into pre-term labour had been determined during these admissions, an IUT would have been appropriate and likely to have been achieved.

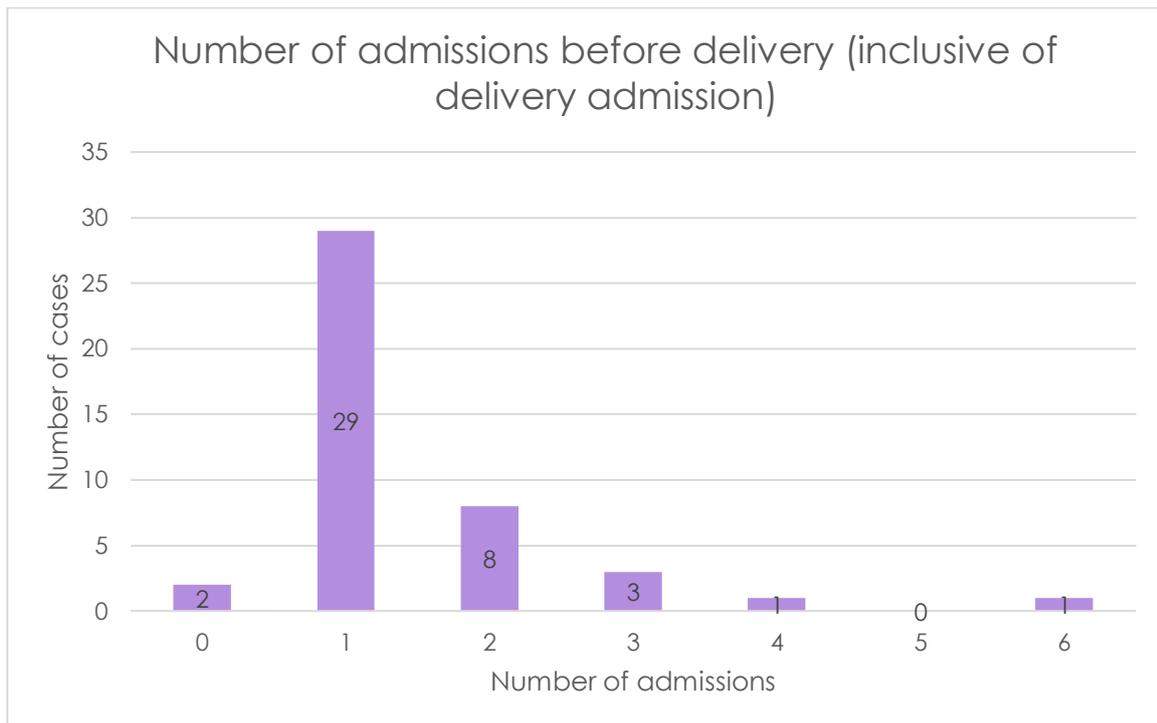


Case Study

A woman self-referred 4 times in quick succession with a history of abdominal pain and backache. This was thought to be sacro iliac pain as she had no cervical dilatation. No fibronectin test was performed, which may have indicated the probability of premature labour. She then rapidly went into spontaneous labour after her membranes broke, by which time it was too late to transfer her to the Level 3 unit



Fig. 8



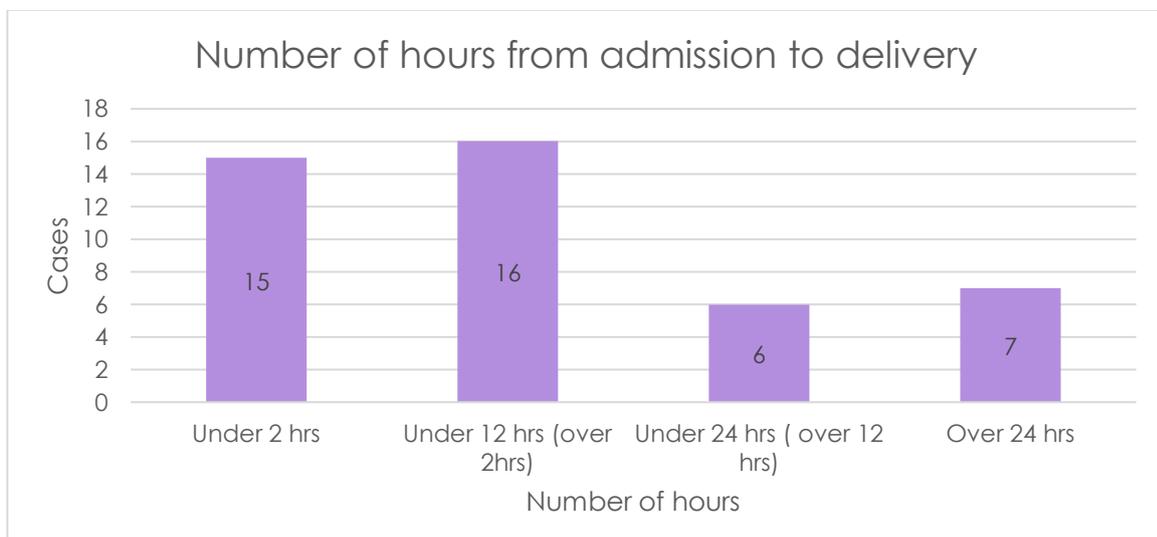
The delivery admission

Time from admission to delivery

We looked at time from the point of admission to delivery, showing a significant percentage (30%) were not admitted and delivered quickly. 6 were in hospital for over 12 hours, and 7 for over 24hrs. Although a small number of these were clinically too unstable to be transferred (2 cases), the remaining 11 cases had the potential to be transferred to a Level 3 unit. The reasons for this not occurring are detailed later in this report.

Only 2 cases (2 babies) were born before arrival at hospital (both delivered at home)

Fig. 9



Diagnostic aids for preterm labour

The use of Fibronectin assays (or equivalent such as Actim Partus) as a predictive test for labour was not applicable in all cases, but in those that were (11 cases, 25%), it was used in only 1 case.

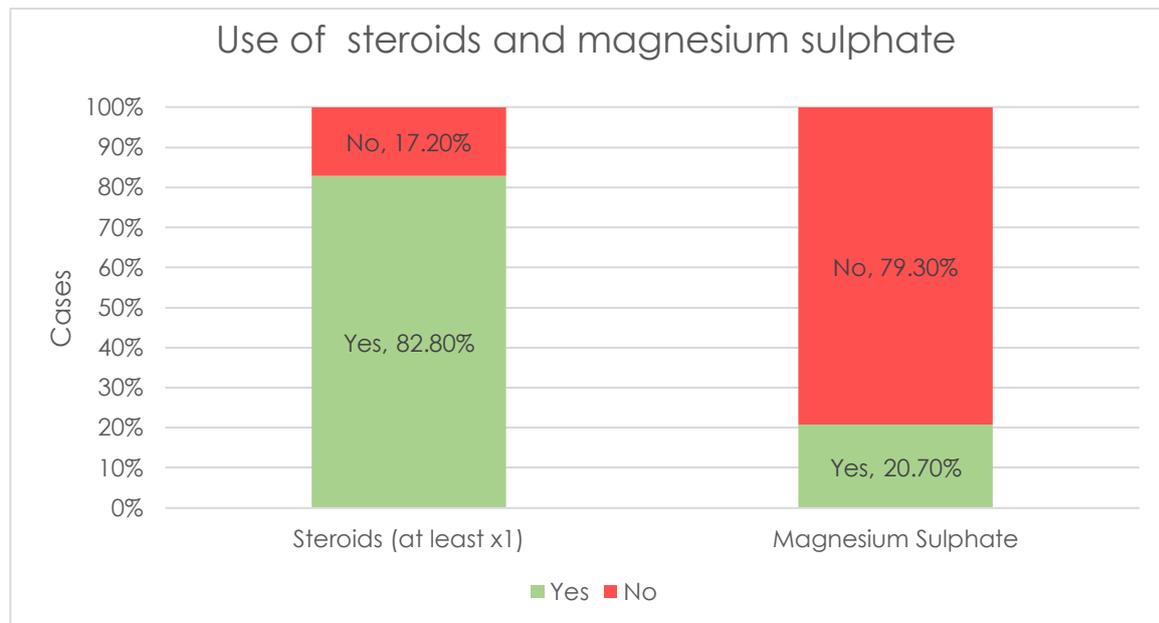
Management of preterm labour

Steroids were given to the mother in 30 (68.2%) of the cases overall and to 24 out of 29 cases (82.8%) where delivery took place more than 2 hours after admission to hospital.

Magnesium sulphate was given to the mother for neonatal neuroprotection in 6 cases (13.6%), all of which delivered more than 2 hours after admission.

The majority of the cohort who received magnesium sulphate were those admitted to Milton Keynes Hospital.

Fig. 10



(Excluding cases where time from admission to delivery was <2hrs)

Mode and onset of delivery

In 37 cases (84%), the onset of labour was spontaneous. Pre labour delivery by caesarean section because of severe growth restriction or pre eclampsia occurred in 6 cases (14%), with a further case undergoing a pre labour caesarean section for fetal distress. There were no cases of induced labour.

Attempted In Utero transfers

Out of the 44 cases, an in utero transfer (IUT) was attempted in 6 (13.6%).

For each of these, the barrier was the Level 3 unit/s refusing or delaying the referral. In every case, the John Radcliffe Hospital, as the first choice for referrals, either refused the transfer, delayed the transfer, or took such a long time to accept the transfer that the woman was no longer suitable or had already delivered. In addition, this represents a considerable amount of clinical time spent on this rather than on caring for patients, and may contribute to parental distress at this already difficult time.

No issues were found with arranging an IUT with the ambulance services at any point during the audit.

Case Study

A woman who was 25 weeks pregnant with twins was admitted to hospital in suspected early labour. Clinicians tried for 5 hours to arrange for her to be transferred to a Level 3 unit, contacting all the hospitals in an appropriate distance. Eventually the John Radcliffe Hospital accepted the transfer, five and a half hours after it was first required and requested, by which time it was too late, as the patient now required a caesarean section.

In Utero transfers not attempted

In the cases where an IUT was not considered we looked at the reasons why this was the case.

In 50% of the cases it was because the woman was in established labour, and as such, unsuitable to transfer. Other reasons included were the woman being too unwell – for example with significant bleeding.

Nearly 30% of cases came under the category of not considered/not documented. In these cases, the clinical picture showed a need for transfer, but it was unclear as to why this was not done. This appeared to occur more frequently when the pregnancy was a multiple between 27 and 28 weeks, or the expected birthweight was under 800g. Anecdotally it would appear that the requirement to transfer this group is not as widely appreciated in some units as it should be, which may explain this finding.

Cases in the 'other' category included those in which a decision not to transfer was made in conjunction with Level 3 unit staff – such as in 2 cases of twins where one was suffering significant IUGR, with a birthweight under 800g, or when an IUT was not considered until it was clinically too late.

Fig. 11



Aspects of care that may have changed place of delivery

In all, 41% (18 cases, 21 babies) of cases had factors in their care that if different, could have changed where they delivered (see Fig 12)

Organisational factors were considered to be those that were a problem with the system, such as being unable to arrange a timely transfer. Clinical factors included clinicians not considering or anticipating the need for transfer. As previously mentioned this was particularly the case in multiple pregnancies, and those with a borderline estimated birth weight, indicating a need to re-emphasise this part of the criteria with clinicians.

This was also the case when the gestation was under 24 weeks. Documentation discussing whether IUT would be suitable with the parents was missing in all the cases. Not attempting to transfer in these cases may well be the most suitable course of action when the parents request no active resuscitation. However, in all but one of these cases (who died at 3hrs of age), the baby/babies were subsequently transferred after delivery to a Level 3 unit, indicating that this may well have not been the case.

Fibronectin (or equivalent) testing was appropriate in 11 cases and in 5 may well have contributed to different clinical decision making regarding the need for IUT. In all the cases reviewed, fibronectin was only used once. This shows a need for the use of this test in clinical practice.

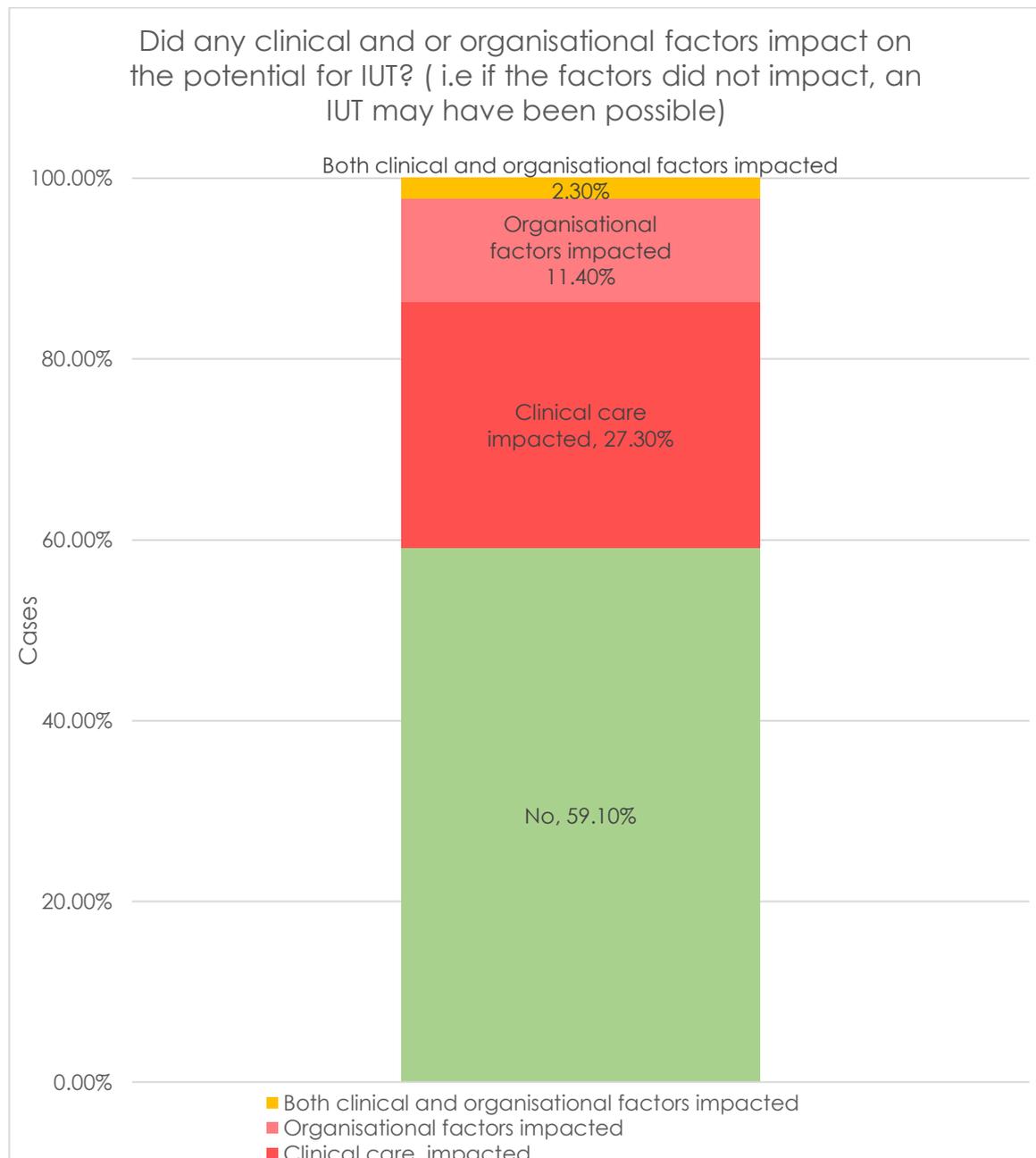
In 3 cases there were missed opportunities for identification of early labour when the women went to GPs or out of hours services rather than dedicated maternity services.

In 6 cases delivery was iatrogenic, because of significant growth restriction or pre eclampsia. All but one of these women could have been safely transferred in utero.

Case Study

A young woman at 24+ weeks of pregnancy visited an out of hours service with abdominal and back pain and was prescribed oral antibiotics for a presumed urinary tract infection, with no cervical or fetal assessment. However, she was in the early stages of premature labour and delivered within 12 hours of being seen, having arrived at hospital by ambulance with increasing pain under an hour before she gave birth. The baby unfortunately died shortly afterwards.

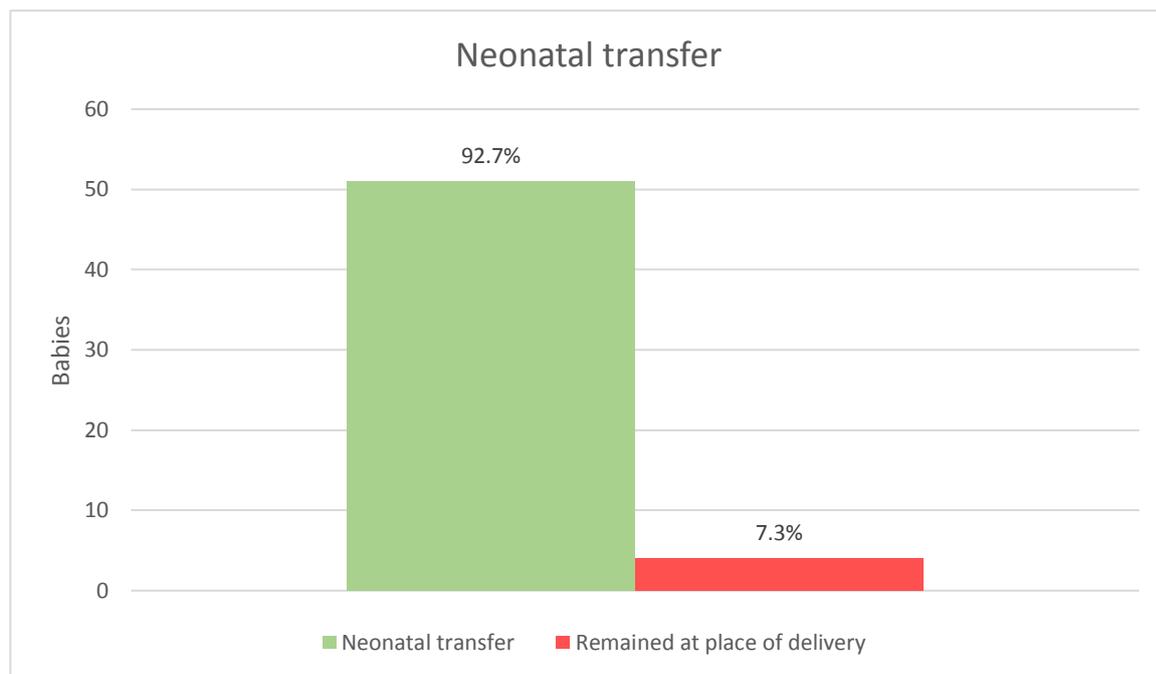
Fig. 12



Neonatal transfer and neonatal outcome

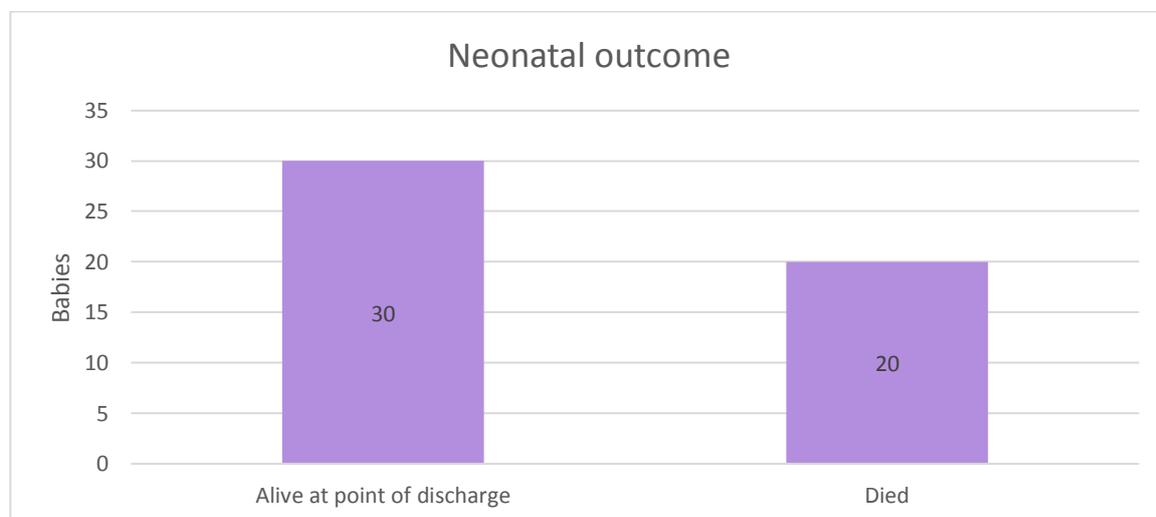
Almost all the babies were transferred to a Level 3 unit after their birth (51 babies, 90.9%). Of the remaining 6 babies who did not transfer to a Level 3 unit, 2 died at under 12 hours of age and the other 4 babies were sets of twins in which one baby had a birthweight of under 800g, but were of a gestation over 30 weeks. Consultation with the Level 3 unit had occurred, who agreed that it was suitable to care for them in the hospital they were born in.

Fig. 13



Neonatal outcome was measured by survival to point of discharge from hospital. 30 (60%) babies survived to this point.

Fig. 14



4 babies of multiple pregnancies excluded as above weight and gestation criteria

Conclusion and Recommendations

Conclusion

The Thames Valley area has a much lower in utero transfer rate of extremely preterm babies than the adjacent Wessex area. However the areas are not entirely comparable because the Wessex area has 2 L3 NICUs and this might make transfer easier.

In over 40% there were clinical and organisational factors that led to a failure of transfer. There is considerable potential for increasing the number of in utero transfers.

It appears that the most frequent barrier was the anticipated speed of labour. However the vast majority were in hospital for more than 2 hours before delivery and 30% of women were in hospital for 12 hours or more before delivery. There were very few born before arrival (BBA) neonates.

There is considerable variation in the management of threatened preterm labour in the Thames Valley.

The use of diagnostic tests for preterm labour is poor. Increased usage could allow better identification of pregnancies at risk, as well as reduce inappropriate antenatal admission and steroid usage.

Considerable difficulties have been encountered in attempting to arrange in utero transfer to the John Radcliffe Hospital where the only regional L3 NICU is situated.

The usage of magnesium for neonatal neuroprotection is poor except in one unit.

On a limited number of occasions, extremely high risk women have been entirely managed in a District General Hospital where antenatal transfer or at least management from a specialist fetal medicine centre would have been appropriate.

Documentation of the decision making and consultation with parents regarding IUT (and therefore both the prognosis and management of the neonate) was minimal. As the research shows an improvement in survival rates of those born in a Level 3 unit, it is important to document discussion with parents regarding IUT, and if it hasn't occurred the reasons why.

Recommendations and actions

The in utero transfer care pathway to the John Radcliffe Hospital needed urgent improvement. As the audit progressed this need was identified and addressed by the Oxford AHSN Maternity Network by developing and implementing a new referral pathway policy in January 2015 (see Appendix). This has led to positive feedback from referring units and so far at least one case where both the neonatal and maternal outcome may reasonably have been considerably improved (see case study below).

There is an urgent need for a consistent, best practice guideline (including the use of diagnostic aids) for threatened preterm labour and a care pathway for consideration of transfer to Level 3 facilities. This need was also identified early on in the audit. Developing this guideline became a supported project plan for the Maternity Network and was developed and sent to key stakeholders for comment in January 2015. It is due for ratification on 22/4/15. It is recommended that adherence is strictly audited.

More consideration should be given to the use of tocolytics to reduce contraction frequency and aid in utero transfer. This has been embedded in the above care pathway.

The usage of magnesium sulphate for neonatal neuroprotection needs to be increased. This is already happening, partially as a result of publicity by the network. A network wide protocol has been developed following a near miss due to a drug error (for which the RCA report identified differing units' policies as the major contributing factor) and was sent to key stakeholders in January 2015 and is due for ratification on 22/4/15. This guideline is currently also being considered by the Wessex region.

Women at very high risk of extreme preterm labour should be managed in conjunction with a tertiary fetal medicine centre. In particular, the use of 'rescue cerclage' for women with a dilated cervix should be limited to those with considerable experience and expertise and where the infrastructure for exclusion of and monitoring for infection exists. A network wide guideline on early identification and referral of such women should be developed.

Women with severely growth restricted babies (IUGR) or severe pre eclampsia at these extreme gestations should be managed in conjunction with a tertiary referral unit and transferred if extreme preterm delivery is likely. This is a national recommendation and is not always followed.

Wherever possible (and it is acknowledged that the speed of preterm birth may render this impossible) exploration of parental wishes for neonates born at the edge of viability is essential. This should include the risks and benefits of in utero transfer, and should be clearly documented.

The use of dedicated maternity services for potential premature labour symptoms need to be encouraged, to avoid misdiagnosis when seen in out of hours or GP services with less specific experience.

There is potential for further work to be done focusing on the risk assessment and screening of women for potential premature labour, in order to try to prevent it.

Case Study

Shortly after the instigation of the new referral pathway a woman presented with abdominal pain at 25 weeks. Transfer was accepted immediately by the John Radcliffe and the woman arrived before midday. She appeared clinically well but in fact had septicaemia. These circumstances were the leading direct cause of maternal death in the 2011 triennial report of UK maternal deaths. This is largely because infection is frequently not diagnosed until it is too late because it may be very difficult to diagnose. Her severe infection was recognised despite reporting feeling well, and she was quickly treated by receiving IV antibiotics and delivering the baby. Both the mother and the baby are currently doing well.

The circumstances could have been very different if the transfer had been delayed.

References

Costeloe et al.(2012). "Short term outcomes after extreme preterm birth in England: comparison of two birth cohorts in 1995 and 2006 (the EPICure studies)". BMJ 2012;345:e7976

Gupta, M., et al. (2010). "Emergency cervical cerclage: Predictors of success." The Journal of Maternal-Fetal & Neonatal Medicine **23**(7): 670-674.

Kenyon, S., et al. "Childhood outcomes after prescription of antibiotics to pregnant women with spontaneous preterm labour: 7-year follow-up of the ORACLE II trial." The Lancet **372**(9646): 1319-1327.

Marlow, N., et al. (2014). "Perinatal outcomes for extremely preterm babies in relation to place of birth in England: the EPICure 2 study." Archives of Disease in Childhood - Fetal and Neonatal Edition **99**(3): F181-F188.

Stock, S. J., et al. (2014). "Variation in management of women with threatened preterm labour." Archives of Disease in Childhood - Fetal and Neonatal Edition.

Thames Valley & Wessex Operational Delivery Networks (2014), "Policy for transfer of infants to a Neonatal Intensive Care Unit/Local Neonatal Unit", www.networks.nhs.uk/nhs-networks/thames-valley-wessex-neonatal-network/documents/network-policies

Vogel, J. P., et al.(2014) "Use of antenatal corticosteroids and tocolytic drugs in preterm births in 29 countries: an analysis of the WHO Multicountry Survey on Maternal and Newborn Health." The Lancet **384**(9957): 1869-1877.

Appendix



Network PTL transfer policy change v2 15/12/2014

Urgent in utero transfer to the John Radcliffe Hospital

Where there is a risk of extreme preterm delivery, either iatrogenic or spontaneous, in utero transfer to a neonatal unit is advised by BAPM: extreme preterm birth is associated with a decrease in neonatal mortality and morbidity if it occurs in a level 3 neonatal unit (Marlow et al 2014). Currently, in the Thames Valley network, over 50% of extremely preterm babies are born outside the level 3 centre. This issue is currently the subject of much scrutiny and is likely to be assessed as an important measure of the quality of a maternity unit's performance at some stage in the near future.

An audit by the Maternity Network of the AHSN has identified, perhaps not surprisingly, that in utero transfer within the Thames Valley to the John Radcliffe Hospital as the local Level 3 neonatal unit can be difficult to achieve, and the John Radcliffe Hospital's refusal to take in utero transfers has been a reason why delivery has taken place outside a Level 3 neonatal unit. It is also recognised that capacity alters rapidly over a short time frame and that delivery may occur days later than transfer and therefore neonatal capacity at the exact time of referral may be irrelevant.

In response to this we have agreed the following policy change:

Requests for urgent in utero transfer to the John Radcliffe Hospital should initially be directed to the **Consultant Obstetrician on call**, rather than the neonatal unit.

From 8am-5pm this call should be made to the Delivery Suite (01865 221988/7), with the specific request to speak to the Consultant Obstetrician on Delivery Suite.

From 5pm to 8am, the call should be to the hospital switchboard (01865 741166), with the request to speak to the Consultant Obstetrician on call.

Only in exceptional circumstances (such as imminent delivery and neonatal unit red alert) will transfer be declined. If transfer is declined by either the neonatal unit or the Delivery Ward, without speaking to the consultant on call, then please request specifically to speak to the consultant on obstetrician on call.

We very much hope that this will make IUT easier and therefore increase patient safety in these extreme circumstances. If however, the John Radcliffe Hospital is unable to accept delivery, every effort should be made to move the mother to an alternative level 3 unit. We would be grateful if this information is disseminated locally.

Signed

Dr Eleri Adams, Consultant Neonatologist; Clinical Director Neonatal Services, OUH

Miss Veronica Miller, Consultant Obstetrician; Clinical Director, Women's Services, OUH

Mr Lawrence Impey, Consultant Obstetrician, OUH; Maternity Network Lead.

Audit and report written and compiled by Katherine Edwards, Oxford AHSN Maternity Network Manager/Lead Midwife and Mr Lawrence Impey, Oxford AHSN Maternity Network Clinical Lead.

Thank you to the Thames Valley and Wessex Operational Delivery Network and Kujan Paramanathan, Neonatal Service Improvement Manager/Data Analyst for their contribution to, and support of the audit.

Oxford AHSN Maternity Network Steering Group

Mr Lawrence Impey, Network Clinical Lead and Consultant Obstetrician, OUH, Katherine Edwards, Network Manager/Lead Midwife, Miss Anita Sinha, Consultant Obstetrician, GWH, Mrs Rebecca Black, Consultant Obstetrician, OUH, and Head of School, HETV, Miss Aparna Reddy, Consultant Obstetrician, BH, Jane Herve, HoM, OUH, Rebecca Furlong and Marion Foster, TV SCN Children's and Maternity Network, Miss Pampa Sarka, Consultant Obstetrician, WP, Miss Eleri Adams, TV Neonatal Network Lead and Consultant Neonatologist, OUH, Audrey Warren HoM BH, Louise Randall, Trainee Consultant Midwife, RBH, Wendy Randall, Consultant Midwife, OUH, Agnes Hibbert, HETV, Mr Mark Selinger Consultant Obstetrician, RBH, Miss Jane Ablett, Consultant Obstetrician, RBH, Miss Harini Narayan, Consultant Obstetrician, GWH, Fiona Goddard, Director of Research Governance, NDOG, University of Oxford, Mr Ghaly Hanna, Consultant Obstetrician, MK, Premila Thampi, Consultant Obstetrician, MK

MK – Milton Keynes University Hospitals NHS Foundation Trust, BH - Buckinghamshire Healthcare NHS Trust, OUH - Oxford University Hospitals NHS Trust, RBH – Royal Berkshire NHS Foundation Trust, WP - Wexham Park Hospital, Frimley Park Foundation NHS Trust, GWH – Great Western NHS Foundation Trust.

Contact Details

Maternity Network Manager/Lead Midwife

katherine.edwards@oxfordahsn.maternity.org

Maternity Network Clinical Lead

lawrence.impey@ouh.nhs.uk



@OAHSNMaternity

Maternity Network website-

www.oxfordahsn.org/our-work/clinical-networks/maternity

Thames Valley Neonatal Network website-

www.networks.nhs.uk/nhs-networks/thames-valley-wessex-neonatal-network