

**Position Paper on  
Specialist  
Neonatal Services  
in Northern  
Ireland**

**May 2006**



## **CONTENTS**

<b>Section</b>	<b>Page</b>
<b>Acknowledgements</b>	<b>5</b>
<b>Executive summary</b>	<b>7</b>
<b>1. Introduction</b>	<b>15</b>
<b>2. Background</b>	<b>15</b>
<b>3. Strategic context</b>	<b>18</b>
<b>4. Information</b>	<b>20</b>
<b>5. Specialist neonatal services in Northern Ireland</b>	<b>21</b>
<b>5.1 Units and cots</b>	<b>21</b>
<b>5.2 Nursing staff</b>	<b>24</b>
<b>5.3 Medical staff</b>	<b>27</b>
<b>5.4 Babies</b>	<b>29</b>
<b>5.5 Specialist neonatal service activity</b>	<b>33</b>
<b>5.6 Transfers and transport</b>	<b>39</b>
<b>6. Summary and conclusions</b>	<b>41</b>
<b>7. References</b>	<b>45</b>
<b>8. Appendix 1 Project brief</b>	<b>47</b>
<b>9. Appendix 2 Tables and figures</b>	<b>49</b>



## **ACKNOWLEDGEMENTS**

This report would not have been possible without the contributions of a wide range of staff. Thanks go to:

- The Neonatal Services Working Group/Northern Ireland Neonatal Network (Chair: Dr Richard Tubman) who acted as Advisory Group for the project.
- Lead neonatal nurses and Consultants in Trusts
- NICORE (Dr Stan Craig and Ms Emma McCall)
- Child Health System managers in four Boards
- Maternal and Child Health Commissioners in four Boards
- Information managers in Trusts and Boards
- Regional Information Branch, DHSSPS
- Ms Kathryn Fodey, DHSSPS Nursing
- Mrs Evelyn Logue, Assistant Director of Nursing, EHSSB
- Dr Robert McMillen, Obstetrician, Antrim Hospital
- Dr John Jenkins, Consultant Paediatrician, Antrim Hospital.



## EXECUTIVE SUMMARY

### Introduction

1. In June 2005 the Chief Medical Officer commissioned a paper in response to concerns that the existing neonatal service in Northern Ireland was unable to meet rising demand. A small project group was established (see appendix 1) with the following aim and terms of reference:

**Aim:** To provide a robust baseline position for specialist neonatal services activity in Northern Ireland, to inform future service planning, provision and development.

### Terms of Reference

- To describe current specialist neonatal service profile, including staffing.
- To identify and describe existing sources of information.
- To collate and analyse existing information on specialist neonatal services from any relevant source, including data on transfers.
- To collect any new information required if gaps are identified after initial analysis.
- To identify existing data from other regions and make comparisons where appropriate.
- To compile a report on specialist neonatal services in Northern Ireland.

The definition of specialist neonatal services used in this paper includes intensive care (level 1) and high dependency care (level 2) as defined by the British Association of Perinatal Medicine (BAPM)<sup>1</sup>. References are also made to special care (level 3) where applicable.

### Background

2. Around 22,000 babies are born each year in Northern Ireland, mostly to Northern Ireland residents, with a small number of non-residents delivering in Northern Ireland hospitals.
3. Ninety percent of babies require no special additional care after birth, with 7% requiring special care (level 3) and 3-4% requiring specialist neonatal care at intensive (level 1) or high dependency level (level 2). In Northern Ireland, fewer than 1000 babies per year require care at levels 1 and 2.
4. Daily or even hourly fluctuations in relatively small numbers of babies result in peaks and troughs of activity. The challenge is to maintain capacity, both in terms of cots and staff, at a level that can accommodate

the full range of demand for the region while ensuring that the service is cost effective and value for money.

5. In Northern Ireland, transfer arrangements exist with Glasgow and Birmingham if a baby requires a supraregional service for clinical reasons, however if no cots are available in Northern Ireland, transfer arrangements must be made with other parts of the UK or the Republic of Ireland on an ad hoc basis.
6. Specialist Neonatal Services in the four UK countries face increasing pressures as more babies survive and options for treatment increase with modern technology. Developments in clinical practice mean that many babies who would have spent long periods in a neonatal unit are now able to go home more quickly. However, very premature babies or those with congenital abnormalities who would have died in the past are now surviving, resulting in a changed case mix towards more ill babies with complex needs. In addition, expectations of parents and professionals have increased.
7. In Northern Ireland, much of this increased demand may have been offset by the falling birth-rate in the 1990s. However, in the short-term an unexpected increase in numbers of live births over the past two years may have tipped this balance. Reasons for increased demand are likely to be multifactorial and complex.

### **Neonatal units and cots**

8. In Northern Ireland, specialist neonatal services are provided by one regional unit (RJMS in Royal Maternity Hospital) and four area units (Altnagelvin Hospital, Antrim Area Hospital, Craigavon Area Hospital and the Ulster Hospital). Daisy Hill Hospital and Erne Hospital provide special care and limited short duration intensive care. Causeway Hospital has paediatric services on site and can stabilise babies prior to transfer.
9. RJMS in Royal Maternity Hospital has a dual role in providing tertiary services to the region in addition to providing services to the local population. The unit is staffed by neonatology consultants round the clock and has on-site access to specialist services such as cardiology, neurology and paediatric surgery.
10. The British Association of Paediatric Medicine document, *Designing a Neonatal Unit (May 2004)*, states that the average population requires 0.75 cots per 1000 birth population for intensive care, 0.7 cots per 1000 for high dependency care and 4.4 cots per 1000 for special care.
11. Based on these assumptions, at an annual birth population of 22,000, Northern Ireland should have 16.5 level 1(intensive care) cots and 15.4 level 2 (high dependency). In fact the numbers are 19 (rising to 20 in Spring 2006) and 21.

12. There is a relative shortfall of level 3 (special care) cots (63 in NI versus 96.8 recommended). Numbers of level 3 cots have decreased in recent years.

### **Nurse staffing**

13. The British Association of Perinatal Medicine recommends that babies should be cared for by qualified staff at a ratio of one nurse to one baby at level 1 (intensive care), or two babies at level 2 (high dependency) or four babies at level 3 (special care). It is acknowledged that these recommendations are aspirational rather than achievable, being met by only 2% of units in the UK in 2005. Key issues for nurse staffing are:

- Lack of existing trained staff resulting in a lead time to fully train new staff
- Staff in training are part of necessary service complement of staff for a unit, rather than supernumerary.
- Loss of Whole Time Equivalents, as many staff who trained full time opt to work part-time
- Age profile of existing neonatal staff suggests that there will be a staff crisis in the next 5-10 years. (This is a particular problem for RJMS and Altnagelvin Hospital).
- The planned development of the regional neonatal transport system has the potential to impact adversely on the availability of regional/tertiary cots in RJMS by utilising staff for transfers, thus reducing the number of staffed cots.

14. Increased capacity to train neonatal nurses is therefore a priority to address the shortfall in trained staff, the retirement crisis, part-time working and staffing of the transport system.

### **Medical staffing**

15. In RJMS, the neonatal unit is staffed by a 24 hour rota of Consultant Neonatologists. Area hospital units have one Consultant Neonatologist providing neonatal cover for officially 7.5 PAs (Programmed Activities) per week between 9am to 5pm and participating on the general paediatric on-call rota.

16. In area units, the majority of consultant and junior medical staff contributing to neonatal services work primarily in acute paediatrics and community paediatrics. When on call, these medical staff provide cover for not only the neonatal service, but also general paediatrics, A&E and child protection.

17. In some units, Enhanced Neonatal Nurse Practitioners have replaced the SHO tier of the medical rota.

## **Babies**

18. The groups most likely to require admission to a neonatal unit are
- Premature babies;
  - Low and very low birthweight babies;
  - Babies with congenital abnormalities; other medical problems; babies requiring assessment and/or management for acquired surgical problems e.g. perforation of gastrointestinal tract.
  - Babies born to mothers who have had problems during pregnancy.
  - Multiple births
19. Mothers of babies likely to be born before 28 weeks gestation or expected to have extremely low birthweight (<1000gms) should deliver in the regional unit where 24 hour neonatal expertise is available. Additional clinical need in any baby will further determine the required level and location of care.
20. Maintaining throughput of babies in the regional NICU is vital to free up cots for newborns requiring regional NICU care.
21. Very low birthweight babies, (<1500gms), comprise around 1% of total births. Although the number of very low birth weight babies admitted to specialist neonatal units is relatively small (224 in 2004), they account for almost a quarter (24%) of admissions and over half (54%) of total level 1&2 days. The impact of a few additional babies in this category will therefore have a disproportionately large effect on number of cotdays.
22. Only a small percentage of babies born at full term require neonatal care, however they comprise the greatest number of babies and also use over one quarter of the total cot days.

## **Neonatal Services Activity**

23. For planning purposes neonatal activity is grouped into cot-days by level of care.
24. Around 27,000 cot days are used per year in Northern Ireland for all levels of care, giving an occupancy rate of 71.8%
25. Activity of 27,000 cotdays per year may either reflect true need for neonatal care or may represent saturation of the service. However, as there is no alternative to specialist neonatal care if these babies are to survive, unmet need is unlikely to remain hidden. Unmet need is identified on occasions when pregnant women or newborn babies require transfer outside Northern Ireland.
26. To attain the recommended occupancy of 70%, Northern Ireland would require an additional 2.5-3 cots. As one level 1 cot will open in CAH in

Spring 2006, two further additional cots would increase total cotdays available to meet 70% occupancy based on current demands.

27. Robust data on activity by level of care is not currently available across Northern Ireland. This information is vital to inform the level and location of any future additional cots.
28. Analysis of unit activity shows that all occupancy rates exceeding 100% are for level 2 care.
29. Results of a four month real-time study (1<sup>st</sup> April to 31<sup>st</sup> July 2004) found an increasing trend in total number of babies in 4 specialist neonatal units (data not available for Altnagelvin). From May 2004, the units were always more than 70% occupied, however at no time did overall occupancy reach 100%.
30. When level 1 (IC) and 2 (HD) babies were considered as a group, from May 2004, the units were often more than 70% occupied.
31. Data were collected on 244 occasions (12 hour periods) for four of the five specialist units (data not available for Altnagelvin). Results showed that:
  - On 2 (<1%) separate occasions occupancy of level 1&2 cots reached 100%
  - On 6 (2.5%) occasions only 1 level 1 (IC) or 2 (HD) cot was unoccupied
  - On 10 (4%) occasions only 2 level 1 (IC) or 2 (HD) cots were unoccupied
  - In contrast, on one occasion, only 14 out of 31 level 1 (IC) and 2 (HD) cots were occupied (45% occupancy).
  - Although 100% occupancy of level 1&2 cots in the four units was reached on 2 separate occasions, we have no record of cot availability in Altnagelvin Hospital at these times.
32. Mean number of level 1 and 2 babies for 31 cots = 23, median = 22, mode = 21. Average occupancy rate for 23 babies in 31 cots = 74%
33. The total number of qualified staff in the four units during the study period did not mirror the increase seen in total number of level 1 and 2 babies.
34. The number of live births in Northern Ireland hospitals by quarter ending June 2002 to December 2005 shows clear seasonal fluctuation, with more babies born between April and September each year. The number of babies requiring neonatal care should show an association with the total number of live births and this should partly account for the increase in demand seen in the neonatal staffing study.
35. Seasonal fluctuation in number of births may also account for the increased pressure on the system in the spring and summer of 2005, extending into autumn, as neonatal cots were occupied with babies born in the preceding months.

36. The number of births in spring and summer 2006 should be closely monitored as this should indicate whether demand will increase further.

## **Transfers**

37. A prospective two-month study in September and October 2005 recorded all transfer requests from all maternity units in Northern Ireland to a specialist neonatal unit. Results show that antenatal and postnatal transfer requests occur on average twice daily across Northern Ireland. Three quarters of requests are for clinical reasons, where babies require to be transferred even if there is a cot available in the local unit. The remaining quarter of requests are for non-clinical reasons, predominantly related to physical capacity.

## **Summary and conclusions**

38. The aim of this project was to provide a robust baseline position for specialist neonatal services activity in Northern Ireland, to inform future service planning, provision and development.

39. While factors affecting demand, such as changed clinical practice, increased multiple births due to IVF, increased parental and professional expectation are all relevant and interesting, our ability to modify these factors is limited. Any shifts which might occur are likely to be gradual and have minimal effect on overall demand in the short term.

40. This report therefore deliberately focuses on neonatal services activity to inform decisions about the future shape and development of the service.

41. A large quantity of information about neonatal services is available, however there is concern about data quality and comparability. In order to inform future service development, we require data from all units in Northern Ireland on cot days by level of care on a daily basis, collected to common data definitions and protocols.

42. NICORE collects information on outcomes of neonatal care and characteristics of babies requiring specialist neonatal care. This vital information is complementary to activity information and addresses quality of care, factors affecting demand and possible explanations for changing trends in the longer term.

43. In Northern Ireland in 2006 we have 103 neonatal cots for an annual birth population of 22,000. This is subdivided into 19 intensive care (level 1), 21 high dependency (level 2) and 63 special care (level 3). An additional level 1 cot is due to open in CAH in Spring 2006. Evaluating the impact of this cot is central to future developments.

44. BAPM occupancy recommendations of 70% would be met by a further two cots, based on the past three years activity levels. Provision, location and level of additional cots can only be determined on the basis of robust supporting data.
45. Northern Ireland has a skilled and committed neonatal nursing workforce. Capacity to train an increased number of neonatal nurses is identified as a priority to meet future service requirements.
46. Out of hours consultant medical cover for area neonatal units includes neonatologists, acute paediatricians and community paediatricians. This is of particular concern if very premature or extremely low birthweight babies are unable to access the regional unit for their initial care. Configuration of future cots needs to take account of 24hour medical staffing.
47. Fewer than 1000 babies per year require Specialist Neonatal Care at intensive or high dependency level (level 1 and 2).
48. Babies born before 28 weeks gestation and weighing less than 1000gms should receive their initial care in the regional unit with 24 hour neonatal cover. Once care in the regional unit is no longer required, transfer or repatriation of these babies should be considered to free up cots for other newborns requiring regional care.
49. Very low birthweight babies, (<1500gms), comprise around 1% of total births, account for almost a quarter (24%) of admissions and over half (54%) of total level 1&2 days. The impact of a few additional babies in this category will therefore have a disproportionately large effect on number of cotdays, particularly in the regional unit.
50. An unexpected increase in number of births in Northern Ireland is likely to partly explain increased pressures experienced over the past year. The number of births should be closely monitored to anticipate future pressures.
51. Around 27,000 cot days are used per year in Northern Ireland for all levels of care, giving an occupancy rate of 71.8%.
52. Highest occupancy rates are in level 2 cots.
53. Aggregate data mask fluctuations and do not show the range of demand for neonatal care. Activity for levels 1&2 must be available separately from level 3. Daily recording of activity is required to monitor peaks and troughs of activity.
54. When units are considered together, as in a network, there are comparatively few occasions when no cots are available. Pressures often arise from a mismatch between the patient and the location of an available cot.

55. Approximately two transfer requests are made per day. Three quarters of requests are for clinical reasons, where babies require to be transferred even if there is a cot available in the local unit. The remaining quarter of requests are for non-clinical reasons, predominantly related to physical capacity.
56. Considerable time is spent in arranging transfers. Adoption of the web-based cot availability system by all units should lead to a more efficient system. Information recorded on a daily basis should include cots occupied, cots closed (plus reason eg infection, staffing issues), cots available and cots expected to be occupied (ie patient in labour).
57. An effective managed clinical network for neonatal services will require full commitment from obstetricians, paediatricians and Trust management.
58. Patients and the public will require information and education about the purpose and functions of a managed clinical network and the implications this may have for the location of their care.
59. A regional transport system is essential for units to fully function as a network.
60. These conclusions will inform recommendations about future provision and development of neonatal services in Northern Ireland.

## 1. INTRODUCTION

In June 2005 the Chief Medical Officer commissioned a paper in response to concerns that the existing neonatal service in Northern Ireland was unable to meet rising demand. A small project group was established (see appendix 1) with the following aim and terms of reference:

**Aim:** To provide a robust baseline position for specialist neonatal services activity in Northern Ireland, to inform future service planning, provision and development.

### Terms of Reference

- To describe current specialist neonatal service profile, including staffing.
- To identify and describe existing sources of information.
- To collate and analyse existing information on specialist neonatal services from any relevant source, including data on transfers.
- To collect any new information required if gaps are identified after initial analysis.
- To identify existing data from other regions and make comparisons where appropriate.
- To compile a report on specialist neonatal services in Northern Ireland.

The definition of specialist neonatal services used in this paper includes intensive care (level 1) and high dependency care (level 2) as defined by the British Association of Perinatal Medicine (BAPM)<sup>1</sup>. References are also made to special care (level 3) where applicable.

## 2. BACKGROUND

Around 22,000 babies are born each year in Northern Ireland, mostly to Northern Ireland residents, with a small number of non-residents delivering in Northern Ireland hospitals. The number has decreased from a high of over 34,000 live births in 1964 until 2000 (Appendix 2: Figure 1). The decrease then halted and NISRA (Northern Ireland Statistics and Research Agency) population projections (based on 2004 data) estimate that births will remain between 21,000 and 22,000 for the next 20 years (Appendix 2: Figures 2 and 3). However, data from Hospital Statistics indicate that an increase of 1,140 total live births (resident and non-resident) in Northern Ireland hospitals occurred between 2002/03 and 2004/05 (21,762 to 22,902 live births), returning to levels last seen in 1999/00 (Appendix 2: Figure 4). Provisional data from the first two quarters of 2005/06 suggest that this trend is

continuing, with a steady 2.5% increase year on year from 2002/03, representing an additional 500-600 births each year.

Ninety percent of babies require no special additional care after birth, with 7% requiring special care (level 3) and 3-4% requiring specialist neonatal care at intensive (level 1) or high dependency level (level 2)<sup>2</sup>. There is no alternative to specialist neonatal care if these babies are to survive and the highest standard of care in this neonatal period not only improves survival but reduces the risk of long-term sequelae such as cerebral palsy or other disabilities.

High staff:patient ratios, specialised equipment and treatment make neonatal services a high cost, relatively low volume specialty. Daily or even hourly fluctuations in relatively small numbers of babies result in peaks and troughs of activity which are much more marked than in higher volume services. The challenge is therefore to maintain capacity, both in terms of cots and staff, at a level that can accommodate the full range of demand for the region while ensuring that the service is cost effective and value for money.

In England, Scotland and Wales, regions can work together to absorb some of this fluctuation in demand by inter-region transfer of babies, before and after birth. In Northern Ireland, transfer arrangements exist with Glasgow and Birmingham if a baby requires a supraregional service for clinical reasons, however if no cots are available in Northern Ireland, transfer arrangements must be made with other parts of the UK or the Republic of Ireland on an ad hoc basis<sup>3</sup>. Transfers for non-clinical reasons are less publicly and professionally acceptable. In November 2005 an incident of antenatal transfer of a patient to Dublin caused media scrutiny of the service. Other less high profile incidents have occurred and are causing concern among neonatologists, paediatricians and obstetricians.

Although the issue of neonatal capacity has come to the fore recently, capacity of the neonatal service in Northern Ireland has previously been considered. In 1991, a needs assessment for neonatal intensive care was conducted by Dr Carol Beattie<sup>4</sup>. This was followed by reports from working groups of SAC paediatrics in 1994<sup>5</sup> and 2000<sup>6</sup>, both groups chaired by Dr John Jenkins. Key findings and recommendations from 1991<sup>4</sup> were: a lack of routinely available information about infants receiving neonatal care; an 'inflow' of high risk pregnancies to Belfast; little evidence that overall neonatal intensive care cot capacity in Northern Ireland was inadequate in 1991; occasional cot shortages in RBHSC for cardiac and surgical cases. It is acknowledged that there have been considerable changes in neonatal services since 1991.

In 1994<sup>5</sup>, the report highlighted the need for a regional unit in Belfast and concentration of intensive care facilities in one site in each Board Area. This has taken place since then. Interestingly the need for intensive and high dependency cots in Northern Ireland was estimated at 39, including 13 for care of infants less than 29 weeks gestation. The 2000 report<sup>6</sup> recommended the development of a Managed Clinical Network and a dedicated Regional Neonatal Intensive Care Transport Service. The report also recommended a

Consultant Neonatologist for each Area unit, training for Advanced Neonatal Nurse Practitioners (ANNPs) and the need for premature babies (<28 weeks gestation) and extremely low birthweight babies (<1000gms) to be born in the Regional unit. Some of these recommendations have taken place, while other themes recur in this paper.

There are a number of factors potentially influencing demand for neonatal services. In the longer-term, developments in clinical practice, improved survival, changes in case mix and more aggressive resuscitation of infants not previously considered viable are thought to have increased the number of very low birth-weight babies being admitted to neonatal units. Much of this increased demand may have been offset by the falling birth-rate in the 1990s. In the short-term an unexpected increase in numbers of live births over the past two years may have tipped this balance. Reasons are likely to be multifactorial and complex.

This paper examines specialist neonatal services activity in Northern Ireland and focuses on the relatively small number of babies, less than 1,000 annually, who require care at levels 1 and 2. It will inform future services planning, provision and development and identify areas which require further investigation. Specific details of clinical practice lie outside the scope of this paper.

### **3. STRATEGIC CONTEXT**

Specialist Neonatal Services in the four UK countries face increasing pressures as more babies survive and options for treatment increase with modern technology. Developments and improvements such as antenatal steroids in premature labour, use of surfactant, routine anti-D prophylaxis of rhesus negative women, decrease in the number of mothers smoking in pregnancy, improved antenatal management of diabetic mothers and general improvements in antenatal screening have partly addressed many of the factors leading to babies requiring specialist neonatal care. Outcomes have improved and many babies who would have spent long periods in a neonatal unit are now able to go home more quickly. However, very premature babies or those with congenital abnormalities who would have died in the past are now surviving thanks to the skills of staff in these specialised services. This has resulted in a change in case mix towards more ill babies with complex needs. In addition, expectations of parents and professionals have increased.

Nationally, a number of recent reports and reviews have examined the increasing demand for neonatal services and made recommendations for change in adapting to meet current requirements. Individual reports are listed in the references section<sup>1,7-14</sup> but the main themes arising from these reports can be grouped under the following headings.

#### **3.1 Clinical networks**

Neonatal services should form managed clinical networks with agreed protocols, standards and pathways of care. Network arrangements should ensure that:

- all levels of care are provided for babies in a geographical region;
- services should be delivered locally where possible, balanced against the need for concentrating specialist services in centres of expertise;
- babies requiring care should have equitable access to specialist neonatal services;
- the impact of peaks and troughs in activity should be better absorbed.

#### **3.2 Emergency transfer**

In some situations, the need for specialist neonatal services can be predicted antenatally and appropriate booking arrangements made or babies transferred in utero. Emergency transfer of newborns or mothers in labour should be avoided where possible. Agreed emergency transfer procedures should be established and should minimise impact on staffing of the transferring unit.

#### **3.3 Staff training**

One of the most important components of the service is properly trained and experienced staff. Staff working in maternity units should be fully trained in resuscitation and stabilisation of infants. Staff in neonatal units should be trained to a level appropriate to the demands of that unit. On the job training is required, particularly in the use of rapidly advancing technology and

equipment. Ongoing support and education of all neonatal staff is required to maintain skills and retain staff in this highly stressful area.

### **3.4 Quality**

High quality care of neonates in an appropriately staffed unit improves survival and reduces the risk of long-term sequelae. The CESDI report, *Project 27/28. An Enquiry into quality of care and its effect on the survival of babies born at 27-28 weeks*<sup>12</sup>, highlights the importance of 'early and close neonatal consultant supervision of care during the first 24 hours of a baby born at 27-28 weeks gestation.'

The British Association of Perinatal Medicine has produced standards for hospitals providing neonatal care<sup>1</sup>. These standards include recommended nurse:baby ratios. At a level of 1:1 for intensive care and 1:2 for high dependency care, these standards are aspirational and currently only met by 2% of the units surveyed in the report entitled, *A survey of current neonatal unit organisation and policy*<sup>13</sup>, commissioned from the National Perinatal Epidemiology Unit by the charity 'Bliss'.

### **3.5 Parents**

Acknowledgement is made of the difficulties of parents whose baby is in hospital for a long period of time and the cost in terms of money and time in visiting and caring for their child. The importance of parental facilities in units is becoming increasingly recognised.

### **3.6 Information**

Information and support should be provided for parents on all aspects of the care of their baby.

### **3.7 Outcomes**

The care which is provided in a specialist neonatal unit can have lifelong effects. Continuing research is required to monitor outcomes from the neonatal units and to increase the evidence base for what constitutes good neonatal care.

## **4. INFORMATION**

Sources of information are listed below:

### **4.1 Births**

- Registrar General Office, part of NISRA
- Child Health System
- Hospital Statistics, part of Regional Information Branch, DHSSPS
- Trust information departments, from maternity units
- Board information departments

### **4.2 Neonatal Intensive Care Unit usage**

- Manual information held in individual units
- Trust information department, from individual units
- Board information departments
- Neonatal Intensive Care Outcomes Research and Evaluation (NICORE)
- Neonatal Staffing Study (Apr – Jul 2004) – a local ad hoc study illustrating real-time fluctuation in NICU usage and staffing

### **4.3 NICU outcomes**

- Neonatal Intensive Care Outcomes Research and Evaluation (NICORE)

### **4.4 Transfers**

- Manual recording in neonatal units
- Ad hoc transfer studies. (Two month prospective study conducted between 1<sup>st</sup> September and 31<sup>st</sup> October 2005).

### **4.5 Comparative information**

- A survey of neonatal unit organisation and policy, conducted throughout the UK by the National Perinatal Information Unit on behalf of Bliss (charity for the newborn).

### **4.6 Gaps in information**

- Large quantities of data are collected about neonatal care. Gaps are more often associated with data quality as there is considerable variation in data definitions, particularly with levels of care. This causes difficulties in making comparisons between units and over time.
- NICORE can provide extremely comprehensive data about all babies admitted to level 1 and 2 care within the first 28 days of life up to 2001/02. However, due to problems and delays in installing a new computer system, data for more recent years is incomplete.
- High level data mask the impact of peaks and troughs in activity. A minimum dataset to include level of care by unit by day would provide much more robust evidence of pressure points in the system.

## 5. SPECIALIST NEONATAL SERVICES IN NORTHERN IRELAND

### 5.1 Units and Cots

Northern Ireland is a relatively small region, with specialist neonatal services provided by one regional unit (in Royal Maternity Hospital) and four area units (Altnagelvin Hospital, Antrim Area Hospital, Craigavon Area Hospital and the Ulster Hospital). In addition, Daisy Hill Hospital and Erne Hospital provide special care and limited short duration intensive care. Causeway Hospital has paediatric services on site and can stabilise babies prior to transfer. This network needs to provide specialist neonatal services for all babies born within the region. Transfer outside the region should ideally only take place for those babies who require services not available within Northern Ireland.

Royal Maternity Hospital has a dual role in providing tertiary services to the region in addition to providing services to the local population. The unit is staffed by neonatology consultants round the clock and has on-site access to specialist services such as cardiology, neurology and paediatric surgery.

The four area units serve their local population but also play an increasing role in providing care for babies when the regional unit is full. Delivering the future, the report of the high risk pregnancy group in Northern Ireland<sup>15</sup>, recommended that all mothers going into labour at less than 28 weeks gestation should deliver in a unit with 24 hour experienced neonatal staffing. This is further supported by the CESDI report, *Project 27/28. An Enquiry into quality of care and its effect on the survival of babies born at 27-28 weeks*<sup>12</sup>, which highlights the importance of 'early and close neonatal consultant supervision of care during the first 24 hours of a baby born at 27-28 weeks gestation.' However, when the regional unit is full, there is no alternative than to send these patients to area units. This results in very premature babies being cared for less appropriately in units where consultant medical staff cover includes acute paediatricians and community paediatricians as well as neonatologists. Paediatricians on these rotas often have to cover acute paediatrics, A&E and child protection in addition to the neonatal unit.

Table 1 shows the number and category of funded cots by unit in Northern Ireland.

**Table 1. Number and category of funded cots in Northern Ireland**

Level of care	RJMS	Antrim	Altnagelvin	CAH	UHD	DHH	Erne	Total for NI
1 (IC)	9	4	3	2	1	0	0	19
2 (HD)	7	2	6	4	2	0	0	21
3 (SC)	15	10	9	8	9	6	6	63
<b>Total</b>	<b>31</b>	<b>16</b>	<b>18</b>	<b>14</b>	<b>12</b>	<b>6</b>	<b>6</b>	<b>103</b>

Source: Neonatal Unit Staff.

The British Association of Paediatric Medicine document, *Designing a Neonatal Unit (May 2004)*<sup>14</sup>, provides guidance on the number of cots required per 1000 babies. This document states that in the average

population, there is a requirement of 0.75 cots per 1000 birth population for intensive care, 0.7 cots per 1000 for high dependency care and 4.4 cots per 1000 for special care. According to these assumptions, at an annual birth population of 22,000, Northern Ireland should have 16.5 level 1 (intensive care) cots and 15.4 level 2 (high dependency). In fact the numbers are 19 and 21. However, a relative shortfall of level 3 (special care) cots (63 in NI versus 96.8 recommended), may mean that there is insufficient reserve in the overall system. These recommendations were based on the needs of the South East Thames region in England. (The report acknowledges that some level 3 care may be given in ward based settings, therefore estimates of level 3 cots are less robust than for levels 1 and 2).

As noted in section 2, there has been a rise in the number of births in Northern Ireland between 2002/03 and 2005/06 (projected) (Appendix 2: figure 4). Table 2 shows the recommended number of cots by level for annual birth populations between 22,000 and 24,000. Even if births rose to 24,000 per year, there are still more than the recommended number of level 1 and 2 cots, although the shortfall in level 3 becomes much more marked.

Although Northern Ireland has more than the recommended number of level 1 and 2 cots, the geographical isolation of the region, difficulties of transferring babies for non-clinical reasons and the distribution of cots over a number of relatively small units, may mean that national recommendations are less applicable and may underestimate the requirements. Robust data is required to clarify local need.

**Table 2: Number and level of cots required to provide neonatal care for birth populations of 22,000 to 24,000.**

	Cots per 1000 births	Recommended no of cots for 22, 23 and 24 thousand births			Actual cots in NI
		22,000	23,000	24,000	
<b>1. Intensive care</b>	0.75	16.5	17.25	18	19
<b>2. High dependency</b>	0.7	15.4	16.1	16.8	21
<b>3. Special care</b>	4.4	96.8	101.2	105.6	63
<b>Total</b>		128.7	134.55	140.4	103

### **Factors affecting cot availability and flexibility**

Within units, there is some flexibility between levels of cots, although this flexibility is limited by available staffing levels.

Differing infection control policies and availability of isolation facilities for babies with MRSA can cause closure of cots, with a resultant impact on other units.

Over the past 15 years, the reduction in births coupled with financial pressures in trusts has led to a reduction in the number of cots, particularly at level 3.

Pressures on PICU may impact on neonatal units, preventing transfer of older babies (around 6 months of age) or conversely, neonates with surgical or cardiac conditions, initially cared for in PICU may be moved to the neonatal unit.

The result of these and other factors is a reduction in the ability of the system to expand in times of high demand.

### **Current developments**

Funding of £250,000 has been allocated in 2005/06 for provision of an additional staffed and equipped intensive care (level 1) cot in Craigavon Area Hospital. This cot should become operational in April 2006 and will increase capacity in the region. The impact of this additional cot should be closely evaluated.

### **Future scope for expansion**

In RJMS there is an area of the neonatal unit with 15 additional level 3 cots which have never been staffed.

A new unit is being built in the Ulster Hospital to include 4 neonatal cots. This is due to be opened in Spring 2007.

Staffing of some of these cots could increase capacity with minimal capital investment.

## **5.2 Nursing staff**

Specialist neonatal services are very labour intensive and require highly trained staff. The British Association of Perinatal Medicine recommends minimum nurse staffing levels for neonatal units<sup>1</sup>. These state that babies should be cared for by qualified staff at a ratio of one nurse to one baby at level 1 (intensive care), or two babies at level 2 (high dependency) or four babies at level 3 (special care). It is acknowledged that these recommendations are aspirational rather than achievable, being met by only 2% of units in the UK.

Nationally there are major problems with staff recruitment and retention, however in Northern Ireland staffing problems can be more clearly defined. If a post is advertised, there are few trained neonatal nurses available to apply, however there are sufficient staff with an interest in neonatal care willing to be trained. Once trained, staff are generally committed to the speciality and retention is not a problem. However, key issues are:

- Lack of existing trained staff resulting in a lead time to fully train new staff
- Staff in training are often part of necessary service complement of staff for a unit, rather than supernumerary.
- Loss of Whole Time Equivalents, as many staff who trained full time opt to work part-time
- Age profile of existing neonatal staff suggests that there will be a staff crisis in the next 5-10 years. (This is a particular problem for RJMS and Altnagelvin Hospital).
- The planned development of the regional neonatal transport system has the potential to impact adversely on the availability of regional/tertiary cots in RJMS by utilising staff for transfers, thus reducing the number of staffed cots.

Increased capacity to train neonatal nurses is therefore a priority to address the shortfall in trained staff, the retirement crisis, part-time working and staffing of the transport system.

Current nurse staffing in the five specialist units is shown in table 3.

**Table 3: Nursing Staff in post on 1st January 2006**

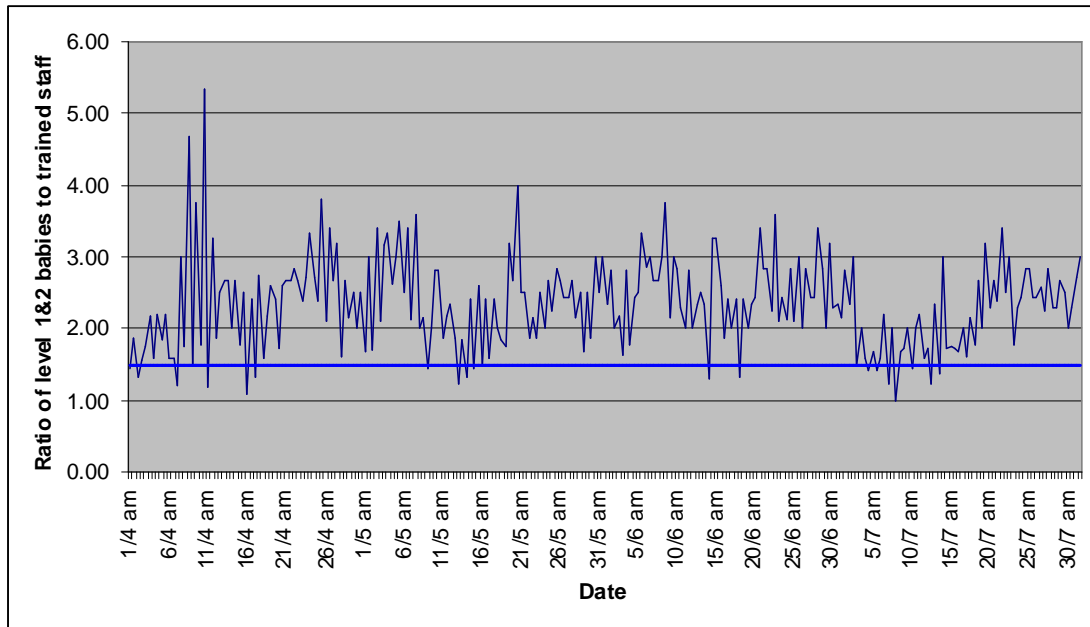
Grade	RJMS		Antrim		Altna-gelvin		CAH		UHD	
	Fund-ed WTE	Actual WTE	Fund-ed WTE	Actual WTE	Fund-ed WTE	Actual WTE	Fund-ed WTE	Actual WTE	Fund-ed WTE	Actual WTE
<b>I</b>	1.0	1.0	0	0	0	0	0	0	0	0
<b>H</b>	2.0	1.0	0	0	1.0	1.0	1.0	0.91	1.0	3.0
<b>G</b>	10.0	10.0	1.0	1.0	1.0	1.0	1.0	2.0	0.8	0.8
<b>F</b>	0.72	13.0	5.0	5.0	22.07	15.25	3.0	5.2	8.19	7.79
<b>E</b>	45.1	24.4	14.26	14.55	5.56	5.54	9.80	7.04	14.07	12.41
<b>D</b>	9.06	8.9	5.13	7.28	0	0	3.2	5.67	0	0
<b>C</b>	4.59	2.6	0	0	0	0	0	0	0	0
<b>B</b>	0	0	0	0	1.0	1.0	0	0.8	0	2.43
<b>A</b>	6.93	6.8	1.5	1.5	2.28	2.58	4.53	2.53	1.80	2.80

Source: Senior nursing staff from each unit.

Note: Advanced Neonatal Nurse Practitioners and Practice Development Nurses are employed at Grades H and I to support medical and nursing staff.  
 Note: With the opening of a new level 1 cot in CAH on 1<sup>st</sup> April, 2006, there are now 3 Neonatal Practitioners working at grade H (one additional member of staff and 2 former grade G nurses who have been regarded to Grade H).

Staffing is also a critical factor in cot availability. If insufficient staff are available, then in effect cots can be closed to admissions. Also, a baby requiring level 1 care will require the same number of staff as four babies at level 3. Staffing requirements therefore fluctuate in keeping with changes in the number and level of babies. Figure 1 illustrates the ratio of neonatally qualified staff to level 1 and 2 babies in RJMS over a four month period. Recommended staffing levels for 1 and 2 combined are 1 nurse to 1.5 baby. This is illustrated by the line marked on the graph. As can be seen the unit reaches recommended levels on relatively few occasions during the four month period.

**Figure 1: Number of level 1 and 2 babies per member of staff with neonatal qualification in RJMS**



Source: Neonatal Staffing Study

Note: BAPM recommendations approx 1.5 babies to 1 nurse for levels 1 and 2 combined. Illustrated by line.

### 5.3 Medical staff

In RJMS, the neonatal unit is staffed by a 24 hour rota of Consultant Neonatologists, while area hospital units have one Consultant Neonatologist providing neonatal cover for officially 7.5 PAs (Programmed Activities) per week between 9am to 5pm. In area units, the majority of consultant and junior medical staff contributing to neonatal services work primarily in acute paediatrics and community paediatrics. When on call, medical staff provide cover for not only the neonatal service, but also general paediatrics, A&E and child protection. For example, in Antrim hospital the neonatal service is covered by the fully certified neonatologist on a 1 in 8 rota, with community paediatricians providing 25% of all consultant on-call cover. In all hospitals, a three tier rota is recommended, with Enhanced Neonatal Nurse Practitioners (ENNPs) replacing the SHO tier in Antrim Hospital. These staff are included in table 4.

**Table 4. Medical Staff (and ENNPs contributing to the rota) in post on 1st January 2006**

		RJMS	Antrim *	Altna- gelvin	CAH ***	UHD ****
<b>Consultant neonatologist</b>	Staff	4	1	1	1	Vacant
	WTE	3.3	0.75	1	1	
<b>Consultant paediatrician</b>	Staff		3	4	4	5
	WTE		0.25	4	4	Note
<b>Specialist Registrar</b>	Staff	6	5.5	5	3	7
	WTE	6	5.5	5	2.5	Note
<b>Associate Specialist</b>	Staff		0	0	0	0
	WTE		0	0	0	0
<b>Staff Grade</b>	Staff		1	1	2	1
	WTE		0.8	1	2	1
<b>SHO**</b>	Staff	8	0	8	10	
	WTE	8	0	8	10	7
<b>ENNP**</b>	Staff		6			
	WTE		6			
<b>ANNP</b>	Staff		2			
	WTE		2			

\* Note: Consultant staffing for Antrim relates specifically to the neonatal unit during the day time, Monday to Friday. Out of hours described in paragraph above. Staff grade does not cover weekends or nights.

\*\* Note: ENNPs have replaced the SHO tier in Antrim Hospital

\*\*\*Note: Staff Grades do not work in NICU. 1WTE SpR is in Community - only does on-call

\*\*\*\*Note: In UHD, 2 hospital based paediatricians providing WTE cover. 3 community paediatricians providing cover on call and at weekends.

Registrars: 5 hospital based providing cover for NNU, Paediatric wards, maternity wards and delivery suite. 2 community based also provide hospital sessions

## **Current developments**

Funding has been identified in 2005/06 for an additional Consultant Neonatologist in RJMS. This post has been advertised and filled. Additional resources have also been made available to support the development of Phase 1 of a neonatal transport system in Northern Ireland. Part of this role should also include the development of a managed clinical network with improved and formalised arrangements for communication and transfer of infants between units and development of the cot availability system at EACC (Eastern Area Control Centre).

## **5.4 Babies**

### **Categories of baby requiring Specialist Neonatal Care**

The Neonatal Intensive Care Outcomes and Evaluation study (NICORE) was established in 1994 and collects data on all babies admitted to level 1 or 2 care within the first 28 days of life. The 6<sup>th</sup> Annual Report (2001/02)<sup>2</sup> provides the most recent detailed information about babies who require specialist neonatal care (levels 1&2). The groups most likely to require admission to a neonatal unit are

- Premature babies;
- Low and very low birthweight babies;
- Babies with congenital abnormalities; other medical problems; babies requiring assessment and/or management for acquired surgical problems e.g. perforation of gastrointestinal tract.
- Babies born to mothers who have had problems during pregnancy.
- Multiple births

### **Prevention**

Good antenatal and obstetric care should help minimise the number of babies who require specialist neonatal care. As mentioned in section 3, developments and improvements such as antenatal steroids in premature labour, use of surfactant, routine anti-D prophylaxis of rhesus negative women, decrease in the number of mothers smoking in pregnancy, improved antenatal management of diabetic mothers, and general improvements in antenatal screening have partly addressed many of the factors leading to babies requiring specialist neonatal care.

NICE guidance has been produced referring to best practice in timing of Caesarian sections in order to reduce the risk of respiratory morbidity. In Northern Ireland, a recent study conducted through NICORE found an increased risk of respiratory morbidity in some babies who were delivered by Caesarean Section from 37 weeks onward. A number of these cases were considered to be 'potentially avoidable'. An audit of all planned Caesarean Sections is currently underway to assess the factors influencing gestation at delivery and the potential for change.

There is now little further scope for preventing problems and reducing demand on the service. For those babies who are ill in the neonatal period, there are no other treatment and care alternatives if they are to survive.

### **Neonatal Intensive Care Units**

The regional unit and four area units all provide care at levels 1, 2 and 3, however they are not equivalent in terms of round the clock neonatologist staffing and on-site access to specialist services such as cardiology, neurology and paediatric surgery. Appropriateness of unit therefore needs to be considered in addition to availability of a cot.

Although each baby requires care tailored to individual need, certain groups require at least initial care in the regional unit. Delivering the Future, the report of the high risk pregnancy group in Northern Ireland<sup>15</sup>, recommends that mothers whose babies are likely to be born before 28 weeks gestation should deliver in the regional unit where 24 hour neonatal expertise is available. Extremely low birthweight babies (<1000gms) should also be born in the regional unit, while additional clinical need in any baby will further determine the required level and location of care. The CESDI report, Project 27/28: An Enquiry into quality of care and its effect on the survival of babies born at 27-28 weeks recommends that: *Units should ensure that there is early and close neonatal consultant supervision of care during the first 24 hours of a baby born at 27-28 gestation*<sup>12</sup>.

Maintaining throughput of babies in the regional NICU is vital to ensure that those babies who no longer require regional NICU care at level 1 are transferred back to area units in order to free up cots for newborns requiring regional NICU care.

### Very low birthweight babies

Recent NICORE work has focused on very low birthweight babies, weighing less than 1500gms, which comprise around 1% of total births. Data comparing 1991 and 2001/02 show that absolute numbers of **births** in this category have changed very little (259 in 1991, 242 in 2001/02). Table 5 however, shows that the annual number of babies in this category who were admitted to level 1 or 2 care in recent years has increased. This may be due to improved survival and/or a change in resuscitation policy.

Although the numbers of babies in this group are relatively small (224 in 2004), they account for almost a quarter (24%) of babies admitted to specialist neonatal units. Once admitted, they stay for longer than other groups and account for over half (54%) of total level 1&2 days. Many of these babies are also very premature and should be born in the regional unit where they have access to 24 hour neonatal consultant care. The impact of a few additional babies in this category will therefore have a disproportionately large effect on number of cotdays, particularly in the regional unit.

**Table 5: Number of low birthweight babies admitted to level 1 & 2 care**

	1998/1999	1999/2000	2000/2001	2001/2002	2004
<b>Total infants ≤ 1500g BW</b>	192	189	212	209	224

Source: NICORE. Data from 1998/99 to 2001/02 from original NICORE database. Data for 2004 collected by NICORE for Vermont Oxford system.

### Gestational age

Babies are also categorised according to gestational age. The most premature babies, who generally also have low or very low birth weight, have longer periods in hospital and once again a few additional babies will have a

disproportionately large effect on number of cotdays. A recent paper in the BMJ described an increase in the proportion of preterm births in Denmark between 1995 and 2004<sup>16</sup>. Such a trend will have implications for both neonatal services and childhood disability services.

Although only a small percentage of babies born at full term require neonatal care, they comprise the greatest number of babies and also use over one quarter of the total cot days. Appendix 2: Figures 5 to 9 illustrate the relationship between low birthweight, gestational age and length of stay in neonatal care.

### **Multiple births**

Some concern has been expressed about the effect of increased multiple births resulting from IVF treatment. Data on multiple births resulting from IVF is obtained from the Human Fertilisation and Embryology Authority (HEFA) Guide to Infertility and Directory of Clinics, 2005/06<sup>17</sup> which shows that in Northern Ireland, 42 babies were born in twin or triplet pregnancies in 2002/03 as a result of IVF. Not all of these will have required neonatal intensive care.

The main issue with multiple births is the need for two or more cots to be available in the same appropriate location to receive these babies once born. Because of the relatively small number of cots scattered over five units, this can precipitate transfer of another neonate to accommodate two or more babies.

### **Birthweight specific cotdays**

One means of comparing cot usage is by birthweight specific cotdays. Table 6 compares the birthweight specific level 1 (only) usage in days per 100 livebirths between 1991 and 2001/02. This shows that the total level 1 usage has remained the same at 19 days per 100 live births. Usage for very low birth weights has changed little while usage by bigger babies has actually increased. Although the number of days spent by an individual baby weighing 2500gms and over is very small, the large numbers of babies in these categories have a major impact. While this information is of interest, it needs to be interpreted with caution as definitions of level 1 care and level 1 cots have changed over the 10 year period.

**Table 6. Birthweight specific cot usage in days/100 live births 1991 and 2001/02.**

<b>Birthweight (g)</b>	<b>1991</b>			<b>2001/2</b>		
	No of livebirths	No of level I cot days	<b>Birthweight Specific level I usage (days/100 livebirths)</b>	No. of live births	No of level 1 cot days	<b>Birthweight Specific level I usage (days/100 live births)</b>
Less than 1000g	99	1687	<b>1704</b>	89	1523	<b>1711</b>
1000-1499	160	1260	<b>788</b>	153	981	<b>641</b>
1500-1999	275	818	<b>297</b>	298	341	<b>114</b>
2000-2499	840	370	<b>44</b>	782	185	<b>24</b>
2500+over	24436	879	<b>3.6</b>	20261	1079	<b>5.3</b>
<b>Total</b>	<b>25813</b>	<b>5014</b>	<b>19</b>	<b>21583</b>	<b>4132</b>	<b>19</b>

Source: 1991 data from Child Health System, described in Needs Assessment conducted by Dr Carol Beattie<sup>4</sup>.  
2001 data from NICORE<sup>2</sup>.

## **5.5 Specialist Neonatal Service Activity**

### **Regional activity**

For planning purposes neonatal activity is grouped into cot-days by level of care. Data were provided by Trusts and Boards and are the most comprehensive currently available. Some concerns have been expressed about the accuracy of this data. Clarification of data definitions and common protocols for collection could improve quality and comparability of data in the future.

Table 10a in Appendix 2 summarises neonatal activity for Northern Ireland between 2002/03 and 2005/06 (data for first six months doubled for full year). Table 10b (Appendix 2) expands this table to include occupancy by level of care and unit for 2002/03 to 2005/06 (projected). (*Occupancy based on the number of funded cots, as detailed in table 1, page 21*).

#### **Key points to note are:**

- Around 27,000 cotdays are used per year in Northern Ireland for all three levels of care. (*Based on the average of three full years of activity data: 2002/03 to 2004/05. Table 10b, Appendix 2*).
- The average annual occupancy rate for all three levels of care is 71.8% (*ranging from 71% to 72.2%. Based on three full years of activity data: 2002/03 to 2004/05. Table 10b, Appendix 2*).
- To attain the recommended occupancy of 70%, Northern Ireland would require an additional 2.5-3 cots. (*Recommendation based on BAPM document, Standards for hospitals providing neonatal intensive and high dependency care (Dec 2001)*<sup>1</sup>).
- One level 1 cot will open in CAH in Spring 2006, therefore two further additional cots would increase total cotdays available to meet 70% occupancy based on current demands.
- Robust data on activity by level of care is not currently available across Northern Ireland. This information is vital to inform the level and location of any future additional cots.

#### **Comment:**

Activity of 27,000 cotdays per year may either reflect true need for neonatal care or may represent saturation of the service. However, as there is no alternative to specialist neonatal care if these babies are to survive, unmet need is unlikely to remain hidden. Unmet need is identified on occasions when pregnant women or newborn babies require transfer outside Northern Ireland.

It is also recognised that some level 3 care can be provided in the ward rather than the neonatal unit, resulting in a blurred boundary in times of high demand. In order to determine true need for intensive and high dependency care, it is essential to separate level 1 and 2 from level 3. Robust data are currently not available to do this at Northern Ireland level.

## **Local unit activity**

Overall regional capacity appears to be almost sufficient, however this masks variation in occupancy between units and levels of care within units. In addition, recent increases in number of births have not affected all areas equally and this may have contributed to local pressures, particularly in the case of CAH.

Table 10b (Appendix 2) shows percentage occupancy by either level of care where available, or as an aggregate of all three levels. All occupancy rates exceeding the recommended 70% are highlighted. Rates exceeding 100% are in bold. Data should be interpreted with caution when making comparisons between units. Once again the need for common data definitions and protocols for collection is identified.

### **Key points to note from table 10b:**

- All occupancy rates exceeding 100% are for level 2 care.
- Antrim Hospital shows a clear increase in number of level 2 cotdays and occupancy rates from 2003/04 to 2005/06 (projected).
- High occupancy rates for one level will result in a corresponding decrease in another level.
- Occupancy rates of over 90% at level 3 may represent true need or use of cots which are available.
- Aggregate occupancy levels can not therefore be compared with individual levels.

### **Real-time fluctuation in activity - Northern Ireland Neonatal Staffing Study**

The two previous sections examine activity regionally and by individual unit, based on activity aggregated over a year. This masks peaks and troughs of activity in individual units and real-time fluctuations in demand.

Staff from four of the five specialist neonatal units conducted a study over a four month period (1st April 2004 to end of July 2004). This real-time study provides extremely detailed data on level of staffing in the four units and in numbers of babies cared for during that period. The study provides information on over 80% of the cots in the five specialist neonatal units in Northern Ireland and although data for Altnagelvin Hospital is unavailable, clinicians agreed that Altnagelvin faces the same issues as other units and findings are unlikely to be substantially different.

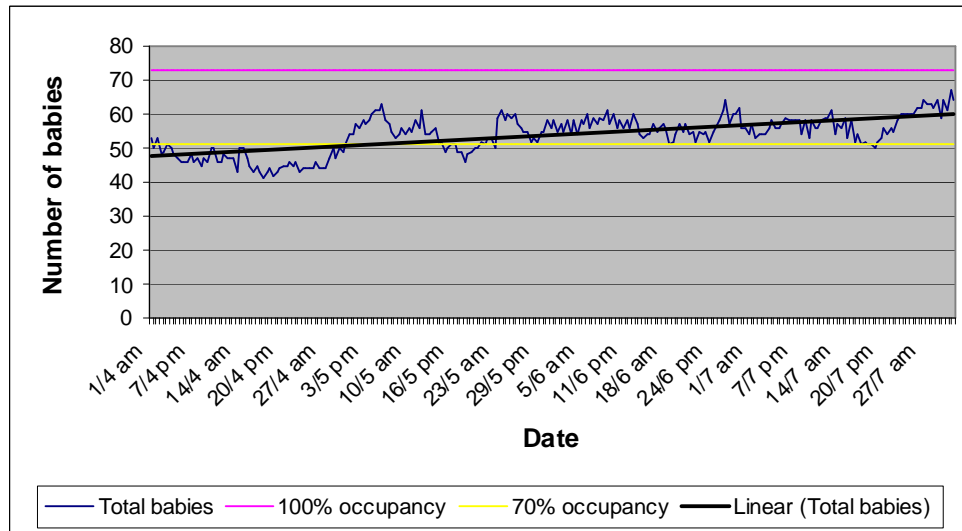
### **Babies requiring care at levels 1, 2 and 3.**

Figure 2 shows the number of babies of all levels cared for in RJMS, CAH, UHD and Antrim hospital. Total number of cots in these units is 73 and 70% occupancy is 51 cots.

### Key points:

- The trend in total number of babies in 4 specialist neonatal units between 1<sup>st</sup> April and 31<sup>st</sup> July 2004 showed a steady increase.
- From May 2004, the units were always more than 70% occupied.
- At no time did occupancy reach 100%.

**Figure 2: Total number of babies (all levels) in 4 Specialist units\***



\* Note: Data not available for Altnagelvin.

Source: Northern Ireland Neonatal Staffing Study

100% occupancy = 73 cots

70% occupancy = 51 cots

### Level 1 and 2 babies only

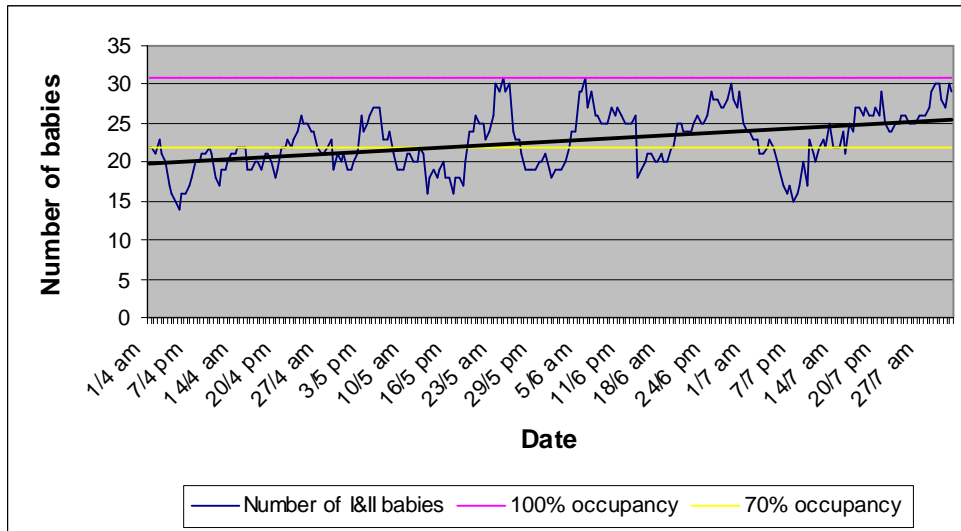
As stated in an earlier section, levels 1 and 2 should be considered separately from level 3. Figure 3 shows the number of intensive care and high dependency babies (levels 1 and 2) in the four specialist units between April and July 2004.

### Key points:

- The trend in total number of level 1 and 2 babies in 4 specialist neonatal units between 1<sup>st</sup> April and 31<sup>st</sup> July 2004 showed a steady increase.
- From mid May 2004, the units were often more than 70% occupied.
- Data were collected on 244 occasions (12 hour periods) for the four units (data not available for Altnagelvin):
  - On 2 (<1%) separate occasions occupancy reached 100%.
  - On 6 (2.5%) occasions only 1 level 1 or 2 cot was unoccupied
  - On 10 (4%) occasions only 2 level 1 or 2 cots were unoccupied.
- In contrast, on one occasion, only 14 out of 31 level 1 and 2 cots were occupied (45% occupancy).

- Mean number of babies = 23, median = 22, mode = 21.
- Average occupancy for 23 babies in 31 cots = 74%
- Although 100% occupancy was reached on 2 separate occasions, we have no record of cot availability in Altnagelvin Hospital at these times.

**Figure 3: Total number of Intensive Care and High Dependency babies (Levels 1&2) in 4 Specialist units**



\* Note: Data not available for Altnagelvin.

Source: Northern Ireland Neonatal Staffing Study

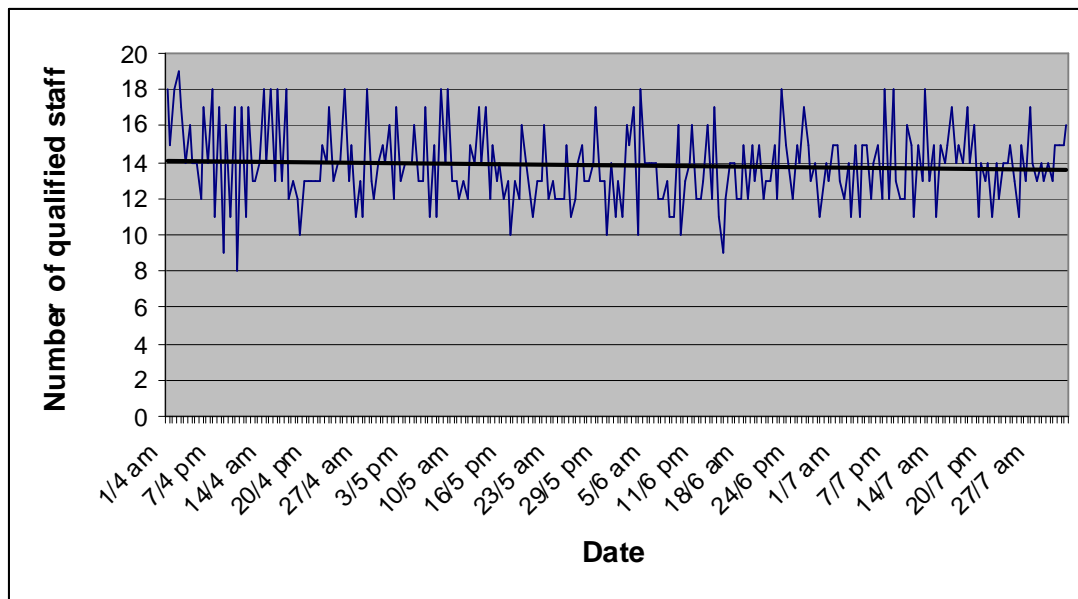
100% occupancy = 31 cots

70% occupancy = 22 cots

### Nursing staff

Figure 4 shows the total number of qualified staff in the four units during the study period. In contrast to figure 3, staffing levels do not mirror the increase seen in total number of level 1 and 2 babies. The recommended staff:baby ratio for levels 1 and 2 combined is approximately 1:1.5. An average of fourteen qualified staff would therefore be expected to care for 21 level 1 and 2 babies. Although figure 3 shows that the number frequently exceeds 21, over the four month period results show a mean of 23 babies, median of 22 and mode of 21.

**Figure 4 Total qualified nursing staff in four units**



\* Note: Data not available for Altnagelvin.

Source: Northern Ireland Neonatal Staffing Study

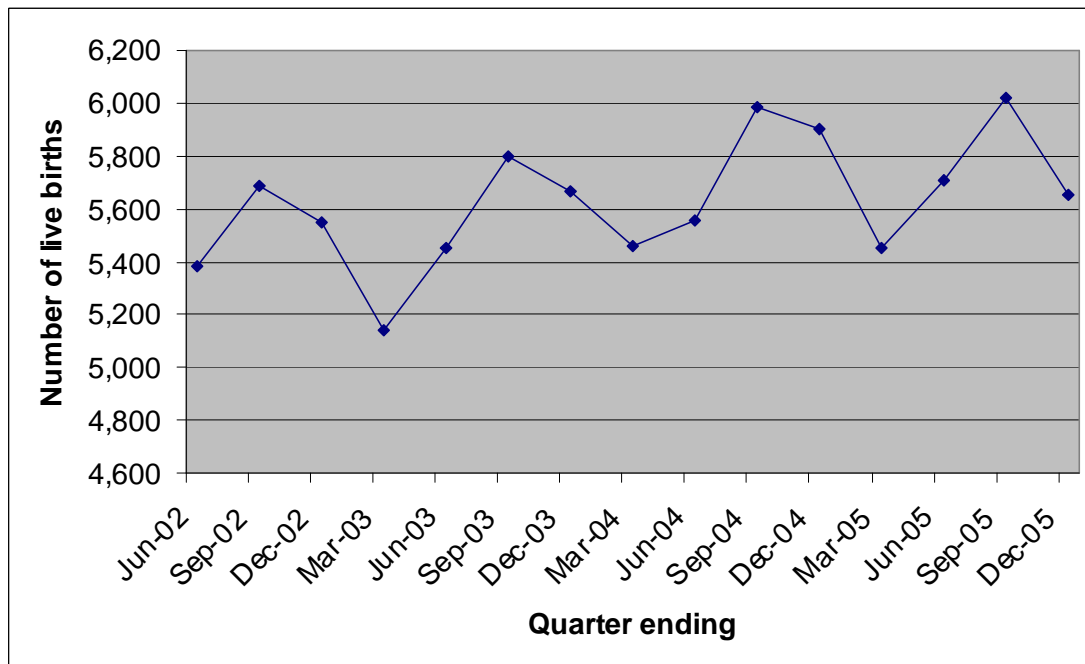
### **Comment**

Figure 5 shows the number of live births in Northern Ireland hospitals by quarter ending June 2002 to December 2005. This shows clear seasonal fluctuation, with more babies born between April and September each year. The number of babies requiring neonatal care should broadly mirror the trend in the total number of live births and this may explain the increase in demand seen in the neonatal staffing study.

Seasonal fluctuation in number of births may also account for the increased pressure on the system in the spring and summer of 2005, extending into autumn, as neonatal cots were occupied with babies born in the preceding months.

The number of births in spring and summer 2006 should be closely monitored as this should indicate whether demand will increase further.

**Figure 5: Number of live births in Northern Ireland hospitals by quarter ending June 2002 to December 2005.**



Source: Hospital Statistics, DHSSPS

## **5.6 Transfers and transport**

Pregnant mothers whose baby may require specialist neonatal care and newborn babies requiring care should be transferred to a hospital with a specialist neonatal unit. This has been highlighted as an ongoing problem, with a number of different factors.

1. No appropriate cot available in receiving hospital
2. No staff available to staff cot which is available
3. No staff available to transfer pregnant mother or baby

A short two-month study was commenced at the beginning of September 2005 to record all transfer requests from all maternity units in Northern Ireland to a specialist neonatal unit. The summary results are shown below in Table 7:

**Table 7: Number of transfer requests [number of patients – either babies or mothers] from all maternity units in Northern Ireland in September and October 2005**

Month	Antenatal request	Neonatal request	Reason for request			Outcome			Total requests
			Not enough staff	Not enough cots	Clinical	Accepted	Another request	Remained	
<b>September</b>	31 [24]	41 [29]	0	21	51	45	12	15	72 [53]
<b>October</b>	26 [19]	28 [22]	2	8	44	29	9	16	54 [31]
<b>Total</b>	<b>57 [43]</b>	<b>69 [51]</b>	<b>2</b>	<b>29</b>	<b>95</b>	<b>74</b>	<b>21</b>	<b>31</b>	<b>126 [84]</b>

*Source: All Neonatal Units in Northern Ireland*

*Note: No returns received from CAH or UHD in Oct.*

The survey shows that antenatal and postnatal transfer requests occur on average twice daily. Three quarters of requests are for clinical reasons, where babies require to be transferred even if there is a cot available in the local unit. The remaining quarter of requests are for non-clinical reasons, predominantly related to physical capacity. Requests are time consuming and add to the stress of caring for an ill baby. Antenatal transfers require additional liaison between obstetricians and paediatricians in the sending and receiving hospital. Development of an availability system which could be checked centrally should reduce time spent in fruitless phone calls, reduce stress and reduce time taken to arrange transfers.

### **Current developments**

A prototype of a web-based cot availability system has already been developed, based in EACC (Eastern Area Co-ordination Centre). Adoption of this system by all units should begin to address co-ordination and streamline the transfer process. Information recorded on a daily basis should include cots

occupied, cots closed (plus reason eg infection, staffing issues), cots available and cots expected to be occupied (ie patient in labour).

Work on a transport system for ill children and neonates is already underway through a different process, however this needs to be linked to development of a managed clinical network and the cot availability system.

## **6. SUMMARY AND CONCLUSIONS**

The aim of this project was to provide a robust baseline position for specialist neonatal services activity in Northern Ireland, to inform future service planning, provision and development. While factors affecting demand, such as changed clinical practice, increased multiple births due to IVF, increased parental and professional expectation and others are all relevant and interesting, our ability to modify these factors is limited. Any shifts which might occur are likely to be gradual and have minimal effect on overall demand in the short-term. This report therefore deliberately focuses on neonatal services activity to inform decisions about the future shape and development of the service. The main conclusions from the report are listed under the headings below:

### **Information**

- A large quantity of information about neonatal services is available, however there is concern about data quality and comparability. In order to inform future service development, data is particularly required from all units in Northern Ireland on cot days by level of care on a daily basis, collected to common data definitions and protocols.
- NICORE collects information on outcomes of neonatal care and characteristics of babies requiring specialist neonatal care. This vital information is complementary to activity information and addresses quality of care, factors affecting demand and possible explanations for changing trends in the longer term.

### **Cots**

- In Northern Ireland in 2006 we have 103 neonatal cots for an annual birth population of 22,000. This is subdivided into 19 intensive care (level 1), 21 high dependency (level 2) and 63 special care (level 3).
- An additional level 1 cot is due to open in CAH in Spring 2006. Evaluating the impact of this cot is central to future developments.
- BAPM occupancy recommendations of 70% would be met by a further two cots, based on the past three years activity levels.
- Provision, location and level of additional cots can only be determined on the basis of robust supporting data.

### **Nursing staff**

- Northern Ireland has a skilled and committed neonatal nursing workforce. Capacity to train an increased number of neonatal nurses is identified as a priority to meet future service requirements.

### **Medical staff**

- Medical staffing is largely determined by training recommendations balanced against service needs and mostly lies outside the scope of this document.
- Modernising Medical Careers is likely to have an impact over the next few years.

- Out of hours consultant medical cover for area neonatal units includes neonatologists, acute paediatricians and community paediatricians. This is of particular concern if very premature or extremely low birthweight babies are unable to access the regional unit for their initial care. Configuration of future cots needs to take account of 24hour medical staffing.

### **Babies**

- Fewer than 1000 babies per year require Specialist Neonatal Care at intensive or high dependency level (level 1 and 2).
- Babies born before 28 weeks gestation and weighing less than 1000gms should receive their initial care in the regional unit with 24 hour neonatal cover.
- Once care in the regional unit is no longer required, transfer or repatriation of these babies should be considered to free up cots for other newborns requiring regional care.
- Very low birthweight babies, (<1500gms), comprise around 1% of total births, account for almost a quarter (24%) of admissions and over half (54%) of total level 1&2 days. The impact of a few additional babies in this category will therefore have a disproportionately large effect on number of cotdays, particularly in the regional unit
- An unexpected increase in number of births in Northern Ireland is likely to partly explain increased pressures experienced over the past year. The number of births should be closely monitored to anticipate future pressures.

### **Activity**

- Around 27,000 cot days are used per year in Northern Ireland for all levels of care, giving an occupancy rate of 71.8%
- Highest occupancy rates are in level 2 cots.
- Aggregate data mask fluctuations and do not show the range of demand for neonatal care.
- Activity for levels 1&2 must be available separately from level 3.
- Daily recording of activity is required to monitor peaks and troughs of activity.
- When units are considered together, as in a network, there are comparatively few occasions when no cots are available. Pressures often arise from a mismatch between the patient and the location of an available cot.

### **Transfers and transport**

- Approximately two transfer requests are made per day.
- Three quarters of requests are for clinical reasons, where babies require to be transferred even if there is a cot available in the local unit. The remaining quarter of requests are for non-clinical reasons, predominantly related to physical capacity.
- Considerable time is spent in arranging transfers. Adoption of the web-based cot availability system by all units should lead to a more efficient

system. Information recorded should include cots occupied, cots closed (plus reason eg infection, staffing issues), cots available and cots expected to be occupied (ie patient in labour).

- A regional transport system is essential for units to fully function as a network.
- An effective managed clinical network for neonatal services will require full commitment from obstetricians, paediatricians and Trust management.
- Patients and the public will require information and education about the purpose and functions of a managed clinical network and the implications this may have for the location of their care.

These conclusions will inform recommendations about future provision and development of neonatal services in Northern Ireland.



## 7. REFERENCES

1. British Association of Perinatal Medicine (BAPM). Standards for Hospitals Providing Neonatal Intensive and High Dependency Care and categories of babies requiring neonatal care. 2<sup>nd</sup> ed. 2001.
2. Neonatal Intensive Care Outcomes Research and Evaluation (NICORE). 2001/02. Sixth Annual Report.
3. Neonatal-paediatric critical care transfer service. Outline Business Case.
4. Needs Assessment for Neonatal Intensive Care (1991). Report produced by Dr Carol Beattie for Regional Medical Services Consortium.
5. Response from SAC paediatrics to the report of the Clinical Standards Advisory Group on Neonatal Intensive Care. 1994
6. Proposals regarding the future of neonatal intensive and special care services in Northern Ireland: Report of a working group to SAC paediatrics (Autumn 2000)
7. Proposals regarding the future of neonatal intensive and special care services in Northern Ireland: Report of a working group to SAC paediatrics (Autumn 2000).
8. Review of Neonatal Intensive Care services, DoH April 2003
9. A Framework for maternity services in Scotland.
10. National Service Framework for Children, Young people and Maternity Services.
11. Parmanum J, Field D, Rennie J, Steer P. on behalf of the British Association of Perinatal Medicine. National census of availability of neonatal intensive care. *BMJ* 2000; 321:727-729.
12. UK Neonatal Staffing Study: A prospective evaluation of risk-adjusted outcomes of neonatal intensive care in relation to volume, staffing and workload in UK neonatal intensive care units. NHS Executive. 2000.
13. Project 27/28. An enquiry into quality of care and its effect on the survival of babies born at 27-28 weeks. CEMACH. March 2003
14. A survey of current neonatal unit organisation and policy (July 2005). National Perinatal Epidemiology Unit, commissioned by BLISS.
15. Designing a Neonatal Unit. Report for BAPM May 2004. Laing, Drucker, Leaf and Newmarch.
16. Delivering the future: report of the high risk pregnancy group. Belfast: DHSSPS, 1998.
17. Langhoff-Roos J, Kesmodel U, Jacobsson B, Rasmussen S, Vogel I. Spontaneous preterm delivery in primiparous women at low risk in Denmark: population based study. *BMJ* 2006;: 332:937-939.
18. Human Fertilisation and Embryology Authority (HEFA) Guide to Infertility and Directory of Clinics, 2005/06.



## POSITION PAPER ON SPECIALIST NEONATAL SERVICES IN NORTHERN IRELAND

**Aim:** To provide a robust baseline position for specialist neonatal services activity in Northern Ireland, to inform future service planning, provision and development.

### Terms of Reference

- To describe current specialist neonatal service profile, including staffing.
- To identify and describe existing sources of information.
- To collate and analyse existing information on specialist neonatal services from any relevant source, including data on transfers.
- To collect any new information required if gaps are identified after initial analysis.
- To identify existing data from other regions and make comparisons where appropriate.
- To compile a report on specialist neonatal services in Northern Ireland.

### Project Group Membership

Dr C Beattie	–	RMSC Lead
Dr E Reaney	–	Project Co-ordinator
Dr C Willis*	–	DHSSPS Medical
Dr R Tubman	–	Consultant Neonatologist
Mrs S McCloskey*	–	DHSSPS Nursing
Mrs V Kelso*	–	DHSSPS Midwifery
Mrs P Farrell	–	Regional Maternity Unit Nursing

### Advisory Group : Neonatal Services Working Group

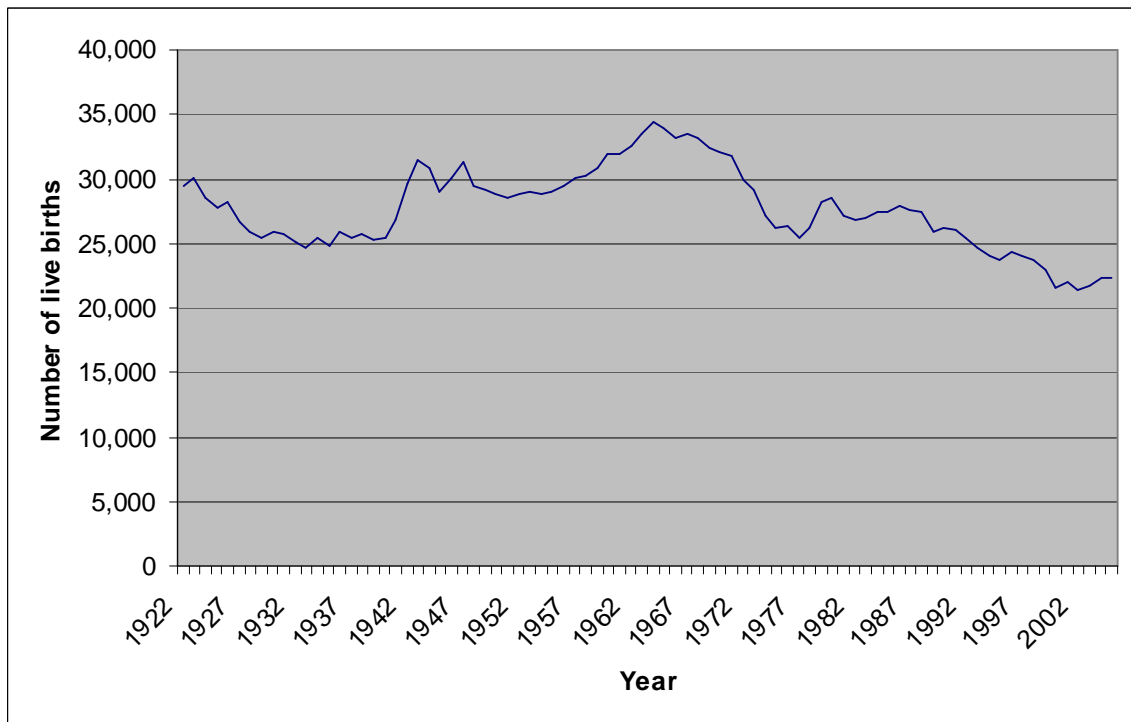
Draft to date for discussion at SAC Paediatrics, October 2005. On completion the report is to be submitted to DHSSPS and the Regional Medical Services Consortium (RMSC).

*\* Moved to another post, so unable to continue involvement in the project.*



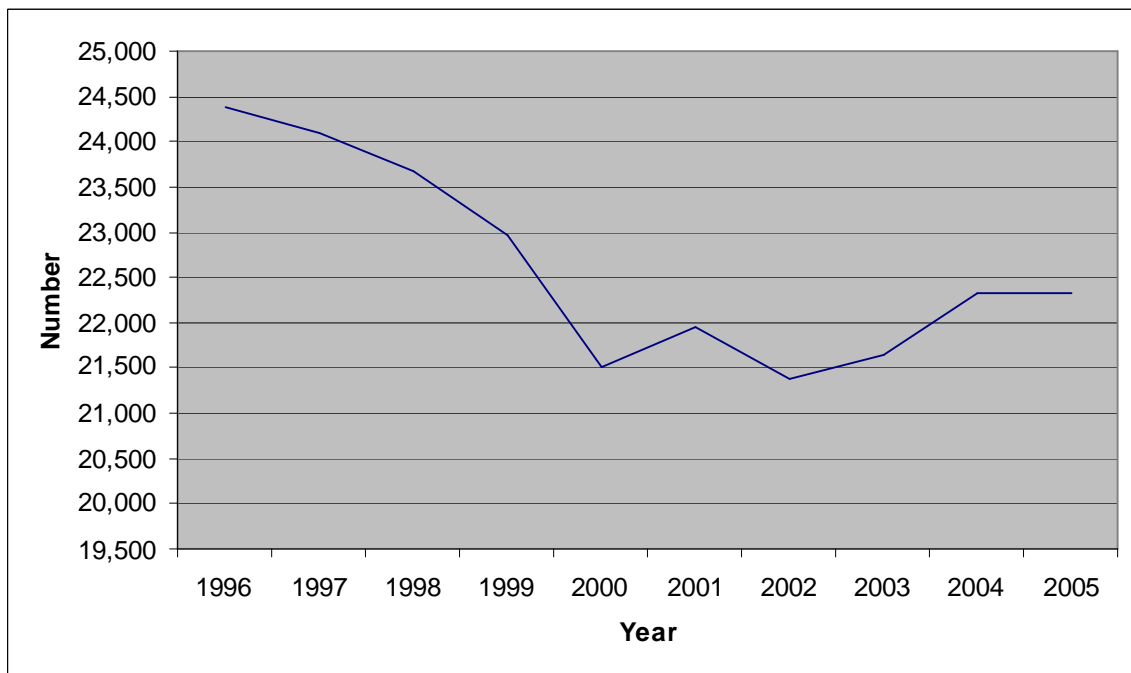
TABLES AND FIGURES

1. Live births per year in Northern Ireland 1922-2005



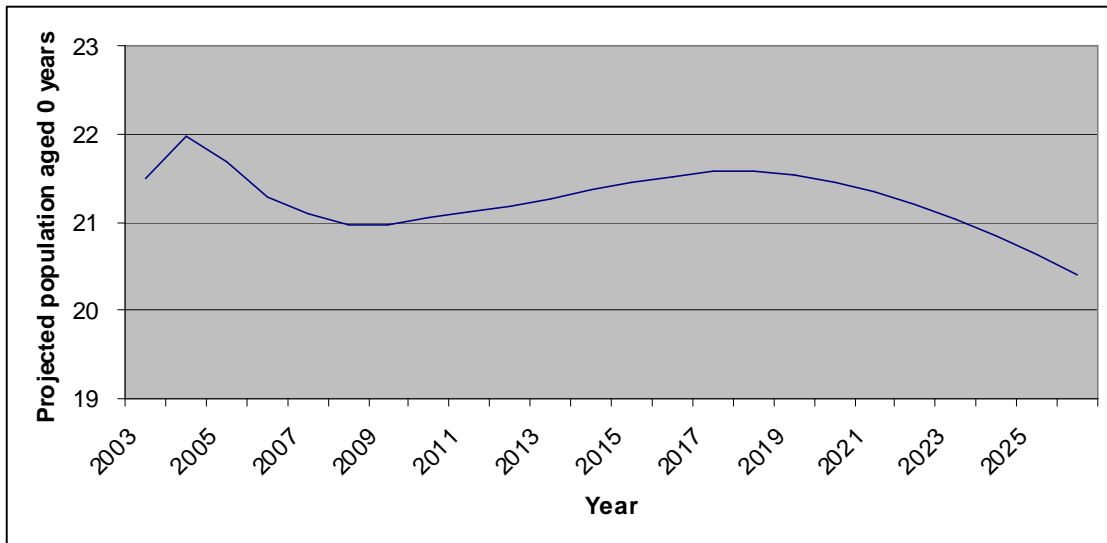
Source: NISRA

2. Live births per year to Northern Ireland residents (1996 – 2005)



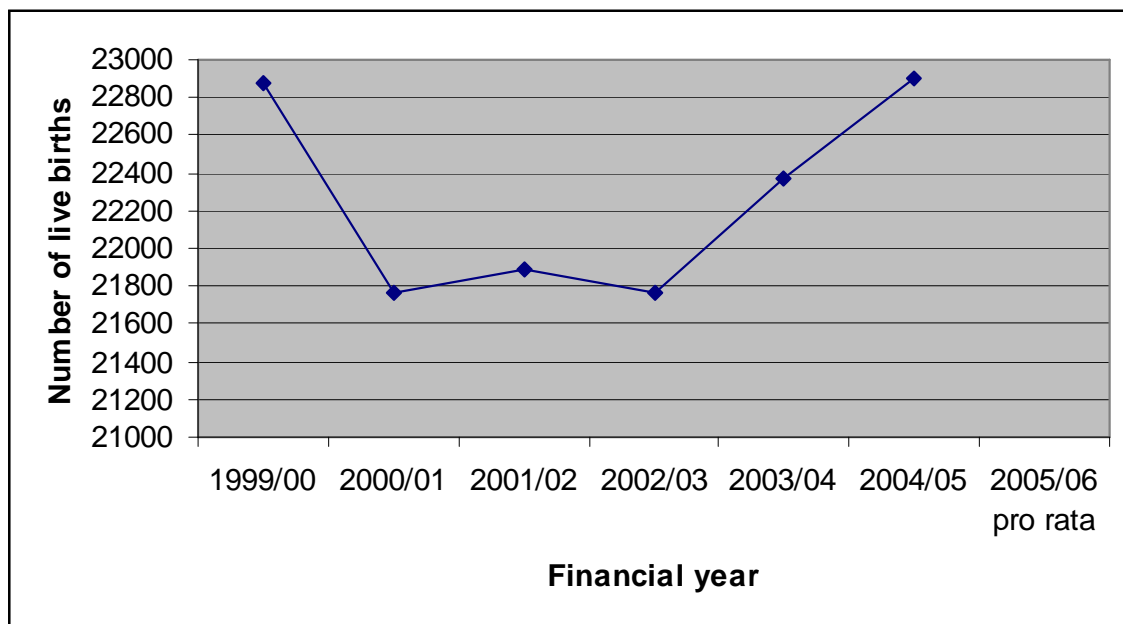
Source: NISRA

### 3. Projected population aged 0 years 2003 – 2026



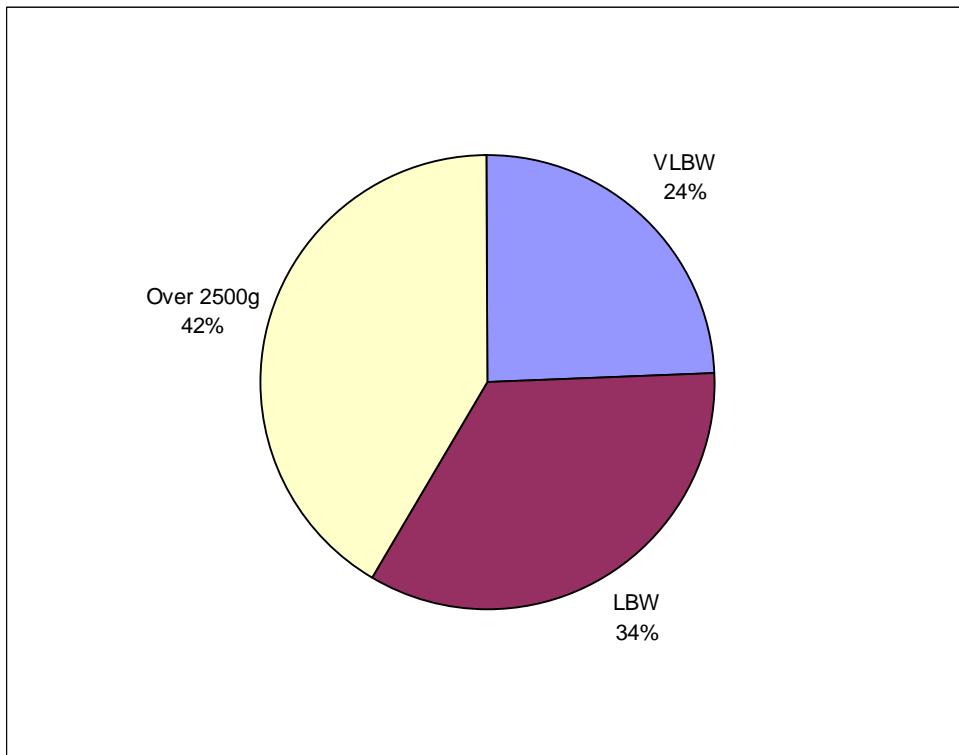
Source: NISRA (Provided by the Government Actuary)

### 4. Live births per year in Northern Ireland hospitals (residents and non-residents)



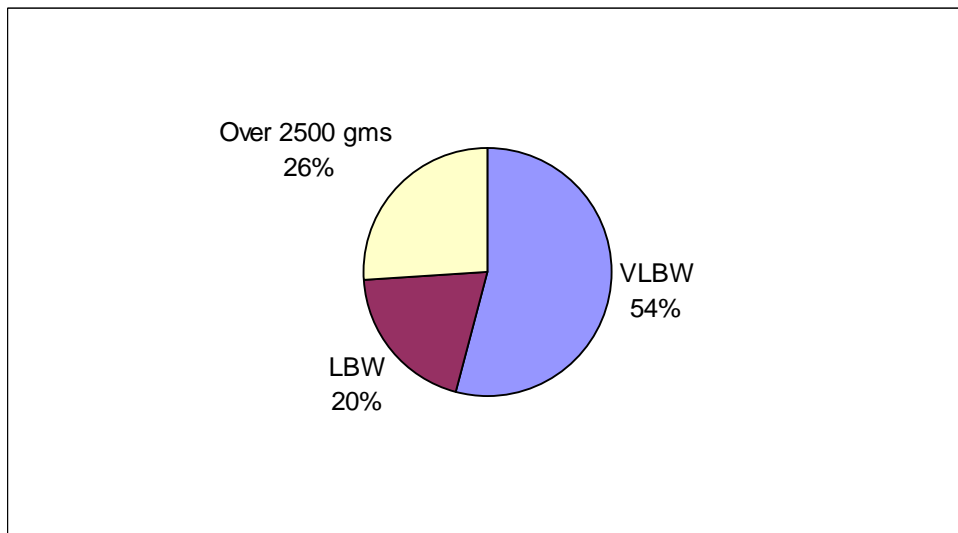
Source: Hospital Statistics, DHSSPS

**5. Percentage of babies requiring level 1 and 2 care by birthweight category.**



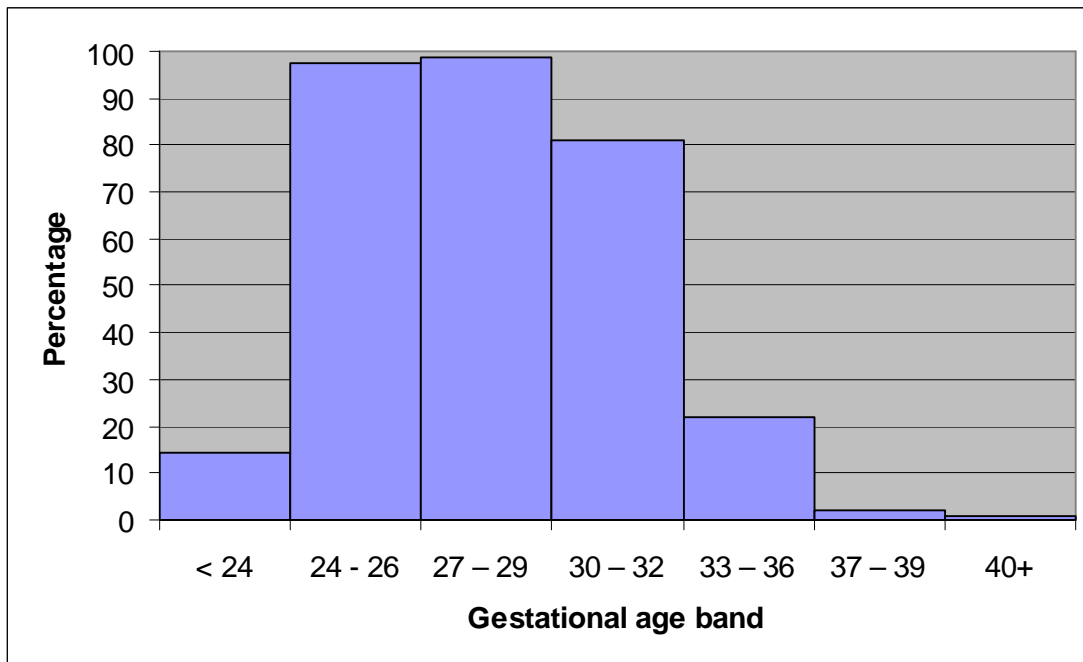
VLBW = Very Low Birth Weight  $\leq 1500$ gms    LBW = Low Birth Weight 1500 – 2499 gms  
Source: NICORE 6<sup>th</sup> Annual report.

**6. Percentage of level 1 and 2 cotdays by birthweight category**



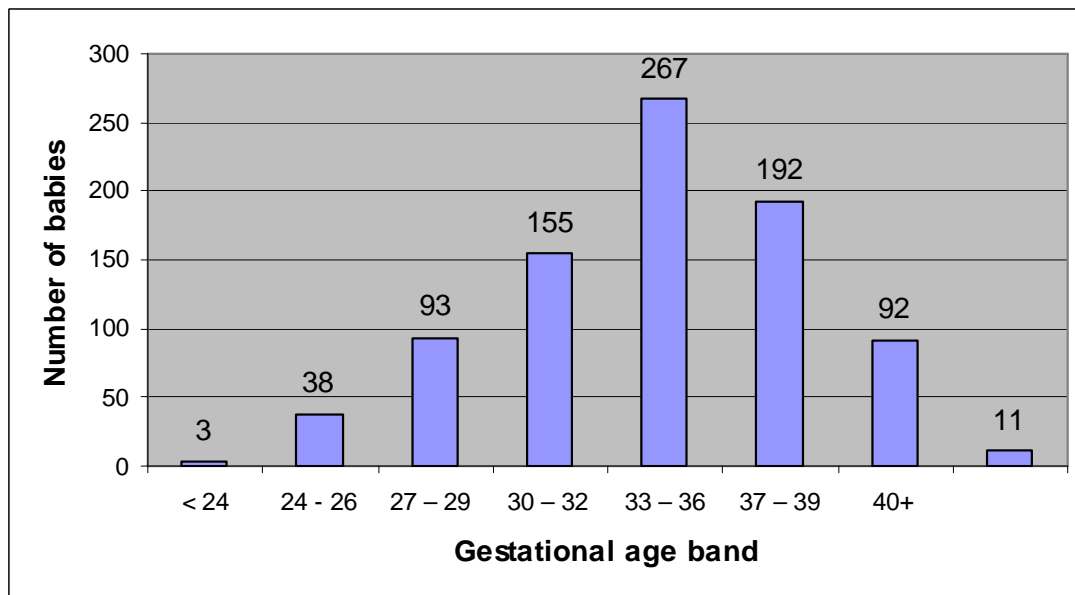
VLBW = Very Low Birth Weight  $\leq 1500$ gms    LBW = Low Birth Weight 1500 – 2499 gms  
Source: NICORE 6<sup>th</sup> Annual report.

**7. Babies admitted to level 1 and 2 care as a percentage of total births by gestational age band**



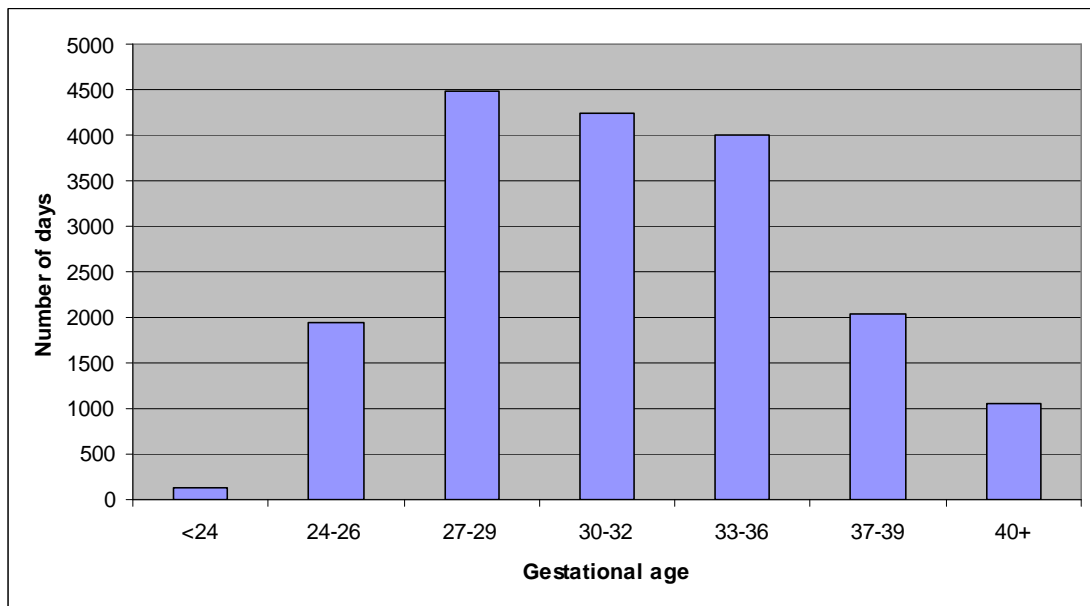
Source: NICORE Sixth annual report

**8. Number of babies admitted to level 1 and 2 care by gestational age band.**



Source: NICORE Sixth annual report

### 9. Total days at level 1 and 2 care by gestational age band



Source: NICORE Sixth annual report

**10a. Number of cotdays by level of care by unit 2002/03 to 2005/06 (projected).**

		2002/03	2003/04	2004/05	2005/06 pro rata
Neo-natal Unit	Level of Care	Total	Total	Total	Total
Royal Hospital	1	3069	2837	2866	8948
	2	2373	2635	2768	
	3	3765	3709	2950	
Ulster Hospital	1	292	262	143	152
	2	556	544	789	528
	3	3249	2963	3265	2634
Antrim Hospital	1		626	655	556
	2	4865	763	968	1166
	3		3538	3569	3306
Craigavon Hospital	1				N/A
	2	3294	2774	3337	
	3				
Daisy Hill Hospital	1				N/A
	2				
	3	1215	1339	1113	
Altnagelvin Hospital	1				304
	2	3285	3587	3796	672
	3				2576
Erne Hospital	1				26
	2	1120	1134	930	6
	3				810
Grand total	1, 2 & 3	27,083	26,711	27,149	N/A

Source: Trusts, via Board Information Departments

Note: Aggregate data used for Royal Hospital for 2005/06 as data by level does not fit with clinical experience.



**10b. Number of cotdays and occupancy by level of care and unit 2002/03 to 2005/06 (projected).**

	Level of care	Cots	Cotdays per year	Cotdays 2002/03	Occupancy 2002/03	Cotdays 2003/04	Occupancy 2003/04	Cotdays 2004/05	Occupancy 2004/05	Cotdays 2005/06 pro rata	Occupancy 2005/06
Royal Hospital	1	9	3285	3069	93.4%	2837	86.4%	2866	87.2%	8948	79.1%
	2	7	2555	2373	92.9%	2635	103.1%	2768	108.3%		
	3	15	5475	3765	68.8%	3709	67.7%	2950	53.9%		
Ulster Hospital	1	1	365	292	80.0%	262	71.8%	143	39.2%	152	41.6%
	2	2	730	556	76.2%	544	74.5%	789	108.1%	528	72.3%
	3	9	3285	3249	98.9%	2963	90.2%	3265	99.4%	2634	80.2%
Antrim Hospital	1	4	1460	4865	83.3%	626	42.9%	655	44.9%	556	38.1%
	2	2	730			763	104.5%	968	132.6%	1166	159.7%
	3	10	3650			3538	96.9%	3569	97.8%	3306	90.6%
Craigavon Hospital	1	2	730	3294	64.5%	2774	54.3%	3337	65.3%	N/A	N/A
	2	4	1460								
	3	8	2920								
Daisy Hill Hospital	1	0	0	1215	55.5%	1339	61.1%	1113	50.8%	N/A	N/A
	2	0	0								
	3	6	2190								
Altnagelvin Hospital	1	3	1095	3285	50.0%	3587	54.6%	3796	57.8%	304	27.8%
	2	6	2190							672	30.7%
	3	9	3285							2576	78.4%
Erne Hospital	1	0	0	1120	51.1%	1134	51.8%	930	42.5%	26	38.4%
	2	0	0							6	
	3	6	2190							810	
Grand total	1, 2 & 3		37595	27083	72.0%	26711	71.0%	27149	72.2%		

**Source: Trusts via Board Information Departments.**

**NOTES: CAH unit closed for two months in 2003/04 for work on the floor. DHH activity data for level 1 and 2 days not available. Numbers likely to be very small. UHD data for 2005/06 only included EHSSB residents. Aggregate data used for Royal Hospital for 2005/06 as data by level does not fit with clinical experience.**

